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17. međunarodni simpozij o kvaliteti

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ČINI RAZLIKU**

17th International Symposium on Quality

**QUALITY
MAKES A DIFFERENCE**

16. – 18. ožujka 2016.
March 16th – 18th, 2016
Zadar, Hrvatska/Croatia

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CROATIAN QUALITY MANAGERS SOCIETY

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QUALITY MAKES A DIFFERENCE

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PREDGOVOR

Poštovane kolegice i kolege članovi HDMK, znanstvenici i stručnjaci u području sustava upravljanja, dobro došli na 17. međunarodni simpozij o kvaliteti, koji se održava na 20. obljetnicu postojanja i rada HDMK, pod radnim nazivom *KVALITETA ČINI RAZLIKU*.

Pripreme za simpozij započele su u vrijeme izlaska iz recesije koja je u Hrvatskoj trajala više godina. Sve sastavnice BDP-a bilježe rast (industrijska proizvodnja, izvoz, potrošnja građana, investicije). Smanjuje se i stopa nezaposlenosti. Turizam u 2015. godini bilježi najbolje rezultate od samostalnosti Hrvatske.

Zemlje članice EU također bilježe rast BDP-a. Cijena nafte na svjetskom tržištu opada. Međutim, EU kao i neke europske zemlje koje još nisu formalne članice EU, susreću se s valom migranata iz zemalja sjeverne Afrike i Bliskog Istoka, ali i zemalja srednje Afrike i Dalekog Istoka. EU, ali i svijet, nisu bili u potpunosti spremni na veliki val migranata. Ovaj migrantski val utjecao je negativno i na međusobne odnose nekih europskih zemalja.

Na globalnom planu prisutan je pokušaj stvaranja nove geopolitičke podjele svijeta. Jačanje terorizma u nekim dijelovima svijeta predstavlja prijetnju globalnoj sigurnosti i ekonomiji. Težnja pojedinih regija za samostalnošću i nezavisnošću ozbiljno prijeti prekrajanju karte Europe. Jedan od pozitivnih događaja na globalnoj razini povijesni je dogovor između SAD i Kine o klimi. Drugi, susret poglavara Katoličke i Ruske pravoslavne crkve.

Na području normizacije dogodile su se značajne promjene. Dana 15.9.2015. godine ISO organizacija objavila je normu ISO 14001:2015, a 23.9.2015. godine normu ISO 9001:2015. Norma ISO 14001:2015 kao ključna poboljšanja obuhvaća: 1) povećanu ulogu uprave, 2) usklađivanje sa strategijom, 3) povećanu zaštitu životne sredine s fokusom na proaktivno djelovanje, 4) efikasniju komunikaciju i 5) sagledavanje problema zaštite okoliša kroz životni ciklus proizvoda ili usluge. Neke od promjena u normi ISO 9001:2015 terminološkog su karaktera, ali ima i suštinskih: 1) promjene u strukturi uvažavajući SL aneks, 2) razumijevanje organizacije i njenog konteksta, 3) potpuna procesna orijentacija i 4) uvođenje zahtjeva za upravljanja rizicima. Obje revidirane norme, organizacije mogu iskoristiti kao prednost u odnosu na konkurenciju. Iz toga proizlazi i radni naziv ovog simpozija: *KVALITETA ČINI RAZLIKU*.

Kvaliteta, shvaćena u najširem smislu ima zadatak i mogućnost umanjiti utjecaj navedenih negativnih globalnih kretanja i doprinijeti blagodatima čovječanstva, ako bude materijalizirana kao kvaliteta proizvodnje i usluga,

obrazovanja, zdravstva, politike, medija, življenja, dakle, ukoliko obuhvati sve segmente djelovanja i života ljudi.

Za Republiku Hrvatsku osobito je važno sve raspoložive resurse staviti u funkciju provedbe započetih reformi i stvaranja pretpostavki održivog rasta i razvoja.

Mi u HDMK smatramo da je na ovom polazištu moguće razvijati konkurentnost gospodarstva, osigurati materijalno blagostanje građanima i razvijati demokraciju.

Organizacijom 17. međunarodnog simpozija o kvaliteti HDMK želi dati znanstveni i stručni doprinos provedbi društvenih reformi i kvaliteti upravljanja u Hrvatskoj i šire.

Ove godine simpozij i HDMK dobili su podršku Višegradskog fonda i partnera 15 institucija iz 8 zemalja: Češke, Mađarske, Indije, Poljske, Rumunjske, Srbije, Slovačke i Turske. Ova je podrška organizacijska, moralna i financijska.

Simpozij se održava u gradu Zadru, gradu pobjedniku u natjecanju za najbolju europsku destinaciju 2016. godine.

Dr. sc. Miroslav Drljača

INTRODUCTORY WORD

*Dear colleagues, members of the Croatian Quality Managers Society, scientists and professionals in the management systems field, welcome to the 17th International Symposium on Quality, which takes place on 20th anniversary of CQMS, under the working title **QUALITY MAKES A DIFFERENCE**.*

We started the preparations for the Symposium in the period of recovery from the recession that has lasted for years in Croatia. All GDP elements rise (industrial production, export, mass consumption, investments). Unemployment rate is decreasing. In 2015 tourism records the best results since the beginning of Croatian independence.

EU member states also record a GDP growth. Oil prices in world markets have been declining. EU, as well as some European countries, still not formal EU members, encounter a wave of migrants from North African and Middle East countries, but also from Central Africa and the Far East countries. The EU, but also the world, was not completely ready for the big migrant wave. This migrant wave has also negatively affected bilateral relations of some European countries.

Globally, there are attempts to create new geopolitical divisions of the world. Strengthening of terrorism in some parts of the world presents a serious threat to global security and economy. Aspirations of some regions for autonomy and independence seriously threaten to remap Europe. One of undoubtedly positive moments on the global level is a historic agreement of the USA and China on the climate. Second one is meeting between the Pope as a head of Catholic Church and the head of Russian Orthodox Church.

*Significant changes have also happened in the field of standardization. ISO 14001:2015 was published on September 15th, 2015 and ISO 9001:2015 on September 23rd. ISO 14001:2015 contains the following key improvements: 1) increased role of top management, 2) compatibility with strategic direction, 3) increased human environment protection focused at proactive action, 4) more efficient communication, and 5) contemplating environmental protection issues from the product or service life cycle perspective. Some of the changes in ISO 9001:2015 concern terminology but there are also some key updates, such as: 1) high level structure in line with the ISO Annex SL, 2) understanding the organization and its context, 3) full process approach and 4) introducing the requirement for risk management. Both revised standards can be used by organisations as a competitive advantage over their competitors. And this is where the title of this symposium comes from: **QUALITY MAKES A DIFFERENCE**.*

Quality, in the broadest sense of the word, has the task and the possibility to reduce impacts of the mentioned negative global movements and contribute to the welfare of mankind if it is materialized as quality of production and service provision, education, health care, politics, media, life, hence, if it encompasses all segments of human activities and life.

For the Republic of Croatia it is of utmost importance to put all available resources to the function of implementation of the initiated reforms and creation of prerequisites for sustainable growth and development.

We in the CQMS still think, based on this postulate it is possible to develop the competitiveness of the national economy, provide material prosperity to our citizens and develop democracy.

By organizing this 17th international symposium on quality the CQMS want to give its' scientific and professional contribution to the implementation of social reforms and to the quality of management in Croatia and beyond.

This year Symposium and the CQMS got Visegrad Fund support and support of 15 institutions from 8 countries: Czech Republic, Hungary, India, Poland, Romania, Serbia, Slovakia and Turkey. This support means organizational, moral and financial support.

The Symposium is held in city of Zadar, city winner of the competition titled European Best Destination 2016.

Miroslav Drljača, Ph.D.

Tematska cjelina/*Thematic unit*
KVALITETA ČINI RAZLIKU
QUALITY MAKES A DIFFERENCE

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ANALIZA PREFERENCIJA MLADIH KAO POLAZIŠTE ZA RAZVOJ MARKETING PROGRAMA

**ANALYSIS OF THE PREFERENCES OF YOUNG PEOPLE AS A
STARTING POINT FOR DEVELOPMENT OF MARKETING PROGRAM**

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SAŽETAK

Svaka generacija stasa pod utjecajem različitih okolnosti i događaja koji u znatnoj mjeri utječu na ponašanje, preferencije, stavove, uvjerenja i životne odabire njezinih pripadnika. Tako se i mlada generacija nazvana Y ili milenijska generacija formira pod utjecajem drugačijih događanja i okolnosti u odnosu na prethodne generacije. Pred marketinškim stručnjacima je izazov kako razvijati marketinšku ponudu da bude privlačna i relevantna za pripadnike različitih generacijskih skupina. Polazište za razvoj marketing programa je istraživanje i analiza obilježja, ponašanja i preferencija ciljne skupine, u ovom slučaju mlade generacije. U radu su izloženi temeljni rezultati kvantitativnog istraživanja provedenog na uzorku 200 ispitanika mlade generacije u Hrvatskoj. Prikazani rezultati mogu poslužiti kao orijentir marketinškim

stručnjacima kod oblikovanja marketinških strategija i taktika usmjerenih na pripadnike Y generacije.

Ključne riječi: ponašanje potrošača, Y generacija, marketinška strategija.

1. UVOD

Kreiranje marketinških strategija usmjerenih prema Y generaciji izazovan je posao. Da bi marketinška ponuda bila privlačna i relevantna određenom segmentu potrošača treba korespondirati s njihovim željama i potrebama. Stoga je prvi korak istražiti i upoznati osnovna obilježja odabranog segmenta, u ovom slučaju, mlade tzv. milenijske generacije. Spomenuta je populacija odrasla pod utjecajem vanjskih faktora koje nije imala ni jedna generacija prije, a sazrijevanje uz nagli razvoj tehnologije učinilo ju je jedinstvenom.¹ U teoriji, generacija Y obično se vremenski definira kao svi rođeni između 1980. i 1994.² odnosno, kao svi rođeni između 1977. i 1994.³ Unatoč razilaženju autora oko raspona dobne granice kod promatrane generacije, prilikom kreiranja marketinške strategije valja imati na umu kako su najmlađi pripadnici ove generacije, danas, studenti⁴. Većina pripadnika promatrane generacije više nisu bezbrižni tinejdžeri već je riječ o zrelim ljudima koji samostalno upravljaju novcem, pa sukladno tome samostalno donose odluke o kupnji.⁵

Nekoliko je razloga za pomno promatranje obilježja i ponašanja pripadnika generacije Y; radi se o najvećoj generaciji nakon *baby boom* generacije, koja se nalazi ili je tik pred pragom svojeg radno aktivnog razdoblja s jedinstvenim obilježjima i ponašanjem kako u ulozi potrošača, tako i u drugim životnim ulogama. U SAD-u Y generacija tri puta je veća od

¹ Deborah H. Lester, Andrew M. Forman and Dolly Loyd, "Internet Shopping and Buying Behavior of College Students", *Services Marketing Quarterly*, Vol. 27, No. 2, 2005, p. 123-138.

² Anglea Weiler, "Information-Seeking Behaviour in Generation Y Students: Motivation, Critical Thinking, and Learning Theory", *The Journal of Academic Librarianship*, Vol. 31, No. 1, 2004, p. 46-53.

³ Seema Nayyar, "Inside the mind of Gen Y", *American Demographics*, Vol. 23, No. 9, 2001, p. 6.

⁴ Anglea Weiler, "Information-Seeking Behaviour in Generation Y Students: Motivation, Critical Thinking, and Learning Theory", *The Journal of Academic Librarianship*, Vol. 31, No. 1, 2004, p. 46-53.

⁵ Pamela Paul, "Getting inside Generation Y", *American Demographics*, Vol. 23 No. 9, 2001, p. 42-49

generacije X, a njezina veličina procjenjuje se na 83 miliona⁶, odnosno 71 milion⁷ pripadnika.

Valentine i Powers interpretiraju i objedinjuju nekoliko istraživanja vezanih uz obilježja generacije Y u SAD-u. Iako veličinom slične generaciji svojih roditelja (*baby boomera*), pripadnici generacije Y imaju različita obilježja. Neke od karakteristika koje obilježavaju mladu generaciju jesu: visok stupanj obrazovanja, sposobnost praćenja napretka i upotrebe tehnologije, izražen osjećaj vlastitog identiteta i veća tolerantnost od prethodne generacije. Pripadnici ove skupine cijene društveno odgovorno ponašanje kompanija, odabiru distinktivne proizvode kojima mogu izraziti vlastitu osobnost; može se reći da je za njih kupovina oblik samoizražavanja. Pripadaju materijalističkoj, potrošačkoj kulturi baziranoj na tehnološkim inovacijama; više od ijedne generacije do sada koriste se elektroničkim tehnologijama, i daleko su manje pod utjecajem tradicionalnih masovnih medija.⁸ Istraživanje provedeno u SAD-u 2005. godine pokazalo je kako generacija Y nije „upropaštena“ zbog odrastanja uz naprednu tehnologiju već su se posve prilagodili mogućnostima koje im tehnologija pruža, pa su tako sve svoje slobodne aktivnosti poput slušanja glazbe, čitanja novina, obavljanja školskih i studentskih obaveza nastavili raditi u jednakoj mjeri kao i prethodne generacije samo uz pomoć tehnologije i to on-line. Za razliku od prethodnih generacija, Y generacija razvila je sposobnost „multi – taskinga“, odnosno obavljanja nekoliko radnji na internetu istovremeno.⁹

Istraživanje vrednota u Europi 1990-te godine prvi puta je uključilo i zemlje dotadašnjeg istočnog bloka. Polazna pretpostavka bila je da su mladi s područja istočne Europe tradicionalniji od svojih zapadnih vršnjaka, što se ispostavilo točnim, ali u manjoj mjeri. Prema Tomić-Koludrović, Leburić mladi s područja Republike Hrvatske dijele slične stavove i vrednote, stil odijevanja i preferiranu vrstu glazbe kao i ostatak mlade generacije sa zapada. Značajnije razlike zabilježene su u projekciji vlastite budućnosti. Generacija na čije je odrastanje, osim već spomenute tehnologije, velik pečat ostavilo ratno razdoblje i društveno-ekonomska tranzicija, ima skeptičnu projekciju

⁶ Valentine B. Dawn, Thomas L. Powers, “Generation Y values and lifestyle segments”, *Journal of Consumer Marketing*, Vol. 30, Iss. 7, 2013, p. 597-606.

⁷ Pamela Paul, “Getting inside Generation Y”, *American Demographics*, Vol. 23 No. 9, 2001, p. 42-49

⁸ Valentine B. Dawn, Thomas L. Powers, “Generation Y values and lifestyle segments”, *Journal of Consumer Marketing*, Vol. 30, Iss. 7, 2013, p. 597-606.

⁹ Deborah H. Lester, Andrew M. Forman and Dolly Loyd, “Internet Shopping and Buying Behavior of College Students”, *Services Marketing Quarterly*, Vol. 27, No. 2, 2005, p. 123-138.

budućnosti, pa se tako mladi u Republici Hrvatskoj više koncentriraju na osiguravanje životne osnovice. Prema tome, položaj mladih sličniji je “skeptičnoj” poslijeratnoj generaciji mladih u Njemačkoj.¹⁰ Iako se o teškoćama mlade generacije kod ulaska u svijet rada i ostvarivanja vlastite ekonomske neovisnosti govori kao o hrvatskoj specifičnosti, uslijed globalnih tokova i recesije u brojnim ekonomijama, sa sličnim problemima suočavaju se pripadnici mladih i u drugim dijelovima svijeta.

Jovanovska generaciju Y u Republici Hrvatskoj definira kao rođene od 1980. do 2000. godine koja prema podacima Državnog zavoda za statistiku broji 860.407 pripadnika i treća je po veličini, nakon *baby boom* i generacije X. Autorica¹¹ opisuje generaciju kao pametnu, kreativnu, optimističnu, orijentiranu na postignuća i tehnološki osviještenu. To su mladi rođeni u doba “aktivnih roditelja”, rasli su pod zaštitom i nadzorom, stoga nisu naučeni na samostalno donošenje ključnih odluka, već su roditelji uključeni u njihov svakodnevni život i odluke. Preferiraju komunikaciju putem elektroničke pošte i SMS poruka u odnosu na „face-to-face“. Koriste pametne telefone, tablete, prijenosna računala i druge naprave. Uključeni su 24 sata dnevno, 7 dana u tjednu. Navikli su na timske sportove i aktivnosti, očekuju timski rad od svih sudionika. Imaju visoka očekivanja od poslodavaca, traže smislen posao, prilike za usavršavanje, nisu spremni mijenjati manje radnih sati za visoku plaću, važan im je fleksibilniji raspored i ravnoteža između posla i slobodnog vremena.

2. PRIKAZ REZULTATA PROVEDENOG ISTRAŽIVANJA

S obzirom da je razumijevanje ponašanja i preferencija ciljne skupine polazište za razvoj marketinške ponude i komunikacije, u radu se iznose rezultati istraživanja i temeljna zapažanja o preferencijama mladih u Republici Hrvatskoj. Cilj istraživanja je bio dobiti uvid u način provođenja slobodnog vremena, glavne preokupacije i vrijednosne stavove mlade generacije.

Jednokratno kvantitativno istraživanje provedeno je u razdoblju od svibnja do kolovoza 2015. godine on-line metodom na uzorku od 200 ispitanika generacije Y. Uzorak je bio kvotni vezano uz spol s kvotama 50% muškaraca i 50% žena u dobi od 19 do 35 godina. Sama on-line metoda odabrana je iz razloga što većina mladih ljudi iz generacije Y ima pristup računalu i interne-

¹⁰ Inga Tomić – Koludrović i Anči Leburčić, *Skeptična generacija: Životni stilovi mladih u Hrvatskoj*, AGM, Zagreb, 2001.

¹¹ Verica Jovanovski “Razvoj poduzetničkih vještina i karijere Generacije y”, Učenje za poduzetništvo, Vol. 2, No.1, Visoka škola za ekonomiju, poduzetništvo i upravljanje, Zagreb, 2012.

tu, no ograničenje je što ipak nemaju svi pristup, što se u najvećoj mjeri odnosi na ruralna područja. Stoga se ovo istraživanje više orijentira na stavove mladih ljudi iz urbanih dijelova Republike Hrvatske, prvenstveno iz Zagreba (70% ispitanih trenutno živi na području Zagreba, dok preostalih 30% ispitanika dolazi iz ostalih dijelova Republike Hrvatske)¹².

Valja napomenuti da 90% ispitanika pripada dobnoj skupini od 19 do 29 godina, a 10% ispitanika dobnoj skupini od 30 do 35 godina. 61,5% ispitanika nije zaposleno, 23,5% radi povremene poslove, 13,5% je u stalnom radnom odnosu i 1,5% je zaposleno na pola radnog vremena.

Prvi set pitanja odnosio se na utvrđivanje načina provođenja slobodnog vremena mladih, njihove potrebe, interese te kako troše svoj novac (Tablica 1). Najčešće upražnjavane dnevne aktivnosti u slobodno vrijeme mladih jesu: surfanje internetom i aktivnosti na društvenim mrežama nakon kojih dolaze druženje s prijateljima i učenje. U tjednom rasporedu kao najčešće aktivnosti javljaju se druženje s prijateljima, izlasci na kavu, sport i rekreacija te učenje. U mjesečnom razdoblju najučestalije aktivnosti jesu: izlasci u noćne klubove, izlasci na kavu, te posjećivanje kulturnih događanja (najučestalije nekoliko puta godišnje).

Tablica 1. Učestalost određenih aktivnosti mladih u slobodno vrijeme

	Više puta dnevno	Jednom dnevno	Više puta tjedno	Jednom tjedno	Više puta mjesečno	Jednom mjesečno	Nekoliko puta godišnje	Jednom godišnje	Nikada	Bez odgovora
Učenje	22%	9%	28%	7%	12%	8%	8%	3%	4%	2%
Druženje s prijateljima	20%	23%	37%	9%	7%	3%	2%	1%	1%	1%
Izlasci u noćne klubove	1%	4%	6%	11%	20%	21%	26%	6%	6%	2%
Odlasci na kavu	9%	11%	31%	11%	19%	7%	9%	1%	2%	1%
Sport i rekreacija	4%	15%	35%	13%	11%	9%	8%	2%	4%	2%
Kulturno umjetnička događanja	0%	3%	8%	4%	11%	21%	36%	12%	5%	3%
Aktivnost na društvenim mrežama	70%	11%	7%	1%	1%	4%	3%	2%	3%	1%
Surfanje internetom	87%	11%	2%	0%	0%	0%	0%	0%	0%	2%

Izvor: Istraživanje autora.

¹² Dobnu granicu uzorka zadovoljili su svi između 19 i 35 godina starosti što obuhvaća gornju granicu generacije Y i prosječnu starost na prvoj godini studija u RH.

Drugi dio istraživanja bavio se utvrđivanjem prioriteta područja u životu ispitanika i to; kako u sadašnjosti, tako i u doglednoj budućnosti (u narednih 5 do 10 godina). Dobiveni rezultati, (Tablica 2), u većoj mjeri podudaraju se s rezultatima prethodnih istraživanja generacije Y na području RH.

Tablica 2. Prioritetna područja mladih u sadašnjosti i doglednoj budućnosti

	TRENUTNO				ZA 5-10 godina			
	Nevažno (4+5)	Osrednje (3)	Važno (1+2)	Bez odgovora	Nevažno (4+5)	Osrednje (3)	Važno (1+2)	Bez odgovora
Financijska samostalnost i stabilnost	23%	10%	67%	0%	25%	8%	67%	0%
Obitelj	29%	8%	63%	0%	27%	6%	67%	0%
Izlasci i dobra zabava	28%	38%	34%	0%	32%	36%	32%	0%
Hobiji	22%	39%	39%	0%	26%	38%	36%	0%

Izvor: Istraživanje autora.

Ispitanici su na ljestvici od 1 do 5¹³ rangirali ponuđena prioritetna područja; materijalna sigurnost, obitelj, zabava i hobiji. Dvije trećine ispitanika smatra financijsku samostalnost i stabilnost i obitelj najvažnijim prioritetima, kako u sadašnjem trenutku, tako i u doglednoj budućnosti. Može se zaključiti da su na veći dio mlade generacije značajno utjecali događaji u vrijeme rano djetinjstva i odrastanja u otežanim uvjetima ostvarivanja egzistencije te opasnosti gubitka najbližih (ratno i poratno razdoblje), kao i sadašnji otežani ekonomski uvjeti i ozbiljan problem nezaposlenosti mladih. Jedna trećina ispitanika mlade generacije, prilično bezbrižna, u prvi plan stavlja dobru zabavu, izlaske i aktivnosti po vlastitom odabiru (hobije) i to kako u sadašnjosti, tako i u doglednoj budućnosti.

U trećem dijelu istraživanja ispitanici su se izjašnjavali oko predloženih tvrdnji putem kojih se nastojao dobiti uvid u životne stavove i vrijednosni sustav mlade generacije (Tablica 3). Na postavljenih 12 tvrdnji ispitanici su mogli izraziti svoje slaganje¹⁴, odnosno neslaganje.

Tri četvrtine ispitanika smatra važnim ostvariti slična postignuća ili nadmašiti svoje roditelje. Ova tvrdnja upućuje na to kako generacija mladih u Republici Hrvatskoj poput svojih zapadnih vršnjaka dijeli visoke ambicije i

¹³ Rang 1 najbitnije mi je, rang 5 najmanje mi je bitno.

¹⁴ Ocjena 5 – slažem se u potpunosti, ocjena 1 – uopće se ne slažem.

odlučnost. U najvećoj mjeri, čak 80% ispitanika smatra da će im fakultetsko obrazovanje donijeti bolju budućnost, a gotovo polovica (48%) bi željela i doktorirati. Dobiveni rezultati ukazuju kako je fakultetsko obrazovanje te napredovanje u tom smjeru vrlo važno mladima u Hrvatskoj.

74% ispitanika deklarira naglašenu spremnost za radne aktivnosti čak i u slučaju kada bi imali osiguranu egzistenciju za cijeli život. Podatak da 61% ispitanika smatra da novac ne bi trebao biti glavni razlog bavljenja određenim poslom budi optimizam o generaciji formiranoj pod utjecajem materijalističke kulture potrošačkog društva. Spremnost na rad te stav da novac ne treba biti glavni pokretač govori o marljivoj, ali i ambicioznoj generaciji.

Za 62% ispitanika smisao života može se pronaći u putovanjima i upoznavanju drugih kultura. Dok nešto više od polovice ispitanika (56%) smatra da se sreća ne postiže kroz materijalne stvari, već se nalazi u davanju i služenju drugima, a 44% izjavljuje da želi imati veliku obitelj i u njoj vidi izvor ljudske sreće.

Tablica 3. Stavovi mlade generacije

Ponuđene tvrdnje	Ne slažem se (1+2)	Niti da niti ne (3)	Slažem se (4+5)	Bez odgovora
1. Želim imati i postići više nego što su moji roditelji.	6%	17%	76%	1%
2. Gdje ja živim ima toliko malo prilika za mene i ono što želim raditi, da je nerealno misliti da ću jednog dana moći birati što želim raditi. Radiš ono što možeš.	33%	25%	41%	1%
3. Jednog dana želim imati veliku obitelj. Mislim da je to izvor najveće sreće.	30%	25%	44%	1%
4. Fakultetsko obrazovanje je bitno za budućnost.	7%	11%	80%	2%
5. Jednog dana želim završiti doktorat.	24%	26%	48%	2%
6. Putovati po svijetu i upoznavati druge kulture je najbolje što možeš raditi u životu.	12%	23%	62%	3%
7. Novac nikako ne bi trebao biti glavni razlog bavljenja određenim poslom.	8%	30%	61%	1%
8. Sreća nije u novcu i karijeri, nego u skromnosti i pomaganju onima kojima je pomoć potrebna.	10%	33%	56%	1%
9. Prvom prilikom idem van iz Hrvatske!	38%	28%	33%	1%
10. Čak i da sam osiguran/a za cijeli život, svedjedno bih izabrao/la raditi.	12%	13%	74%	1%
11. Spreman/spremna sam se ubijati od stresa i posla dok mogu, kako bi jednog dana imao/la kuću na moru, dobar auto... zapravo da si jednog dana mogu omogućiti baš sve što poželim.	32%	23%	43%	2%
12. Vjera mi puno pomaže kroz život.	45%	20%	33%	2%

Izvor: Istraživanje autora.

Najveća disperzija odgovora ispitanika uslijedila je kod tvrdnji 2, 9, 11 i 12, a koje se odnose na uvjete i mogućnosti rada, spremnost na vlastita odricanja kod stjecanja materijalnih dobara te u pogledu uloge vjere u životu.

43% ispitanika izjavljuje spremnost za žrtvovanje i marljiv rad kako bi ostvarili svoje egzistencijalne ciljeve, dok ih je 23% ravnodušno, a jedna trećina nije spremna na osobne žrtve radi stjecanja materijalnih stvari. Relativna većina odgovora koji izražavaju slaganje s tvrdnjom ukazuje kako su mladi itekako zabrinuti za svoju egzistenciju i uglavnom su spremni na težak radni vijek kako bi kasnije mogli uživati u plodovima svog rada.

41% ispitanika izražava spremnost prihvatiti bilo kakav posao jer im je važno da mogu raditi, dok se 33% s time izričito ne slaže, a 25% nema svoj stav. Loše gospodarske prilike u zemlji te globalna kriza uz koju je ova generacija odrasla i odabirala svoje zanimanje mogu protumačiti pesimizam kod većeg broja ispitanika, dok ambiciozniji dio generacije smatra da je ipak moguće pronaći svoju poslovnu priliku unatoč vanjskim faktorima koji tome ne idu u prilog.

38% ispitanika ne bi željelo otići trbuhom za kruhom iz Hrvatske, 28% ih je neodlučno, dok je jedna trećina spremna napustiti Hrvatsku u potrazi za boljim prilikama i životom.

Kod tvrdnji 9 i 12 najveći je udio ispitanika koji se ne slažu s ponuđenim navodom. Pretpostavka da mladi žele napustiti Hrvatsku analizirana je kroz tvrdnju 9. Kod tvrdnje 9 najveći je udio ispitanika populacije (38%) koji ne želi otići iz Hrvatske, iako je njihov udio tek neznatno (5%) veći od udjela onih koji su spremni prvom prilikom potražiti bolju budućnost negdje drugdje, što je za hrvatsko društvo u cjelini poražavajuća informacija. Obzirom na male postotne razlike između odabranih odgovora može se zaključiti da su mladi u dobroj mjeri još neodlučni te da se razlikuju u stavu treba li otići ili ostatu u Hrvatskoj.

Kod tvrdnje 12 udio ispitanika koji ne smatraju vjeru važnim dijelom svog života iznosi 45%, dok s druge strane, vjera je važan temelj u životu za jednu trećinu ispitanika. Navedeno ukazuje na svojevrsnu polarizaciju utjecaja različitih čimbenika na formiranje životnog svjetonazora mladih.

3. ZAKLJUČAK

Za marketinške stručnjake izazov je kreirati marketinšku ponudu na način da svojim karakteristikama i komunikacijom bude privlačna i relevantna pripadnicima različitih generacija. Stoga istraživanje, upoznavanje i razumijevanje ponašanja i preferencija ciljne skupine predstavlja prvi korak u formuli-

ranju marketing programa. Izazov je tim veći ako postoji generacijski jaz između marketinških stručnjaka i ciljne skupine, u ovom slučaju mlade generacije. U svakom društvu koegzistiraju različite generacije. Pripadnici određene generacije formiraju se pod utjecajem određenih događanja i okolnosti iz okruženja; a njihov utjecaj zavisi od dobi, odnosno, fazi života u kojoj se nalaze. Pojedinu generaciju stoga povezuju slična iskustva i obilježja; jezik, navike, uvjerenja, životni stavovi. Pripadnici Y generacije u svojim 20-tim ili ranim 30-tim sve su uključeni u različite društvene tokove. Njihovo promišljanje i djelovanje te preuzimanje različitih životnih uloga značajno će oblikovati društvo u desetljećima koja slijede. Stoga ne čudi interes istraživača i brojni radovi u kojima se nastoje identificirati i objasniti karakteristike i životni stilovi mlade generacije. Ipak, najveći broj radova bavi se obilježjima generacije u zapadnim razvijenim zemljama ili brzo rastućim azijskim ekonomijama. U hrvatskim okvirima, malo se pažnje posvećuje navedenom, odatle potječe interes autora za provedbom istraživanja koje je dijelom predstavljeno u ovom radu.

Provedenim istraživanjem nastojao se dati svojevrsni doprinos razumijevanju mlade populacije u Hrvatskoj. Prikazani rezultati mogu poslužiti kao orijentir marketinškim stručnjacima kod oblikovanja marketinških strategija i taktika usmjerenih na pripadnike Y generacije.

Istraživanjem su potvrđene neke zajedničke karakteristike mlade generacije, kako u razvijenim zemljama, tako i u Hrvatskoj, ali i određene specifičnosti. Može se reći da je današnja mlada generacija obrazovanija od bilo koje dosadašnje generacije, više od ijedne do sada koristi elektroničke tehnologije, odrastala je u materijalističkoj potrošačkoj kulturi i pod sve manjim je utjecajem tradicionalnih masovnih medija. Dakle, iako mladi u Hrvatskoj dijele slične stavove, stil odijevanja i preferiranu vrstu glazbe kao i ostatak mlade generacije u razvijenim zemljama, istraživanja ukazuju i na određene specifičnosti, prvenstveno kada je u pitanju projekcija vlastite budućnosti, gdje mladi iz Hrvatske imaju skeptičnu projekciju budućnosti¹⁵ i zabrinuti su oko osiguranja vlastite egzistencije.

Nadalje, mlada generacija opisuje se kao pametna, kreativna, optimistična, orijentirana na postignuća i tehnološki osviještena. Predstavnici imaju visoka očekivanja od poslodavaca, traže smislen posao, prilike za usavršavanje, nisu spremni mijenjati manje radnih sati za visoku plaću, važan im je fleksibilni raspored i ravnoteža između posla i slobodnog vremena.¹⁶

¹⁵ Inga Tomić-Koludrović i Anči Leburic, *Skeptična generacija: Životni stilovi mladih u Hrvatskoj*, AGM, Zagreb, 2001.

¹⁶ Verica Jovanovski "Razvoj poduzetničkih vještina i karijere Generacije y", Učenje za poduzetništvo, Vol. 2, No.1, Visoka škola za ekonomiju, poduzetništvo i upravljanje, Zagreb, 2012.

Nadalje, generacija mladih promišlja važna egzistencijalna pitanja i nije se pokazalo točnim uvriježeno mišljenje da mlade zanima samo zabava ili brza i laka zarada. Dvije trećine mladih ispitanika smatra financijsku samostalnost i stabilnost i obitelj svojim najvažnijim prioritetima, kako u sadašnjem trenutku, tako i u doglednoj budućnosti. Tri četvrtine mladih ispitanika smatra važnim ostvariti slična postignuća ili nadmašiti svoje roditelje i smatraju fakultetsko obrazovanje važnom polugom za ostvarenje svojih ambicija. Mladi su izrazili naglašenu spremnost za rad čak i u slučaju osigurane životne egzistencije. Spremnost na rad te stav da novac ne treba biti glavni pokretač govori o razboritoj, marljivoj i ambicioznoj generaciji. Naravno, mlada generacija voli se i zabavljati; omiljen način provođenja slobodnog vremena je na internetu, društvenim mrežama ili druženju s prijateljima.

Abstract:

ANALYSIS OF THE PREFERENCES OF YOUNG PEOPLE AS A STARTING POINT FOR DEVELOPMENT OF MARKETING PROGRAM

Generations are formed under the influence of various circumstances and events that significantly affect the behaviour, preferences, attitudes, beliefs and life choices of its members. Thus, the young generation, called Generation Y or the Millennium Generation, is formed under the influence of different events and circumstances compared to previous ones. In front of marketing experts is a challenge to develop an attractive and relevant marketing offer for members of different generational groups. The starting point for the development of marketing programs is the research and analysis of the characteristics, behaviours and preferences of the target group, in this case the young generation. The paper presents the results of a quantitative survey conducted on a sample of 200 respondents of young people in Croatia. The stated results can be used as a landmark for marketing experts in designing marketing strategies and tactics directed to the members of the Generation Y.

Key words: consumer behaviour, generation Y, marketing strategy.

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QUALITY AND INNOVATION – PARTNERING DISCIPLINES¹

KVALITETA I INOVACIJA – PARTNERSKE DISCIPLINE

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ABSTRACT

Quality and innovation are significant and necessary business factors in all kinds of organizations. However, they often are considered as separate fields of knowledge, and relations between them in the organizations' business context are at least vague. Quite typically quality professionals are not much aware of the innovation phenomena, and neither are innovation experts familiar with the quality principles and procedures. In general modern quality and innovation disciplines have developed apart from each other during the last one hundred years, and this development is highlighted in this article. However, now over the recent years, we have noticed many general cross-references between them. This article considers questions of innovation in quality and quality in innovation, and realization of the both topics in the organizations and society. Innovation is needed and has been practiced for a long time in the

¹ This text has been partly presented at a conference in Hail, Saudi Arabia and at the EOQ Congress in Tallinn, Estonia in 2013.

context of quality improvement and the development of the new products. The process 'from-invention-to-innovation' is complicated and involved with many different actors. Professional quality practices may be beneficial in this process. Viewpoints of quality and innovation are also considered with regard to standardization including possibilities of the business integrated implementation of quality management and innovation management in a harmonized way. A great challenge is to understand how the awareness and skills of the human individuals and wide societal efforts can promote quality and innovation. Quality and innovation are partnering disciplines, which can be useful to each other and together create organizational differentiation for competitive advantage.

Key words: quality, innovation.

1. EVOLUTION OF THE DISCIPLINES

Quality and innovation are ancient issues. The *quality* concept relates to an object and parties involved with that object. Quite originally (Aristotle, 350 BC), the word quality had two meanings: (a) Differentia, which actualizes the essence of the object in question and differentiates it from the other objects, and (b) how well or badly the object is perceived by the involved parties. This double meaning is still valid in the everyday language², and it is included in the general standardized professional definition³, too. *Innovation* is linguistically based on the verb innovate that means to make changes in something established, especially by introducing new methods, ideas, or products. The older related word is *invent* from the Middle Ages with the meaning of creating or designing something that has not existed before. People have however made inventions already before the appearance of these words. 'Every change in human activity, made designedly and systematically, appears to be an invention'.⁴

Quality and invention were seamlessly fused issues at the time of craftsmanship. The roots of modern quality management date back to the time of the beginning of the industrial revolution around 1750. That also was the dawn

² Oxford Dictionaries, Definition of quality, 2015. <http://www.oxforddictionaries.com/definition/english/quality>

³ ISO (2015a). ISO 9000:2015, Quality management systems - Fundamentals and vocabulary, ISO Geneva, Switzerland.

⁴ Otis T. Mason, The origins of invention. Walter Scott, Ltd. London, 1895. <https://archive.org/download/originsinventio00masoogoo/originsinventio00masoogoo.pdf>

of modern innovation.⁵ Quality and innovation emerged with a close relationship through quality of products to the needs, process improvement, improving people living and working environments, and patents.

Technology is a common issue in both quality and innovation. Technology includes means by which labor, capital, and information are transformed into products (goods and services) to provide value for interested parties.⁶ This concept of technology extends beyond the engineering and manufacturing to encompass a range of marketing, investment, and managerial processes. It also includes quality management. Technology is an important way of realization of quality. Aristotle has been referred in the context of innovation discussion through the ages. He stated that ‘technology imitates nature’ but also argued that technology can go beyond the nature through authentic human creativity and complete ‘what nature cannot bring to a finish’.⁷

After professional specialization, quality and innovation have developed as distinct specialized disciplines with their own development history, expertise, specialists, research and education traditions, and methodologies. This professionalization of both areas dates back to the early years of the 1900’s.⁸ We have recognized significant cross-references between these disciplines now again very recently in certain national and regional quality and innovation movements and in the international quality management and innovation management standardization as will be described later in this article. Figure 1 shows some significant milestones in the evolution of the both disciplines.

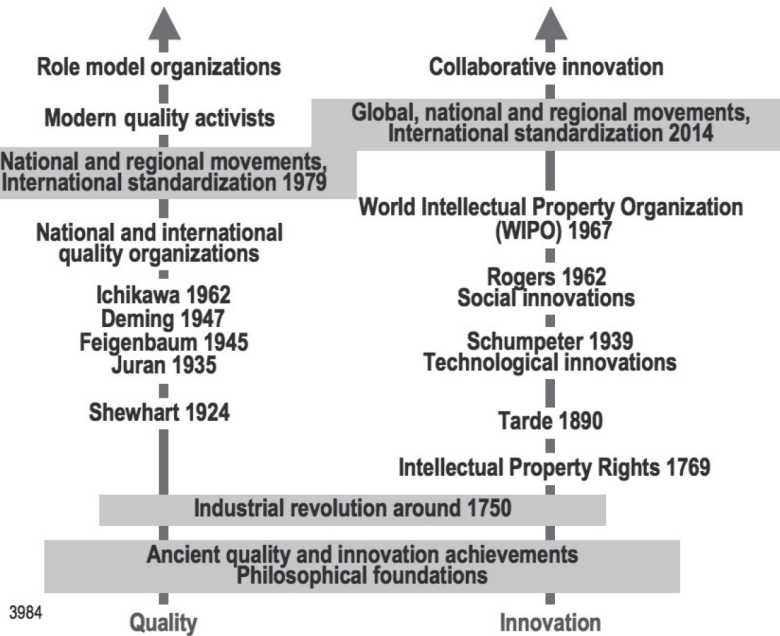
⁵ Joseph M. Juran, *A history of managing quality*, ASQ Quality Press, Milwaukee, USA, 1995.

⁶ Clayton M. Christensen, *The innovator’s dilemma*, Harvard Business School Press, USA, 1997.

⁷ Joachim Schummer, „Aristotle on technology and nature“, *Philosophia Naturalis*, No. 38, 2001, pp. 105-120. https://notendur.hi.is/~lobbi/ut1/a_a/Aristotleogtaekni.pdf

⁸ Gabriel Tarde, *The laws of imitation*, Henry Holt and Company, New York USA, 1903. <http://archive.org/stream/lawsofimitation00tard>; Joseph M. Juran, *A history of managing quality*, ASQ Quality Press, Milwaukee, USA, 1995. Benoit Godin, *Innovation: The history of a category*, 2008. <http://www.csiic.ca/PDF/IntellectualNo1.pdf>

Figure 1. Milestones in the evolution of the quality and innovation disciplines



Achievements and success of the both disciplines were based on the influence of strong and intentional experts and advanced organizations. More recently also the societal actors have contributed to promote quality and innovation within the organizations and societies. A personal creativity of individual inventors has always played a prominent role in the field of innovation.

Quality and innovation come true only through real organizational implementations. In order to recognize useful relationships between them for their integrated implementation in organizations we should be aware of their inherent concepts, principles, and foundations.

2. SUCCESSFUL QUALITY MANAGEMENT IS INCORPORATED WITH INNOVATIONS

Quality of an object means the degree to which the object fulfills the needs and expectations of those parties being interested in the object.⁹ Organ-

⁹ ISO 9000:2015, Quality management systems - Fundamentals and vocabulary, ISO Geneva, Switzerland.

izations compete for the high quality of their products (goods and services). In order to be successful, they must be responsive to the changing forces of the business environment¹⁰ and strive for distinctively excellent products through their effective and efficient business processes. This also is the challenge of *quality management* and one of its major activity areas *quality improvement*.¹¹ Through the continual performance improvement of the business processes and products. In fact, there is no real improvement without innovation.

Both excellent products and competitive processes are based on innovation; actually the quality improvement tools can be considered as creativity and innovation tools.¹² Hence, innovation is not any new subject in the quality discipline, but it has inherently been included in the professional quality practices already for decades. However, in general quality experts can't be regarded as the experts of innovation, but mostly quality innovations take place spontaneously.

The word innovation explicitly appeared on the major quality discussions about ten years ago. From then on, this concept has also got an increasing importance in national quality initiatives, especially represented by the performance excellence models (quality award criteria)¹³, the future of quality studies¹⁴, and in the international quality management standardization, including the standards ISO 9004¹⁵ and ISO 9001.¹⁶ Innovation can be applied for quality improvements at all business areas in the organizations including technology, products, processes, and the business system as a whole.

Innovation has also been viewed as a new 'wave' for reviving quality management.¹⁷ However, it is more fruitful to understand quality and innovation as two distinct partnership disciplines with mutually beneficial relationships producing useful ideas, methodologies, tools, etc. to each other.

¹⁰ Larry Downes and Chunka Mui, *Killer App*. Harvard Business School Press, Boston, 2000.

¹¹ Ibid.

¹² James H. Harrington, Glen D. Hoffherr and Robert P. Reid, Jr., *The creativity toolkit*, McGraw-Hill, New York, USA, 1998.

¹³ NIST (National Institute for Standards and Technology), Malcolm Baldrige national quality award, Award criteria. NIST, Washington, USA, 2010.

¹⁴ ASQ Emergence – Future of quality study, 2011. <http://asq.org/about-asq/how-we-do/futures-study.html>

¹⁵ ISO 9004, Managing for the sustained success of an organization - A quality management approach, ISO, Geneva, Switzerland, 2009.

¹⁶ ISO (2015b). ISO 9001 Quality management systems – Requirements. ISO, Geneva, Switzerland.

¹⁷ Hiroshi Osada, *From quality manager to quality innovator*, World Quality Forum, Budapest, 2015. Greg Watson, „Quality in an age demanding innovation“, World Quality Forum, Budapest, 2015. K-S Chin, „Quality and innovation: A partner or substitute? Management system vs. Innovation, World Quality Forum, Budapest 2015.

3. INHERENTLY INNOVATIONS IMPLY QUALITY IMPROVEMENT

Innovation exists everywhere, including the context of products and technology and the world of words; innovation is discussed in the scientific and technical literature, but also in social science like history, sociology, management and economics.¹⁸ Innovation is also a central idea in the popular imaginary, in the media and in public policy. Innovation has become the emblem of the modern society, and a panacea for resolving many problems.

When the interest in the traditional quality practices has been declined in the public discussion, the popularity of innovation has increased very strongly, one even can talk about the innovation ‘hype’. Hence we also can notice reactions against overemphasizing the innovations. For instance, standardization¹⁹ and imitation²⁰ have with good reason seen economically more beneficial than innovation. This is justified with the fact that innovation is a slow and uncertain way to business or product regeneration. However, both standardization and innovation are needed in all organizations.²¹ In this regard, the both issues are traditionally included in quality management; control of the operations as usual is based on standards, and innovation is needed for improvement.

Vocabulary of words and terms used in the context of innovation has fluctuated during the decades.²² While innovation experts and many organizations acknowledge that innovation is important for the business growth and success, the term ‘innovation’ is still without a consistent, agreed definition in the business world. Sometimes we may get confused about the terms change, innovation, invention, novelty, originality, creativity and innovativeness²³

The European technical specification CEN/TS 16555-1 defines innovation as the ‘implementation of a new or significantly improved product (good

¹⁸ Benoit Godin, *Innovation: The history of a category*, 2008. <http://www.csiic.ca/PDF/IntellectualNo1.pdf>

¹⁹ DIN (Deutsches Institut für Normung e. V.), *Gesamtwirtschaftlicher Nutzen der Normung*, Berlin, Wien and Zurich. Beuth, 2000.

²⁰ Matti Apunen, *Innovaatiot ovat vaarallinen muotihuume, Suomeen tarvitaan ‘imitaatiotaloutta’* (Innovation is a dangerous fashion narcotic, the ‘imitation economy’ is needed in Finland), 2015, Helsinki Times (Helsingin Sanomat) 24.11.2015 <http://www.hs.fi/paakirjoitukset/a1448257858222>

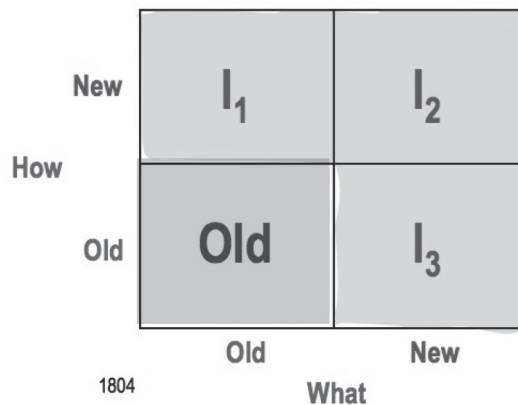
²¹ Paul Pangaro, *Notes on the Role of Leadership and Language in Regenerating Organizations*, 2013. <http://pangaro.com/littlegreybook.pdf>

²² Jeff Dance, *What is innovation? 30+ definitions lead to one fresh summary*, 2012. <http://freshconsulting.com/what-is-innovation/>

²³ Benoit Godin, *Innovation: The history of a category*, 2008. <http://www.csiic.ca/PDF/IntellectualNo1.pdf>

or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations²⁴ (figure 2). In this definition, the expressions ‘significantly’ and ‘implementation’ are subjects to interpretation. Hence, it is emphasized in the context of innovations that the innovation should be a conceptually new and commercially viable solution that is available to markets, governments, and society. All this, however, proves that innovations aim at quality improvement. Business innovations are directly related to improving product performance, increasing the effectiveness and efficiency of the business processes, and making possible organizations’ radical structural and operational reforms. All these topics are basic intentions of the professional quality management.

Figure 2. Innovation is a conceptually new and commercially viable solution



Organizational development focuses on the products and business structures (‘What’) and processes (‘How’). Opportunities of the innovations are related to the areas of I₁, I₂ and I₃. From the organization’s performance point of view How is more important than What.

²⁴ CEN CEN/TS 16555-1 Innovation management - Part 1: Innovation management system. CEN Brussels, Belgium, 2013.

4. INNOVATIONS IN TECHNOLOGY AND QUALITY MANAGEMENT

Technology innovations may be directed according to the two major ways by using:²⁵

- a) Sustaining technology for fostering and enhancing the existing technical features or;
- b) Disruptive technology for simplifying the existing technical solutions and providing very different value proposition.

Technology-based innovations of products (goods and services) provide practically unlimited possibilities for improving the quality of products but also influencing on the performance of the business processes. This includes innovations in information technology (IT), biotechnology, nanotechnology, optical technology, energy technology, social technology, wellbeing technology, etc.²⁶

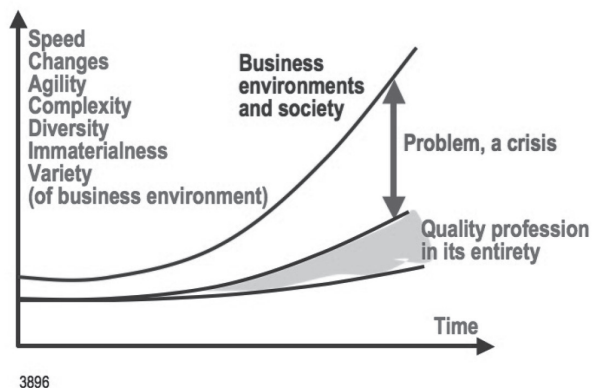
The new technologies may radically change all business arrangements in organizations, including practices of quality management. Especially opportunities of the new IT based solutions create new ways to work in processes and carry out business activities and products, for instance through networks or ecosystems of organizations. All these are challenging also from the quality management point of view. The achievements of the information technology include radio frequency identification (RFID), near field communication (NFC), social software and Web 2.0, robotics, 3D printing, mobile payment technology and blockchain, Big data analyzing, biohacking, etc. Open source information, crowd-sourcing activity, Cloud services, navigating technology, and mashup products are currently important practical examples. Ubiquitous IT, Internet of things (IoT) or industrial internet are also known as machine-to-machine (M2M) services, which means that not only a service provider is represented by an automatic means but also the recipient may be a machine. The IoT emphasizes sensors that can connect objects to the internet and automatically send their data to IT systems. The objects can be everything from the health care monitors to traffic lights, thermostats, trains or automobiles.

²⁵ Clayton M. Christensen, *The innovator's dilemma*, Harvard Business School Press, USA, 1997.

²⁶ Juhani Anttila and Kari Jussila, „Aiming at competitive products and delighted customers in the time of recession“, in proceedings of the 14th International Quality Symposium, Croatian Quality Managers Society, in Rovinj, Zagreb, Croatia, 2013.

We have recognized serious needs for innovations also in quality practices and methodologies (figure 3).²⁷ Do any real innovations have been created for organizations' quality implementations after Deming, Ichikawa, Juran, and Feigenbaum? Do we only follow the French saying, 'Plus ca change, plus c'est la même chose' (The more it changes, the more it is the same thing)?²⁸ In this way the quality profession is not able to adapt to the general development of the organizations' business development and trends of the society at large. The existing prevalent practices have become too formal, complicated, or rigid in many implementations, and they are not necessarily any more relevant or effective to the challenges of today's business environments. Especially disruptive²⁹ and 'lean'³⁰ solutions are needed for quality management and quality assurance, for instance taking into account the uncertainty of startups and complexity of the networked businesses and ecosystems.³¹

Figure 3. A crisis in quality management



A crisis in quality management or quality profession in its entirety results from the lack of innovations in the quality management principles, tools,

²⁷ Juhani Anttila, „Innovations in quality management“, Prerequisites, needs, and realization, in Sharing best practices in business excellence proceedings of Middle East Quality Association (MEQA) Conference, Abu Dhabi, United Arab Emirates, 2011.

²⁸ Jean Baptiste Alphonse Karr, *Les Guêpes*, 1849.

²⁹ Clayton M. Christensen, *The innovator's dilemma*, Harvard Business School Press, USA, 1997.

³⁰ Eric Ries, *The lean startup*, Penguin Group, New York, USA, 2011.

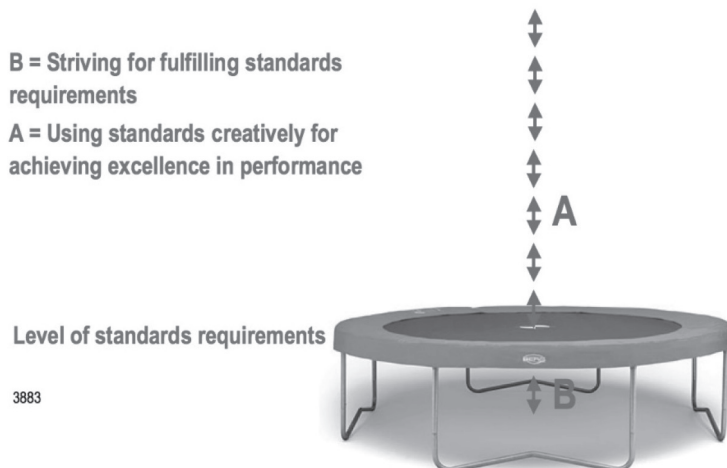
³¹ Juhani Anttila, „Integrated quality approach in business networks“, in proceedings of the 54th EOQ Congress in Izmir, Turkey, 2010.

and infrastructures with regard to the changes in the organizations' business environments.

5. THE CREATIVE USE OF QUALITY MANAGEMENT STANDARDS FOR BUSINESS BENEFITS

The international standards have a big impact on the quality implementations in organizations but they have been perceived as representing stagnation, when they have not been able to follow the general trends of business development. However, we have no limitations in using innovations also in the traditional areas of quality management. For instance, although the ISO 9000 standards do not explicitly promote creativity and innovations in their implementations, their ultimate purpose is to strive for excellence in business performance.³² This should be accomplished with the responsibility of the organizations, which only depends on the organizations' business leaders' and experts' will and ability to differentiate their business from the others of the crowd. A key issue is that standards are understood as unlimited opportunities and not as specific restrictive targets ('The Trampoline principle', figure 4).

Figure 4. The 'Trampoline principle' for creative applying the standards

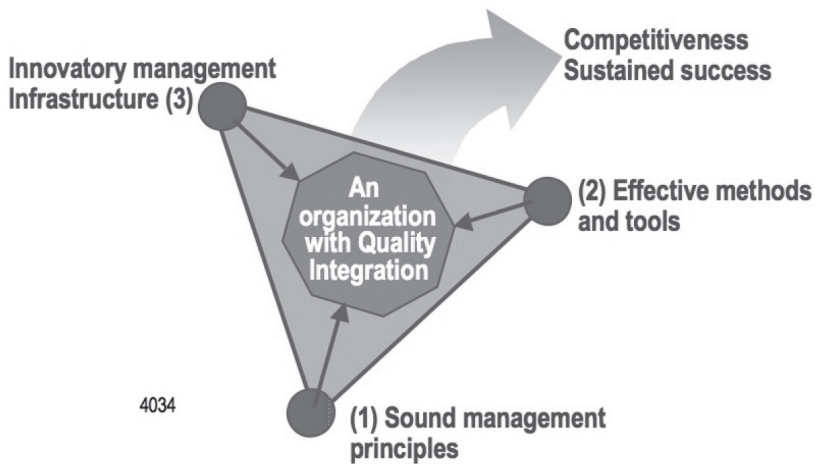


The biggest obstacles, which hinder or prevent our creative progress, are

³² Juhani Anttila and Kari Jussila, „ISO 9001:2015 – A questionable reform. What should the implementing organizations understand and do?“, World Quality Forum, Budapest, 2015b.

the existing habits, misperceptions and prejudices of ourselves, and cultural aspects of our organization, business branch, or country, from which it is difficult to break away. Possibilities for innovations may be found from the model of learning organizations (figure 5),³³ which we have used for the ‘Quality integration’,³⁴ i.e. business integration of the organizational quality practices for aiming at the excellent performance and sustained success.

Figure 5. The model and the three cornerstones for a creative business integration of quality management



‘Quality Integration’.³⁵ In addition, the ‘innovation integration’ can be considered in the same way.

The cornerstones of the learning organization model consist of:

- Sound guiding business ideas including organization-dedicated concepts and principles, goals and strategies, and their articulation aligned with the challenging aims of the ISO 9000 standards:

³³ Peter Senge, Charlotte Roberts, Richard B. Ross and Art Kleiner, *The fifth discipline field-book*, Nicholas Brealey Publishing Limited, London, UK, 1995.

³⁴ Juhani Anttila, „A creative business-integrated application of the ISO 9000 standards in Sonera Corporation“, Finland in Moosa, K. and Shariff. I. (Eds.), *Practical guide to ISO 9000:2000 Quality management system*, Ibrahim Publishers, Lahore, Pakistan, 2007.

³⁵ Ibid.

- Living with the standardized quality management principles (QMPs)³⁶ and the modern professional quality models integrated with business system and processes;
- Understanding ISO 9000 standards for quality of management and for business excellence.
- Effective tools, methods and theories supporting the quality approach:
 - Using internationally recognized methodology for increasing business effectiveness and efficiency, and for differentiating from the others;
 - Applying modern means, for instance using advanced IT business methodology.
- Innovatory management infrastructure for realizing the quality approach:
 - Mobilizing the whole organization to use the company’s selected business integrated quality principles and tools creatively;
 - Tuning the quality approach with the rapidly changing and emergent business environment and organizational management structures.

6. SOCIETY-WIDE MOVEMENTS FOR QUALITY AND INNOVATION

Organization-wide quality programs according to the frameworks of TQC, CWQC and TQM have been introduced and implemented at least since 1950’s. However, typically innovation aspects were not explicitly included in these realizations.

Globally during the several recent decades, many initiatives have been executed for developing societies from the viewpoints of quality philosophy and applying the quality practices. All of these examples are different and based on different quality foundations. Some of these cases have been successful, having also continuity and sustainability, but some others not.³⁷

³⁶ ISO ISO 9000:2015, Quality management systems - Fundamentals and vocabulary, ISO Geneva, Switzerland, 2015a.

³⁷ Juhani Anttila and Kari Jussila, „Societal quality and the competitiveness,“ in proceedings of 16th International Symposium on Quality, Croatian Quality Managers Society, Zagreb, Opatija, Croatia, 2015.

National and regional initiatives have been launched or policies defined to promote innovation activities broadly.³⁸ In these cases, innovation activity is typically seen as a systemic issue, although in practice innovations originate from the ideas of creative individuals or inventors and often are accomplished by many persons in networks or organizations. Typically in these contexts, also quality aspects have been presented, but only in general terms. Innovation experts have not necessarily been in close contacts with quality experts in these projects.

Also methodologies have been developed and researches made³⁹ for evaluating the effectiveness of the innovation policies, including innovation inputs and outputs, at country level. These are used for comparing different economies, countries and regions. However, the societal bodies can at their best have only the supportive role, because inventions are made by single, grouped or networked individuals and completed into innovations by different organizations. Quality of the innovation process and quality of the innovation results can be considered only in a superficial way in these high level evaluations.

Organizations have a key role in implementing quality and innovation procedures in practice for business and societal benefits. It is not beneficial to the organizations if quality management and innovation management are developed separately as isolated initiatives from each other. The both disciplines need each other and they even may ‘cross-fertilize’ each other, for instance there should be quality and innovation in both quality and innovation process-

³⁸ Jose Manuel Barroso, *The importance of innovation in Europe*, 2009. http://www.youtube.com/watch?v=g2ZkOcUVYyo&feature=player_embedded European Commission Innovation Union, A pocket guide on a Europe 2020 initiative, 2013. http://books-hop.europa.eu/en/innovation-union-pbKI3213062/downloads/KI-32-3-062-EN-C/KI-3213062ENC_002.pdf?FileName=KI3213062ENC_002.pdf&SKU=KI3213062ENC_PDF&CatalogueNumber=KI-32-13-062-EN-C

Council on competitiveness (2005). *Innovate America: Thriving in a world of challenge and change*. http://www.compete.org/storage/images/uploads/File/PDF%20Files/NII_Innovate_America.pdf TEM, The Ministry of Employment and the Economy, Finland (2009). *Government’s communication on Finland’s national innovation strategy to the parliament*. https://www.tem.fi/files/21010/National_Innovation_Strategy_March_2009.pdf

Reijo Miettinen, *National innovation system. Scientific concept or political rhetoric?*, Edita, Helsinki, Finland, 2002.

Åke Uhlin, „The idea of innovation systems and the need for a new horizon of expectation“, 2005. http://bildanden.se/Filer/the_idea_of_innovation_systems.pdf

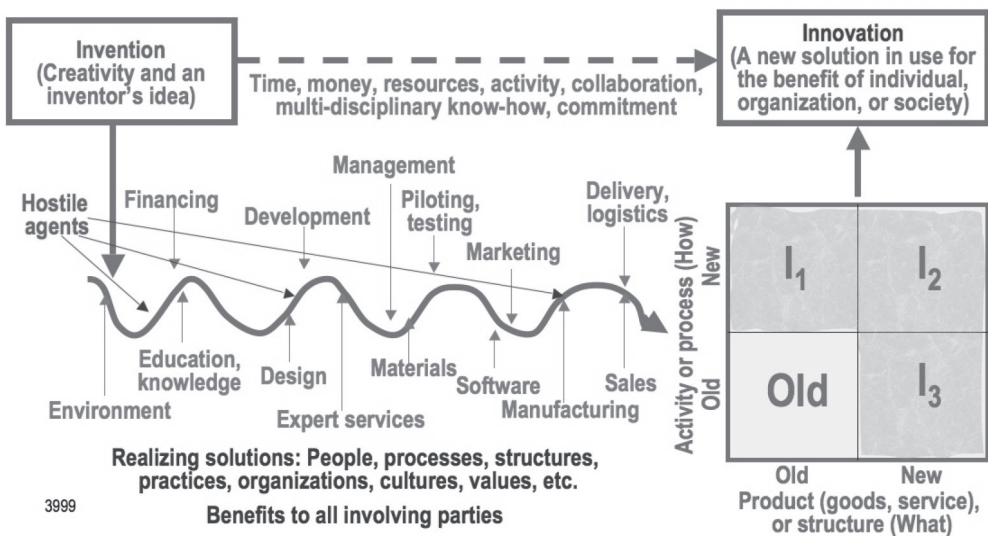
³⁹ Cornell University, INSEAD, and WIPO, *The Global Innovation Index 2015: Effective innovation policies for development*, Fontainebleau, Ithaca, and Geneva, 2015. <https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII-2015-v5.pdf>

Dan Steinbock, „Finland’s innovative capacity“, Ministry of the Interior, Helsinki, 2006. <http://www.intermin.fi/julkaisu/132006?docID=25000>

es. The ‘from-invention-to-innovation’ process is very complicated in practice and is involved with many different actors (figure 6). Professional quality practices may be beneficial in this process.

The complicated environment is particularly challenging for many small and medium size enterprises (SMI) and startups, whose business is often totally based on innovative solutions,⁴⁰ but professional quality and innovation resources are very limited, and adequate quality methodologies have not yet been developed for these application areas. However, in today’s economic environments these organizations have a remarkable importance in the terms of employment and national income.

Figure 6. From invention to innovation in practice.



Quality aspects should be taken into account in all phases. This diagram also want to visualize that practically innovation cannot be carried out only by one person, but a great variety of different expertise is needed in the process for realizing the innovation result. Inventors are key persons to initiate the process, but nobody can be an ‘innovator’ in practice.

⁴⁰ Eric Ries, *The lean startup*, Penguin Group, New York, USA, 2011.

7. PEOPLE AS THE PRIMARY SOURCE OF INNOVATION, CREATING INTELLECTUAL PROPERTY

Creativity is connected with the human subconscious and intuition (imaging). Each human being is naturally creative. A key issue is to release this ability from the internal and external obstacles of the implementation, and to activate it to practical situations (processes). This is a big challenge for the organizational innovation management.

Artists are considered to be creative persons, and their approach could also be used for benchmarking for business innovation. They appreciate the following agenda as the path to higher creativity:⁴¹

1. The sense of safety: Positive attitude to creativity without fear;
2. The sense of identity: Honest self-scrutiny and awareness with regard to own needs, interests and mental limits, autonomy and self-protection;
3. The sense of power: Mental strength, perseverance to overcome obstacles of spiritual growth, and hope;
4. The sense of integrity: Being honest and having strong moral principles, moral uprightness, being whole and undivided;
5. The sense of possibility: Release from everyday ties, believe in a new and positive action;
6. The sense of abundance: Joy and plentifulness of the good things of life;
7. The sense of connection: Social and professional contacts for influence and help;
8. The sense of strength: Winning the losses and withstanding criticism, coping with the inadequacy of time;
9. The sense of compassion: Sympathetic concern about the sufferings or misfortunes of others;
10. The sense of self-protection: Avoiding obsessions, for instance workaholism, dangers due to lack of mental stimulation, lust of reputation, and unhealthy competing;
11. The sense of autonomy: Feeling freedom, acceptance and success, detaching from self-centeredness, getting contact with the outside world through physical activity;
12. The sense of faith: Trusting, knowing own consciousness and creativity, recognizing imagination.

⁴¹ Julia Cameron, „The artist’s way, A spiritual path to higher creativity“ Penguin Putnam Inc., New York, USA, 1992.

Especially Leonardo da Vinci has been considered as the key reference of a creative personality. His innovation principles were:⁴²

- *Curiosità* – An insatiable quest for knowledge and continuous improvement;
- *Dimostrazione* – Learning from experience;
- *Sensazione* – Sharpening the senses;
- *Sfumato* – Managing ambiguity and change;
- *Arte/Scienza* – Whole-brain thinking;
- *Corporalità* – Body-mind fitness;
- *Connessione* – Systems thinking.

It is very common that the inventors are going to be quite alone, without the necessary support from others or even are confronting hostile agents against their achievements.

Intellectual property (IP) derives from the work of an individual's mind or intellect. IP includes industrial property (inventions, patents, trademarks, industrial designs, and geographic indications of source) and copyright (novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs). Intellectual property rights usually give the creator an exclusive right over the use of his/her creation for a certain period of time. Many legal principles governing intellectual property rights have evolved over centuries. Creative Commons provides an infrastructure and tools for giving individual creators, companies, and institutions a simple, standardized way to a 'some rights reserved' approach to copyright through licenses that are legally solid, globally applicable, and responsive to our users' needs.

Today, many of the innovations come from the collaboration of many individuals operating in networks.⁴³ Genuine innovatory networks are unplanned, emergent aggregations.⁴⁴ Their growth is sporadic and self-organizing. Network members are independent actors. Nobody manages the network as a whole but each actor has its own characteristic impact on the network. Crowd-sourcing is the practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people and especially from the online community rather than from traditional employees or suppliers.

⁴² Michael J. Gelb, „How to think like Leonardo Da Vinci: Seven steps to genius every day“, Bantam Dell, New York, 2000.

⁴³ Don Tapscott, and Anthony Williams, „Wikinomics: How mass collaboration changes everything“, Penguin Books Group, New York, USA, 2006.

⁴⁴ Juhani Anttila, „Integrated quality approach in business networks“, in proceedings of the 54th EOQ Congress in Izmir, Turkey, 2010.

8. BUSINESS INTEGRATION AND ORGANIZATIONAL LEARNING

As well as the evolution of the quality and innovation disciplines (figure 1), also the business management has a similar historical evolutionary development. Many business thinkers and teachers from the creators of the classical school of management theory, for instance F.W Taylor and H. Fayol, to today's influential persons have defined their own management principles and preferences according to their own experiences and insights.⁴⁵ These are significant general references for managerial development in any organization.

Early business thinkers emphasized the importance of compliance and control aspects. Although much later quality and innovation appeared as concepts in the reference materials of the business experts, they touched on those aspects in quite a general level and without their mutual linkages.

Quality and innovation are abstractions, they are related to the characteristics of the results or outputs of certain activities or processes; managing quality or innovation is not possible directly but management takes place through the organizations' business system and processes.⁴⁶ According to the ISO 9000 standard *quality management* means coordinated activities to direct and control an organization with regard to quality. Quite respectively *innovation management* means coordinated activities to direct and control an organization with regard to innovation.

Business leaders at different levels of organizations keep a central position to consider the managerial disciplines on their general management responsibilities.⁴⁷ Business leaders often prioritize financial performance and legal aspects when the market and individual interests are being emphasized. Hence it is challenging for highly specialized other disciplines to get a remarkable role in their agendas. Business leaders normally recognize importance of quality and innovation in practice but they do not consistently act for them as part of their management duties. Naturally top business leaders call for cre-

⁴⁵ Juhani Anttila, Kari Jussila, and Jorma Kajava, „Reinforcing business integration in managing specialized disciplines in organizations, Management system standards viewpoints. in Quality and social responsibility“, proceedings of the 13th International Symposium on Quality, Croatian Quality Managers Society, Zagreb, Solin, Croatia, 2012.

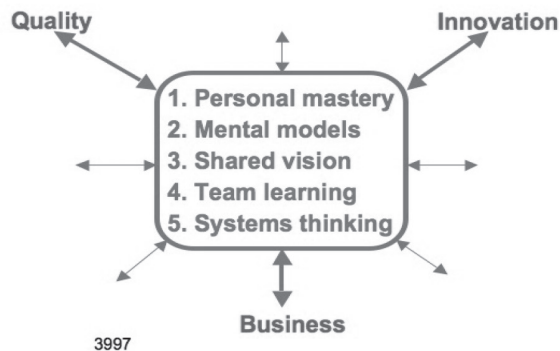
⁴⁶ Juhani Anttila and Kari Jussila, „Standardization and integrated management systems-Business-practitioners' viewpoints. in Navigating global quality in a new era“, proceedings of the EOQ Congress/World Quality Congress, Budapest, Hungary, 2011.

⁴⁷ Juhani Anttila, Kari Jussila, Jorma Kajava and Ilkka Kamaja, Integrating ISO/IEC 27001 and other managerial discipline standards with processes of management in organizations. in Proceedings of The 7th International Conference on Availability, Reliability and Security (ARES) in Prague, Czech Republic, 2012.

ativity, reasoning, and intuition, no less than rational fact-based analysis, because they have to wrestle with dilemmas and not only struggle with problems.⁴⁸ With dilemmas, unlike problems, there are no right solutions; one can only choose the most suitable solution. The authentic organizational quality management and innovation management cannot be delegated and cannot be genuinely and effectively implemented without the business leaders' consistent contributions based on their organizational position, authority, and role.

In order to ensure effectiveness, challenging management domains, including quality, innovation, and many other specialized disciplines, should be integrated with the organization's business system and processes,⁴⁹ and be consistent with the organization's business targets and culture. Successful development of the business integration is a holistic learning process that leads on to continual refining the discipline related concepts and principles, tools and methodologies, and management practices (figure 5) in a compatible and balanced way. This organizational learning constitutes the development not just of new capacities, but of fundamental shifts of mind, individually and collectively. That is based on sensibility to new opportunities, changing attitudes, and getting new skills. In this context, the five basic learning factors of figure 7 are the key means by which this learning and business integration are ensured.⁵⁰

Figure 7. Five basic learning factors



⁴⁸ Albert Low, *Zen & creative management* Charles E. Tuttle Company, Tokyo, Japan, 1993.

⁴⁹ Juhani Anttila, Kari Jussila, Jorma Kajava and Ilkka Kamaja, Integrating ISO/IEC 27001 and other managerial discipline standards with processes of management in organizations. in Proceedings of The 7th International Conference on Availability, Reliability and Security (ARES) in Prague, Czech Republic, 2012.

⁵⁰ Peter Senge, Charlotte Roberts, Richard B. Ross and Art Kleiner, *The fifth discipline field-book*, Nicholas Brealey Publishing Limited, London, UK, 1995.

ISO/IEC Directives have defined a high-level structure (table 1) and identical core text, and common terms and core definitions to be used in all international standards for the different discipline specific management. The high-level structure consists of key issues of the normal established business management that are significant for promoting the business integration of specific management issues. These guidelines can be used in integrating quality management and innovation management processes simultaneously into an organization's processes of business management.

Table 1. The harmonized structure and the chapters and clauses of the text (ISO/IEC, 2012)

1. - 3. General introductory clauses	7.1 Resources
4. Context of the organization	7.2 Competence
4.1 Understanding of the organization and its context	7.3 Awareness
4.2 Understanding the needs and expectations of interested parties	7.4 Communication
4.3 Determining the scope of the XXX management system	7.5 Documented information
4.4 XXX management system	7.5.1 General
5. Leadership	7.5.2 Creating and updating
5.1 Leadership and commitment	7.5.3 Control of documented Information
5.2 Policy	8. Operation
5.3 Organizational roles, responsibilities and authorities	8.1 Operational planning and control
6 Planning	9. Performance evaluation
6.1 Actions to address risks and opportunities	9.1 Monitoring, measurement, analysis and evaluation
6.2 XXX objectives and planning to achieve them	9.2 Internal Audit
7. Support	9.3 Management review
	10. Improvement
	10.1 Nonconformity and corrective action
	10.2 Continual improvement

It presents the management aspects required for the different specific disciplines and emphasize their integration within the normal organizational processes. In this structure, XXX means the specific discipline, for instance quality or innovation.

According to the standardized structure, the organizations can consider required managerial aspects in the harmonized way. The requirement standards ISO 9001:2015 (Quality management) and ISO 50501 (Draft) (Innovation management) follow this structure. The same general structure is used in the European technical specification CEN/TS 16555-1 (Innovation management).⁵¹ These standards promote the integrated implementation of quality management and innovation management in organizations.

⁵¹ CEN CEN/TS 16555-1, Innovation management - Part 1: Innovation management system. CEN Brussels, Belgium, 2013.

9. CONCLUSIONS

Reflecting on the development of the quality and innovation activities in general, one can draw a conclusion that originally they were seamlessly integrated and then separated and evolved into two different disciplines during their professionalization and continued to develop largely as separate. Still their relationship is not generally clear from the organizations' management point of view. However, the interaction between them is important and fruitful within organizations and among respective expert communities. Both disciplines should be effectively integrated with the business system and processes. In this article, the relationships between quality management and innovation have been considered. Very analogical is the situation between innovation and many other disciplines, for instance environmental management, information security management, occupational health and safety management, etc.

Sažetak:

KVALITETA I INOVACIJA – PARTNERSKE DISCIPLINE

Kvaliteta i inovacija značajni su i potrebni poslovni faktori u svim vrstama organizacija. Međutim, često se smatraju odvojenim područjima znanja te su odnosi među njima u poslovnom kontekstu organizacije u najmanju ruku neodređeni. Prilično je karakteristično da profesionalci u kvaliteti nisu posebno svjesni fenomena inovacije, a ni stručnjaci za inovacije nisu upoznati s načelima i postupcima kvalitete. Općenito su se moderne discipline kvalitete i inovacije razvijale odvojeno tijekom posljednjih sto godina i taj se razvoj naglašava u ovome radu. Međutim, posljednjih godina smo primijetili mnoge unakrsne reference među njima. Ovaj rad razmatra pitanja inovacije u kvaliteti i kvalitete u inovaciji te realizaciju obiju tema u organizacijama i društvu. Inovacija je potrebna i primjenjuje se u praksi već dugo vremena u kontekstu poboljšavanja kvalitete i razvoja novog proizvoda. Proces od-izuma-do-inovacije je vrlo složen i uključuje mnoge različite aktere. Stručne prakse kvalitete mogu biti korisne u ovom procesu. Gledišta kvalitete i inovacije se također razmatraju u odnosu na normizaciju uključujući mogućnosti poslovno integrirane primjene upravljanja kvalitetom i upravljanja inovacijom na usklađen način. Veliki izazov je shvatiti kako svjesnost i vještine pojedinaca i raširena nastojanja društva mogu promicati kvalitetu i inovaciju. Kvaliteta i inovacija su partnerske discipline koje mogu biti korisne jedna drugoj i zajedno mogu stvoriti organizacijsku različitost u svrhu konkurentске prednosti.

Ključne riječi: kvaliteta, inovacija.

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SOCIAL ENTREPRENEURSHIP IN QUALITY MANAGEMENT OF CULTURE SPHERE

SOCIJALNO PODUZETNIŠTVO U
UPRAVLJANJU KVALITETOM NA PODRUČJU KULTURE

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SUMMARY

The relevance of the materials presented models of social entrepreneurship in the sphere of culture as an important source of development organizations in this field. The authors concretize the importance of social entrepreneurship as a tool for the development of business processes, institutions of culture, justify the principles of social entrepreneurship for the sphere of culture, and also of experience in the development of social entrepreneurship projects in the Russian Federation.

Key words: social entrepreneurship, institutions and cultural sphere, social projects, business processes, quality management.

1. INTRODUCTION

Modern social and economic conditions, characterized by high organizational stress, socio-economic instability, the actualization of the needs of social guarantees of the population have a negative impact on the development of the cultural sector. Of the cultural sphere, as a rule, are experiencing financial,

administrative and regulatory constraints for innovative development. Actualized need for fundraising and sponsoring, development, start-up projects. It is important to note that the formation of long-term relationships of partnership is possible in a situation of mutual interest of stakeholders - beneficial terms of cooperation. In this connection, the scope of the culture is in a difficult situation, due to the fact that the business attractiveness of projects in this field is limited. It seems that the cultural sector organizations direction of projects of social entrepreneurship is the most popular and relevant in terms of formation and development of innovative tools to attract partners to implement projects.

2. DISCUSSION

As the analysis of the literature, a social entrepreneurship should be understood in entrepreneurial activity, which is aimed at alleviating or resolving social problems. The organization's activities in the sphere of culture of social entrepreneurship should be characterized by the following important features:

- *Social impact*, that is, the target aimed at solving/mitigation of existing social problems, including the development of cultural sphere. As a result of the implementation of social entrepreneurship projects in the field of culture must be submitted sustained positive measurable social outcomes.
- *Innovativeness* of the organization of culture, that is, the use of new and unique approach to create conditions to increase the social impact.
- *Self-sufficiency* and financial sustainability of the organization of culture, that is, the ability of organizations to solve social problems as long as is necessary and at the expense of revenues from its own activities.
- *Scalability* and replicability of social models of the impact, that is, an increase in the territory of the organization (national and international) and dissemination of the positive experience of cultural institutions to promote and strengthen social impact.
- *Entrepreneurial* approach, i.e. the ability of the organization to see the sphere of culture market failures in the social sector (especially in culture), to find opportunities to accumulate resources, to develop new solutions that have a long-term positive impact in optimizing the activity in this direction.

To participate in the programs and projects of social entrepreneurship can not only public institutions of culture, but also socially oriented non-prof-

it organizations whose activities are aimed at solving social problems, development of civil society in the Russian Federation. The main condition for the recognition of non-profit organizations is the implementation of socially oriented their activities, an indicative list of which is established by Article 31.1 of the Federal Law of 12 January 1996 “On non-profit organizations.”

Such activities include activities in the field of education, education, science, culture, art, health care, prevention and health protection, promotion of healthy lifestyles, improving the moral and psychological state of citizens, physical culture and sports and the promotion of such activities, as well as assistance spiritual development of the individual.

Studying issues of social entrepreneurship in the sphere of culture, it is impossible not to consider the issues related to their social portrait. It is important to understand that social entrepreneurship in general purpose extraction of private benefits is determined by the secondary to solving social problems. According to Natalia Zvereva, chairman of the fund “Our Future”, the primary stimulus for this category of business becomes the goal of “a better world” (35%), “the desire to be useful to society” (40%) and “meet the needs of society” (24%). Of course, important and personal growth, and self-realization (56%), as well as the realization of the idea - so answered 53% of social entrepreneurs. The author also notes that the social entrepreneurship in Russia is a growing trend that helps seriously versatile integrated support initiatives by government, civil society organizations, major financial institutions. Today we can say that social entrepreneurship is becoming an important trend in the Russian economy.¹

One of Russia’s biggest competitions of grant support in the field of social entrepreneurship is a contest for awarding grants of the President of the Russian Federation to support creative projects of national importance in the field of arts and culture. The purpose of the contest is “to contribute to the preservation and dissemination of national culture, introduction to the cultural values of the different layers of the population, maintaining the traditions of multinational culture of the peoples of the Russian Federation.” The main priorities are projects of national importance in the field of culture and art; Projects that promote the formation of a common cultural space and the creation of cultural values; projects aimed at preserving the cultural heritage of Russia and the spread of the best achievements in the field of culture and arts of the Russian Federation; as well as projects in the field of cultural tourism.

¹ Natalia Zvereva, Director of the “Our Future”. Social entrepreneurship is becoming a trend real “new business: social entrepreneurship”. URL: <http://www.nb-forum.ru/>

In 2015, the award of 100 grants of the President of the Russian Federation to support creative projects of national importance in the field of culture and arts can apply for social projects in the region:

- Museology;
- Library science;
- Arts and crafts, folk art;
- Fine arts, design and architecture;
- Musical art;
- Choreographic art;
- Theatrical Art;
- Circus arts;
- Cinematography.²

It is important to note that this competition is held annually in Russia since 2006.³ In 2011, Russian President Dmitry Medvedev has awarded 100 grants to support presidential creative projects of national importance in the field of arts and culture. Most of the grants has been allocated for the development of musical projects, publishing projects and documentaries promoting the ideals of inter-ethnic harmony, as well as for the organization of workshops, folklore, music and theater studios and exhibitions.

In 2010, the winner of the regional competition of projects in the field of social entrepreneurship the 2010 Fund of regional social program “Our Future” was the project “Museum in Kolomna marshmallow factory” (launched in 2008). The long-term goal of the project is the development of the historic center of Kolomna through culture and tourism. The starting point for the work of its creators was to organize the production of the legendary Kolomna marshmallow recipe from the reconstructed XIX century.⁴

It should be noted that the active measures of the state and private support for social entrepreneurship in the field of culture are bearing results. Every year a growing number of workers of culture, participating in various competitions grants with unique colorful designs.

² The Ministry of Culture of the Russian Federation. <http://mkrf.ru/>

³ An order from the Ministry of Culture of the Russian Federation from 16.08.2006. N 398 (e.d. By 27.02.2009) “On approval of the Council for Grants of the President of the Russian Federation to support creative projects of national importance in the field of culture and art, and the Regulation on the conduct of the competition for the grants of the President Russian Federation to support creative projects of national importance in the field of culture and art “ (Registered in the Ministry of Justice 03.11.2006 N 8439). URL: http://www.consultant.ru/document/cons_doc_LAW_87053/

⁴ The fund regional social program “Our Future”. URL: <http://www.nb-fund.ru/social-entrepreneurship/>

For example, in accordance with the Presidential Decree of 1 July 1996. №1010 “On measures to strengthen public support for arts and culture in the Russian Federation” in 2010 awarded grants of the President of the Russian Federation to support creative projects of national importance in the field of culture and art: Abalaevu Farid Velihanovichu, specialists of the State Cultural Institution “Republican House of Folk Art” (Makhachkala), the implementation of the project on reconstruction of ancient national ceremonies; Berdnikova Nadezhda Gennadevna, specialist, coordinator of the scenario group limited liability company “ASisTP” (Moscow) for a project to create a series of documentary films on the development of digital libraries; Kislovskaya Galina, director of the Federal State Cultural Institution “Russian State Children’s Library” (Moscow) for a project to create a digital collection of rare children’s books; Kolosova Svetlana Viktorovna, director of the municipal cultural institutions “inter settlement Central Library” (pos. Pankovka, Novgorod region), on the implementation of the project on creation of a network of information centers for the rural population; Koreneva Natalia, Academic Choir conductor (Moscow) for a project to create a children’s musical creative association “Patriot”; Peters Tatyana Pavlovna, philologist and linguist (s. Bolshie Vyazemy, Moscow region), on the implementation of the project for the preparation and publication of the book “From the battlefield” (to the 200th anniversary of the War of 1812 and the foreign campaigns of the Russian army 1813-1814);

Pogrebnoy Alexei Ivanovich, the artistic director of a limited liability company “vi- deo studio” Vyatka “(Kirov), the implementation of the project on creation of the documentary film” The ABCs of Love “; Shaimardanova Anatolievna Lyudmila, director of municipal budgetary institutions” Library and Information System “(Mr. Nizhnevartovsk, Tyumen Region), for a project to create a library-service “Mercy”.

In 2014, Russian President Vladimir Putin instructed the government to include in the draft budget for 2014 and the planning period of 2015-2016 funds in amount of 500 million rubles for the competitions on the distribution of grants to non-profit organizations under the control of the All-Russian public movement “Civil Dignity”.⁵ Among the winners were such projects as the Company’s “knowledge” of Russia “-” Regional public organization promoting visual arts and culture, “Art of the Third Millennium” (grant amount - 6 000 000) and the project “Regional public organization Information and Cultural Center” Russian emigration (grant amount - 1 290 000 rubles).⁶

⁵ The Ministry of Culture of the Russian Federation. <http://mkrf.ru/>

⁶ Contest Website grant support to NGOs. URL: <http://grants.oprf.ru/>

Private foundations also contribute to the development of social business initiative in the field of culture. So Vladimir Potanin Foundation annually announces a competition of grant support museum activities, which aims to support leaders who can make a museum of modern center of education and learning, as well as open public institutions. As part of the museums' fund strategy, the following areas:

1. "Changing Museum in a Changing World" (grants employees of museums of the Russian Federation on the implementation of modern museum projects);
2. "Museum Troopers" (contests in two directions: training in Russia and abroad, and to attract competent professionals museum sector to engage in activities, the development of projects of development and modernization of Russian museums);
3. "Affiliate Program" (together the resources of the Fund, the possibilities and potential of leading Russian museums and non-profit organizations for the implementation of innovative initiatives of the museum community in areas related to the strategic priorities of the Fund);
4. "Museum Guide" (grants for the promotion of museums in the public space, increase the availability of museum collections. In particular, by means of their presentation on the Internet and support the work of museum ification landscape);
5. The festival "Museum Guide/Museum Guide" (an event that brings together and represents all museum initiative fund. The festival includes curatorial exhibition of the best museum practices and a discussion platform and discusses trends in the development of the museum sector. The materials for the exhibition are projects of the winners of "The Changing Museum in a changing world "and" first publication ");
6. Grants employees of the State Hermitage Museum (individual grants professional mobility of employees of the State Hermitage).

Interestingly, in our opinion, are such interactive projects - winners of competitions Potanin Foundation for the sphere of culture, as a project of "Illusions of Old Town" (2008, project manager - Elvi Averyanov); Project "Museum of Archaeology for blind children in the Historical Museum" (2008, project manager - Natalia Shishlina); Project "More than a souvenir" (the creation of a new service for anglers and their families in 2015, the project leader - Andrei Volkov); "Online game in the Moscow Museum of Modern Art" (2014, project manager - Katerina Zaitseva).⁷

⁷ Contest Website grant support to NGOs. URL: <http://grants.oprf.ru/>

3. CONCLUSION

According to George Nikich (Ph.D., board member of the International Association of Art Critics (AIS), curator of the Forum 'Culture +', the chief curator of the Moscow International Forum of Art Initiatives, Lecturer, Department of Cultural Management Project of the Moscow School of Social and Economic Sciences (Russian-British University)), culture has an enormous social resource, and a businessman of his releases.

Specificity of social entrepreneurship in the cultural sphere lies in the fact that "almost any business in a social culture in the sense that the promotion of culture and the inclusion of culture in the daily life of man is developing a social gesture. The effectiveness of social entrepreneurship in the culture is expressed not only in numbers, but in the states - the state of the people, the state of social groups, cultural state of entire areas".⁸

Sažetak:

SOCIJALNO PODUZETNIŠTVO U UPRAVLJANJU KVALITETOM NA PODRUČJU KULTURE

Relevantnost građe predstavljenih modela socijalnog poduzetništva u području kulture kao važnog izvora razvoja organizacija na tom polju. Autori konkretiziraju važnost socijalnog poduzetništva kao alata za razvoj poslovnih procesa, kulturnih institucija, dokazuju načela socijalnog poduzetništva za područje kulture, kao i iskustvo u razvoju projekata socijalnog poduzetništva u Ruskoj Federaciji.

Ključne riječi: socijalno poduzetništvo, institucije i područje kulture, socijalni projekti, poslovni procesi, upravljanje kvalitetom.

4. LITERATURE

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⁸ Nikich G. Money and charity. 2008. № 3 (68). With 50-52. URL: <http://www.nb-forum.ru/>

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7. Vladimir Potanin Foundation. URL: <http://www.museum.fondpotanin.ru/progra>

MIMOSA OSA-EAI – AN INFORMATION EXCHANGE STANDARD

MIMOSA OSA-EAI – STANDARD RAZMJENE INFORMACIJA

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ABSTRACT

The MIMOSA OSA-EAI standard was developed with the intention of solving problem of integrating different applications. Its specification provides an information exchange standard to allow sharing asset registry, condition, maintenance and reliability information between enterprise systems and a relational database model to allow storage of the same asset information, i.e. sensor location, measurement event, raw sensor data, processed signal data, etc. Condition monitoring systems have become more popular in recent years, sensor technology is constantly improving in detecting more types of conditions and analysis models are becoming more mature. This paper will present general principles, model and database schema of the OSA-EAI, and general simplified data flow model from machine sensor to maintenance support personnel.

Key words: machine, maintenance, MIMOSA OSA-EAI, model, standard.

1. INTRODUCTION

Numerous asset management systems are offered by different vendors. On the other hand, complex systems have complex data flow and part of the system connected with own unique data exchange interfaces. Different integration techniques bring their own advantages and disadvantages so businesses need to resolve dilemma:

- Purchase a custom bridge that integrates systems, which may be more cost effective than internally building one, but provides less customization and requires updates for new system versions, or
- Use an industry standard bridge, which allows businesses to mix different systems with reduced integration costs, but there may be performance loss compared to a custom solution and vendors have to support the standard.¹

Enterprises, like Rockwell Automation², AVEVA Group³, DRS Technologies⁴, Raytheon Company⁵ and Bentley Systems Inc.⁶, which are critically dependent upon complex physical assets have historically focused integration efforts on two major horizontal layers:

- Real-Time Control and,
- Business Information Systems.

Experts within these two areas seldom work directly with each other and do not focus on integration between the layers, which has resulted in a significant vertical information gap. This gap is compounded when O&M (Operations and Maintenance) processes, systems and people are not efficiently integrated with each other, resulting in a corresponding horizontal information gap. Together, these gaps create an empty space in the very center of enterprise process and information integration.⁷

¹ Avin D. Mathew, Liqun Zhang, Sheng Zhang and Lin Ma, "A Review of the MIMOSA OSA-EAI Database for Condition Monitoring Systems", Proceedings of the World Congress on Engineering Asset Management, Gold Coast, Australia, 2006.

² Rockwell Automation, http://literature.rockwellautomation.com/idc/groups/literature/documents/wp/oem-wp001_-en-p.pdf, (19.05.2015.)

³ AVEVA Group, <http://www.aveva.com/en/News-Events/Press-Releases/Press-Releases-2013/Corporate/AVEVA-Automated-Plate-Nesting-released.aspx>, (19.05.2015.)

⁴ DRS Technologies, <http://www.drs.com/CorporateInfo/index.aspx>, (19.05.2015.)

⁵ Raytheon Company, <http://jobs.raytheon.com/jobs/sap-process-integration-pi-developer-job-garland-texas-1-5377985>, (19.05.2015.)

⁶ Bentley Systems Inc., <http://www.bentley.com/en-US/Products/Bentley+Enterprise+Connection+Services/>, (19.05.2015.)

⁷ MIMOSA OSA-EAI, www.mimosa.org, (02.05.2015.)

Historically, the O&M community has also lacked tight alignment with the Life-cycle Engineering community. This has led to a series of poorly connected activities with highly suboptimal results including data quality problems and the loss of configuration control for complex physical assets including plants, platforms and facilities. The effect has been a loss of integrity management for the digital asset which makes integrity management for the physical asset much more difficult.

To resolve difficulties with system integration and to provide a unified view of the condition of machinery to the users, ISO (International Standardization Organization) introduced international standard ISO 13374-1:2003, Condition monitoring and diagnostics of machines – Data processing, communication and presentation – Part 1: General guidelines. The standard provides the basic requirements for open software specifications and allows machine condition monitoring data and information to be processed, communicated and displayed by various software packages without platform-specific or hardware-specific protocols. It consists of four parts that define guidelines and requirements of the standard.⁸

The MIMOSA (Machinery Information Management Open Systems Alliance) OSA-EAI (Open Systems Architecture for Enterprise Application Integration) standard was developed with the intention of solving problem of integrating different applications. Its specification provides:

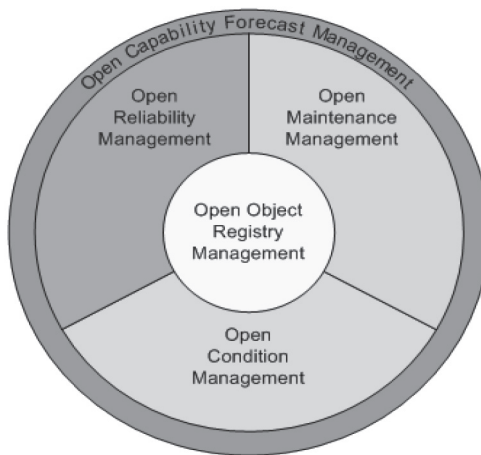
- An information exchange standard to allow sharing asset registry, condition, maintenance and reliability information between enterprise systems and
- A relational database model to allow storage of the same asset information.

The OSA-EAI uses a layered architecture to allow individual components to be used independently to satisfy functional requirements (Figure 1).⁹

⁸ ISO, ISO 13374-1:2003, http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=21832, (19.05.2015.)

⁹ MIMOSA OSA-EAI, www.mimosa.org, (02.05.2015.)

Figure 1. OSA-EAI Information Scope¹⁰



Source: MIMOSA OSA-EAI.

The biggest obstacle in making of maintenance systems is the lack of interdisciplinary knowledge. The optimal solution contains a proper and full integration with other maintenance systems in the enterprise. MIMOSA provides effective solutions to overcome described information gap.

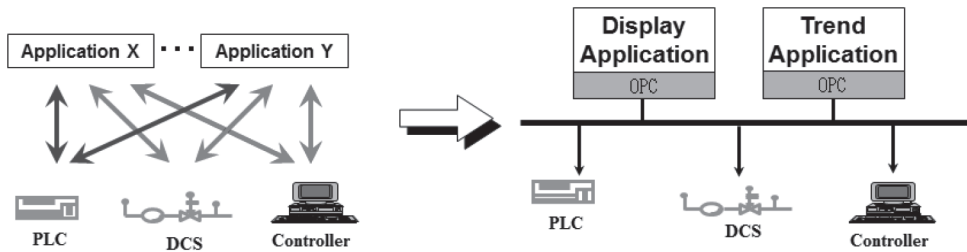
2. MIMOSA OSA-EAI STANDARD

Operators, maintenance personnel, logistic managers, OEMs, parts suppliers, and engineers have always wanted to have information about the condition of equipment assets at their fingertips when they need it. Unfortunately, it is typically scattered among separate information systems, one for each platform and then separated by information type: manufacturers nameplate data, as-installed data, as-maintained data, operational data, condition monitoring data (such as vibration readings, infrared thermography, oil analysis, control device monitoring, etc.), and asset diagnostic/health and reliability data. Interconnectivity of the islands of engineering, maintenance, operations, and reliability information is envisioned by use of the OSA-EAI. Previously, these separate information islands were built using specialized proprietary systems that provided value because they were optimized for a specific task or tasks, and they provided best results and value for those purposes. However, their combined value can be multiplied significantly if they can be merged into an

¹⁰ Ibid.

information data network. The data network can be realized by building open OSA-EAI bridges to proprietary data stores to allow that stores to collaborate and to allow information to be easily understood and utilized (Figure 2).

Figure 2. From connectivity to collaboration¹¹



Source: MIMOSA OSA-EAI.

The OSA-EAI supports the exchange of XML files over multiple data transport options including files (Tech-Doc), HTTP (Tech-XML-Web), and SOAP Web Services (Tech-XML-Services), to accommodate various types of applications and integration scenarios. The Web Service definitions are sufficiently granular such that they can be used in a Service-Oriented Architecture (SOA).¹²

2.1. Open Management segments

OSA-EAI standard introduces five Open Management segments that are responsible for key system elements:

- Open Object Registry Management,
- Open Reliability Management,
- Open Maintenance Management,
- Open Condition Management,
- Open Capability Forecast Management.

Open Object Registry is a core O&M interoperability enabler for asset intensive industry. It provides a full mesh network for maintaining interrelationships between people, processes and systems in Service Oriented Architecture. Object Registry enables permanent and consistent identification of all

¹¹ Ken Bever, “Open O&M and MIMOSA Standards Introduction (PowerPoint presentation)”, Tuscaloosa: The Open O&M Initiative, 2012.

¹² MIMOSA OSA-EAI, www.mimosa.org, (02.05.2015.)

systems, sub-assemblies and components and supports all types of physical asset components, systems, platforms and facilities.

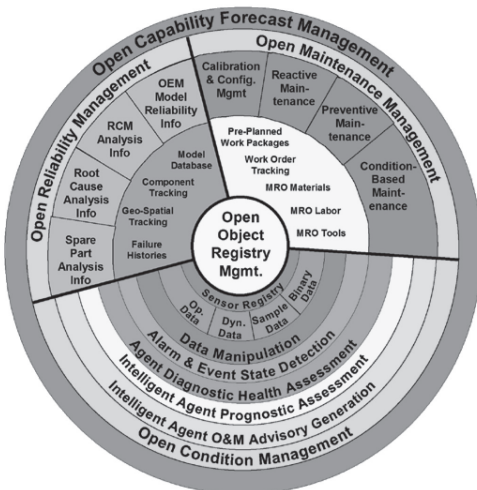
Open Reliability Management provides consistent information architecture for managing all physical asset reliability information in an open, distributed, multi-vendor, multi-system environment. Reliability Management enables continuous improvement throughout system, sub-assembly and component life-cycles.

The OSA-EAI data model and interfaces are intended to provide rich support for Open Reliability Management and Open Maintenance Management activities enabling asset lifecycle management. This includes vertical support within an enterprise integrating maintenance oriented shop floor and business systems, as well as inter-enterprise integration.

Open Condition Management provides consistent information architecture for managing all physical asset condition information in an open, distributed, multi-vendor, multi-system environment. Condition Management conforms to ISO 13374 standard for Machine Condition Monitoring & Diagnostics.

Open Capability Forecast Management provides consistent information architecture for physical asset capability forecasting based on projected future operating profiles, quality constraints and time constraints, and for managing all physical asset capability forecasting information in an open, distributed, multi-vendor, multi-system environment.

Figure 3. OSA-EAI Structure¹³



Source: MIMOSA OSA-EAI.

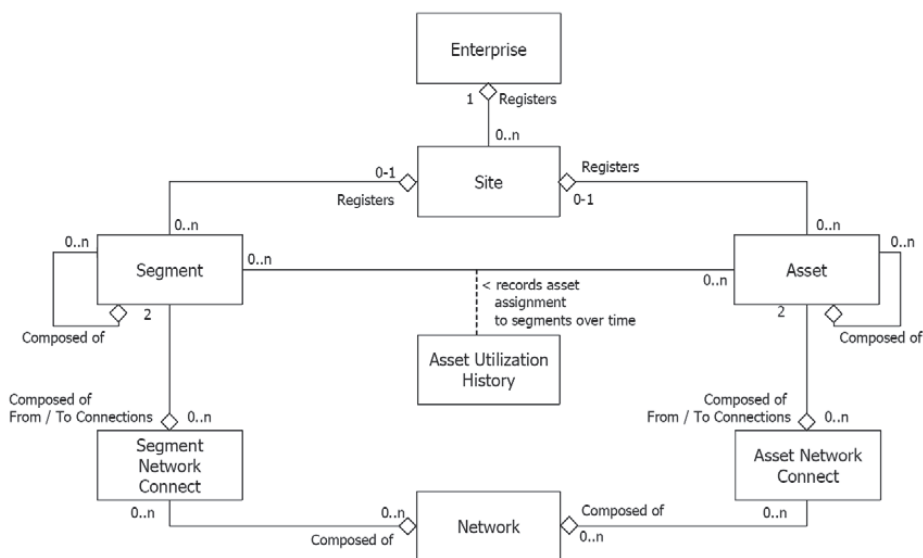
¹³ Ken Bever, “Open O&M and MIMOSA Standards Introduction (PowerPoint presentation)”, Tuscaloosa: The Open O&M Initiative, 2012.

Capability Forecast Management supports operational forecast scheduling and what-if order/mission decision support. Figure 3 shows relationships between segments and internal structure of each segment.

2.2. Common Conceptual Object Model (CCOM)

OSA-EAI's CCOM (Common Conceptual Object Model) defines core objects and features and a simplified version of that model is shown in Figure 4.

Figure 4, Simplified version of OSA-EAI CCOM [10]



Source: MIMOSA OSA-EAI.

Key objects of CCOM are:¹⁴

- Enterprise – an enterprise is the corporate level of an organization or the top organizational structure of a non-profit or military body. An enterprise is composed of many sites.
- Site – an enterprise-defined entity which can be decomposed into segments and which generates new assets, agents, databases and measurement locations.

¹⁴ The Open O&M Initiative (2006) *Using MIMOSA's OSA-EAI and ISA-95/B2MML*. Tuscaloosa: The Open O&M Initiative.

- Segment – a logical entity which is designed to perform a function at a site. A segment can be monitored, associated with work, decomposed into smaller segments and serve as a “container” for a physical asset.
- Asset – an instantiated entity which can be physically tagged with an asset identifier and/or depreciated by an accounting system. Assets are assigned an ID which uniquely identifies the asset for its entire lifetime even if used for different segments over time.
- Asset Utilization – records the assets used by segments over time.
- Network – a named association of segments and/or assets from/to connections in a sequenced production process or as a named hierarchy of segments.

The functioning of the system requires proper definition of an entity that describes basic system information. Enterprise entity is on the highest level and contains company information. This allows storing of the major companies’ maintenance data in the same information system. Each company owns one or more production buildings. Consequently, on each production area, data are stored in the entity Site. Every factory contains several machines, which can be easily and logically grouped. These groups represent Segments. Finally, data from the actual machines, that are the focus of monitoring systems, are stored in the Asset entity. Besides basic structure of the system, there are data about manufacturers of machines and sensors, which are installed on each machine. For easy storing of this type of data, entities Model and Transducer are needed. Entity Model contains data about equipment and specifics of the particular machine model (Asset). The entity Transducer defines sensor data: frequency characteristics, measuring unit, measuring constants, last calibration time, etc.

As addition to simplified version of OSA-EAI CCOM shown in Figure 5, relationship between entities, that includes entities Model and Transducer too, can be seen on Entity relationship model shown in Figure 5.

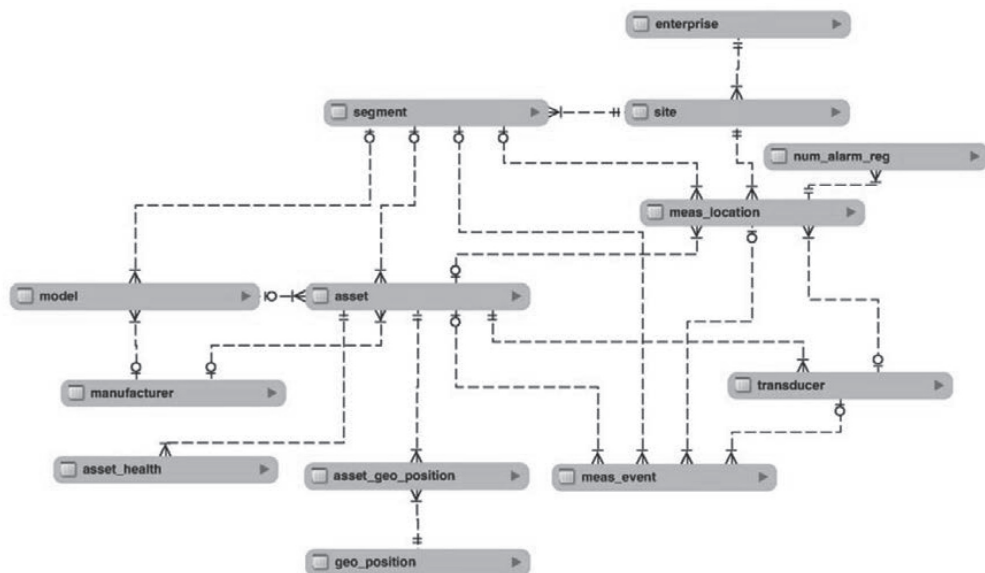
2.3. Relational database model

Relational database is defined by the entity relationship model in the form of XML (Extensible Markup Language) schemas. The MIMOSA standard offers a SQL (Structured Query Language) script for quicker database setup. Each table corresponds to a particular primary key generated from the three fields:

- Version of the base,
- Version of the installation,
- Unique identifier of each row.

The table of codes contain additional key i.e. specific key for each code. Seemingly complex structure, allows storage of codes during the database structure update process.¹⁵ Entity relationship model of MIMOSA OSA-EAI relational database is shown in Figure 5.

Figure 5. Entity relationship model of MIMOSA OSA-EAI relational database¹⁶



Source: MIMOSA OSA-EAI.

Specific to this relational database structure is a strategy of writing various data. Some entities, in addition to the basic data, need a different number of other attributes, which are generally of a different type. To support this, MIMOSA OSA-EAI database provides additional tables whose names contain a description of the attributes type. A typical example is an entity Measurement. Besides numerical measurements, system also contains textual data that can only be an integer, binary data or entity such as time dependent signal. That result with a special table which contains the type name of stored

¹⁵ Pavle Boškosi, Đani Juričić, “MIMOSA OSA-EAI Standard for E-Maintenance”, Proceedings of the 8th Conference AIG’13 Automation in economy and industry, Maribor, Slovenia, 2013.

¹⁶ Ibid.

data for each type of measurement database contains. The same pattern applies to all other entities that require a different number of diverse attributes.¹⁷

Besides pattern for a different attributes, the database allows the database hierarchy. Hierarchy is a typical pattern for defining relations between machines and their components.

Despite the fact that the database is fully ready for use, its apparent complexity can disturb proper use. Document storage is the easiest way to understand the correct use of the database. The central entity in the database is table Measurements. Each measurement requires data about sensor, which includes a particular signal, the data about element of the machine on which the measurements relate, and the information about the machine. Consequently Measurements table has a relation to table Asset and table Transducer.

2.4. Communication interfaces

MIMOSA OSA-EAI provides standard communication interfaces designed based on Web services. Standard precisely specify the necessary commands and their parameters by means of WSDL (Web Services Description Language) files. The proposed instruction set provides access to all data and functions contained in the information system for machinery monitoring. Moreover, there are defined interfaces for connecting with external systems, such as MES (Manufacturing Execution System) or ERP (Enterprise Resource Planning) systems. From the perspective of the database WSDL files do not offer ways to store computed characteristics in the Measurements table. Standard envisages that the data acquisition module will store characteristics in database. In those cases, data collection and data processing are carried on the outside of the platform and it is also necessary to create an additional communication interface.

The specification of WSDL files makes implementation of the required commands really easy. The difficulty in communicating with web services is the amount of overhead data. In cases where the reliability of the transmission and amount of information is an important factor, all communication interfaces can be based on the binary data transfer.¹⁸

¹⁷ Isto.

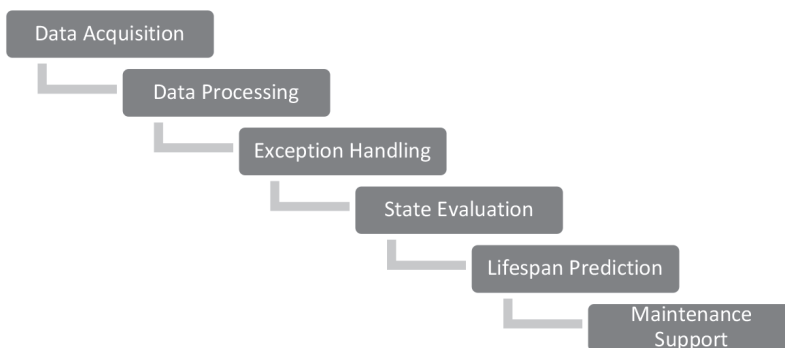
¹⁸ The Open O&M Initiative (2006) Using MIMOSA's OSA-EAI and ISA-95/B2MML. Tuscaloosa: The Open O&M Initiative.

2.5. Data flow from sensor to maintenance personnel

If we are interested in just simple following the data flow from sensor on some machine all the way to maintenance support personnel, then all the complex model, segments, database and interfaces shown in previous paragraphs can be simplified to block diagram shown in Figure 6.

Each block stands for one module with its own specific function in the process of determining the status of the machinery. Data Acquisition and Data Processing modules are responsible for the proper data acquisition and processing relevant characteristics of the received data. Exception Handling module controls and analyses data which exceed some established limits and initiate appropriate alarms. State Evaluation module works based on previously processed characteristics and current machine's production regime.

Figure 6. Simplified data path from sensor to maintenance personnel



Source: MIMOSA OSA-EAI.

Lifespan Prediction is responsible for evaluation of the machine's lifespan based on the history data and model attributes. According to State Evaluation results and Lifespan prediction, Maintenance Support module generates information and advices for maintenance personnel and operators.

3. CONCLUSION

This paper presented MIMOSA OSA-EAI standard, Open Management segments, Common Conceptual Object Model (CCOM), relational database model, standard communication interfaces of the MIMOSA OSA-EAI, and

general simplified data flow model from machine sensor to maintenance support personnel and operators.

The MIMOSA OSA-EAI is a thorough and well-constructed specification for asset data management. OSA-EAI is suitable for a condition monitoring database, covering the major aspects of condition monitoring, including asset and sensor registry management, measurement, event management, and storing raw data and processed signals. Data model is complex and lack of documentation is obvious but, at the same time, standard provides usable database implementation schema with openness for all possible adjustments. MIMOSA OSA-EAI continues to be a work in progress and it provides a bright future for engineering asset management and maintenance support systems.

Sažetak:

MIMOSA OSA-EAI – STANDARD RAZMJENE INFORMACIJA

MIMOSA OSA-EAI standard razvijen je s namjerom rješavanja problema integracije različitih aplikacija. Njegova specifikacija predstavlja standard razmjene informacija kako bi se omogućilo dijeljenje registra imovine, uvjeta, održavanja i sposobnosti ostvarenja funkcija informacija između poslovnog sustava i odnosnog modela spremanja baze podataka i informacija o istoj imovini, tj. senzora lokacije, mjerenja događaja, senzora sirovih podataka, procesuiranog signala, itd. Sustav nadzora uvjeta postao je popularan proteklih godina, tehnologija senzora stalno se poboljšava i pronalazi više vrsta mogućnosti, a modeli analize postoju sve razvijeniji. Ovaj članak prezentira opće principe, model i shemu baze podataka OSA-EAI i opći pojednostavljeni model protoka podataka od stroja do osobe koja provodi održavanje.

Ključne riječi: stroj, održavanje, MIMOSA OSA-EAI, model, standard.

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THE QUALITY OF INNOVATION MANAGEMENT GIVES OUR BUSINESS SYSTEM: HOW TO ADVANCE FORWARD?

KVALITETA UPRAVLJANJA INOVACIJAMA OMOGUĆUJE
DINAMIČNOST POSLOVNOG SUSTAVA – KAKO DALJE?

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ABSTRACT

The use of a systematic approach to managing innovation is a good stepping stone for any organization aiming to become more innovative in order to win on the market. One of the barriers to innovation in small- and medium-sized enterprises (SMEs) is a lack of internal infrastructure to support the process of transforming an idea into an applicable innovation. Even in larger organizations in many cases there are no proper drivers, responsibilities assigned, and infrastructure established to cultivate and develop the innovation capacity.

Innovation is not a new subject in human history or in the history of quality management. There are no real improvements without innovation, and every innovation should be a quality improvement. In today's business environment there is an increasing demand for disruptive and "lean" innovations in quality management and quality assurance practices because the existing quality management systems and their practices in organizations are no longer effective for the challenges of new circum-

stances, especially those related to networked businesses and ecosystems. Looking into the development of quality management and innovation activities in general, it can be concluded that they have evolved largely as separate disciplines. Organizations have a key role both in implementing quality and innovation procedures in practice. It is no longer beneficial to organizations if quality management and innovation management are developed separately and considered different activities that are isolated from each other. Successful development of business integration is a holistic organizational learning process that leads to refining related concepts and principles, tools and methodologies, and management practices in a compatible and balanced way. In 2013, the “Innovation Management” CEN/TC 389 Technical Committee prepared a document labeled CE/TS 16555-1 with the aim of increasing organizations’ awareness of the value of an innovation management system, helping establish such a system, expanding capacity for innovation, and ultimately generating more value for the organization and its stakeholders. These guidelines can be used to integrate quality management and innovation management processes simultaneously into an organization’s business management process.

The purpose of this paper is to facilitate and enhance practical implementation of the innovation management system standard CEN/TS 16555-1-7 (1) while at same time updating and revising a current QMS, ISO 9001- 2015.

Key words: innovation management system, CEN/TS 16555-1, sustaining change, innovation, integrated system, business system.

1. INTRODUCTION – DO WE PROPERLY SUSTAIN CHANGE?

A recent statistic tells us that almost 50% of the Fortune 500 companies in 1999 had disappeared from the list just ten years later.¹ What is the life cycle of our companies like? Are we supporting organizational survival professionally, with the right awareness of the all key driving forces and changes? We’re living in uncertain, complex, fast-moving times in this world (short for volatility, uncertainty, complexity, and ambiguity). There are multiple business transformation triggers in place at the same time and with equal force – triggers such as globalization, shifts in technology, challenges of regulatory compliance and shifts in customer demand. There have been deep insight on the urgent need to balance our organizations’ survival capability (fig.1). Balancing the short-long term is perhaps the leader’s single biggest challenge. The number one inhibitor of high performance is short-term thinking.

The need for short-term performance with the imperative of long-term strategic focus transform our businesses has never been more demanding or more specific:

¹ <https://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/business-transformation-corporate-agenda.pdf>

- **The right strategic vision is critical** – In addition to anticipating what our customers are going to be looking for in the future, we need to define the depth and scope of the changes and redesign our internal processes and broader ecosystem.
- **Execution is the hardest part of transformation** – More than half of all companies undertaking transformation fail to achieve their desired outcomes. One of the most common stumbling blocks is underestimating the operating model refinements that will be required across the organization.
- **Beware of leaders who are clinging to past or current successes** – This is the hypnotic illusion of the status quo. Transformation needs to be a continuous, never-ending process rather than a distinct ‘event’.

One common feature we see in organizations that survive beyond middle age is a willingness to constantly change: to innovate and stay ahead of the competition, not simply rest on their current success. In these circumstances we may agree that the riskiest thing we can do is just maintain the status quo.

2. THE FRAMEWORK OF THE INNOVATION PROCESS HAS EVOLVED OVER PAST DECADE

The use of a systematic approach to managing innovation is a good stepping stone for any organization aiming to become more innovative. One of the barriers to innovation in small-and medium-sized enterprises (SMEs) is a lack of internal infrastructure to support the acceleration of innovation. Even bigger organizations might not have the right drivers, responsibility and infrastructure to cultivate and develop their innovation capacity.²

Hence, innovation is not a new subject in the quality discipline but has inherently been present in professional quality practices for decades. In fact, there isn’t any real improvement without innovation, and on the other hand all innovations are for quality improvement. We have recognized pressing needs for disruptive and “lean” innovations in quality management and quality assurance practices because current practices in organizations are not necessarily any more relevant or effective to the challenges of today’s business environments (e.g. related to networked businesses and ecosystems).

By reflecting on the development of quality and innovation activities in general, one can draw the conclusion that they continue to evolve largely as separate disciplines.

² Leslie Martinich and Mila Božič, Innovation Processes for SMEs: Moving from Serendipity to Strategy, ECIE 2011, Aberdeen, Scotland, 2011.

It is not beneficial to the organizations if quality management and innovation management are developed separately from each other as isolated initiatives.³

These guidelines⁴ can be used in integrating quality management and innovation management processes simultaneously into an organization's processes of business management. Successful development of the business integration is a holistic organizational learning process that leads to refining related concepts and principles, tools and methodologies, and management practices in a compatible and balanced way.

By having experience in leading QMS and adopting IMS, we (quality professionals and innovation leaders) are able to facilitate and *do* such a balanced integration of both standards in our organizations to support systemic innovation management and *be* the change catalyst in delivering company vision and strategic intent.

For quality professionals (QPs) and leaders who are serious about initiating and sustaining positive change for their organizations, it is crucial to master and integrate the domains of systems thinking, personal mastery and teamwork, as these apply to creating lasting change.⁵

We need to continuously adapt the skills, tools and competences needed to become 'future-focused Leaders'. This means making significant transitions towards more future focused leadership behaviors and practices. It means letting go of past practices, where mostly optimization and standardization have often been enough for our managerial positions. For the future, both optimizing and innovating of what we do will become part of our daily practices.

To deal successfully with future demands that we accept the importance of discontinuity as a prerequisite of creativity and innovation.⁶

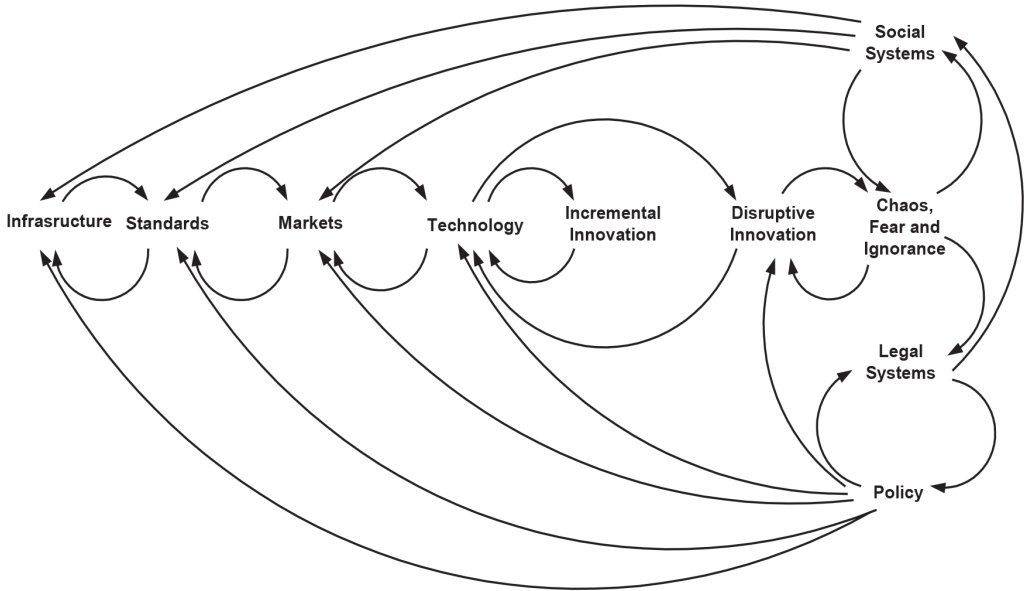
³ Juhani Anttila, <http://www.qualityintegration.biz/HailInnovation.html>

⁴ <https://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/business-transformation-corporate-agenda.pdf>

⁵ Janet Sernack, <http://www.imagination.com.au/blog/page/3/>

⁶ Ibid.

Fig. 1. Organizations' survival capability



Source: Leslie Martinich, Competitivefocus, 2002.

We have to deepen our awareness and capacity to lead effectively and to create an environment where quality and innovation culture is naturally embedded in the fabric of our organization and community.

3. OUR TASK IS TO KNOW THE DIFFERENCE AND TO MAKE THAT DIFFERENCE

Finally, we have recognized that the European approach to development of management systems for quality control and improvement has been mired in a commitment to standardization that *stagnated innovation* in designing new methods and capabilities for a long time (as stated in IAQ-EOQ, Report, 2015).

- The ISO 9000 series has demonstrated a long-term incremental increase in what is basically bureaucratic administration of the quality function for the long-term; however, it does not specify content or methodologies to be employed to achieve the quality outcomes or increase efficiency. It indicates a need for continual improvement but does not address or specify any particular approach or methodology which is considered best practice.

- The European Quality Award (EFQM Business Excellence Model) provides a structured self-assessment model that is also silent on best-practice content that makes a difference in business performance and only demonstrates what to do in one-off case studies (i.e. an applicant's organization) without the benefit of sound theoretical or academic basis for these actions – thus these practices become anecdotally-defined, not scientifically based. It does not identify specific practices, only highlighting “opportunities for improvement” without defining what improvements would be best for implementation.

Organizations learn by conducting structured reflection on the past experience to discover patterns and inquire about connections and dependencies between factors that drive business performance. There are three levels of reflection required to capture learning for improvement:

- Reflection at the work process level inquires on the way that work is accomplished and seeks to maintain control of standards or to improve performance (e.g., problem-solving and continual improvement).
- Reflection by middle management about the patterns observed in the work to identify methods, techniques, and tools to coordinate the manner that standardization and improvement influence business outcomes.
- Reflection by senior management about the assumptions and context of the external work environment to uncover opportunities to create the desired future state of the organization.

A standardization cycle provides the opportunity to consolidate and solicit customer feedback for reflection on the degree of alignment achieved to date. The improvement cycle provides an opportunity to leap forward and achieve increased capability thru application of creativity in order to better deliver customer needs.

How will a generic improvement model help? Lean methods do not have a standard mental process model. Team action- develop a mental model for application of lean thinking.

As we understand the reason for innovation mediocrity, what can we as aspiring leaders of innovation, do about it? What is needed is⁷ to develop and manifest entrepreneurship within organizational culture based on shaping individual and organizational psychology (attitudes, motivations, beliefs, behav-

⁷ CEN TS 16555 parts 1 to 6 are available from the NSAI published standard catalogue www.standards.ie

iours, and so forth); and⁸ to optimize innovation results by embracing innovation as the central purpose and focus of organizational strategy.

Fig. 2. Innovation integration



Most organizations have not appropriately allocated responsibility for either quality or innovation! Everyone has some responsibility for the quality of their content and process, and it should be the same for innovation. Converting strategic intent into actual results by adopting a business eco-system context we can:

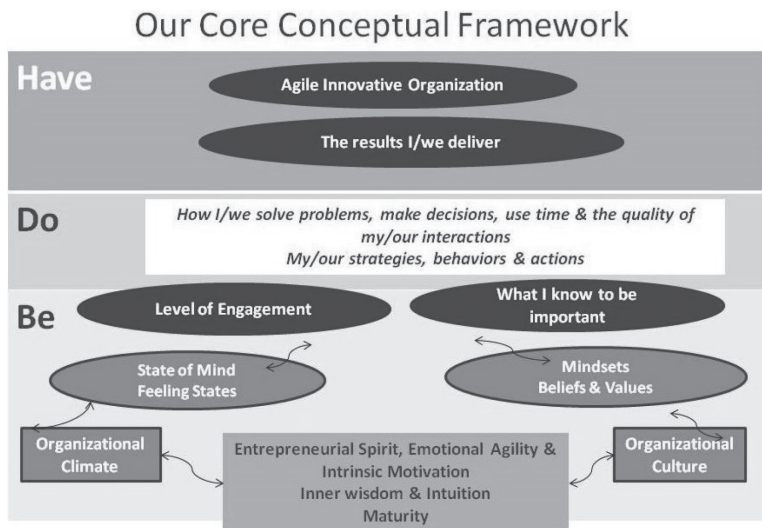
- Accelerate the innovation process;
- Reduce the risks inherent in innovation;
- Engage the entire organization as “co-creators” and create a broader ecosystem in the innovation effort.

See this illustrated in the Conceptual Framework, Companywide: A Systemic Approach, Fig 3.⁹

⁸ <https://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/business-transformation-corporate-agenda.pdf>

⁹ Janet Sernack, <http://www.imagination.com.au/blog/page/3/>

Fig. 3. Our core conceptual framework



Source: Janet Sernack, <http://www.imagination.com.au/blog/page/3/>

First, we need to clarify and define the results we want to HAVE in the short- and longer-term organizational outcomes and the desired future. Many organizations want to have agile innovative organizations that compete strategically, through innovation. They outperform the competition and create high value and low cost, new market segments.

Second, which most organizations DO is tend to focus their innovation efforts on achieving short-term results involving quick and easy ways of generating income and or reducing costs. These are mostly internally focused, tend to be episodic and seldom outwardly focus on understanding and empathizing with customers’ problems, their perception of value or efficiency, or involve true organizational learning.

What most organizations should DO, in order to achieve longer term objectives and sustainable results, is to know how to see and deal effectively with the company’s own unique set of inhibitors to change. Next is to pay attention to what is needed to acknowledge and flow with people’s survival and learning anxieties when involved in any kind of change process or new learning intervention. In other words, to engage and enroll them, at the cognitive, heart, and soul levels in the results they want to have.

Third – all of the above is true but first, we have to BE somebody in order to be able to DO something. Nonetheless, most organizations neglect the BE-aspect in innovation agility.

These types of soft skills based training programs need to include and integrate the three key phases of innovation: discovery, design, and delivery and mostly focus on execution and not ideation.

The most critical foundational factors are enabling people to make the difference inside a well-defined innovation process, permanently, where visionary leaders do the really hard work of leading self-organizing teams from whom they are be-ing and fearlessly role modeling real collaboration and true agility.

If we want to cultivate the agile innovation leadership and coaching skills to model real collaboration and true agility to transform problems into innovative ideas and solutions, we have to be disruptive and change the game to make a real difference.¹⁰

Innovation is very important for us at personal and organizational level, with disciplined efforts we can get better at it. Mostly we are not yet sure how to do it?

A change agenda designed to deliver continuous improvement, development, leadership and positive transformation of the enterprise and all of its relationships has been framed in the generic model and framework for innovation management systems over the past decade.

4. INNOVATION OF MANAGEMENT SYSTEM (IMS) STANDARDS

“As evidence suggests, innovation – both as a field of study and as a practical discipline – has gained considerable attention over the past 15 years. As organizations become broader and more complex, the need for a systematic approach to new product, service or business development techniques strengthens accordingly. And this is merely the tip of the iceberg – there are multiple insights on why communities can benefit from an organized approach to innovation – a process at the heart of our everyday (business) lives. As of today, this approach is becoming a reality and work slowly progresses towards the creation of a unified Innovation Management Standard. Why the delay? Plainly because relating innovation to standardization is something most practitioners still find counter-intuitive.”¹¹

That work successfully concluded last June (2015). In that successful result some stakeholders and supranational bodies such as AENOR in Spain

¹⁰ Mila Božić and Olga Štajdohar Pađen, Quality Leader/Manager Development: How does it impact us? Proceedings book Quality, growth and development, 15th International Symposium on Quality, Croatian Quality Managers Society, Zagreb, 2014.

¹¹ <http://www.realcloudproject.com/the-european-standard-for-innovation-management-uncents-16555-12013-has-been-recently-published/>

and SIS in Sweden were crucial, integrated into and collaborating within the CEN/TC 389 Innovation Management technical committee, that was created (by CEN) in November 2008 to support a culture of innovation in Europe and accelerate the access of innovation to both domestic and global markets¹².

This Technical Specification provides guidance on establishing and maintaining an innovation management system (IMS). **It is applicable to all public and private organizations regardless of sector, type, or size.** The document provides guidance on:

- understanding the context of the organization;
- establishing the leadership and commitment of top management;
- planning for innovation success;
- identifying and fostering innovation enablers/driving factors;
- developing the innovation management process;
- evaluating and improving the performance of the innovation management system;
- understanding and using innovation management techniques.

By using this document, organizations can increase their awareness of the value of an IMS, establish such a system, expand their capacity for innovation, and ultimately generate more value for the organization and its interested parties. Since the innovation management system outlined in this document follows the PDCA structure (plan-do-check-act), so it can be integrated within other standardized business management systems existing in the organizations, e.g. EN ISO 9001, EN ISO 14001, etc.

What is standardization in comparison with innovation by definition?

Standardization is defined as: “The voluntary process of developing technical specifications based on consensus among all interested parties (industry including SMEs, consumers, trade unions, public authorities, etc). It is carried out by independent standards bodies, acting at national, European (CEN) and international (ISO) level.”

Innovation is defined as “implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations” [Oslo Manual, OECD 2005].

Innovation Management System is a “set of interrelated or interacting elements of an organization to establish innovation policies and objectives, and processes to achieve those objectives” [CEN/TC 389 N 106, 2012].

¹² CEN TS 16555 parts 1 to 6 are available from the NSAI published standard catalogue www.standards.ie

Why a common framework?

- Aim: Guide organizations to introduce, develop and maintain a framework for systematic innovation management practices (an IMS);
- Scope: *Applicable to all public and private organizations, regardless of sector, type, or size;*
- Intention: Increase awareness of innovation, guide to establish an IMS, improve innovation performance and create value for the organization.

The next section explores the promise of Innovation Management Standardization and discusses the key drivers for the adoption of innovation management standards (IMS):

- This standard guide organizations to implement systematic innovation;
- Facilitate innovation assessment and benchmarking;
- Expand the market for innovation support services;
- Pre-requisite for funding, procurement & partnering etc.;
- Step to integrate innovation as a discipline into the organization.

Nowadays, innovation is necessary even more in the public sector and social system, as well. Recently, we noticed a good example launched by the Croatian Accreditation Agency, which has initiated a project called “Encouraging Innovative Behavior of Employees in the Public Sector through Application of Interventions in Job Design“. Naturally, there is no innovation without people’s involvement.

The Croatian Accreditation Agency (HAA) is a state agency tasked with accrediting laboratories and inspection and certification bodies. In November 2015 an agreement between HAA and Faculty of Economics and Business, University of Zagreb was signed in order to establish a scientific-consulting cooperation on research within a project of Croatian Foundation for Science to encourage innovative behavior of employees in public sector.

The main goals of this project are to investigate the relationship of job characteristics and various phases of innovative behavior, to analyze in which way the personal characteristics of employees influence the relationship of job characteristics and innovative behavior, to find out how position characteristics of employees influence the relationship of job characteristics and innovative behavior, to investigate how much certain interventions in job design shape work and typical job characteristics, to improve the innovative capacity of the workforce in the public sector applying the interventions in the job design, enhance theoretical and practical knowledge on the importance and the role of job design as a precondition for employee innovation.

HAA hopes that its involvement in this project will result in improved of working practices and business processes at HAA, and that HAA will obtain guidelines for increasing its innovative successfulness through job design, which in the end should promote positive changes in employees' values and behavior. The end of the project is planned for May 2018.

It is reasonable to expect that project outcomes would be positively influenced if the HAA complement it with the implementation of the IMS-16 555, which ensure building of innovative culture, and key elements for formal guidance of their internal innovation management system, i.e. such organizational environment and context where innovative competences will flourish.

A holistic approach fortifies and multiplies the innovation process, successful management and development of people's competences much faster than fragmented elements.

Fig. 4. The overall illustration of the IMS



An organization's management system is concerned with managing quality: An Innovation Management System is a set of elements of an organization's management system for making better things better.

BS 7000-1:2008: Guide to managing innovation, was first published
 IMS PD CEN/TS 16555-1:2013: Innovation Management – Part 1: Innova-

tion Management System is the first in a series of seven technical specifications that pursue the following dimensions:

- Developing an innovation strategy and vision;
- Building an organization and culture to promote innovation;
- Introducing a best-fit innovation process;
- Using methods, techniques, and tools to promote innovation;
- Focusing and measuring the innovation results.

5. INTEGRATION OF QUALITY AND INNOVATION MANAGEMENT SYSTEM

In Table 1 we presents the compilation of the clauses for both standards: QMS-IMS.

Table 1. present the compilation of the clauses for both standards: QMS-IMS

Clauses of ISO 9001:20015	Clauses of CEN/TS 16555-1:2013(E)
1. Scope	1. Scope
2. Normative references	2. Normative references
3. Terms and definition	3. Terms and definition
4. Context of organization - Understanding the org. and its context - Needs and expectations of interested parties	4. Context of organization - Understanding the org. and its context - Needs and expectations of interested parties
5. Leadership - Leadership and commitment - Policy - Roles, responsibility and authority	5. Leadership for Innovation - Innovation Vision & Strategy Development - Leadership and commitment - Innovation culture - Roles, responsibility and authority
6. Planning - Actions to address risks & opportunities - Objectives and plans to achieve them	6. Planning for Innovation - Actions to address risks & opportunities - Objectives and plans to achieve them
7. Support - Resources - Awareness - Competence - Communication - Documented information	7. Innovation Enablers/Driving Factors - Resources - Awareness - Competence - Communication - Documented Information - Strategic human resources - IP & knowledge management - Collaboration
8. Operations - Operation planning and control	8. Innovation Management Process - Developing Innovation Projects and Assessing the results

9. Performance Evaluation - Monitoring, measurement, analysis & evaluation - Internal audit - Management review	9. Performance Assessment of the InnoMS - Monitoring, measurement, analysis & evaluation - Internal audit - Management review
10. Improvement - Non-conformity and corrective action - Continual Improvement	10. Improvement of the InnoMS - Identify deviations and establish corrective action - Continual Improvement
	11. Innovation Management Techniques - Management of strategic intelligence, Innovative thinking, IP, Collaboration and Creativity

Source. Made by authors.

Illustration based on CEN/TS 16555-1, presented by Fig. 3 encompasses Leadership for Innovation and key clauses of the IMS:

- Develop Innovation Vision, Strategy, Policies and objectives Top Management Commitment Fostering an Innovation Culture, with clearly defined Roles & Responsibilities Planning for Innovation Success determine Risks and Opportunities (~ ISO 9001:2015) Innovation Objectives Activities, Resources and Milestones.
- Innovation Enabling Factors Roles and responsibilities Resources Competence (e.g. Training in TRIZ, Creativity, Thinkertoys, DFSS, ... etc.), Awareness Communication, Documented information, Strategic human resources, Industrial Property(IP) and knowledge management Collaboration (Internal and External).
- Innovation Management Process, Innovation Funnel – aspects included framing and insight generation, idea management, develop of the innovation project, protection & exploitation of outcome and Market Introduction;
- Assessment Determine Indicators (Financial and Non-financial) Methods for monitoring Criteria for evaluating to ensure Suitability, Adequacy, and Effectiveness of the IMS.

6. TOWARDS AN INTEGRATED QMS-IMS

In conclusion, as systematic innovation becomes a necessity in a fast-changing, hyper-competitive and complex (“VUCA”) world, the worth of a management standard addressing the process of innovation finds high level justification.

To deliver the desired results (i.e. value creation) innovation needs to be methodical and organized: at least to a certain (reasonable!) extent. Therefore, the worth of a management standard addressing innovation will rest in its ability to provide clear guidance on the different ways of achieving sustained success through new product, service, or business model development.

By creating what may at first sound like an impossible paradox: ***establishing a discipline of innovation***. These innovation leaders strategically and systematically build this discipline through a unique mix of resources, processes, tools, and values that allow everyone to contribute

IMS enables and stimulates sound, systematic innovation practice and business development that relates to the innovation strategy for the future, as well as aligning (placing) innovation within an organization's core capabilities.

Sažetak:

KVALITETA UPRAVLJANJA INOVACIJAMA OMOGUĆUJE DINAMIČNOST POSLOVNOG SUSTAVA – KAKO DALJE?

Uporaba sustavnog pristupa upravljanju inovacijama dobra je odskočna daska za svaku organizaciju koja želi postati inovativnijom kako bi bila uspješna na tržištu. Jedna od prepreka inovaciji u malim i srednjim poduzećima je nedostatak unutrašnje infrastrukture za podršku procesu transformacije ideje u primjenljivu inovaciju. Čak i u većim organizacijama u mnogim slučajevima nema pravih pokretača, dodijeljenih odgovornosti i uspostavljene infrastrukture koji bi negovali i razvijali sposobnost inovacije.

Inovacija nije nova tema u povijesti čovječanstva niti u povijesti upravljanja kvalitetom. Ne postoje stvarna poboljšavanja bez inovacije, a svaka inovacija trebala bi biti poboljšanje kvalitete.

U današnjem poslovnom okruženju postoji povećana potražnja za razornim i „mršavim“ (lean) inovacijama u praksama upravljanja kvalitetom i osiguranja kvalitete jer postojeći sustavi upravljanja kvalitetom i njihove prakse u organizacijama više nisu djelotvorne za izazove, posebno one koji se odnose na umreženo poslovanje i eko sustave.

Gledajući razvoj upravljanja kvalitetom i inovativnih aktivnosti općenito može se zaključiti da su se oni u velikoj mjeri razvijali kao odvojene discipline. Organizacije imaju ključnu ulogu u praktičnoj primjeni kako postupaka kvalitete tako i inovacije. Nije dobro za organizacije ako se upravljanje kvalitetom i upravljanje inovacijama razvijaju odvojeno, ukoliko se smatraju različitim međusobno izoliranim aktivnostima.

Uspješan razvoj poslovne integracije je holistički proces učenja organizacije koji vodi do usavršavanja povezanih koncepata i načela, alata i metodologija, kao i upravljačkih praksi na kompatibilan i uravnotežen način.

2013. godine je Tehnički odbor CEN/TC 389 „Upravljanje inovacijama“ pripremio dokument CEN/TS 16555-1 s ciljem podizanja svijesti organizacija o vrijed-

nosti sustava upravljanja inovacijama, pomoći u uspostavljanju sustava, povećanja njihove sposobnosti za inovaciju i u konačnici stvaranja veće vrijednosti za organizaciju i njene zainteresirane strane. Ove smjernice mogu se primijeniti prilikom istovremene integracije procesa upravljanja kvalitetom i upravljanja inovacijama u procese upravljanja poslovanjem organizacije.

S iskustvom u vođenju SUK i SUI, stručnjaci za kvalitetu i vođe u stanju su olakšati uravnoteženu integraciju obiju normi u svojim organizacijama, podržati sustavno upravljanje inovacijama i biti katalizator promjena u ostvarenju vizije i strateških ciljeva društva.

Stručnjacima za kvalitetu i vođama koji razmišljaju o uvođenju i održavanju pozitivnih promjena u svojim organizacijama, jasno je da moramo svladati i integrirati područja sustavnog razmišljanja, osobnih vještina i timskog rada, jer oni doprinose ostvarenju trajnih promjena.

Trebamo stalno usvajati i prilagođavati potrebne vještine, alate i kompetencije kako bi postali „vođe usmjerene na budućnost“. To znači provedbu značajnih tranzicija prema ponašanjima i praksama vodstva više usmjerenih na budućnost. Znači napuštanje starih običaja gdje su za naše upravljačke funkcije često bile dovoljne optimizacija i standardizacija. U budućnosti optimizacija i inovacija onoga što radimo postat će dio naše dnevne prakse.

Svrha rada je potaknuti i unaprijediti praktičnu primjenu norme za sustav upravljanja inovacijama CEN/TS 16555-1 istovremeno s osuvremenjivanjem i reviziranjem sadašnjih SUK, ISO 9001:2015.

Ključne riječi: sustav upravljanja inovacijama, CEN/TS 16555-1, održiva promjena, inovacija, integrirani sustav, poslovni sustav.

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THE BARRIERS OF INSIDE COMPANY COMMUNICATION - BRAKE QUALITY MANAGEMENT

PREPREKE UNUTRAŠNJE KOMUNIKACIJE KOMPANIJE -
KOČNICA UPRAVLJANJU KVALITETOM

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ABSTRACT

The content contribution focuses on internal communication and quality management in the organization. The part of internal communication can be various barriers that can be a precondition for the negative impacts of the introduction of effective quality management system that gives priority to TQM.

Key words: internal company communication, organizational communication, effective internal communication, quality management system, TQM.

1. INTERNAL COMMUNICATION IN AN ORGANIZATION

McQuail suggests that communication implies a sender, a channel, a message, a receiver, a relationship between sender and receiver, an effect, a context in which communication occurs and a range of things to which 'messages' refer. He indicates that sometimes, but not always, there is an intention, or purpose to 'communicate' or to 'receive'. Communication means transmission of information from the sender to the recipient provided the recipient understands the information.

Internal communications can be defined as transactions between individuals and groups in organizations at various levels and in different areas of specialization.

Kalla defines internal communications as "all formal and informal communication taking place internally at all levels of an organization", while Orsini defines them as "the full range of ways that people communicate with each other within the organization".

Internal Communications in the twenty-first century is more than methods, publications, and broadcasts that comprise it. It's about building a corporate culture and having the potential to drive organizational change. Internal communication is an important tool to construct a clear and precise company image inside the organization. At the same time internal communication supports the organization by securing the knowledge about the organization among the employees. According to Argentit the goals of internal communications in order of their importance are:

- create the sense that employees are an important asset to the organization;
- improve morale and foster goodwill between employees and management;
- inform employees about internal changes;
- explain compensation and benefit plans;
- increase employee understanding of the organization and its products, organization, ethics, culture, and external environment;
- change employee behaviour toward becoming more productive, quality oriented, and entrepreneurial;
- increase employee understanding of major health/social issues or trend affecting them; and
- encourage employee participation in community activities.

Planning internal communication in an organization requires information on the prevailing situation of how internal communication currently works.

When making a communication plan the current methods and resources should be charted and seen if they meet the targets set for communication. The analysis of the current situation is based on the most significant fields of communication, defined by the organization.

Internal communication does not refer only to those few “official” channels of communication within your organisation, such as internal newsletters, notice boards or staff meetings. It is not a process that goes from the top, the Chief, to the bottom, the intern. Rather, internal communication refers to the almost constant interactions within your organisation that convey meaning. Therefore, internal communication encompasses both overt communication like meetings, memos etc, and more casual forms of communication such as gossip, pleasantries and body language.

2. THE TEN MISTAKES MADE IN INTERNAL COMPANY COMMUNICATION

Here are ten mistakes mad in internal company communication:

Top managers do not follow their own standards

A company’s management has to act according to the same guidelines that apply to the staff. This works best if the executives generally act slightly more humbly than their position requires. Those who contain themselves in hard times strengthen the inner coherence of a company, achieving the solidarity which is inevitable in times of crisis. Companies led by sensitive managers are better prepared for difficult phases than those where managers do not act according to the standards they expect from their employees.

Employees adapt important information from the press

Basically, employees cannot be well-enough informed, as they always suspect that 1) managers only share the absolutely necessary information, 2) managers tell only half the story, and 3) even that half of the story can be false. Internal trust can only be achieved by conveying information internally before it is spread externally.

Employees are not being integrated in substantial change processes

Managers expect their employees to identify with their job and to work as independently as possible. In this case, each revision of a company’s internal structure also affects the employee’s self-organisation. Such action discourages staff, if it is implemented without prior warning and explanation. Therefore, transformations have to be announced in good time, and have to be discussed

collectively. If managers cannot involve employees in the change process, they should make a strong case for why this is not possible.

Decision making processes are not being communicated comprehensively

Change processes have to be communicated in a clear and comprehensible manner by those who have made the decision. This explanation should not only address the transformation itself, but also tackle the initial questions which led to the transformation:

- the alternatives which have been reviewed and were rejected;
- the arguments supporting the chosen solution;
- the schedule as well as those in charge of the decision;
- precise specifications: when, how and for whom are these changes relevant?

E-mails are overrated

Many people consider e-mails to be a plague. Originally, they were introduced to convey documents; today they are rather used as group blogs which run through giant mailing lists, not only diluting the original message, but appearing to be enormously time-consuming. E-mails do not only block up our inboxes, but also our brains. They do not make our lives easier, but instead distract us from work, as we are constantly in fear of missing out on something. And once you are no longer bothered by them, you can start to feel insignificant. It is the task of internal communication to arrange for an explicit email policy: mails should only be written on urgent topics that cannot be discussed personally, and they should be written in whole sentences, including a correct address and a complimentary close.

Leaders prefer e-mail communication instead of personal presence and communication

Trust is a matter of personal acquaintance. Managers who address and direct their employees mainly by e-mails do not obtain personal feedback and therefore miss out on the findings from personal commentaries, which cannot be conveyed in writing. Especially in big companies, internal communication by e-mail often is considered to be the standard solution, but this is the wrong way.

Internal communication is unilateral

Employees' ideas are often discarded, but at the same time the management requires bottom-up incentives – this is an almost catch-22 situation. Every organisation should allow room for second best ideas, and for trial and error.

If every idea that comes from the staff is rejected, ignored, or even publicly disqualified, they will soon resign. Internal communication is always bilateral.

Managers underestimate nonverbal communication

Managers are being judged on the basis of everything but their performance. The way they speak, sit, or dress, whether they are on time, whether they display status symbols, whether they play off hierarchy – all these factors shape the appreciation and the credibility of managers. Companies with a distinct, but at the same time rather gentle, management culture often show better development. If internal communication is not able to influence the non-verbal behaviour of managers, then the whole company will suffer.

Employees and their contributions are not valued sufficiently

The higher the manager's position within the company's hierarchy is, the less distinct his feeling for the problems and achievements of his employees, who notice this distant attitude.

The implication for internal communication is: you can never praise your employees enough! The so-called 'management by walking' is probably the most successful method of leading a department. But even then, praise can be misunderstood, if the achievements of others are forgotten or, even worse, deliberately concealed; this nips the employees' motivation in the bud. Those who distinguish themselves at the expense of others reduce the performance of the whole company.

Decisions are not fair

Anyone dealing with internal communication should read John Rawls' "A Theory of Justice", because companies perform best when their employees are under the impression that they are being treated fairly. However, the question is: What is actually fair? The American moral philosopher elaborately answered this question over 650 pages. To put Rawls' findings in a nutshell: Fair is a decision to which both sides can agree, even if they did not know which side of the discussion they were on. This is what the Harvard professor calls a "Veil of ignorance", i.e. decisions to which you can agree, even though you are not the one who decides but the one who is affected by the decision.

3. MAIN PRINCIPLES OF EFFECTIVE INTERNAL COMMUNICATION

Unlike with external communication, organisations often fail to strategically plan their internal communication. In other words, internal commu-

nication is usually either arbitrary or incomplete and if planned, tends to be planned only in reaction to specific events (downsizing for example). However, effective internal communication is planned, not only to deal with specific issues, but for the long-term well-being of the organisation.

Some basic principles to keep in mind when creating your strategic internal communication plan are:

- develop a long-term focus;
- identify clear values for your organisation;
- define the specific goals for your internal communication strategy;
- use comprehensive, pervasive methods;
- be consistent in your messages;
- the rest of this tool kit will guide you through the step-by-step process of developing a strategic internal communication plan that is based on these principles.

4. REQUIREMENTS FOR EFFECTIVE INTERNAL COMMUNICATION IN CONTEXT TQM

Lynn Townsend, set forth the following eight requirements for effective internal communication:

- Internal communication must be recognized as an essential tool of management. It is a way to achieve corporate objectives, build teamwork, and motive: It can make managers become better leaders. This requirement recognises that, employee attitudes and resulting performance are improved by effective communication.
- Employees must be well informed concerning their mutual interests in company success. Management's position on issues needs to be known and employees should be persuaded to take actions that will best serve mutual interests and goals.
- Individual managers must actively support the corporate communication efforts; Managers must develop teamwork among them and work cooperatively with the corporate office. Management has responsibilities to create a climate conducive to communication and to maintain a flow through open channels.
- Great emphasis must be placed on communication and measurement Communication cannot be left to chance. There must be a plan who communicates that how to whom, for what purpose and to what effect.
- Top management must establish a communication climate other divisions and departments will reflect this climate.

- A long-term investment in professional talent and communication programming must be made. Programming and qualified people cost money, but it is well spent.
- Management must recognise its responsibility ‘to listen as well as to speak. If the boss is not a good listener, those who report to him will soon stop trying to communicate.
- Management must recognise the desire of employees to help their company and the power of communication to tap this great potential. Employees are willing to help and communication can turn this desire into action.

5. HOW SHOULD AN COMPANIES ESTABLISH A GOOD INTERNAL COMMUNICATION PROGRAM

- Make sure communication professionals are involved. People go to newspapers, television programs, Web sites and online chat rooms because the information is interesting, accessible and relevant. It is also written well, selected and presented professionally and is user-friendly. Professional communicators need to have a significant role in communicating with employees. Excessive “legalese” or human resources jargon, whether in a newsletter or CD-ROM, detracts from clear communications.
- Make sure communications is from all directions. The process of communicating internally should include an information flow that goes throughout the organization. It should not just be from the top down, or even up and down, but from all directions.
- Make sure messages are clear, consistent and credible. While this may seem obvious, too often, communications with conflicting messages come from different departments, leaving employees confused. Clarity and credibility are essential.
- Assure that all information is accessible, accurate and accountable. People have become accustomed to more control over their selection and source of information, whether it is on television, online or in their in-basket. Accessibility is often the key. And all internal information must be accurate and come from an appropriate, accountable source within the company.
- Take advantage of technology. Use intranets, interactive Web sites, e-mail, virtual teleconferencing and other new technologies to keep internal audiences up-to-date and in the loop.

- Printed material such as newsletters and company magazines, etc., still are important. Employees take home newsletters to their families, they read magazines at the pool, they clip items of special personal interest. While online information can be quicker and more interactive, quality publications still have a value in internal communications.
- Don't forget personal interaction. The most effective internal communications vehicles are still face-to-face meetings and small group interactions. CEOs and senior executives must communicate directly, as much as possible, across the organization.

6. CONCLUSION

Internal communications should have a priority within any organization, and particularly at a time when external issues, such as the confidence-shaking news from the world of business, create anxieties and doubts. Internal communications systems are expensive to build and maintain, and easy to overlook during the busy times of building a business. Each of the communication cross-cultural problems and mistakes are much more complex than it is possible to convey. Each of them influences the course of communications, and can be responsible for conflict or the escalation of conflict when it leads to miscommunication or misinterpretation. A culturally-fluent approach to conflict means working overtime to understand these and other ways communication varies across cultures, and applying these understandings in order to enhance relationships across differences.

Sažetak:

PREPREKE UNUTRAŠNJE KOMUNIKACIJE KOMPANIJE – KOČNICA UPRAVLJANJU KVALITETOM

Sadržaj rada bavi se unutrašnjom komunikacijom i upravljanjem kvalitetom u organizaciji. Unutrašnja komunikacija može sadržavati razne prepreke koje mogu biti preduvjet negativnih utjecaja na uvođenje učinkovitog sustava upravljanja kvalitetom kojemu je prioritet TQM.

Ključne riječi: interna komunikacija, organizacijska komunikacije, djelotvor- na interna komunikacija, sustav upravljanja kvalitetom, TQM.

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THE KANO MODEL – DIFFERENCE BETWEEN MUST HAVE AND ATTRACTIVE REQUIREMENTS OF SERVICE

KANO MODEL – RAZLIKA IZMEĐU OSNOVNIH I
UZBUDLJIVIH ZAHTJEVA PRUŽANJA USLUGE

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ABSTRACT

The study aimed at finding if Dr. Kano's model can be used as an effective tool in measuring customer satisfaction and service quality, and how useful it could be for service providers. The basics of this model state the differences between must-be and attractive requirements. The research proved that quality assurance should be the focus of service providers who wish to establish themselves on a competitive advantage, compared to others; and gives evidence for why it is good to be proactive in the market. What does service quality in a restaurant really mean and what are the right strategies for meeting customer expectations is only one of the questions this research paper will answer.

Key words: Kano model, restaurant industry, quality assurance.

1. INTRODUCTION

Sometimes what customers may think is important, regarding the characteristics of the products or services may not be the same what service providers think and what they focus on. Most service providers (SPs) use a traditional approach years after years, and that is the direct method, where they conduct customer satisfaction surveys. That kind of approach has its limits and its findings may not always result in what customers really want. Moreover, when applied to more complex products it does not work, or with overall service and it gives a picture of only one point in time.¹

SPs are using qualitative and quantitative research methods which help them to come to some results. It is true that it gives them certain percentages regarding how satisfied customers are with certain feature, which is good, but is that enough?

Rather than being reactive, SPs should be proactive. Proactive selling techniques ensure SPs that the process of selling is going in the desired way, just as planned. There are many proactive tools which SPs can use any time during the sale and before in order to maintain control over the whole process of a sale.²

The majority of services cannot be measured, calculated or tested before a process of sale in order to ensure their quality. The main issue for SPs should be how to achieve quality service, in order to reduce costs, increase market share and profit.³

It is not necessarily true that customers do not know what they want, and that they have to be convinced or told. Dr. Kano (1984) wanted to improve customer satisfaction by his two-dimensional effective instrument, which he used to analyze the requirements of the customers. He believed it is possible and achievable with his powerful method to classify customer requirements.

Expected needs or *must-be* requirements are the most important, because without them the customer will be dissatisfied, but it does not mean that with them the customer will necessarily be satisfied. Those are simply basic criteria of a product or services which do not need mention. Fulfilling them is an obligation for service providers and it does not lead to a higher point on satis-

¹ Does your customer really want what you offer them? Assessing customer value in business-to-business markets. *Strategic Direction*, Vol. 30, No. 6, 2014.

² William I. Miller, *Proactive selling: Control the process, win the sale*, New York, 2003.

³ Valarie A. Zeithaml, "Communication and control processes in the delivery of service quality", *Journal of Marketing*, Vol. 52, No. 2, 1988, p. 35-48.

faction line.⁴ Without *must-be* requirements which are taken for granted, there is high possibility of losing customers.

One-dimensional requirements, better known as customer wants, are the reason why a service provider is still on the market. Those requirements are the voice of customers.

Customers should not be able to imagine nor expect *attractive* requirements, but at one point in time when they actually experience those wow effects customers should be thrilled. Without those requirements no one will end up dissatisfied, but if service providers decide to provide them, customers' level of satisfaction will suddenly increase.⁵

Lieberman (2008) pointed out how the Kano model is related with customer value management. It can lead company on the right path. The Kano model can easily help companies to exactly know which requirements they must fulfill; with which requirements they should compete with; and which requirements can quickly increase the level of customer satisfaction.⁶ The main goal of SPs is to achieve their visions and to create an ideal environment, where customers will be highly satisfied. An ideal environment must be proactive, communicative, understanding, caring, innovative and profitable.⁷

2. METHODS

The purpose of this research paper was to find out what customers want and to examine customer satisfaction level on the example of one restaurant in the city of Dubrovnik. The restaurant is recently opened, its appearance and offering is different from others. They offer brunches, a *à la carte* menu, pizzas and dishes from the grill, in a pleasant atmosphere. They were surveyed to see how customers feel about them due to their uniqueness and being new on the market.

Research was done in order to find the comparison between satisfaction of customers and performance of product. The research tested Dr. Kano's model to find different customer requirements of restaurant service.

Participants of this research were people between the ages of 18 and 60; those were the people who went to the specific restaurant, not taking into ac-

⁴ Noriaki Kano, Seraku Nobuhiku, Takahashi Fumio and Tsuji Shinichi, "Attractive quality and must-be quality", *Journal of the Japanese Society for Quality Control*, Vol. 14, No. 2, 1984, p. 39–48.

⁵ *Ibid.*

⁶ A. Shakin, and N. Nekuie, "Development of the Kano model", *The Asian Journal on Quality*, Vol. 12, No. 2, 2011, 176–188.

⁷ Jeff Parke, *Managing Customer Expectations*, 2012.

count how frequently. There were 18 questions, using Dr. Kano's two dimensional effective approaches. Two dimensional approach means that each question was asked twice but in a different way, functional and dysfunctional. For each feature of the restaurant there was functional question-positive one "how would you feel" if certain feature is present in service, and then dysfunctional-negative one "how would you feel" if there is an absence of that same feature.

Questions were made on a model of Jack steak house.⁸ Open source method was used; an online link was posted on the official *Facebook* page of surveyed restaurant.

3. RESULTS

The aim of the study was to apply Dr. Kano's model to measure customer satisfaction of a restaurant in the city of Dubrovnik, Croatia. The customers were reached via social media network (official *Facebook* page of the restaurant) and the researcher collected a total of 271 replies. Out of 271 responses 17 were invalid because they were incomplete. The data collected was analyzed in order to find Dr. Kano's (1984) customer requirements: *attractive, must-be, one-dimensional, indifferent, reversed* and *questionable*. Out of 9 attributes of a service in the analyzed and surveyed restaurant, two attributes were found to be attractive. There were no attributes which could be classified into indifferent and questionable. A majority of the restaurant attributes were one-dimensional.

Questions and answers were analyzed two by two, because of functional and dysfunctional way of asking the same question.

4. CONCLUSION

The hypothesis was to test the validity of Dr. Kano's model. The main focus of the research was not the surveyed restaurant; it was just used as an example to test what happens if service providers decide to use an academic approach, and how helpful it could be for them. The research proved that Dr. Kano's method was a very clear, helpful and useful tool. Results which were found are important for all service providers who would like to improve their offer, assure the quality and avoid failures.

⁸ Michael D. Lieberman, *Adding value to CSM: The Kano model, Customer Satisfaction*, World Advertising Research Center, 2008.

Because Dr. Kano model is specific it increases the value of results. In this case results are specific for the surveyed restaurant. But, results like this can be specific for any other service of product, to exactly know what requirements current customers find as very important, without which features of product or service they would be dissatisfied, as well as what delighted them. Kano's six requirements: *attractive*, *must-be*, *one-dimensional*, *indifferent*, *reversed* and *questionable* are and should be important for everyone who wants to succeed in business and improve quality of products or services.

Regarding the surveyed restaurant, majority of the answers were one-dimensional, which means if they are absent customers will be dissatisfied. Since the scope of this research was not to examine cultural factors, the suggestion for further research is needed.

Service providers should focus on attractive requirements. Ambience in the restaurant and manager's personal "thank you" are attractive requirements for all groups. For service providers of surveyed restaurant it means when those features of service are not fulfilled, customers will not be dissatisfied. Those are well known wow effects, which can only increase customer satisfaction. With these features service providers gain a competitive advantage.

For "more experienced" group, if a waiter checked to see if their meal or drink was satisfactory, it is attractive requirement as well. Maybe they are not used to it, because for other groups it is reverse requirement, which means they would rather not have it. The biggest difference between groups and what they perceive is visible here. That is the main reason why service providers should make segmentation on their market, of their customers. Not each group wants to be treated the same nor want the same things, and service providers should not deliver the same service to each group.

If the service providers want to assure quality, gain a competitive advantage and be proactive rather than reactive, then the traditional questionnaire will not be helpful; the only way is switching to quality assurance. Accordingly, for quality assurance Dr. Kano's model is much better tool than a traditional questionnaire. The results shared in this study show that customers actually know what they want, they do not necessarily need to be convinced; however they will not necessarily voice it out. Therefore, the service providers need to constantly strive to delight them.

Sažetak:

KANO MODEL – RAZLIKA IZMEĐU OSNOVNIH I UZBUDLJIVIH ZAHTJEVA PRUŽANJA USLUGE

Ovaj rad namjerava otkriti efektivnost korištenja Kano modela u mjerenju zadovoljstva kupaca i mjerenju kvalitete usluge. Osnovne pretpostavke ovoga modela počivaju na razlici između "mora biti" atributa usluge i "atraktivnih" atributa usluge. Istraživanje je dokazalo kako se osiguranje kvalitete postavlja u središte pozornosti davatelja usluga koji se time izdvajaju od konkurencije i osiguravaju sebi prednost na tržištu. Kako se mjeri kvaliteta usluge u restoranu te koje se strategije koriste samo su neka od pitanja koja se obrađuju u ovome radu.

Ključne riječi: Kano model, uslužne djelatnosti, osiguranje kvalitete.

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QUALITY OF SERVICE IN COMPUTER NETWORKING

KVALITETA USLUGE U UMREŽENIM KOMPJUTORIMA

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ABSTRACT

From the perspectives of users of the Internet, service quality can be determined based on their expectations and programs that are being used. Interactive applications or those in real-time judged by the ability to send and receive data so that users do not investigate any issue problem, but others users who use only Web and transfer the files have less such requests. The application or user quality depends experiencing network devices with data packets must go through them. Low-speed links cause delays. Overloading the router can cause delays of loss of data. Well Service quality has to do with management of network resources to ensure that data are sent to the satisfaction as satisfying the requirements of applications. Network planning and engineering the traffic are ways so as to ensure that sufficient capacity of the network and the resources are there to support the users and traffic on the network,

it is placed in such a way that it will do best through the resources available to provide an expected Quality Service.

Key words: quality, service, networks, computer.

1. INTRODUCTION

Human life is getting better every day, even though complains and requests are getting more too. This seems to be the case for Internet users. In the past, Dial-up access seemed to be a pretty big achievement in computer network, which allowed people e-mail and file transfers, slow but secure.

Nowadays, internet bandwidth has been increased, audio and video traffic can be done secure in real time and users now complain if their Online players get blocked even for a single moment.

From the internet user point of view, quality of service can be determined from their expectations and their programs that they are using. Interactive applications (real time applications) are judged by their ability of sending and accepting data in a way that users don't realize any problems. But other people that use only the Web and file transfer have less of these requests.

People's perception of how applications use the internet can be categorized by the use of Internet Protocol (IP). We can measure different behaviors like:

- Delay,
- Jitter,
- Throughput,
- Packet loss.

Each of these has a different impact in applications. Application quality is dependent on network devices in which data has to flow in. Links with low speed cause delay. Overload in routers can cause delay and data loss. Quality of Service therefore has to do with managing network resources to provide secure data transfers, so that applications work well.

Measurement and monitoring of service level that the network provides is an important way to understand Quality of Service and to secure that expectations of users are met. By reporting and registering network behavior, it is possible to gather information that can be used to adjust and optimize user experience and network resources.

Network planning and traffic engineering are ways to secure that the network has enough capacity to support the users and the traffic in the net-

work is placed in that way that it will do it's best to offer its best quality by using its resources.

2. BASIC ARCHITECTURE AND WAYS OF IMPLEMENTATIONS

For many years, Internet has been used from scientists for researching and data transferring with peers. Remote access, file transfer and emails have been most used applications and for these, the Diagram model has been enough.

2.1. Actual problems on the internet

In this model, each data packet has been passed to its destination in an individual way. WWW (World Wide Web) changed the internet. New Applications like video-conferences, Web searches, electronic media, are developing with an incredible speed. The phenomenal success of the internet brought new challenges to life. One of these is performance assurance and other service differentiations. The ability to secure resources and to differentiate services in the network is known as: **Quality of Service in the network**. Resources assurance is a big problem for many applications to achieve, while the internet is getting bigger and bigger by offering many services. Implementations of these opportunities in the Internet have been one of the biggest challenges which requested hard work in all aspects of Internet technology and modification in base architecture of the internet.

There have been developed a number of technologies where developed architectures and mechanisms in these technologies address these two key issues:

- Resources allocation,
- Performance optimisation.

Integrated services and differentiated services are two architectures for resources allocation.

New service models that are proposed there, offer resources safety and service differentiation for data traffic and users. Multiprotocol Label Switching - MPLS and Traffic Engineering on the other hand secures service providers a set of equipments to provide bandwidth and to optimize performance; without these it would be difficult to ensure QoS (Quality of Service) in the highest level with a reasonable price.

2.2. Resources allocation

Nowadays, many problems in the Internet have to do exactly with the inability of resources allocation where network fails or traffic delay occurs. The internet in these days does not have an active way to allocate resources. Packets are treated in the same way, First-come, First-Served (FCFS). The internet uses TCP (Transmission Control Protocol) to detect network issues. Resources allocation based on TCP requires that each application must use the same schema for controls, but many application based in UDP do not support TCP controls, especially real-time applications. The service that the actual internet provides is also known as the Best-Effort. This is the simplest service that internet network can offer: it does not include any resources allocation for data traffic. When issues occur, the data leaves with overload. While the network treats data in an equal way, each data can be attacked from issues.

Integrated services and differentiated services show two solutions for the above problem and each of the architectures show a number of concepts that are important to ensure QoS.

2.3. Performance optimization

When resources allocation architectures and services have been determined, performance optimization has become the next challenge. This means: resources organization in the network in the most effective way by increasing the chances of sending data and decreasing expenses for these. The connection between performance optimization and QoS can look like a not direct connection if we compare it to the resources allocation. However, performance optimization is important for QoS. Implementing QoS goes further than adding mechanisms like these:

- Traffic policing,
- Classification,
- Scheduling.

3. QUALITY OF SERVICE IN AN IP NETWORK

Even though there are some technologies that help in building services based in IP, these technologies might not be able to full fill clients' needs. Some clients might have additional needs like guaranteed bandwidth, security etc. With the development of modern applications like B2B, e-commerce, video-on-demand, voice over IP - listed requests are important because applications like VoIP are sensitive from delay.

Delay - is the time that the network requires to send a packet from the source to its destination.

Unlike from traditional applications that are based on best-effort services, VoIP applications have strict requests for delay. Packets in these applications have to be sent from its source to its destination with a delay not bigger than 150 milliseconds. Video applications like: Video-conferences and VOD have requests for bandwidth.

Data privacy and security are a special concern for clients like: banks and security companies. Privacy means that the data are not accessible from the outside. On the other hand, security means that that even though the network is not secure and packets are accessible, the content of those has to be ensured.

3.1. Measurement parameters for network performance

Guaranteed service quality that is offered from the network can be measured by the network performance. Some of measurement tools for network performance are:

- Bandwidth,
- Packet Delay,
- Jitter,
- Data Loss.

Bandwidth – is a term that is used to describe the throughput in a medium, protocol or connection. It provides the tubes dimensions that is required from applications to communicate on the network. An application that requires guaranteed bandwidth requires that the network separates a minimum bandwidth which that application can use without interferences. Depended on the type of the network, bandwidth guaranties can be made in the IP layer or in the Data-link layer.

Packet Delay – consists of: Serialization or Delayed dispatch, delayed spreading and delayed changes.

Serialization or Delayed dispatch - the time that a device sends a packet. This depends from the size of the packet and the links bandwidth. A packet with the size of 64 byte, in a line with 4 Mbps takes 128 ms to be transmitted. On the other hand, a packet of the size of 64 byte, in a line of 128 Kbps takes 4s to be transmitted.

Spread delays - The time that is needed for a bit to be sent from a sender to be transmitted to a receiver. This depends from the devices and distance, it's independent from the bandwidth.

Delayed changes - the time that is needed for a device to start spreading a packet after it has received it. This is depended on the network's status and the number of packets awaiting.

Jitter - End-to-end delay for a packet that corresponds to a flow is the sum of all delays that occur. Not every packet in the flow try the same delay, it depends on the instant that happens in each hop on the network. If the network is blocked, queues will be built in each hop and this increases the end-to-end delay. This variation in delay is called Jitter.

Data Loss - shows the number of packets that are lost on the network while transmitting. Loss might happen because of devices corruption, in interfaces input and output, etc. Data loss is a result of a handicapped device can be always avoided by building always good physic networks.

3.2. Mechanisms implementations categories

Mechanism implementation in networks based in IP is a challenging job. It requires the understanding of the theories of ranking and clients requests to determine parameters of politics for ranking. Implementation of mechanisms can be divided in some categories:

- Clasification - identification and marking,
- Blocking managment - creation and planing of rankings,
- Avoidance techniques for blocking - blocking monitoring,
- Controlls/forming techniques - must contain the service contract,
- Signaling - is used between two nodes on the network.

4. QUALITY OF SERVICE USING SIP (SESSION INITIATION PROTOCOL)

Many communication scenes include traffic transmitting in real-time like voice-over-video. In these cases it is critical that packets reach in their destination not later than the time that they have been launched from their source. If they arrive later, review can't happen and they have to be deleted. If the size of the packets that arrive later increases, quality of service from the end user gets worse and can be completely not understandable.

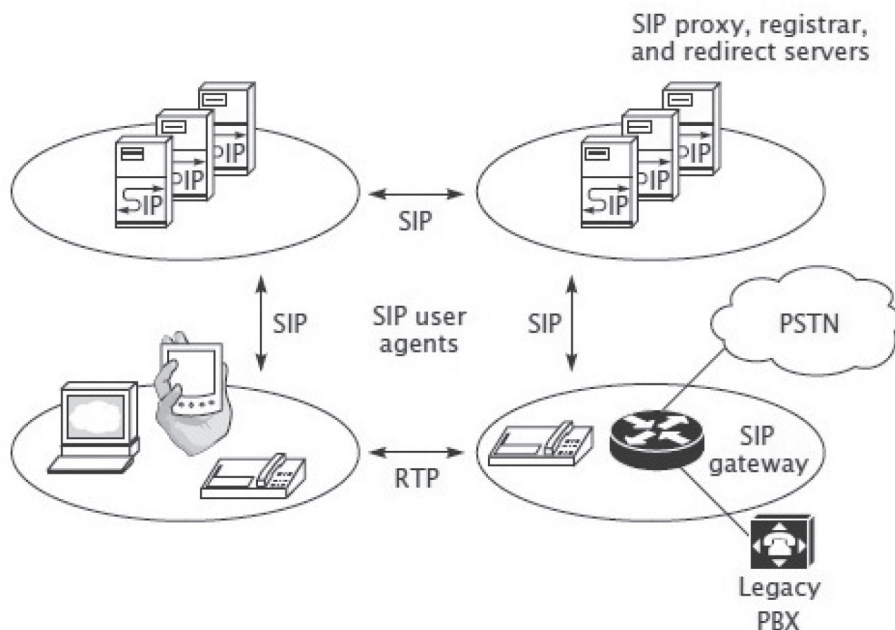
Even though over all a network can look like it has enough bandwidth, sometimes it happens that in some point of the network, it has limited bandwidth. There will always be cases where over dimensioning of the network it not an option and is critical to implement some mechanisms which help to perceive a determined quality of service for some traffic flows and/or for de-

terminated users. If we see resources that are limited and there is no capacity on the network, the assurance of QoS necessarily implies that some packets must be prioritized. Overall, prioritizing can be implemented for those types of traffics that have special requirements of QoS. In these cases, routers can prioritize packets that correspond to real-time flows.

Another key case that must be considered is credit. Service providers might charge for QoS. The fact that in some cases bandwidth is limited, e.x: in wireless networks, connection controls for provision to guaranty QoS makes it possible for big internet service providers to race with providers that can't afford high level quality.

QoS access in a network is independent from the application layer, all happens in the IP layer. This is a key principle in internet design, and it is a big advantage that it allows two layers to develop independently, like the application layer and the transport layer. However, in some point it is necessary to integrate these two layers together, which we will see in the following diagram.

Figure 1. SIP elements



Users are clients of applications that contain both - clients and server. The client indicates the SIP request in the name of the user and it behaves like

the party that calls. The Server accepts a request and replies in the name of the user and acts like the callee party. Some examples are: SIP telephones, gateways, PDA and robots.

Network servers are optional components of the SIP contexts. There are three types of servers:

- Proxy servers,
- Redirect servers,
- Location servers.

5. CONCLUSION

The need for Quality of Service (QoS) in the Internet is based on the fact that best-effort service and datagram model do not meet the needs of new applications, which require resource assurance in order to operate efficiently. The current Internet does not support any forms of resource allocation for traffic flows, it provides the Best-Effort service, where the network treats all individual packets exactly the same way and serves the packets on a first-come, first-served (FCFS) basis.

Internet originally developed for data communication, and now is used more and more for real-time applications, so there is need for enabling QoS and offering better services in Internet, but trying to do this for a reasonable price.

Customer requirements make service providers to do their best to offer different levels of services in the Internet. Implementing QoS goes beyond just adding mechanisms such as traffic policing, classification and scheduling; it is about delivering new services over the Internet.

In order to meet Quality of Service first issue is resource assurance. Integrated Services and Differentiated Services are two architecture models for resource allocation in the Internet. Integrated Services use reservation to provide guaranteed resources for individual flows. The Differentiated Services architecture takes a different approach. It combines policing, provisioning, and traffic prioritization to provide different levels of services to customers.

The second issue is performance optimization, which means organizing resources in a network in the most effective way to maximize the probability of meeting expectations and minimize the cost for it. To manage the performance of a network is required controlling the paths of the traffic flows. The ideal solution is Multiprotocol Label Switching (MPLS). Network performance optimization through effective provisioning and better control of the flows is known as traffic engineering. So, service providers to ensure more services at less cost for their customers can use the set of tools combined by MPLS and

traffic engineering. The combination of MPLS and Traffic Engineering provide networks with set of tools to support better performance of networks. They address the issues of bandwidth provisioning and performance optimization in Internet. The mechanism of explicit route in MPLS adds an important capability to the network and combined with Traffic Engineering, help network providers make the best use of available resources of their network.

Sažetak:

KVALITETA USLUGE U UMREŽENIM KOMPJUTORIMA

Iz perspektive korisnika interneta kvaliteta usluge može se definirati na temelju njegovih očekivanja i korištenih programa. Interaktivne aplikaciji ili one u realnom vremenu ocjenjuju se prema mogućnosti slanja i primanja podataka tako da korisnici nisu imali problema, ali i one korisnike koji koriste samo web i šalju datoteke manje nego je zahtijevano. Aplikacija ili kvaliteta za korisnika ovisi o mrežnoj opremi s paketima podataka koji trebaju kroz njih prolaziti. Mala brzina veze uzrokuje kašnjenja. Preopterećenje rutera može uzrokovati kašnjenja i gubitak podataka. Dobra kvaliteta usluge mora putem upravljanja mrežnom opremom osigurati zadovoljstvo slanjem podataka kroz zadovoljenje zahtjeva aplikacije. Planiranje mreže inženjering prometa podataka način je kako osigurati dovoljan kapacitet mreže i resursa koji podržavaju korisnika i promet kroz mrežu. To treba biti napravljeno na najbolji način u odnosu na raspoložive resurse kako bi pružili očekivanu kvalitetu usluge.

Cljučne riječi: kvaliteta, usluga, mreže, kompjutor.

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EVALUATION OF THE QUALITY OF THE ATTRIBUTE MEASUREMENT SYSTEM ACCORDING TO DIFFERENT METHODS

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ABSTRACT

The basic condition for the correct decision on whether the product meets the customer's requirements, is using the highest quality measurement system. In the case where the evaluated quality characteristic is not measurable is the most important feature for using measurement systems human i.e. operator performing the inspection. Evaluate the quality of this measurement system is possible by using multiple methods, which are described in the methodology guides for evaluation of the measurement system quality. The main objective of this paper is to evaluate the quality of the measurement system of attributive quality characteristic by three different methods on real data. There will be also the analyze of the main differences and the strengths and weaknesses of the methods used for the evaluation of the quality of the measurement system.

Key words: measurement system, quality characteristic, repeatability, operator.

1. INTRODUCTION

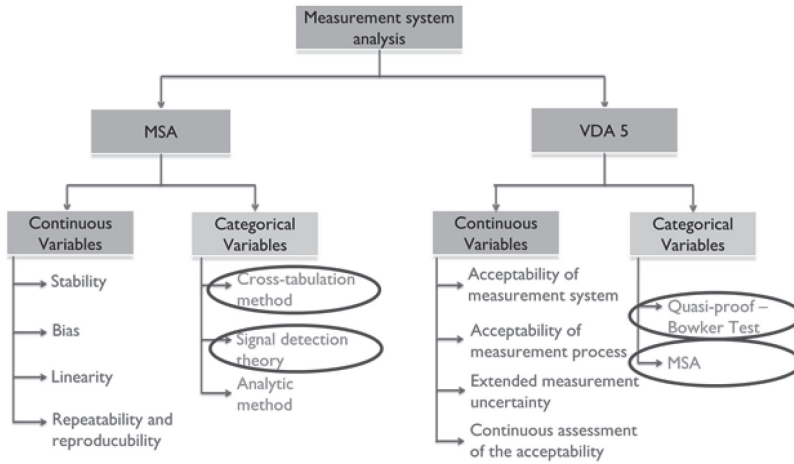
The success of companies at the market has for several decades depended on the quality of the provided products and services. This quality cannot be achieved without functioning quality management system, whose main task is to plan, manage and continuously improve all the processes within the organization. All decision-making within the scope of this “trilogy of quality” should be done on the basis of collected data or facts. In the case of manufacturing processes, these facts represent the measured data of all the monitored quality parameters. An important condition for making the right decision is, in this case, a sufficient amount of quality data, provided thanks to a quality measurement system only. ISO/TS 16949 standard, which includes the requirements for quality management system in the automotive industry, says, in Clause 7.6.1, that statistical studies must be performed in order to analyze the variability of all types of measurement and test systems. At present the evaluation of the quality of used measurement system is mostly performed by using two approaches respectively methodologies. It is a Measurement System Analysis (MSA) methodology developed by the U.S. automotive industry and VDA 5 methodology developed by the German automotive industry. By using the methods included in both methodologies, it is possible to evaluate not only the quality of the measurement system for continuous variables, but also the quality of the measurement system for categorical variables (Fig. 1)^{1,2}.

Attribute measurement systems represent a class of measurement systems where the value of the measurement result is one of a finite number of categories (attributive variable). These systems can also include visual inspection, which can lead to multiple levels of classification, eg. very good, good, bad, very bad. That is a significant difference from the measurement systems of measurable quality characteristics, which can result in a continuous range of values (continuous variable). In the case of visual inspection, when is the inspection result depends primarily on human abilities, can be the probability of wrong decision unacceptable. Before any change of the measurement or control method is therefore a necessary to assess the quality of the proposed measurement system by using appropriate assess methods. This will be achieved by evaluating the quality of visual inspections by using three methods (Fig. 1).

¹ Measurement Systems Analysis. MSA, 4th Edition, AIAG Reference manual, Southfield, 2010.

² Qualitäts Management-Center. Verband der Automobilindustrie e.V - Prüfprozesseignung (VDA 5), Henrich Druck und Medien GmbH, Frankfurt, 2010.

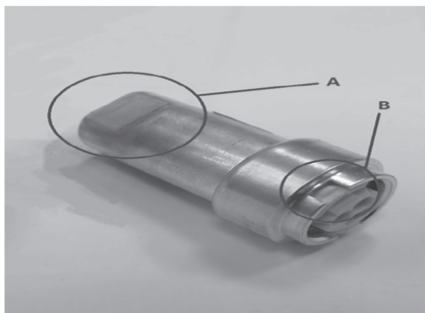
Figure 1. Methods for evaluation the quality of the measurement system



Source: Made by author.

For the analysis of the main differences and the strengths and weaknesses of these methods were selected two processes from the automotive industry. First quality characteristic (A), which was selected for the analysis is the position of the groove (see A on Fig. 2) on the body of part MGG 066/1 against the groove in the holder (see B on Fig. 2). For the inspection of selected quality characteristic (specifications $\pm 5.5^\circ$) is not using any comparative gauge. The second quality characteristic (B) is the distance between the two ends of the rubber joint seal at the door of a car. The target value of this characteristic is 6.4 mm, the upper tolerance limit is 6.6 mm and a lower tolerance limit is 6.1 mm.

Figure 2. Quality characteristic



Source: Made by author.

A Figure 3. Quality characteristic B



Source: Made by author.

This quality characteristic is controlled by a profile projector, which will enlarge the profile seal tenfold (Fig. 3). Based on the comparison of enlarged profile seals and drawing is made decision about the acceptability of the controlled product.

2. QUASI-PROOF

This method evaluated on the basis of a statistical test (Bowker test) whether there are significant differences in the evaluation between different operators. This method does not allow assessing the conformity between operators and the reference value.

Table 1. Table for conformity between operator A and B
(quality characteristic A)

Frequency n_{ij} „+ + +“		Operator B		
		„+ + +“	Mixed results	„- - -“
Operator A	„+ + +“	16	1	0
	Mixed results	6	3	4
	„- - -“	0	0	10

Source: Made by author.

Because the inspection is carried out by three operators, it must be constructed tables for all possible pairs of the operators. Table 1 and 2 shows the distribution of the results between the operator A and B.

Table 2. Table for conformity between operator A and B
(quality characteristic B)

Frequency n_{ij} „+ + +“		Operator B		
		„+ + +“	Mixed results	„- - -“
Operator A	„+ + +“	45	1	0
	Mixed results	1	1	1
	„- - -“	0	0	1

Source: Made by author.

The agreement between the operators should be determined based of the results on Bowker test for all pairs of operators (Table 3 and 4).

Table 3. Result of Bowker tests (quality characteristic A)

Interaction	T	K	Result
Operator A vs. Operator B	7.5714	7.81	H ₀
Operator B vs. Operator C	8	7.81	H ₁
Operator A vs. Operator C	12	7.81	H ₁

Source: Made by author.

Based on the results of the Bowker tests, we have two different measurement systems.

Table 4. Result of Bowker tests (quality characteristic B)

Interaction	T	K	Result
Operator A vs. Operator B	1	7.81	H ₀
Operator B vs. Operator C	3	7.81	H ₀
Operator A vs. Operator C	3	7.81	H ₀

Source: Made by author.

In the case of first quality characteristic we reach the conclusion that between the evaluation of operators B and C, as well as between operators A and C is a statistically significant difference, and we can therefore conclude that these operators have different results of visual inspection. In the case of quality characteristic B there is not any statistically significant difference for all possible pairs of the operators.

3. CROSS-TABULATION METHOD

In the case of cross-table methods are results of the performed inspection recorded in tabular form. Inspection results can be recorded using a numeric designation (0 = rejection; 1 = acceptance), or another indication (eg. OK = acceptance; NOK = rejection etc.). Column with a reference value should be a part of the table. The aim of the next step was to summarize obtained data from operators using cross tables. Cross tables must be constructed for each pair of operators (see Table 5).

Table 5. Cross table study results for operator A and B (quality characteristic A)

A * B Cross tabulation			B		Total
			NOK	OK	
A	NOK	Count	58	11	69
		Expected Count	31.7	37.3	69
	OK	Count	11	70	81
		Expected Count	37.3	43.7	81
Total		Count	69	81	150
		Expected Count	69	81	150

Source: Made by author

Based on the constructed cross tables of all pairs of operator can be calculated indicators of the degree of compliance between operators kappa κ (see Table 6), we can say that the level of agreement between all operators in the case of quality characteristic A is good. In the case of quality characteristic B are the values of compliance between operators worse (operator A vs operator C). Results obtained by using this method are in contradiction with the results of Bowker test (quasi-proof). This can be caused by differences in the number of nonconforming samples used to analyze of these measurement systems.

Table 6. Level of agreement between operators

Quality characteristic A				Quality characteristic B			
Kappa	A	B	C	Kappa	A	B	C
A	-	0.70	0.67	A	-	0.70	0.44
B		-	0.73	B		-	0.68
C			-	C			-

Source: Made by author.

Similarly to the case of agreement between operators is also necessary by constructing the cross-table and the subsequent calculation of the Kappa, to evaluate conformity between the evaluation of operators and the reference value. The values of kappa indicators for all three operators are in Table 7.

Table 7. Level of agreement between operators and reference values

	Quality characteristic A			Quality characteristic B		
	A	B	C	A	B	C
Kappa	0.72	0.72	0.77	0.21	0.21	0.27

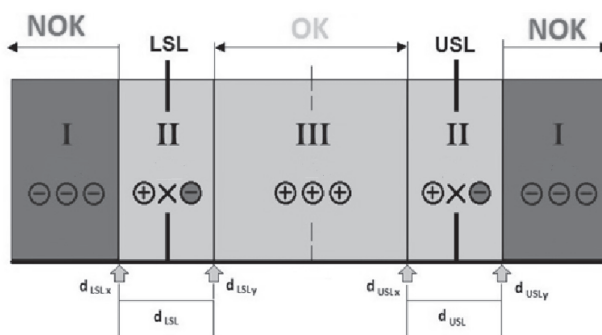
Source: Made by author.

The kappa value is for all three operators less than 0.4 (quality characteristic B) and therefore we can say that all operators show poor conformity with the reference evaluation. In practice, this means that all three operators frequently take the wrong decision on the conformity with the customer's specifications.

4. SIGNAL DETECTION THEORY

The principle of this method is based on determining an approximation of the width of the II (gray) area and from this the repeatability and reproducibility of the measurement system GRR. Subsequently is compared the percentage value of GRR with specified criteria. First, it is necessary to identify the end and start points of 'gray' areas. On the basis of these values can be then determined width (d) of the II „gray“ areas (see Fig. 4).³

Figure 4. Gray areas of production range



Source: Pavel Klaput, Radim Macek, Adéla Lubojácka. "The Assessment of the Suitability of the Measurement System of Attributive Quality Characteristics by Different Methods". Kvalita - Quality 2014. Ostrava, 20p. J9-J17.

³ Pavel Klaput, Radim Macek and Adela Lubojacká, "The Assessment of the Suitability of the Measurement System of Attributive Quality Characteristics by Different Methods", In Kvalita - Quality 2014. Ostrava: DTO CZ, 2014.

Evaluation of the acceptability of visual inspection is performed by calculating the percentage value of repeatability and reproducibility of the measurement system on the overall tolerance by the formula:

$$\% \text{ GRR} = \frac{d}{USL - LSL} \cdot 100 \quad (1)$$

In the case of quality characteristic A is the %GRR value greater than 30% (38.3%), so the measurement system (visual inspection) is unacceptable. For the second measurement system is not possible to calculate width of II “gray” areas, because there are no I “red” areas.

5. STRENGTHS AND WEAKNESSES OF THE USED METHODS

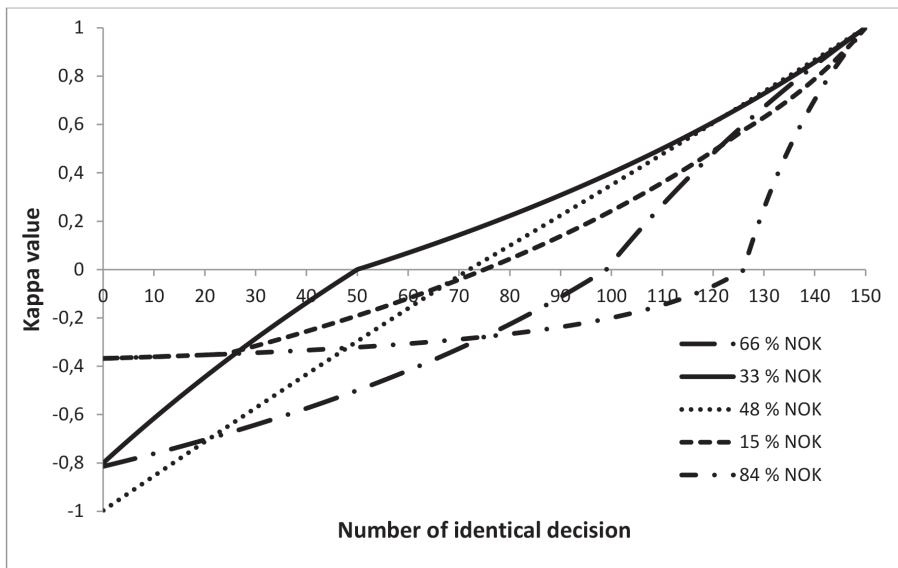
By comparing the obtained results can be identified main strengths and weaknesses of used methods. The biggest advantage of the quasi-proof method is its simplicity and ease of applicability. Its advantage is also taking of a clear decision based on evaluation of Bowker test. The principal weakness of this method is the absence of comparison of operators evaluation with reference values. These weaknesses are fully demonstrated on the real data used in this paper. On the contrary cross-tabulation method provides a more comprehensive evaluation of the quality of the measurement system. However even this method has some disadvantages, which are also demonstrated in the evaluation of real data. In the first place it is lack of clarity in the assessment of conformity between operators or between operators and reference value. Based on the kappa values in the range 0.4 – 0.7 is not possible to clearly assess the quality of the measurement system. The second weakness of this method is a way of calculation of the kappa indicator. For maximum conformity (all decisions between two operators, resp. between operator and the reference value are the same) is always the value of kappa equal to 1.⁴ In other situations, however the kappa value depends not only on number of identical decisions, but also at the number of NOK (according to reference values) samples used to measurement system analysis (Fig. 5).

Fourth Edition of MSA (measurement system analysis) reference manual gives no information about the recommended number of NOK samples. For these reasons, it may be better results (higher kappa) achieved only on

⁴ Douglas C. Montgomery and George C. Runger, *Applied statistics and probability for engineers*, 5th ed, John Wiley Hoboken, 2011.

basis of a smaller number of NOK samples. In this way can be artificially increased the quality of the analyzed measurement system.⁵

Figure 5. Dependence of the kappa on the number of NOK samples



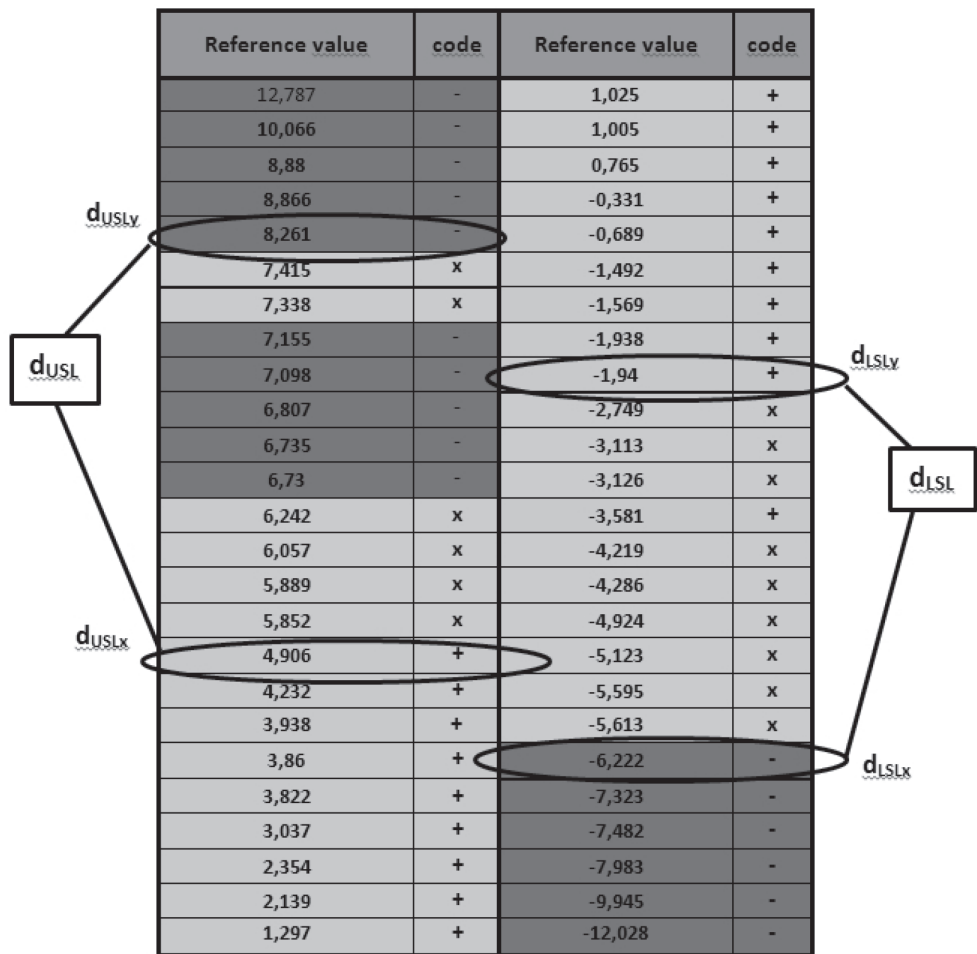
Source: Made by author.

Last weaknesses occurred at the evaluation of the quality of measurement system by using the signal detection theory. First weakness of these approach (theory) is the fact, that %GRR value can't be calculated for quality characteristic with one specification limit (one-side tolerance). The second weakness of this approach was revealed by the evaluation of the analysis for quality characteristic B. In this case, all operators failed to agree on a NOK evaluation for samples below the lower specification limit. For this reason is not possible to determined I "red" zone below the lower specification limit. This fact complicates calculation of the % GRR value.⁶ Last found problematic area of this approach is the presence of several I "red", II "gray" or III "green" zones in production range of given quality characteristic.

⁵ Emese Vágó and Sandor Kemény, "Model-based approach for attribute gauge analysis", Quality and Reliability Engineering International, Vol. 27, No. 6, 2011.

⁶ Jozef Petrik, Pavol Palfy and Milan Havlik, "The Influence of the Method on the Brinell Hardness Test Quality", Annals of Faculty Engineering Hunedoara - International Journal of Engineering Vol. 11, No. 1, 2013.

Figure 6. Distribution of the zones for quality characteristic A



Source: Made by author.

On the figure 6 you can see distribution of the zones for quality characteristic A. In such cases it is necessary to correctly identify the boundaries of each zone (Fig. 6).

6. CONCLUSION

All above-mentioned weaknesses and problem areas of measurement system analyses are the obstacle for full understanding and correct performance of these analyses not only for the automotive industry suppliers. The correct,

simple and complex procedures and methods can move the larger use of this quality planning tool behind the automotive sphere limits and thus contribute to the continuous improvement of production processes and company competitiveness. The best possible understanding and interpretation of all the results of the analysis of real data is the most important prerequisite of effective and continuous improvement of the attribute measurement system.

7. ACKNOWLEDGEMENTS

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Sažetak:

PROCJENA KVALITETE KARAKTERISTIKA MJERNOG SUSTAVA PREMA RAZLIČITIM METODAMA

Temeljno pravilo za ispravnu odluku da li proizvod ispunjava zahtjeve korisnika je upotreba mjernog sustava najviše kvalitete. U slučaju kad procijenjene karakteristike kvalitete nisu mjerljive vrlo je važno da čovjek, operator, koji primjenjuje mjerni sustav, provede inspekciju. Procjena kvalitete mjernog sustava moguća je primjenom više metoda, opisanih u metodološkom vodiču za procjenu kvalitete mjernih sustava. Temeljni cilj ovog rada je procjena kvalitete mjernih sustava i njihovih karakteristika primjenom tri različite metode stvarnih podataka. Također i analiza glavnih razlika i snaga te slabosti metoda koje se koriste za procjenu kvalitete mjernih sustava.

Ključne riječi: mjerni sustav, karakteristike kvalitete, ponovljivost, operator.

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COMPUTER-AIDED DECISION-MAKING IN STATISTICAL PROCESS CONTROL

ODLUČIVANJE POMOĆU KOMPJUTORA U PROCESU STATISTIČKE KONTROLE

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ABSTRACT

Statistics Process Control (SPC) can be defined as the problem solving process incorporating many decisions including selection of the control chart based on the verification of the data presumptions. There is no professional statistical software which enables to make such decisions in a complex way. This paper deals with software product which was worked out at the Department of Quality Management, FMME, VŠB-TU Ostrava, Czech Republic for the realization of such decision.

Key words: Selection of control chart, Shewharts' charts, nonconventional control charts.

1. INTRODUCTION

Statistical process control (SPC) is an approach to process control that has been widely used in various industrial or non-industrial fields. SPC is based on so called Shewharts' conception of the process variability. This conception distinguishes variability caused by obviously effected common causes (pro-

cess is considered to be statistically stable) from variability caused by abnormal assignable causes (process is considered to be out of control).

The main goal of SPC (Montgomery, 2012) is an identification of abnormal variability caused by assignable causes with the aim to

- make the process stable,
- minimize the process variability,
- improve the process performance.

The application of SPC must be built as the problem-solving process¹. By the SPC design the general structure of the problem-solving process must be respected and the sequence of the subprocesses “Out-of control signal revelation – Root cause identification – Corrective or improvement action acceptance - verification of action” must be the axis of every SPC application.

SPC as the problem solving process incorporate the decision making processes – i.e. many decisions about various statistical, methodological, social and economical factors affecting the efficiency of the SPC². Decisions linked to the main goals of SPC refer to the out-of control signal revelation (1), identification of root cause of assignable causes (2), selection of corrective or improvement action (3) and their realization (4). There are many excellent accessible professional statistical programs³⁴⁵. But there is no SW support for very important decision which precedes activities (1) - (4): selection of the suitable type of the control chart (which is one of the most important activities influencing the efficiency of the whole SPC implementation) based on the properly made verification of statistical properties of data. Above mentioned statistical software offer various types of control charts, various methods for data verification but there is no complex methodology how to select the best control chart.

For that reason the SW program in Excel called APSS (Analysis of the Process Statistical Stability), solving this failure of the professional statistical packages with additional learning functions was created in the Department of Quality Management at the Faculty of Metallurgy and Material Engineering, VŠB-Technical University of Ostrava, Czech Republic. The paper deals with goals, principles, functions and a structure of this program.

¹ Darja Noskievičová, “Effective Implementation of Statistical Process Control”, Engineering the Future, Edited by Laszlo Dudas, Sciyo, Rijeka, 2010.

² Ibid.

³ Statistica v. 10, User manual, StatSoft, Inc., 2010.

⁴ Statgraphics Centurion, v. XV, User manual, StatPoint Technologies, 2006.

⁵ Minitab v. 16, User manual, Minitab Inc., 2010.

2. GOALS, PRINCIPLES AND FUNCTIONS OF APSS

Here are goals, principles and functions.

2.1. Goals

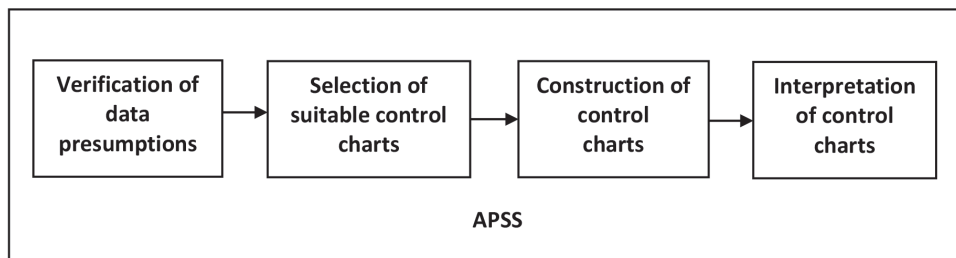
The main goals of APSS are as follows:⁶

- integration of partial steps of SPC into one complex solution;
- support of learning of the decision-making activities in the frame of the verification and ensuring the statistical stability of the processes, i.e. by the selection of the suitable control charts and by the interpretation of the reached results;
- increasing quality of the self-learning process.

2.2. Principles and functions

APSS enables to realize activities (see Figure 1.) in one complex environment at all main connections. Except the application of particular control charts users will learn to select suitable control chart based on the statistical data analysis and to interpret correctly reached results.

Figure 1. The basic tasks of APSS



Source: Made by author.

APSS guarantees following functions: self-study, communication, decision-support, control, verification of obtained knowledge, data support, methodical support.

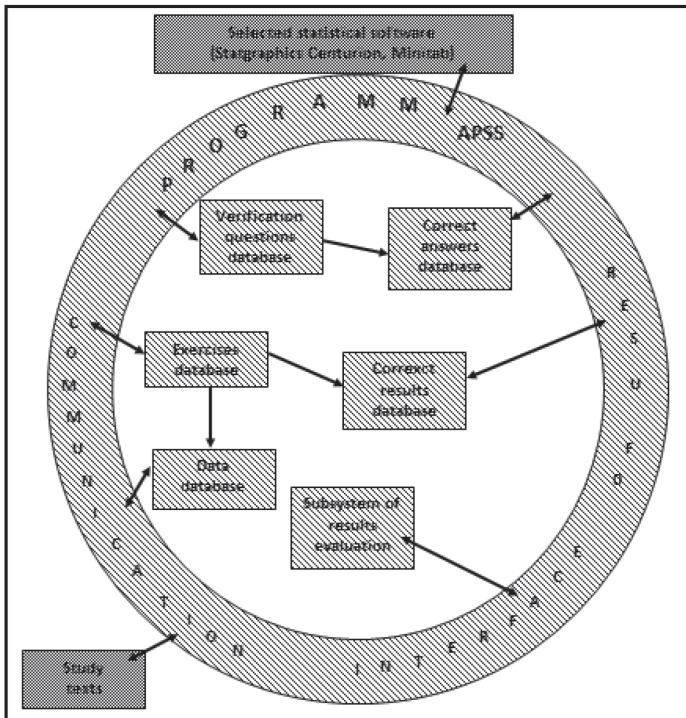
⁶ Noskiewičová, D., *Module 4 Process improvement using statistical analysis, Submodule 4.4 Analysis of the process statistical stability*, User manual, VŠB-TU Ostrava, Ostrava, 2015.

3. APSS STRUCTURE

The basic structure of APSS with its basic elements and outer and inner relations is depicted on the Figure 2. APSS itself forms the environment for practicing intended tasks, decision-making, verification of these decisions (testing questions and evaluation of the results), quick complementing missing knowledge (e-learning study materials written by the author of this paper concerning the problems of classical Shewhart and nonconventional control charts) and communication between user and professional statistical SW (APSS supposes that users are able to use professional statistical SW Statgraphics and Minitab). This professional statistical SW is used for the construction of control charts selected by user, some activities connected to the control chart analysis and verification of data presumptions

APSS has been created as an opened system. It means that all databases can be complemented and whatever statistical SW can be used (but under the condition of adequate changes in the exercises and database of correct results).

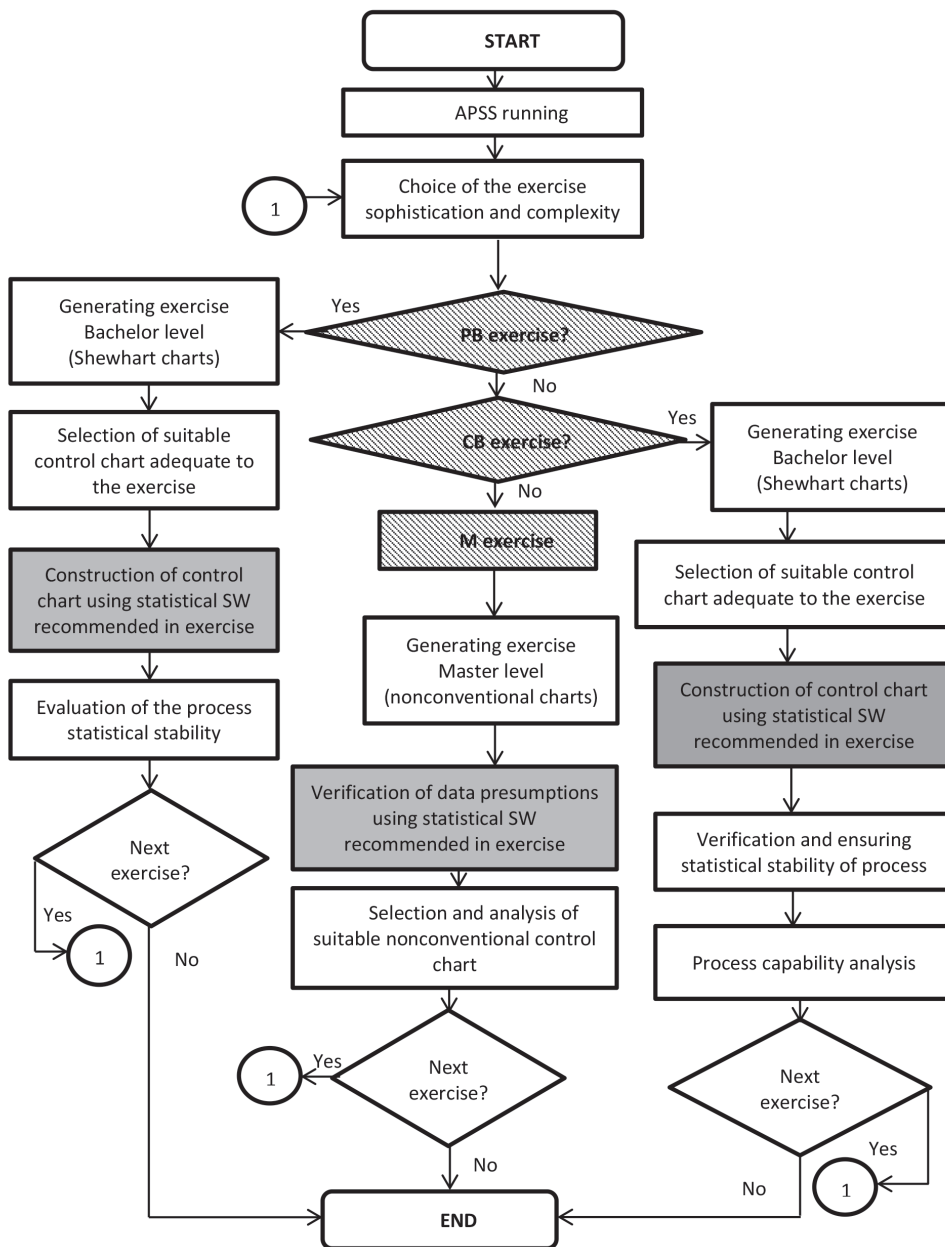
Figure 2. Structure of APSS and its basic outer and inner relations



Source: Made by author.

More detailed information about the structure, functioning and contents of APSS is given by Figure 3.

Figure 3. Flow chart of the detailed APSS structure



Source: Made by author.

Steps in white blocks are done in the frame of APSS, the steps in grey ones are realized using the recommended professional statistical SW.

APSS is divided into three main modules according to the sophistication and complexity of exercises. The first module is dedicated to the solution of particular bachelor (PB) exercises – it covers selection and analysis of Shewhart conventional control charts. The second module corresponds to the bachelor level of knowledge of SPC and it is dedicated to the solution of complex bachelor (CB) exercises – in addition to the previous module it contains also process capability analysis. The third module corresponds to our master level of knowledge of SPC (M exercises). It covers selection of suitable non-conventional control chart and its analysis when data presumptions for the application of Shewhart conventional control charts are not met. This module also contains verification of these data presumptions. All modules have the same feature – from every communication screen of the program the user is able to the solved exercise, the exercise data or to the manual. In the next paragraphs there is more detailed description of these modules.

3.1. Module of DB exercises

This module starts with automatic generating exercise. Then the selection of suitable control chart is done. When the selection is not correct the user is recommended to move to the e-learning texts which are linked to APSS and to study the problem. Then the verification test in APSS is activated. The user must reach 10 points otherwise he must repeat the whole test with upgraded questions. When the selection of control chart is correct the parameters of control chart (subgroup size n and number of subgroups k) are entered. If these values are not correct the user is recommended to go back to the exercise and study it carefully again. Having correct parameters n and k the user must open SW recommended in the exercise, copy the data from the exercise into it and to construct previously selected control charts. User's results are then compared to the correct solution in APSS. When there is no conformity the user is recommended to move to the e-learning texts and to study the problem. In the case of the conformity APSS continues by the verification of the user knowledge about statistical stability analysis. When his answers are not correct he is recommended to move to the e-learning texts and to study the problem. When answers are correct the user must move to the applied statistical SW and to verify statistical stability of the process from the solved exercise. His results are again compared to the correct solution. After it there are some questions about the following steps of the SPC. In the case of incorrect answers there is again need to study the problem using the linked study texts. Otherwise the user can choose the next exercise or to finish.

3.2. Module of CB exercises

This module contains the whole previous module and after verification of statistical stability it asks the questions about capability analysis. When answer is not correct the user must move to e-learning material. Then he must go to the opened statistical SW and to recompute control limits of the previously constructed and analysed control chart. Then the estimated values of the process parameters needed for the capability indices computations are entered into APSS. Again APSS compares the user results with the correct solution. When there is no conformity the user must go back to the setting the estimations of the process parameters and again to compute capability indices. Otherwise he can continue with the interpretation these results. When his conclusions are not correct the user is recommended to go to the linked e-learning materials and to study the problem. In the case of the correct interpretation the user can choose the next exercise or to finish.

3.3. Module of M exercises

This module teaches the user to verify data presumptions using suitable statistical tests and to select suitable control charts based on this statistical analysis. It contains 5 branches. The first branch enables solution when data are not normally distributed. The second branch gives solution in the case of data autocorrelation; in the third branch the user learns to solve the situation when little changes of the process parameters must be identified; the fourth branch is dedicated to the problem of the lack of the data about the process and the last branch offers solution when more then one quality characteristic must be watched simultaneously.

4. CONCLUSIONS

This paper deals with the description of the software product which was worked out for the practicing selection of the suitable control chart based on verification of the data. In the first chapter SPC is defined as the problem solving incorporating many decisions including also selection of the suitable control chart which must be based on the verification of the data presumptions. The second chapter is dedicated to the description of the goals, principles and functions of APSS (Analysis of the Process Statistical Stability), SW program programmed in Excel, that was created in the Department of Quality Management at the Faculty of Metallurgy and Material Engineering, VŠB - Technical University of Ostrava, Czech Republic to support correct selection of control

charts. In the third chapter there is general description of the whole program and also more detailed characterization of its parts. The program is very useful instrument for learning how to correctly choose suitable control chart based on the verification of the data properties.

Acknowledgment

This paper was elaborated in the frame of the specific research project SP2016/107 which has been solved at the Faculty of Metallurgy and Materials Engineering, VŠB - TU Ostrava with the support of Ministry of Education, Youth and Sports, Czech Republic.

Sažetak:

ODLUČIVANJE POMOĆU KOMPJUTORA U PROCESU STATISTIČKE KONTROLE

Statistička kontrola procesa može se definirati kao proces koji rješava problem sje-dinjavanjem brojnih odluka uključivo odabir kontrolnog dijagrama koji se bazira na potvrdi pretpostavljenih podataka. Ne postoji profesionalni statistički softver koji omogućuje kompleksno odlučivanje. Ovaj rad popularizira softver kao proizvod koji je razvijen u službi upravljanja kvalitetom, FMME, VŠB-TU Ostrava, Češka Repu-blika, u svrhu odlučivanja.

Ključne riječi: odabir kontrolnog dijagrama, Shewhartov dijagram, nekon-vencionalni kontrolni dijagrami.

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POSSIBILITIES OF PROCESS CAPABILITY ANALYSIS IN THE CASE OF DATA NON-NORMALITY

MOGUĆNOSTI ANALIZE SPOSOBNOSTI PROCESA
U SLUČAJU NENORMALNIH PODATAKA

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Jezik/Language: Engleski/English

ABSTRACT

Many industrial companies are joined to the chain of suppliers. As a guarantee of permanent quality of supplied products process capability declaration is often required. This paper is focused on methodical approaches for process capability assessment in the cases of data non-normality. Process capability is characterized and main problems regarding with process capability analysis are described in introduction. Following chapters introduce and compare methodical approaches for process capability analysis in the cases of data non-normality. Various methodical approaches are applied on the practical data about chosen quality characteristic in the case study and results of process capability analysis are compared and discussed.

Key words: process capability, methodical approach, non-normality.

1. INTRODUCTION

Process capability is characterized as process ability to produce products which fulfil required quality criteria. Process capability assessment is compulsory in automotive industry and also is required in various industrial branches. Automotive industry has big potential for application of statistical methods due to the nature of production. Mass or big series production requires continuous production monitoring and assessment of actual conditions. On line monitoring enables to react on deviations from ideal situation as fast as possible. Each deviation may cause non conformity production and then big losses (especially financial).

Process capability analysis is statistical method and therefore necessary assumptions must be verified. Correct procedure must be used and also achieved results must be rightly interpreted. This article is focused on methodical approaches for process capability analysis. There is no uniform procedure for process capability analysis in this time. Uniform procedure should exactly specify what to do in the cases of data non-normality and statistical non-stability. Different situations have several possible solutions and achieved results are different. There are methodical approaches defined by customers in automotive industry which are used for process capability analysis. Suppliers in automotive industry have easier position thanks defined procedures. Solution for each situation must be found in practice.^{1,2,3}

2. GENERAL METHODOLOGY FOR PROCESS CAPABILITY ANALYSIS („CLASSICAL APPROACH“)

Logic of process capability assessment comes from generally used procedure. General procedure for process capability can be described in six steps: 1) choice of quality characteristic, 2) measurement system analysis, 3) data collection, 4) verification of statistical process stability, 5) verification of data normality, and 6) calculation of process capability indices.⁴

Single steps should be complied. Fourth and fifth step could be changed if concrete control chart is applicable only in case of data normality. In this

¹ Jiří Plura, *Plánování a neustálé zlepšování jakosti*, Praha: Computer Press, 2001.

² Samuel Kotz, – Cynthia R. Lovelace, *Process Capability Indices in Theory and Practice*. New York: Oxford University Press, 1998.

³ ČSN ISO 21747:2006 *Statistické metody - Ukazatele výkonnosti a způsobilosti procesu pro měřitelné znaky kvality*, Úřad pro technickou normalizaci, metrologii a státní zkušebnictví, Praha, 2010

⁴ Jiří Plura, *Plánování a neustálé zlepšování jakosti*, Praha: Computer Press, 2001.

case data normality should be verified before verification of statistical stability. Process non-normality could be a result of statistical non-stability.⁵

In the case of statistically stable process and data normality capability indices are calculated by formulas referred in left column of Table 1.

Table 1. Formulas for C_p and C_{pk} capability indices calculation by classical and percentile methods.

Classical method (data normality)	Percentile method
$C_p = \frac{USL - LSL}{6\sigma}$	$C_p = \frac{USL - LSL}{x_{99,865} - x_{0,135}}$
$C_{pk} = \min \left\{ C_{pl} = \frac{USL - \mu}{3\sigma}; C_{pu} = \frac{\mu - LSL}{3\sigma} \right\}$	$C_{pk} = \min \left\{ C_{pl} = \frac{USL - x_{50}}{x_{99,865} - x_{50}}; C_{pu} = \frac{x_{50} - LSL}{x_{50} - x_{0,135}} \right\}$

Source: Jaroslav Nenadal, Darja Noskievičova, Ružena Petrikova, Jiří Plura and Jozef Tošenovský, "Moderní management jakosti. Principy, postupy a metody" Praha: Management Press, s.r.o., 2008, p. 377, ISBN 978-80-7261-186-7.

Classical approach has following logic of assessment. In the case of statistically stable process and data normality capability indices are calculated by formulas for classical method referred in left column of Table 1. If process is not stable and causes of statistical non-stability cannot be identified then process performance indices are calculated (Pp a Ppk).

These indices are also calculated by formulas referred in left column of table 1 with different estimation of standard deviation. In The case of statistical stability of process and data non- normality two possible strategies for process capability indices calculation are used:

- Finding the best theoretical probability distribution and calculating process capability indices by percentile method (formulas for calculation are referred in right column of Table 1).
- Using data transformation and in the case of successful transformation (transformed data have normal distribution) using classical formulas for capability indices calculation.

⁵ Ibid.

3. ACTUAL APPROACHES TO PROCESS CAPABILITY ANALYSIS IN THE CASES OF DATA NON-NORMALITY

There are different methods of process capability analysis. These methods include two main groups according to principle. The first group is based on data transformation and the other one is based on percentiles.

Table 2. Actual approaches to process capability analysis in the cases of data non-normality

Approach	Name of method
Percentile methods based on probability distribution	The best probability model based on goodness of fit test results
	Probability plot
	Clements method
	Burr method
Percentile methods which are not based on probability distribution	Numerical percentiles
Transformation techniques	Box-Cox transformation
	Johnson transformation
Percentile methods using re-transformed percentiles	Re-transformation method
Others methods	Weighted variance method
	Wrights capability index
	Fuzzy logic
	Neural network
	Special capability indices

Source: made by author.

Both groups have different modifications, special cases or combinations. Table 2 summarizes possible approaches into process capability analysis in the cases of data non-normality.

4. SELECTED METHODOLOGIES FOR PROCESS CAPABILITY ASSESSMENT

General methodology for process capability does not provide uniform procedure for non-standard situation solving. Standards in automotive indus-

try (e.g. QS 9000 or VDA) deals with process capability assessment but situations when assumptions are not fulfilled are described insufficiently. From standards which are used in automotive industry come methodologies made by individual customers. These methodologies are usually more detailed. Suppliers in automotive industry must use methodology of process capability assessment which is accepted by given customer. Very sophisticated option of selected methodologies for process capability assessment is offered in statistical software QS-STAT.

A specific customer requirement for process capability assessment comes from superior standards used in automotive industry which usually provides basic information. For example VDA 4 in chapter “Process capability investigation” provides main principle which tries to find adequate time model of process behaviour. This standard prescribes eight time models which are marked by letters A-D.⁶

Originally American standard QS 9000: “Statistical process control” describes in chapter concerning on clarification of terms of process capability and process performance for measurable quality characteristic recommended procedure. This procedure is similar like mentioned general methodology for process capability assessment.⁷

Methodologies for process capability assessment based on requirements of selected customers will be presented in next sections. Detailed methodical approaches were formed especially due to insufficient information mentioned in automotive standards (like VDA or QS 9000). Customers established own methodologies which provides better information about specific situation solving and provides better guideline for process capability assessment.

4.1. Assessment methodology by Volkswagen

Assessment methodology in compliance with VW is widely used especially thanks to large portfolio of VW suppliers. So a lot of companies which supplies into VW use it. This methodology can be named as the level of the best practice. Process capability assessment is done by unique algorithm. Principally defined models are fit into measured data. Assessment is done in several steps which are strictly defined. The steps could be summarized into these main phases:

- verification of constant dispersion using control chart,
- verification of constant location using control chart,

⁶ VDA 4 *Management jakosti v automobilovém průmyslu – Zkoumání způsobilosti procesů*, Svaz automobilového průmyslu, 2005.

⁷ QS 9000 *Statistická regulace procesů (SPC)*, Česká společnost pro jakost, 2006.

- verification of assumed probability distribution,
- process model selection,
- process capability indices calculation⁸.

4.2. Assessment methodology by Bosch

Assessment methodology by Bosch is less complex in comparison with VW methodology. The steps could be summarized into these main phases:

- verification of constant location using control chart,
- verification of assumed probability distribution,
- process model selection,
- process capability indices calculation.⁹

4.3. Assessment methodology by Ford

The difference of Ford methodology is expected therefore VW and Bosch are German companies and Ford is American company. However, methodologies VW and Ford have similar approach for process capability assessment.¹⁰

Detailed analysis shows that methodologies mostly have similar procedure. The algorithms have the same logic. Achieved results are different especially due to differences in decision steps realization. For example differences are in preferred types of distributions, types of control charts or different tests which are used for verification of assumptions. Statistical software QS-STAT works with a lot of different assessment methodologies. Only three are mentioned above. Detailed information is described in internal guidelines which are hardly available. These guidelines are released only internally or for suppliers which must assess own processes in accordance with these guidelines.

5. CASE STUDY

Selected methodologies were applied on quality characteristic in case study. Measured data comes from real process where plastic eye is moulded into metal rod. Then symmetry of axis of metal rod and axis of plastic eye are observed. Symmetry is typical quality characteristic which does not correspond with normal distribution. Character of distribution is skewed. In pre-

⁸ Standard VW 101 31: *Process Capability Investigation for Measurable Characteristics* (2005).

⁹ QS-STAT 2010: Návod k softwaru QS-STAT.

¹⁰ Ibid.

vious article of authors¹¹ they were proposed two specific procedures for similar situation which is solved in this case study.

Analysis of statistical stability using control charts showed that process is statistically stable. Table 3 summarizes selected methodologies, achieved values of C_{pk} indices and methods which were used for C_{pk} indices calculation are mentioned.

Table 3. Achieved values of C_{pk} indices by selected assessment methodologies.

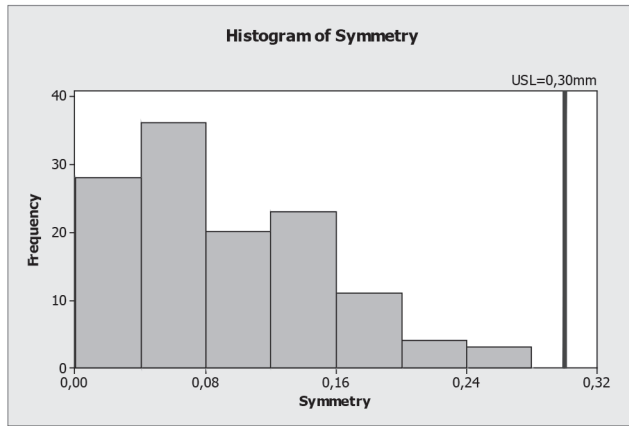
Selected assessment methodology	Value of C_{pk} indice	Calculation method
VW 101 31 (1)	1,16	Johnson transformation
Bosch 2012 (2)	1,15	Johnson transformation
Q-DAS (3)	0,87	Weibull distribution
Audi AG (4)	1,16	Johnson transformation
BMW Cp (5)	1,00	Composed distribution 1
Ford on going (6)	1,25	Composed distribution M4
Ford short term (7)	0,92	Composed distribution
"Classical" assessment methodology		
The best distribution (8)	0,83	Weibull distribution
The best transformation (9)	1,60	Johnson transformation

Source: Made by author.

From figure 1 is obvious that it could be a part of normal distribution curve. Missing part can never be obtained because symmetry has a natural border at the beginning of coordinate system.

¹¹ Karel Nepraš and Jiří Plura, "Possibilities of data non normality solving at process capability analysis in terms of part symmetry" In: Metal 2015, 24th International Conference on Metallurgy and Materials. Ostrava, Tanager, 2015.

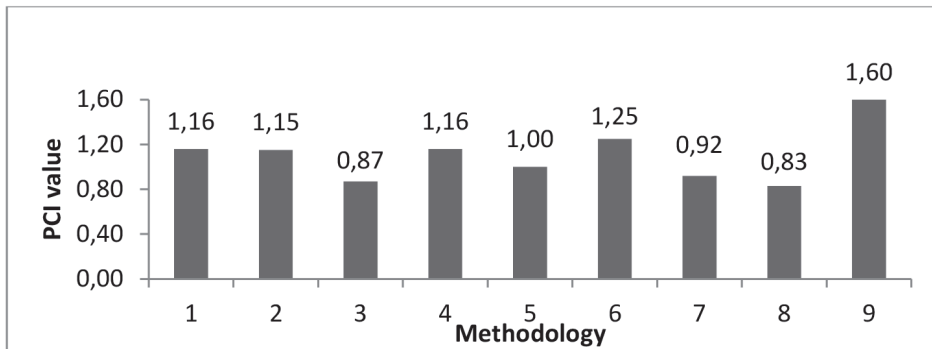
Fig. 1. Histogram of part symmetry



Source: Made by author.

Achieved values of C_{pk} indices are showed on Fig. 2 for better comparison. This figure shows that the biggest value of C_{pk} indice was calculated by classical assessment methodology using Johnson transformation. The lowest value of C_{pk} index was calculated by classical assessment methodology using Weibull probability distribution. The biggest value of C_{pk} index was calculated by Ford on going methodology in comparison of customer's assessment methodologies. The lowest was calculated by Q-DAS methodology. A significant difference between calculated values of C_{pk} indices can be seen on Fig. 2.

Fig. 2. Calculated values of C_{pk} indices evaluated by different assessment methodologies.



Source: Made by author.

Interesting statement is similar procedure of calculation but different results in some methodologies. Methodologies VW 10131 and Ford on going have similar algorithm but different results. In the case of VW is $C_{pk}=1,16$ and in case of Ford on going $C_{pk}=1,25$. This difference is caused by different theoretical distribution model used for assessment. Johnson transformation was used in case of VW. Ford on going methodology used composed distribution for C_{pk} calculation. Surprising are also differences between results of procedures which use Johnson transformation.

Case study shows that using of nine methodical approaches provides different results. Results of this study show that used methodology must be specified before own assessment. Also specified methodology must be agreed by customer and supplier. If there is no specification for assessment methodology then big discussions of achieved results can be expected.

6. CONCLUSION

A lot of methodical approaches for process capability analysis exist. Some customers in automotive industry have own methodology, requirements and solve concrete situation differently. Methodical approaches of individual customers are not available for everybody. They are available usually internally as guidelines for process capability assessment. The way to make all methodologies uniform is possible only via superior standard. If superior standard (QS 9000 or VDA) prescribes uniform methodology then methodologies for process capability analysis in automotive industry could be uniform. Case study shows that different methodical approaches bring different results even if all assumptions are fulfilled and selected methodology is used.

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Sažetak:

MOGUĆNOSTI ANALIZE SPOSOBNOSTI PROCESA U SLUČAJU NENORMALNIH PODATAKA

Mnoge industrijske kompanije dio su lanca opskrbe. Kao jamstvo trajne kvalitete dobavljenih proizvoda, često se traži izjava o sposobnosti procesa. Ovaj rad usmjeren je na metodološki pristup ispitivanju sposobnosti procesa u slučaju nenormalnih podataka. Sposobnost procesa naznačena je kao glavni problem povezan s analizom sposobnosti procesa i opisana je u uvodu. Slijedeća poglavlja prezentiraju i uspoređuju metodološke pristupe za analizu sposobnosti procesa u slučajevima nenormalnih podataka. Različiti metodološki pristupi u praksi obrađeni su vezano za karakteristike kvalitete u studiju slučaja i rezultat analize sposobnosti procesa uspoređeni su i razrađeni.

Ključne riječi: sposobnost procesa, metodološki pristup, nenormalnost.

7. LITERATURA

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Tematska cjelina/*Thematic unit*
KVALITETA I PROCESNO UPRAVLJANJE OKOLIŠEM
PROCESS MANAGEMENT IN ENVIRONMENT PROTECTION

Zadar, Hrvatska/*Croatia*
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March 16th – 18th, 2016

ASPEKTI OKOLIŠA S POSEBNIM OSVRTOM NA GOSPODARENJE OTPADOM PREMA NORMI ISO 14001:2015/E/

ENVIRONMENTAL ASPECTS WITH PARTICULAR REFERENCE ON
WASTE MANAGEMENT ACCORDING TO NORM ISO 14001:2015/E/

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SAŽETAK:

Daje se kratki prikaz sustava upravljanja okolišem ISO 14001:2015/E/ s naglaskom na regulirane aspekte okoliša. Istražuje se problematika upravljanja otpadom u Hrvatskoj. Donose se praktični aspekti koje organizacija koja želi certificirati sustav u skladu s navedenom normom, s obzirom na postojeću regulativu u tom području koja je usklađenu s regulativom EU, treba uvažavati, primijeniti i provoditi. Posebno se obrađuju zahtjevi za gospodarenje otpadom sukladno zahtjevima ove norme.

Ključne riječi: ISO 14001:2015/E/, upravljanje okolišem, aspekti okoliša, gospodarenje otpadom.

1. UVOD

Nova norma ISO 14001:2015/E/ posebno naglašava održivi razvoj i postizanje ravnoteže između okoliša, društva i gospodarstva. „Termin *održivi razvoj* 80-tih godina 20. st. ušao je u opću terminologiju kako bi se ukazala povezanost razvoja i zaštite okoliša. ... Definira se kao razvoj koji zadovoljava potrebe današnjega naraštaja bez ugrožavanja budućih naraštaja. Održivi razvoj, kvaliteta okoliša i gospodarski razvoj postale su spojive aktivnosti.“¹

Održivi razvoj kao krajnji cilj postiže se uravnoteženjem i harmonijom navedena tri stupa održivosti. Od održivog razvoja se očekuje odgovornost i transparentnost sa strogom legislativom zbog povećanog i rastućeg ugrožavanja okoliša zagađenjem, nepravilnim upravljanjem otpadom, neracionalnim korištenjem prirodnih resursa, degradacijom eko sustava, gubitkom bioraznolikosti i klimatskim promjenama. Sve ovo zahtijeva od organizacija usvajanje i provedbu sustavnog pristupa upravljanja okolišem s ciljem doprinosa ekološkom stupnju održivosti. Sustavno su dani ciljevi upravljanja okolišem.²

2. MEĐUNARODNA NORMA ISO 14001:2015/E/

Međunarodna norma ISO 14001:2015/E/ ima svrhu poslužiti organizacijama kao okvir za zaštitu okoliša i pravovremenu reakciju na promjenjive uvjete okoliša u ravnoteži s društveno ekonomskim potrebama. Normom se određuje zahtjeve upravljanja okolišem koji organizaciji omogućuju postizanje namjeranih rezultata koje je ustanovila u vlastitom sustavu upravljanja okolišem.

Ovakav sustavni pristup upravljanju okolišem može upravi organizacije osigurati bitne informacije na kojima će graditi dugoročnu politiku okoliša uz uspjeh i stvaranje mogućnosti za doprinos održivom razvoju kroz:

- zaštitu okoliša sprečavanjem ili ublažavanjem negativnih utjecaja;
- ublažavanje mogućih negativnih učinaka iz okoline na samu organizaciju;
- pomoć organizaciji u ispunjavanju obaveza usklađenosti;
- poboljšanje učinaka na okoliš (postignuća);
- kontrolu ili utjecaj na način na koji su proizvodi i usluge projektirani, izvedeni i distribuirani, na koji se način koriste i zbrinjavaju i to primjenom perspektive životnog ciklusa koja može spriječiti da se utjecaj na okoliš premjesti na drugo mjesto tijekom životnog ciklusa;

¹ Mladen Črnjar, *Ekonomika i politika zaštite okoliša*, Ekonomski fakultet Sveučilišta u Rijeci, Rijeka, 2002, str. 187.

² Cf. Marko Bešker, *Politika okoliša*, Oskar, Zagreb, 2005.

- postizanje financijskih i operativnih koristi do kojih može dovesti primjena okolišnih podobnih alternativa, koje ojačavaju položaj organizacije na tržištu;
- komunikaciju, objavom informacija o okolišu značajnim zainteresiranim stranama.

Ova međunarodna norma, kao i druge međunarodne norme, nema namjeru povećavati ili mijenjati zakonske zahtjeve organizacije.

U normi se posebno naglašava da uspjeh sustava upravljanja okolišem ovisi o opredijeljenosti na svim razinama i funkcijama organizacije na čelu s upravom. Organizacije mogu ispunjavanjem zahtjeva norme i implementacijom povećati mogućnosti za sprečavanje ili ublaživanje negativnih utjecaja na okoliš i poboljšati pozitivne utjecaje na okoliš, posebno one koje imaju strateške ili konkurentske implikacije.

Uprava ima mogućnost učinkovito se baviti rizicima³ i prilikama integrirajući upravljanje okolišem u poslovne procese organizacije, strateško usmjerenje i donošenje odluka uz usklađivanje s drugim poslovnim prioritetima uključujući upravljanje okolišem u svoj ukupni sustav upravljanja.

Uspostavljeni sustav prema zahtjevima ove međunarodne norme može se koristiti kao dokaznica za uvjeravanje zainteresiranih strana o učinkovitosti sustava upravljanja okolišem. Usvajanje ove norme neće samo po sebi jamčiti optimalne okolišne rezultate. Primjena ove međunarodne norme zbog konteksta same organizacije može se razlikovati od jedne do druge organizacije. Tako primjerice dvije se organizacije mogu baviti istom djelatnošću ali mogu imati različite obaveze usklađenosti, opredijeljenosti u svojoj politici okoliša, ekološkim tehnologijama i ciljevima okolišnog učinka, a da pri tome obje ispunjavaju zahtjeve ove međunarodne norme.

Razina detaljnosti i složenosti sustava upravljanja okolišem varirat će i zavisno od konteksta organizacije⁴, opsega sustava upravljanja okolišem, obaveze usklađenosti i prirode djelatnosti, proizvoda i usluga uključujući i aspekte okoliša i povezane učinke na okoliš. Ova međunarodna norma ispunjava zahtjeve za norme iz sustava upravljanja.

Ti zahtjevi uključuju zajedničke strukture visoke razine, identičan osnovni tekst i zajedničke pojmove s ključnim definicijama, zamišljen kao olakša-

³ Miroslav Drljača i Marko Bešker, „Održivi uspjeh i upravljanje rizicima poslovanja“, XIV. savjetovanje SQM 2010, Centar za kvalitet Crne Gore i časopis Kvalitet, Br. 7-8, Poslovna politika, Beograd, Tivat, 2010.

⁴ Miroslav Drljača, Marko Bešker i Josip Čiček, „Unutarnji i vanjski kontekst organizacije“, Zbornik radova 16. međunarodnog simpozija o kvaliteti Kvaliteta i konkurentnost, Hrvatsko društvo menadžera kvalitete, Opatija, Zagreb, 2015, str. 455-472.

nje korisnicima koji implementiraju više ISO normi za sustave upravljanja, kao integrirani sustav.

Norma ISO 14001:2015/E/ ne sadrži zahtjeve specifične za druge sustave upravljanja, kao što su: upravljanje kvalitetom, zaštitom zdravlja, sigurnošću na radu, energijom i financijama. Ona omogućuje organizaciji primjenu zajedničkog pristupa i razmišljanja na temelju rizika kako bi integrirale svoj sustav upravljanja okolišem sa zahtjevima drugih sustava upravljanja.

Ova međunarodna norma sadrži zahtjeve koji se koriste za ocjenu sukladnosti. Organizacija koja želi dokazati svoju sukladnost s ovom međunarodnom normom može to učiniti:

- provedbom samo određivanja i samo deklariranja;
- traženjem potvrde o sukladnosti od stranaka koje imaju interes u organizaciji kao što su kupci;
- traženjem potvrde samo deklariranja od strane izvan organizacije;
- traženjem certifikacije/registracije svog sustava upravljanja okolišem koju provodi neka vanjska organizacija.

Ova međunarodna norma koristi organizaciji u ostvarivanju namjeravnih rezultata sustava upravljanja okolišem koji pružaju vrijednost za okoliš, organizaciju i njene zainteresirane strane. U skladu s politikom okoliša organizacije, namjeravani rezultati sustava upravljanja okolišem uključuju:

- poboljšanje učinaka na okoliš;
- ostvarivanje ciljeva okoliša;
- pridržavanje obaveza usklađenosti.

2.1. Struktura norme ISO 14001:2015/E/

1 Područje primjene

2 Upućivanja na druge norme

3 Pojmovi i definicije

3.1 Pojmovi koji se odnose na organizaciju i vodstvo

3.2 Pojmovi koji se odnose na planiranje

3.3 Pojmovi koji se odnose na podršku i rad

3.4 Pojmovi koji se odnose na ocjenu i poboljšanja

4 Kontekst organizacije

4.1 Razumijevanje organizacije i njezinog konteksta

4.2 Razumijevanje potreba i očekivanja zainteresiranih strana

4.3 Određivanje područja primjene (opsega) sustava upravljanja okolišem

4.4 Sustav upravljanja okolišem

5 Vodstvo

5.1 Vodstvo i opredijeljenost

5.2 Politika okoliša

5.3 Uloge, odgovornost i ovlasti u organizaciji

6 Planiranje

6.1 Radnje koje treba poduzeti za obradu rizika i prilika

6.1.1 Općenito

6.1.2 Aspekti okoliša

6.1.3 Obaveze usklađenosti

6.1.4 Provedba planiranja

6.2 Ciljevi okoliša

6.2.2 Planiranje radnji za ostvarivanja ciljeva okoliša

7 Podrška

7.1 Resursi

7.2 Kompetentnost

7.3 Svijest

7.4 Komunikacija

7.4.1 Općenito

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10.1 Općenito

10.2 Neusklađenost i korektivna radnja

10.3 Stalno poboljšavanje

3. ASPEKTI OKOLIŠA

Organizacija u području sustava upravljanja okolišem mora utvrditi aspekte okoliša zbog svojih aktivnosti, proizvoda i usluga koje može nadzirati i one na koje može utjecati, kao i njihove povezane utjecaje na okoliš, uzimajući u obzir perspektivu životnog ciklusa.

Kod utvrđivanja aspekata okoliša organizacija mora uzeti u obzir: promjene uključujući planirani ili novi razvoj, kao i nove ili izmijenjene aktivnosti, proizvode i usluge, neuobičajene uvjete i izvanredne situacije koje je moguće razumno predvidjeti.

Organizacija mora odrediti aspekte koji imaju ili mogu imati značajan utjecaj na okoliš, tj. značajne aspekte okoliša, primjenom uspostavljenih kriterija.

Organizacija mora priopćiti svoje značajne aspekte okoliša na raznim razinama i funkcijama u organizaciji prema potrebi. Organizacija mora priopćiti svoje značajne aspekte okoliša. Organizacija mora održavati dokumentirane informacije o svojim:

- aspektima okoliša i povezanim utjecajima na okoliš;
- kriterijima primijenjenim za određivanje svojih značajnih aspekata okoliša;
- značajnim aspektima okoliša.⁵

4. PRIPRAVNOST I ODZIV U IZVANREDNIM SITUACIJAMA

Organizacija mora uspostaviti, primijeniti i održavati proces-e potrebne za pripravnost i odziv u mogućim izvanrednim prepoznatim situacijama:

- mora uspostaviti, primjenjivati i održavati procese potrebne za ispunjavanje zahtjeva aspekata okoliša (obaveze usklađenosti, provedbe, planiranja);
- pripremiti se za odziv planiranim radnjama za sprečavanje ili ublažavanje negativnih utjecaja izvanrednih situacija na okoliš;

⁵ Značajni aspekti okoliša mogu dovesti do rizika i prilika povezanih s negativnim utjecajima na okoliš (prijetnje) ili pozitivnim utjecajima na okoliš (prilike).

- odgovoriti na stvarne izvanredne situacije;
- poduzeti radnje za sprečavanje ili ublažavanje negativnih situacija primjerene veličini opasnosti i potencijalnom utjecaju na okoliš;
- periodično provjeravati planirane radnje odziva gdje je to praktično;
- periodično preispitati i revidirati proces-e i planiranje radnji odziva, posebno nakon nastanka izvanrednih situacija ili provjera;
- osigurati, prema potrebi, značajne informacije i osposobljavanje povezano s pripravnošću i odzivom na izvanredne situacije značajnim zainteresiranim stranama, uključujući osobe koje rade pod njenim nadzorom.

Organizacija mora održavati dokumentirane informacije u mjeri potrebnjoj za pouzdanost da se proces-i provode kako je planirano.

5. OBAVEZE USKLAĐENOSTI

U skladu s razumijevanjem potreba i očekivanja zainteresiranih strana organizacija određuje dovoljno detaljne obaveze usklađenosti, koje je prepoznala, a koje su primjenjive na njezine aspekte okoliša te kako se one primjenjuju na organizaciju.

Obaveze usklađenosti uključuju zakonske zahtjeve koje organizacija mora ispunjavati i druge zahtjeve kojih se organizacija mora pridržavati ili ih se odlučila pridržavati.

Ti obavezni zakonski zahtjevi povezani su sa sustavom upravljanja okolišem i mogu uključivati, ako je primjenjivo;

- zahtjeve državnih tijela ili drugih nadležnih organa;
- međunarodne, nacionalne i lokalne zakone i propise;
- zahtjeve navedene u dozvolama, odobrenjima ili drugim oblicima i ovlaštenjima;
- naloge, pravila ili smjernice regulatornih organa.

6. GOSPODARENJE OTPADOM

Gospodarenje otpadom je skup aktivnosti, odluka i mjera usmjerenih na:⁶

- sprečavanje nastanka otpada, smanjenje količina otpada i/ili njegovog štetnog utjecaja na zdravlje;

⁶ Cf. Miroslav Drljača, „The transition from linear to circular economy (Concept of efficient waste management)“, III. International Conference, Proceedings Book *Quality System Condition for Successful Business and Competitiveness*, Association for Quality and Standardization of Serbia, Vrnjačka Banja, 2015, p. 35-44.

- obavljanje sakupljanja, prijevoza, uporabe, zbrinjavanje i drugih djelatnosti u svezi s otpadom te nadzor nad obavljanjem tih djelatnosti;
- skrb nad odlagalištima koja su zatvorena.

Gospodarenje otpadom mora se provoditi na način da ne dovodi u opasnost ljudsko zdravlje i bez korištenja postupaka ili načina koji bi mogli štetiti okolišu kako bi se izbjeglo rizike zagađenja nadzemnih i podzemnih voda, tla, zraka, pojave buke, neugodnih mirisa, estetsko naruženje, ugrožavanje biljnog i životinjskog svijeta, bio raznolikosti.

Osnovni ciljevi gospodarenja otpadom su:

- izbjegavanje i smanjenje nastajanje otpada i smanjivanje opasnih svojstava i to razvojem ekološki podobnih (čistih) tehnologija koje koriste manje prirodnih resursa;⁷
- tehnički razvoj i unapređenje i promicanje proizvoda koji ne pridonose ili u manjoj mjeri pridonose povećanju štetnog utjecaj otpada i opasnosti zagađenja;
- razvoj odgovarajućih metoda zbrinjavanja opasnih tvari sadržanih u otpadu namijenjenih uporabi;
- uporaba recikliranjem, ponovnom uporabom ili obnovom odnosno drugim postupkom, koji omogućuje izdvajanje sekundarnih sirovina, ili uporabu otpada u energetske svrhe;
- zbrinjavanje otpada na propisan način;
- sanacija otpadom zagađenog okoliša.

Planski dokumenti gospodarenja otpadom su Strategija gospodarenja otpadom na nacionalnoj razini. Planovi gospodarenja su na nacionalnoj, regionalnoj, županijskoj razini, na razini općina i proizvodnih organizacija generatora otpada.

Strategija gospodarenja otpadom Republike Hrvatske (NN 130/05) sastavni je dio Nacionalne strategije zaštite okoliša Republike Hrvatske (NN 46/02). Strategijom gospodarenja otpadom Republike Hrvatske se dugoročno određuje i usmjerava gospodarenje otpadom, a ona sadrži:

- ocjenu postojećeg stanja gospodarenja otpadom;
- osnovne ciljeve i mjere gospodarenja otpadom;
- mjere gospodarenja opasnim otpadom;
- smjernice za uporabu i zbrinjavanje otpada s načelima zaštite okoliša gospodarskim načelima;

⁷ Cf. Josip Čiček i Miroslav Drljača, „Okolina i društvena odgovornost u svjetlu norme ISO 26000:2010 (E)“, Zbornik radova 13. međunarodnog simpozija o kvaliteti *Kvaliteta i društvena odgovornost*, Hrvatsko društvo menadžera kvalitete, Solin, Zagreb, 2012, str. 27-37.

- smjernice za odlaganje otpada čije se nastajanje ne može izbjeći i koji se ne može obraditi;
- smjernice za osiguranje najpovoljnijih tehničkih, proizvodnih i gospodarskih mjera za postizanje ciljeva gospodarenja otpadom.

Plan gospodarenja otpadom u Republici Hrvatskoj za razdoblje 2007. - 2015. godine (NN 85/07; 126/10; 31/11; 46/15) provedbeni je dokument Strategije. Plan sadrži:

- vrste, količinu i porijeklo otpada za koji treba osigurati gospodarenje;
- uvjete gospodarenja posebnim kategorijama otpada;
- razmještaj lokacija (mreža) građevina i uređaja za oporabu i zbrinjavanje otpada i rokove za njihovu izgradnju;
- opće tehničke zahtjeve za građevine i uređaje za gospodarenje otpadom.

Nadzor nad provedbom Plana gospodarenja otpadom u Republici Hrvatskoj obavlja Ministarstvo zaštite okoliša i prirode. Ministarstvo je dužno jednom godišnje, do 30. lipnja tekuće godine, za prethodnu godinu, podnijeti Vladi Republike Hrvatske Izvješće o izvršenju utvrđenih obveza i učinkovitosti poduzetih mjera iz Plana gospodarenja otpadom Republike Hrvatske.

6.1. Plan gospodarenja otpadom

Plan gospodarenja otpadom županije, odnosno grada Zagreba, sadrži:

1. Mjere izbjegavanja i smanjenja nastajanja otpada.
2. Mjere gospodarenja otpadom prema najboljoj dostupnoj tehnologiji koja ne zahtijeva previsoke troškove.
3. Mjere iskorištavanja vrijednih karakteristika otpada, odnosno mjere odvojenog skupljanja otpada.
4. Plan izgradnje građevina namijenjenih skladištenju, obradi ili odlaganju otpada u cilju uspostavljanja cjelovite nacionalne mreže građevina za zbrinjavanje otpada.
5. Mjere sanacije otpadom onečišćenog okoliša i neuređenih odlagališta.
6. Mjere nadzora i praćenja gospodarenja otpadom.
7. Izvore i visinu financijskih sredstava za provedbu pojedinih mjera.
8. Rokove za izvršenje utvrđenih mjera.

Nadležni ured nadzire provedbu planova gospodarenja otpadom, a jednom godišnje, do 31. svibnja tekuće godine, podnose županijskoj skupštini

odnosno Skupštini grada Zagreba, izvješće o izvršenju utvrđenih obaveza za prethodnu godinu. Usvajeno izvješće nadležni ured dostavlja Ministarstvu i Agenciji za zaštitu okoliša.

Plan gospodarenja otpadom grada, odnosno općine, sadrži:

1. Mjere odvojenog skupljanja komunalnog otpada.
2. Mjere za upravljanje i nadzor odlagališta za komunalni otpad.
3. Popis otpadom onečišćenog okoliša i neuređenih odlagališta.
4. Redoslijed aktivnosti sanacije divljih odlagališta i otpadom onečišćenog okoliša.
5. Izvore i visinu potrebnih sredstava za provedbu sanacije.

Nadležni ured uprave nadzire provedbu planova gospodarenja otpadom. Poglavarstva grada i općine dužna su jednom godišnje, do 30. svibnja tekuće godine, podnositi gradskom odnosno općinskom vijeću izvješće o izvršenju Plana za prethodnu godinu.

6.2. Proizvođač otpada

Proizvođač otpada koji proizvodi godišnje više od 150 tona neopasnog otpada i/ili više do 200 kg opasnog otpada, dužan je planirati gospodarenje otpadom za razdoblje od četiri godine. Plan gospodarenja otpadom proizvođača otpada sadrži osobito:

- Podatke o vrsti, količini i mjestu, odnosno procesu nastanka otpada te predviđanje trenda nastajanja otpada.
- Mjere za sprečavanje ili smanjivanje nastanka otpada i njegove štetnosti.
- Postojeći i predviđeni način gospodarenja otpadom.
- Podatke o vlastitim građevinama i uređajima za gospodarenje otpadom.
- Plan proizvođač izrađuje na propisanim obrascima, a obrasce popiše Ministar.

Ovaj se Plan gospodarenja otpadom dostavlja nadležnom urednu i Agenciji za zaštitu okoliša. Odgovornost gospodarenje podijeljena je tako da je država odgovorna za gospodarenje opasnim otpadom i za spaljivanje otpada. Županija i grad Zagreb odgovorni su za gospodarenje svim vrstama otpada osim opasnog otpada. U provedbi mjera gospodarenje otpadom županija je dužna surađivati s jedinicama lokalne samouprave. Više županija može osigurati zajedničku provedbu.

Gradovi i općine odgovorni su za gospodarenje komunalnim otpadom. Dužni su u suradnji i koordinaciji sa županijom osigurati provedbu propisa-

nih mjera za odvojeno prikupljanje otpada. Troškovi gospodarenja otpadom obračunavaju se prema kriteriju količine i svojstvu otpada uz primjenu načela „zagađivač plaća“, a iznimno za komunalni otpad iz kućanstava mogu se primijeniti i drugi obračunski kriteriji u skladu s propisom kojim se utvrđuje komunalno gospodarstvo. Troškovi gospodarenja otpadom moraju obuhvatiti:

- troškove odvojenog skupljanja otpada;
- troškove prijevoza otpada;
- troškove drugih mjera gospodarenja otpadom koje nisu pokrivena prihodima ostvarenim prometom otpada;
- procijenjene troškove uklanjanja otpada, koje je nepoznata osoba odložila izvan odlagališta otpada;
- troškove odlaganja otpada koji obuhvaćaju troškove projektiranja i izgradnje građevina za odlaganje otpada, troškove rada odlagališta te procjenu troškova zatvaranja odlagališta, njegovog naknadnog održavanja i gradnje nove građevine koja će se koristiti nakon prestanka rada postojeće.

7. ZAKLJUČAK

Nova norma ISO 14001:2015/E/ posebno naglašava održivi razvoj i postizanje ravnoteže između okoliša, društva i gospodarstva. Ima identičnu strukturu kao i ostale norme za sustave upravljanja. Kao ključna poboljšanja obuhvaća: 1) povećanu ulogu uprave, 2) usklađivanje sa strategijom, 3) povećanu zaštitu životne sredine s fokusom na proaktivno djelovanje, 4) efikasniju komunikaciju i 5) sagledavanje problema zaštite okoliša kroz životni ciklus proizvoda ili usluge. Sadrži zahtjeve za utvrđivanje aspekata okoliša i zahtijeva da organizacija u području sustava upravljanja okolišem mora utvrditi aspekte okoliša zbog svojih aktivnosti, proizvoda i usluga koje može nadzirati i one na koje može utjecati, kao i njihove povezane utjecaje na okoliš, uzimajući u obzir perspektivu životnog ciklusa. Kod utvrđivanja aspekata okoliša organizacija mora uzeti u obzir: promjene uključujući planirani ili novi razvoj, kao i nove ili izmijenjene aktivnosti, proizvode i usluge, neuobičajene uvjete i izvanredne situacije koje je moguće razumno predvidjeti. U sinergiji sa Strategijom gospodarenja otpadom Republike Hrvatske kao sastavnim dijelom Nacionalne strategije zaštite okoliša Republike Hrvatske, predstavlja snažan alat organizacija za izgradnju sustava upravljanja okolišem, u okviru kojeg treba izgraditi sustav gospodarenja otpadom, kako na razini organizacije tako i na razini općina, gradova i države u cjelini.

Summary:

ENVIRONMENTAL ASPECTS WITH PARTICULAR REFERENCE ON WASTE MANAGEMENT ACCORDING TO NORM ISO 14001:2015/E/

Authors deliver a brief overview of the environmental management system according to norm ISO 14001:2015/E/ focusing on regulated environmental aspects. Authors explore the issue of waste management in Croatia. They delivers practical aspects of an organization that wants to certify according to this norm, according to positive rules in that area compatible with EU rules, need to respect, use and provide. Specially treated requirements for waste management according this norm.

Key words: ISO 14001:2015/E/, environmetal management, environmental aspects, waste management.

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ODRŽIVO GOSPODARSTVO I SUSTAVI UPRAVLJANJA

SUSTAINABLE ECONOMY AND MANAGEMENT SYSTEMS

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SAŽETAK

Održivo poslovanje koje uključuje brigu o velikom broju aspekata i utjecaja koji nastaju kao posljedica djelovanja određenog gospodarskog subjekta postaje sve više uvjet uspješnog razvoja. Posljedica toga je i razvoj novih sustava upravljanja koji su u funkciji održivosti ili stavljaju naglasak na neke od njegovih segmenata kao što je okoliš. Sve se više u sustave upravljanja uključuje i težnja da sve što se poduzima bude u cilju održivog gospodarstva. Sustavi koji su u proteklom desetljeću prisutni na tržištu i dobivaju sve više na važnosti, najviše su vezani za sektore koji su povezani s potrošnjom resursa te su u većini slučajeva implementirani, održavani i certificirani kroz integrirane sustave upravljanja. Međutim, s obzirom na sve veću interdisciplinarnost djelovanja organizacije, ali i sve veći broj sustava upravljanja, organizacijama je sve teže snaći se u velikom broju različitih normi i sustava upravljanja,

prepoznati važnost svakog od njih i ispravno se odlučiti za primjenu onih od kojih će sve strane imati najviše koristi. U radu će se dati prikaz trenutnog stanja u Republici Hrvatskoj u implementaciji i certifikaciji po različitim normama te dati naglasak na razlikama pojedinih sustava upravljanja i mogućnosti njihove integracije. Naglasak je na sljedećim normama: ISO 14001, FSC (FM i COC) PEFC (FM i COC), GLOBAL GAP, ISO 50001, EMAS, ETS, ISCC.

Ključne riječi: održivost, okoliš, sustavi upravljanja.

1. UVOD

Najveću važnost i priznanje sustava upravljanja vezanih uz održivo gospodarstvo predstavljaju sustavi upravljanja vezani uz okoliš jer direktno utječu na održivo gospodarstvo kroz korištenje resursa, pa ćemo na istu temu dati kratak pregled sustava upravljanja.

Kroz svakodnevni život svjedoci smo podizanja svijesti među ljudima o potrebi za razvoj održivog gospodarstva, zaštite i očuvanja prirodnih resursa koji se nalaze oko nas i koji nam stoje na raspolaganju. Zahtjevi generirani prema gospodarskim subjektima da prilagode svoje poslovanje zahtjevima održivog gospodarstva su veći i veći i sve su češće vezani uz zakonske i ostale propise. Svijest o potrebi usklađivanja poslovanja s navedenim uvjetima raste iz dana u dan, a te tvrtke uglavnom prihvaćaju svoju odgovornost u očuvanju i korištenju prirodnih resursa i potrebu da sagledaju sve aspekte kako za svoj, tako i za tržišni opstanak.

Kao pomoć u ostvarenju tih ciljeva stoje nam na raspolaganju razni sustavi upravljanja koji sa svojim zahtjevima djelomično postaju vodič za upravljanje aktivnosti tvrtki prema održivom gospodarstvu. Zahtjevi pojedinih sustava upravljanja su u potpunosti ili uglavnom u skladu s određenim aspektima održivog gospodarstva. Kroz ovaj rad dan je pregled sustava upravljanja koji može pomoći tvrtkama da steknu uvid u postojeće sustava upravljanja kako bi lakše donijeli odluku o njihovoj provedbi.

Veliki broj razvijenih sustava upravljanja će u pojedinoj situaciji tvrtkama predstavljati poteškoću oko odabira i odluke za primjenu sustava koji najbolje odgovara njihovim poslovnim potrebama. Sama primjena sustava upravljanja i njihove eventualno certifikacije uvelike će pomoći u postizanju ciljeva vezanih za održivo gospodarstvo.

2. SUSTAVI UPRAVLJANJA U FUNKCIJI ODRŽIVOSTI

S obzirom na najveću prepoznatljivost međunarodnih normi na području održivosti i direktnu vezu s okolišem, za sustav upravljanja okolišem ćemo dati kratki osvrt.

2.1. ISO 14001 – Sustavi upravljanja okolišem

Međunarodna norma ISO 14001 postavlja zahtjeve za planiranje, uspostavu, primjenu i nadzor sustava upravljanja okolišem.

Kroz sustav upravljanje okolišem osigurava se smanjenje nepovoljnih utjecaja na okoliš, pravovremenim odzivom u slučaju nezgoda ili izvanrednih situacija, smanjenje troškova, usklađivanje poslovanja sa zakonskim zahtjevima i ostalim zahtjevima te pozitivnu predodžbu tvrtke u javnosti.

Positivan i aktivan odnos prema okolišu postao je bitan pokazatelj poslovne uspješnosti, s naglaskom da je poslovanje usmjereno prema održivosti.

2.2. ISO 50001 – Sustavi upravljanja energijom

Norma koje je još uvijek nedovoljno poznata na području Republike Hrvatske (nedostatak proizvodnje i potrošnje energije te ulaganja vezanih uz energetska učinkovitost). Predstavlja nadogradnju na normu sustava upravljanja okolišem ISO 14001 s naglaskom na potrošnju resursa.

Zbog velikih potreba za energijom novih tržišta u razvoju sve manje dostupnih zaliha fosilnih goriva te u svezi s navedenim, sve viših cijena goriva, ali i negativnog utjecaja korištenja fosilnih goriva na okoliš – efekt „staklenika“, energetska (ne)učinkovitost se iskazuje kao problem od najvećeg značaja u svijetu posljednjih godina. Problem gospodarenja energijom je posebno izražen u industriji kao velikom potrošaču energije.

Jedan od ključnih čimbenika razvitka uspješnog poslovanja gospodarskih subjekata je da se zaštiti okoliš, pa je trajna optimizacija sustava upravljanja energijom kroz normu ISO 50001 podupiranje tvrtki u razvoju sustava i procesa projektiranih da se poveća njihova energetska učinkovitost.

Prema važećoj zakonskoj regulative certificirane tvrtke, odnosno velika poduzeća ne moraju obavljati energetske pregled jer je certifikat ISO 50001 jednakovrijedan, a samim time profitiraju kroz smanjenje troškova energije i investicijskih troškova, kao i kroz trajnu optimizaciju energetske učinkovitosti. Uz sve navedeno, optimizacijom potrošnje energije smanjuje se i emisija CO₂ te učvršćuje svijest zaposlenika o važnosti očuvanja okoliša.

ISO 50001 se vrlo lako može integrirati u postojeći sustav kvalitete, sigurnosti i/ili sustav upravljanja okolišem, za sve tipove organizacije koje žele pratiti i unaprijediti energetska učinkovitost.

2.3. ETS - Verifikacija izvješća o emisijama stakleničkih plinova

Zadnjih nekoliko godina u Republici Hrvatskoj je primjenljiv sustav trgovanja emisijama stakleničkih plinova koji funkcionira na načelu ograničenja dopuštene količine emitiranih emisija stakleničkih plinova, tzv. kvota, koje smiju ispuštati različita postrojenja obuhvaćena Direktivom.

Ograničenje dopuštene količine emisija s vremenom se smanjuje, a konačni je cilj da u 2020. godini ukupne emisije iz sektora obuhvaćenih EU ETS-om budu 20% niže u odnosu na razinu emisija iz 1990. godine. Svake godine obveznik mora posjedovati onoliko emisijskih jedinica koliko je potrebno za pokrivanje verificiranih, pri čemu obveznik, ako smanji svoje stakleničkih plinova ulaganjem u nove i energetske učinkovitije tehnologije, preostale emisijske jedinice može sačuvati za pokrivanje budućih potreba ili ih može prodati drugomu obvezniku kojem nedostaju emisijske jedinice za pokrivanje verificiranih.

U toj fazi u Republici Hrvatskoj primjenjuje se jedinstvena dodijeljena kvota na stakleničkih plinova za cijeli EU. Emisijske jedinice dodjeljuju se na dražbi, a za postrojenja kojima se emisijske jedinice dodjeljuju besplatno su usklađena pravila raspodjele koja vrijede diljem EU.

Verifikacija slijedi pristup temeljen na riziku s ciljem stvaranja verifikacijskog mišljenja s razumnim jamstvom, dok je verifikator odgovoran za očuvanje načela dobrog upravljanja i temelji svoj izvještaj da su podaci o emisijama u izvještaju točno prikazani, da izvještaj o emisijama ne sadrži propuste ili pogreške i u konačnosti da se emisije prate u skladu s dozvolom za emisije stakleničkih plinova

2.4. EMAS - Eco-Management and Audit Scheme

EMAS (Eco-Management and Audit Scheme) je sustav ekološkog upravljanja i neovisnog ocjenjivanja kojim organizacije procjenjuju utjecaj njihove djelatnosti na okoliš, informiraju javnost o trenutnoj procjeni stanja utjecaja te unapređuju učinkovitost rada u skladu sa zahtjevima zaštite okoliša.

Uključivanje organizacija u sustav EMAS je dobrovoljno i dostupno svim ekonomskim sektorima (javnim i privatnim djelatnostima), odnosno pravnim i fizičkim osobama - obrtnicima.

EU Eco-Management i shema za reviziju (EMAS) je alat za upravljanje tvrtki i drugih organizacija za procjenu, prijavu i poboljšanje njihovu učinkovitosti zaštite okoliša. Program je bio dostupan za sudjelovanje tvrtki od 1995 godine, a izvorno je bio ograničen na poduzeća u industrijskim sektorima.

EMAS je danas otvoren za sve gospodarske sektore, uključujući javne i privatne usluge. Za razliku od međunarodnog niza ISO 14000, EMAS nema status norme već uredbe (regulative) Europske komisije. Za oba navedena sustava upravljanja zaštitom okoliša možemo općenito reći kako teže prema ostvarenju istih ciljeva, ali na donekle drugačiji način. ISO 14001 se oslanja na zakonsku legislativu zemlje u kojoj se sustav certificira dok EMAS, kao uvjet pristupanja države Europskoj uniji, zahtijeva usklađenje postojeće legislative s legislativom Europske unije.

Usporedimo li zahtjeve koje ova dva sustava upravljanja stavljaju pred zainteresirane organizacije, možemo zaključiti kako EMAS sadrži zahtjeve norme ISO 14001 te da u aspektu povezanim sa zakonskom legislativom zahtijeva više nego norma ISO 14001. Nadalje, ovi se sustavi razlikuju po pitanju provođenja početne ocjene stanja utjecaja na okoliš, dostupnosti politike, ciljeva i pokazatelja utjecaja na okoliš, javnosti, frekvencije i provođenja neovisne ocjene, ocjene utjecaja na dobavljače, uključenosti zaposlenika u proces kontinuiranog unapređenja utjecaja na okoliš, osiguravanja informacija o značajnim aspektima okoliša zainteresiranim stranama, uporabi logo-a itd.

Kao zaključak istaknimo da se organizacija koja ima implementiran i održavan sustav ISO 14001, nalazi u položaju da uz relativno male napore zadovolji i zahtjeve EMAS uredbe, pri čemu certifikacija sustava upravljanja prema ISO 14001 nije preduvjet za EMAS registraciju.

U Republici Hrvatskoj se trenutno stvaraju preduvjeti kroz zakonsku regulativu za EMAS i još ne postoje akreditirane tvrtke koje mogu provesti EMAS audit.

2.5. FSC - Forest Stewardship Council

FSC je međunarodni certifikat i sustav označavanja koji jamči da proizvodi od drva i papira koji nose FSC oznaku dolaze iz šuma ili izvora kojima se gospodari ekološki odgovorno, društveno korisno i ekonomski održivo.

FSC sustav upravljanja podrazumijeva FSC FM (Forest management certification) - certifikacija za upravljanje šumama i FSC COC (Chain of Custody) - certifikacija lanca sljedivosti

FSC akreditirana certifikacija znači da se šumom gospodari prema strogim ekološkim, socijalnim i ekonomskim standardima.

FSC FM certifikat u Hrvatskoj - Državna tvrtka "Hrvatske šume" su od

2002. godine nositelji FSC certifikat za gospodarenje šumama. FSC certifikat predstavlja veliku čast i međunarodno priznanje načinu gospodarenja šumama koje se odvija u skladu sa strogim kriterijima. Također u zadnjih nekoliko godina certifikat posjeduje i privatni šumovlasnici u Republici Hrvatskoj. Time je hrvatska šumarska struka koja već generacijama na odgovoran način gospodari izuzetno značajnim nacionalnim resursom dobila veliko priznanje.

Tvrtke u drvoprerađivačkom sektoru su istu priliku prepoznali tako da u Hrvatskoj trenutno ima preko 250 FSC COC certificiranih tvrtki koje su time stekle veliku komparativnu prednost. Postojanje certifikata potiče izvornu orijentaciju naše drvne industrije i to tako da se postigne veća dodana vrijednost na proizvode.

FSC COC (Chain of Custody) certifikacija predstavlja potvrđivanje lanca sljedivosti za održivi razvoj svjetskih šumskih resursa, šumskih ekosustava, a time i ekološke ravnoteže planete uopće. Lanac sljedivosti prati FSC certificirani materijal kroz proizvodni proces od šume do potrošača uključujući sve faze pretvorbe i svi vlasnici u proizvodnom lancu moraju biti nositelji FSC certifikata da bi se u konačnici finalni proizvod mogao označiti propisanim FSC oznakama.

Takve oznake predstavljaju poveznicu između odgovorne proizvodnje i potrošnje odnosno omogućuju potrošačima da donesu odluku o društveno-ekološki odgovornoj kupnji.

FSC CoC (Chain of Custody) certifikacija pomaže nositeljima takvih certifikata kroz poboljšani marketinški pristup u rastućem ekološki svjesnom sektoru.

Tvrtke iz Hrvatske koji nude svoje proizvode (načinjene od sirovine šumskog porijekla) na međunarodnom tržištu, osobito na tržištu Europe, sve češće se susreću sa zahtjevima za FSC certifikatom kao uvjetom za kupnju njihovih proizvoda. Nažalost, rijetko se događa da takvi zahtjevi budu postavljeni od strane potrošača i klijenata iz Hrvatske što za sada ipak govori da kao društvo još uvijek nismo dovoljno prepoznali važnost da posjedovanje certifikata nije samo zahtjev klijenta već je jedan o temelja održivosti u poslovanju.

2.6. PEFC - Certificiranje šuma i lanac sljedivosti – COC

PEFC certifikat sličan je FSC certifikatu za održivo gospodarenje šumama koji osigurava vlasnicima šuma neovisno priznavanje njihove odgovorne prakse upravljanja šumama.

Upravljanje šumama je dugoročni proces. Rezultati dobre prakse često se mogu primijetiti i postati jasni tek nakon niza desetljeća.

U Hrvatskoj certifikat PEFS COC još nije dobio toliko na važnosti jer nema certificiranih šuma po istom principu ali se sporadično pojavljuju zahtjevi i certificirane tvrtke jer žele ispuniti zahtjeve kupaca i biti dio međunarodne mreže u kojoj je jedan od temeljnih zahtjeva održivost.

2.7. Global GAP

Norma EUREPGAP objavljena je prvi put 1997. godine. Objavila ju je Euro-Retailer Produce Working Group-a (EUREP grupa) koju su činili europski trgovci hranom, poljoprivredni proizvođači te članovi raznih interesnih udruženja. Norma je definirana na zahtjev kupaca s ciljem stvaranja opće prihvaćene norme dobre poljoprivredne prakse (DPP/GAP), dokumentirane na način da je prikladna za provedbu procesa certifikacije prema međunarodno prihvaćenim procedurama. Norma se odnosi na sve aktivnosti na farmi. Zasnovana je na primjeni dobre poljoprivredne prakse (DPP/GAP), programa integrirane kontrole pesticida (IPC), sustava upravljanja kvalitetom (QMS) i HACCP načela.

Cilj primjene je jačanje povjerenja kupaca u kvalitetu i zdravstvenu ispravnost poljoprivrednih proizvoda, smanjenje negativnog utjecaja konvencionalne poljoprivredne proizvodnje na okoliš te stalna briga o zdravlju i sigurnosti zaposlenika u poljoprivrednoj proizvodnji kao i životinja u uzgoju. Nakon desetogodišnje primjene EUREPGAP zahtjeva na području Europe te njene primjene i priznavanja na ostalim kontinentima (Amerika, Afrika, Australija, Japan i Tajland), u rujnu 2007. godine EUREP grupa objavila je promjenu imena norme EUREPGAP u GLOBALGAP.

Danas se certifikacija proizvoda/proizvodnje prema normi GLOBALGAP pojavljuje kao jedna od bitnih preporuka trgovačkih lanaca usmjerena prema dobavljačima poljoprivrednih proizvoda.

Procjenom usklađenost svog proizvodnog procesa, odnosno proizvoda prema zahtjevima norme GLOBALGAP proizvođač ne ispunjava samo zahtjeve norme već se kroz opredjeljenje usmjerava stvaranju održive poljoprivrede koja će kroz brižno gospodarenje tlom, zrakom i vodom, ostati na korištenje i budućim generacijama.

Osim stvaranja moderne poljoprivredne proizvodnje proizvođač podiže svoju konkurentnost i otvara vrata međunarodnog tržišta poljoprivrednih proizvoda. Certifikat GLOBALGAP predstavlja putovnicu poljoprivrednih proizvoda za međunarodno tržište. U republici Hrvatskoj je sve više zahtjeva za primjenom i certifikacijom prema navedenom sustavu kako zbog izvoza tako i zbog pojedinačnih zahtjeva trgovačkih lanaca.

2.8. ISCC certifikacija

ISCC je također nova, tražena vrsta certifikacije koja se odnosi na poljoprivredne proizvode, kao i na sve sudionike tog proizvodno-prodajnog lanca: farmere, silose, trgovce, tvornice ulja, tvornice biodizela i druge. Zadnjih nekoliko godina sve veći je broj zahtjeva u Republici Hrvatskoj za ISCC certifikate koje međunarodne tvrtke postavljaju našim proizvođačima i izvozniciima pri izvozu i trgovini. U razdoblju od 2014. do 2020. godine u EU će se posebna pozornost posvetiti ruralnom i održivom razvoju.

Europska komisija donijela je Direktivu o obnovljivoj energiji koja definira opći okvir za razvoj obnovljive energije pa su tako biogoriva poželjna samo ako su proizvedena na održivi način. U sklopu sustava ISCC razrađena je mogućnost računanja količine stakleničkih plinova nastalih iz biogoriva. Za njihovu je upotrebu propisano da moraju ostvariti uštedu od najmanje 35% emisije stakleničkih plinova u odnosu na fosilni benzin. Sirovine za biogorivo ne smiju se proizvoditi na zemljištu s bogatom bioraznolikošću i velikom zalihom ugljika ako žele dobiti ISCC certifikat.

Sustav počiva na lancu sljedivosti (Chain of Custody), pa se certifikacija provodi na sličan način kao za ostale tipove COC certifikacije (npr. FSC COC).

3. ZAKLJUČAK

U Republici Hrvatskoj je dosad najpoznatiji sustav upravljanja okolišem ISO 14001 bez obzira na gospodarsku granu i djelatnost, dok su ostali sustavi prisutni kroz pojedine sektore. Sve veći zahtjevi javnosti, zakonska regulativa, razne udruge i pokreti stavljaju sve veću važnost na potrebu upravljanja tvrtkom na način da se poštuju pravila ekonomske održivosti. Sve veći broj tvrtki pokušavaju uskladiti svoje poslovanje s tim zahtjevima i istodobno se suočavaju s problemom kako predstaviti svoje aktivnosti javnosti na vjerodostojan način, a da ne koriste previše resursa (vrijeme, novac ...). Različite međunarodne organizacije za standardizaciju, već dugi niz godina, izdaju sve više različitih normi koje definiraju sustav upravljanja tvrtkama za zadovoljene uvjete održivog upravljanja. Vrlo često, provedba pojedinih sustava upravljanja je najjednostavniji način za predstavljanje za javnost aktivnosti tvrtke u tom segmentu. Umjesto širokog predstavljanja aktivnosti tvrtke ponekad je dovoljno navesti da posjeduje određeni certifikat. U budućnosti očekujemo sve veći broj certifikata u skladu sa standardima koji promiču održivo gospodarenje, jer korist je višestruka. Implementacijom i upravljanjem pojedinim sustavima upravljanja može se postići usklađenost poslovanja s idejom održivog gospodarenja i ugleda u javnosti.

Abstract:

SUSTAINABLE ECONOMY AND MANAGEMENT SYSTEMS

Sustainable economy which includes care about large number of aspects and influences which are generated as a result of certain economic entity becomes more and more a requirement of a successful development. The consequence is also a development of new management systems which are in function of sustainability or emphasize some of its segments as environment. More and more management systems include a tendency that everything that is being done is for a sustainable economy. Systems that are present on the market in the last decade and gaining in importance and are mostly related to the sectors that are related to consumption of resources and are mostly implemented, maintained and certified through integrated management systems. However, given the increasingly interdisciplinary nature of the organization but also an increasing number of management systems, organisations are finding difficult to manage in variety of standards and management systems, to recognize the importance of each of them and decide correctly for application of those of which all sides will benefit the most. This study will provide a review of the current situation in Republic of Croatia in implementation and certification according to various standards and will emphasize the differences of particular management systems and their ability of integration. The emphasis is on the following standards: ISO 14001, FSC (FM i COC) PEFC (FM i COC), GLOBAL GAP, ISO 50001, EMAS, ETS, ISCC.

Key words: sustainability, environment, management systems.

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PROCES GOSPODARENJA OTPADOM I RIZIK NEUČINKOVITOSTI

THE PROCESS OF WASTE MANAGEMENT
AND THE RISK OF INEFFICIENCY

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SAŽETAK:

U radu se analizira način provođenja zakonskih i normativnih zahtjeva upravljanja otpadom u Republici Hrvatskoj (RH). Analiza je pokazala da postoji niz slabosti u ispunjenju zahtjeva zakona, propisa i normi. Većina uočenih slabosti se odnosi na nepostojanje definiranog procesa gospodarenja otpadom koji u sebi integrira proces upravljanja rizicima gospodarenja otpadom. Generalna je poruka da se sadašnje slabosti mogu ublažiti ako se pristupi intenzivnoj edukaciji subjekata u gospodarenju otpadom iz područja upravljanja procesima i rizicima unutar njih.

Ključne riječi: gospodarenje otpadom, upravljanje okolišem, rizici okoliša.

1. UVOD

Rad je izrađen na temelju istraživanja sadržaja zakona, propisa i međunarodnih normi sustava koji reguliraju pitanja gospodarenja otpadom te na temelju rezultata provedenog intervjua o načinu primjene zakona, propisa i međunarodnih normi sustava koji reguliraju pitanja gospodarenja otpadom u 10 trgovačkih društava u RH.

Koncepcija razmišljanja temeljenog na rizicima eksplicite je ugrađena u sve ISO norme za sustave upravljanja pa i za sustav upravljanja okolišem ISO 14001:2015¹. U ovoj normi, a slično i u drugim normama sustava upravljanja, postoji točka koja govori o sustavu upravljanja, ovdje konkretno, **4.4 Sustav upravljanja okolišem**, koja zahtjeva da, organizacija mora uspostaviti, primijeniti, održavati i stalno poboljšavati sustav upravljanja okolišem, uključujući potrebne procese i njihovo međusobno djelovanje. Dalje, u skladu sa zahtjevima točke **6.1 Radnje koje treba poduzeti za obradu rizika i prilika**, traži se da se te radnje provedu za procese potrebne za ispunjavanje zahtjeva prema: aspektima okoliša, obvezi usklađenosti i provedbi planiranja.

S druge strane u Zakonu o zaštiti okoliša RH², u članku 52. traži da Plan zaštite okoliša sadrži: „**mjere i aktivnosti u području zaštite okoliša u Državi, način provedbe mjera, redoslijed ostvarivanja mjera, rok izvršavanja, nositelje provedbe, projekte, procjenu sredstava za provedbu Plana te analizu troškova i koristi**“. Člankom 62. traži se da se izradi „Strateška procjena utjecaja na okoliš (u daljnjem tekstu: strateška procjena) je **postupak kojim se procjenjuju vjerojatno značajni utjecaji na okoliš** koji mogu nastati provedbom strategije, plana ili programa“.

Uredbom o strateškoj procjeni utjecaja plana i programa na okoliš³ u članku 4. kaže se „**Strateška procjena se provodi tijekom izrade nacрта prijedloga plana i programa** prije utvrđivanja konačnog prijedloga i upućivanja u postupak donošenja na način propisan Zakonom i ovom Uredbom“.

I konačno, u članku 18. **Zakona o održivom gospodarenju otpadom**⁴ stoji „Plan sprječavanja nastanka otpada sastavni je dio Plana gospodarenja otpadom i sadrži osobito:.. - promicanje provjerenih sustava za gospodarenje okolišem (Environmental Management System – EMS-a), uključujući (Eco-Management and Audit Scheme – EMAS) i ISO 14001“.

¹ Međunarodna norma ISO 14001:2015, Sustavi upravljanja okolišem – Zahtjevi s uputama za primjenu.

² Zakon o zaštiti okoliša, (NN 80/13, NN 78/15).

³ Uredba o strateškoj procjeni utjecaja plana i programa na okoliš, (NN 64/08).

⁴ Zakon o održivom gospodarenju otpadom, (NN 94/13).

Iz svega navedenog može se zaključiti da „Konceptija razmišljanja temeljenog na rizicima“ nije eksplicite ugrađena u hrvatsko zakonodavstvo o okolišu i otpadu. To upućuje na zaključak da je visoka vjerojatnost da se i neće, korištenjem suvremenih metoda i tehnika, učinkovito upravljati rizicima gospodarenja otpadom.

2. SMJER U KOJEM BI TREBALO KRENUTI

Smjer bi trebalo tražiti u činjenici da se nova vrijednost stvara u poslovnim procesima, ali istovremeno se iz tih procesa izravno ili neizravno proizvode negativni utjecaji na okoliš. Poseban je problem stvaranja otpada, a potom njegovim gospodarenjem po načelu održivosti. Razumno bi bilo prihvatiti zahtjeve norme ISO 14001:2015 gdje se u uvodu kaže:

„0.1 Općenito

Postizanje ravnoteže između okoliša, društva i gospodarstva smatra se ključnim za ispunjavanje potreba sadašnjosti bez ugrožavanja sposobnosti budućih generacija da zadovolje svoje potrebe. Održivi razvoj kao cilj postiže se uravnoteženjem tri stupa održivosti. Društvena očekivanja od održivog razvoja, transparentnost i odgovornost razvijaju se sa sve stroženijom legislativom, rastućim pritiscima na okoliš zagađenjem, neučinkovitim iskorištavanjem resursa, nepravilnim upravljanjem otpadom, klimatskim promjenama, propadanjem EKO sustava i gubitkom bio raznolikosti.

Ovo je dovelo do toga da organizacije usvoje sustavni pristup upravljanju okolišem, uvođenjem sustava upravljanja okolišem s ciljem doprinosa okolišnom stupu održivosti“.

Tu ravnotežu između okoliša, društva i gospodarstva moguće je postići ako organizacija uspostavi, primijeni, održava i stalno poboljšava sustav upravljanja okolišem, uključujući potrebne procese i njihovo međusobno djelovanje. Pored procesa u čijoj se interakciji stvara nova vrijednost i njihov negativni utjecaj na okoliš još treba definirati:

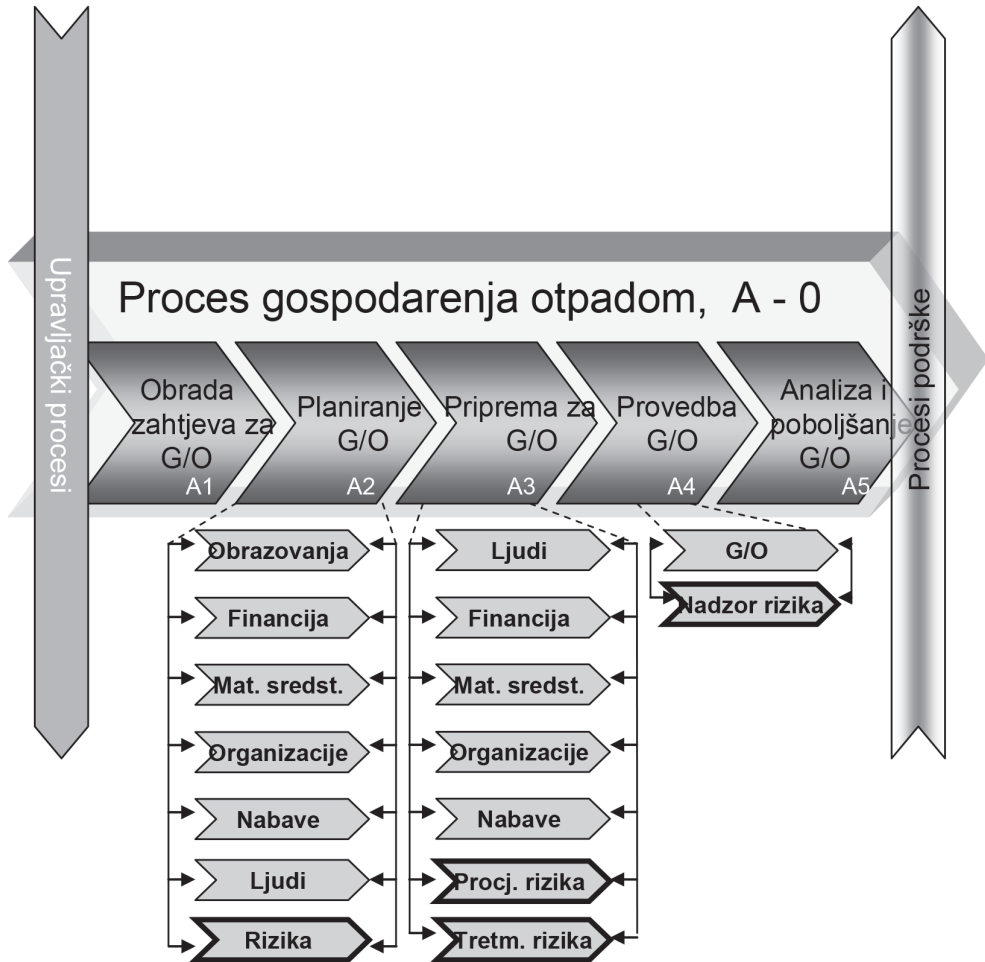
- Proces gospodarenjem otpadom, a unutar njega i;
- Proces upravljanja rizicima gospodarenja otpadom.

3. KAKO DIZAJNIRATI PROCES GOSPODARENJA OTPADOM

Proces gospodarenja otpadom je upravljački proces koji se implementira u sve procese stvaranja proizvoda i usluga i njihove interakcije s drugim procesima. Njegovi pod-procesi, prema IDEF metodologiji, u prvoj dekompoziciji su: Obrada zahtjeva za gospodarenje otpadom; Planiranje gospodare-

nja otpadom; Priprema gospodarenjem otpadom; Provedba gospodarenja otpadom, te Analiza i poboljšanje procesa, (Slika 1).

Slika 1. Dekompozicija procesa gospodarenja otpadom



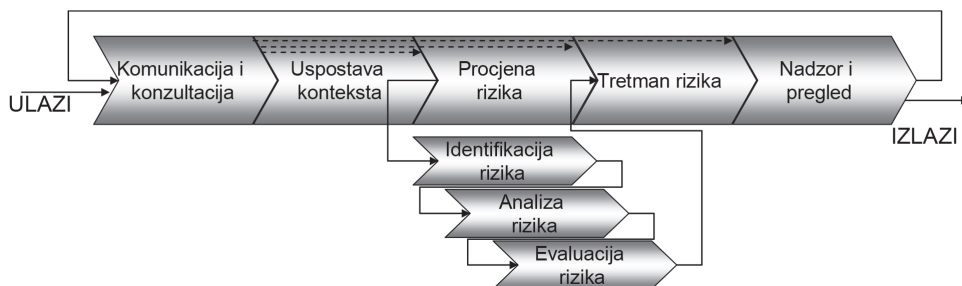
Izvor: Izvorno autorsko.

U ovaj proces je integriran Proces upravljanja rizicima definiran u normi ISO 31000:2009 (na Slici 1 elementi označeni debljom linijom). Na Slici 2 je grafički prikazan Proces upravljanja rizicima.

Procesa upravljanja rizicima prema normi ISO 31000:2009:

- Proces upravljanja rizicima bi trebao biti sastavni dio integriranog sustava upravljanja;
- Treba biti ugrađen u kulturu i praksu organizacije;
- Prilagođen je poslovnim procesima organizacije.

Slika 2. Dekompozicija procesa upravljanja rizicima



Izvor: Izvorno autorsko.

Obuhvaća pet pod-procesa (grupa aktivnosti), Slika 3:

- Komunikacija i konzultacija;
- Uspostavljanje konteksta;
- Procjena rizika (Identifikacija, Analiza, Evaluacija);
- Tretman rizika;
- Nadzor i pregled.

4. GENERATORI RIZIKA NEUČINKOVITOG GOSPODARENJA OTPADOM

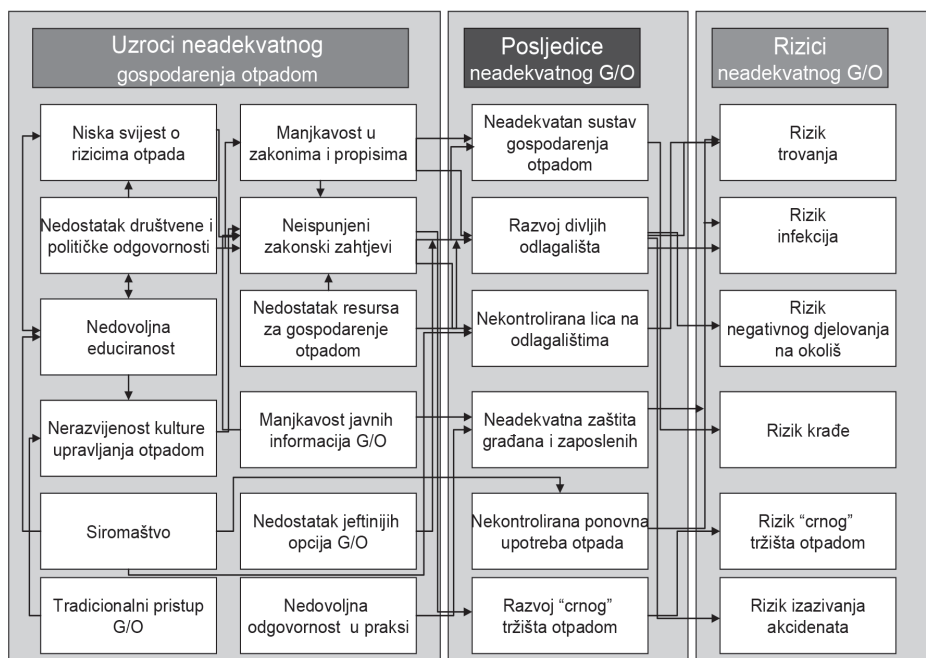
Općenito gledano, da bi postojao rizik neučinkovitog gospodarenja otpadom trebaju postojati uzroci koji ga generiraju. Uzroci su vezani za neke generalne faktore (Slika 1) te za posebne faktore koji su vezani s grupom ili podgrupom otpada iz Kataloga otpada⁵. U namjeri da se pokaže koliko je složena priprema za procjenu rizika neučinkovitog gospodarenja otpadom, navodimo samo grupe otpada:

- Otpad koji nastaje pri istraživanju, eksploatiranju i fizikalno-kemij-skoj obradi mineralnih sirovina;

⁵ Pravilnik o katalogu otpada, (NN 90/15).

- Otpad iz poljoprivrede hortikulture, proizvodnje vodenih kultura, šumarstva, lovstva i ribarstva, pripremanja i prerade hrane;
- Otpad od prerade drveta i proizvodnje drvenih panela i namještaja, celuloze, papira i kartona;
- Otpad iz kožarske, krznarske i tekstilne industrije;
- Otpad od rafiniranja nafte, pročišćavanja prirodnog plina i pirolitičke obrade ugljena;
- Otpad iz anorganskih kemijskih procesa;
- Otpad iz organskih kemijskih procesa;
- Otpad od proizvodnje, formulacije, dobave i uporabe prevlaka (boje, lakovi i staklasti emajli), ljepila, sredstava za brtvljenje i tiskarskih tinta;
- Otpad iz fotografske industrije;
- Otpad iz termičkih procesa;
- Otpad od kemijske površinske obrade i prevlačenja metala i drugih materijala; hidrometalurgije obojenih metala;
- Otpad od mehaničkog oblikovanja, te fizikalne i mehaničke površinske obrade metala i plastike;
- Otpadna ulja i otpad od tekućih goriva (osim jestivih ulja i ulja iz poglavlja 05, 12 i 19);
- Otpad od organskih otapala, rashladnih i potisnih tvari (osim 07 i 08);
- Otpadna ambalaža; asorbensi, tkanine za brisanje, filtarski materijali i zaštitna odjeća koja nije specificirana na drugi način;
- Otpad koji nije drugdje specificiran u katalogu;
- Građevinski otpad i otpad od rušenja objekata (uključujući iskopanu zemlju s onečišćenih lokacija);

Slika 3. Uzroci i posljedice neučinkovitog gospodarenja otpadom



Izvor: Izvorno autorsko.

- Otpad koji nastaje kod zaštite zdravlja ljudi i životinja i/ili srodnih istraživanja (osim otpada iz kuhinja i restorana koji ne potječe iz neposredne zdravstvene zaštite);
- Otpad iz građevina za gospodarenje otpadom, uređaja za pročišćavanje otpadnih voda izvan mjesta nastanka i pripremu pitke vode i vode za industrijsku uporabu;
- Komunalni otpad (otpad iz kućanstava i slični otpad iz ustanova i trgovinskih i proizvodnih djelatnosti) uključujući odvojeno sakupljene sastojke komunalnog otpada.

Slika 3. prikazuje generalne uzroke neučinkovitog gospodarenja otpadom, a posljedice takvog stanja su aspekti rizika neadekvatnog gospodarenja otpadom. Da bi se uočila detaljna izvorišta opasnosti od otpada potrebno je unutar svake podgrupe analizirati svojstva otpada prema nastanku.

Rješenje neučinkovitog gospodarenja otpadom treba tražiti u stručnom i profesionalnom upravljanju rizicima gdje je nužno postojanje procesa gospodarenja otpadom čiji je dio podproces upravljanja rizicima.

5. SEDAM KORAKA U PROCJENI RIZIKA NEUČINKOVITOG GOSPODARENJA OTPADOM

U okviru zakonske regulative i zahtjeva norme ISO 14001:2015, u području zaštite okoliša, postoji potreba i obaveza za izradom procjene rizika od strane svih subjekata koji su obveznici gospodarenja otpadom. Iz tih razloga je potrebno usvojiti i razumjeti neke od metodologija procjene rizika. Autori ovoga rada preporučuju VPR metodologiju⁶ koja u sebi akceptira proces procjene rizika prema normi ISO 31000:2009.

Tablica 1. Uobičajene skale za analizu faktora rizika

Br.	Opasnost (Op)		Izloženost (Iz)		Posljedica (Po)		Otpornost (Ot)	
	Naziv	Opis	Naziv	Opis	Naziv	Opis	Naziv	Opis
1.	Vrlo niska		Vrlo niska		Nevažne		Vrlo niska	
2.	Niska		Niska		Neznatne		Niska	
3.	Srednja		Srednja		Znatne		Srednja	
4.	Visoka		Visoka		Ozbiljne		Visoka	
5.	Vrlo visoka		Vrlo visoka		Katastrofalne		Vrlo visoka	

Izvor: Izvorno autorsko.

VPR metodologija promatra rizik kao funkciju:

- Opasnosti (Op) koje su povezane s izvorima opasnosti;
- Izloženosti opasnostima (Iz);
- Posljedice (Po) ili gubitak vrijednosti, koje se javljaju ako se rizik pojavi;
- Otpornosti na opasnosti (Ot), kao trenutačna sposobnost kontrole i/ili smanjenja rizika;
- Vjerojatnost (Vj) da će se rizik dogoditi;
- Utjecaj (U) se izračuna prema: $U = (Op \times Iz \times Po) : Ot$;

⁶ Marko Bešker, Višedimenzionalna procjena rizika, OSKAR, Zagreb, 2015.

Tablica 2. Skala vjerojatnosti

Br.	Naziv	Opis
1.	Nevjerojatno	
2.	Moguće	
3.	Vjerojatno	
4.	Vrlo vjerojatno	
5.	Neizbježno	

Izvor: Izvorno autorsko.

Takav pristup omogućuje da se izračuna rizik prema definiciji $R = U \times V_j$. Nužni koraci u procjeni rizika su:

- Odabrati metodologiju procjene rizika;
- Izraditi kriterije vrednovanja faktora rizika za svaki aspekt procjene na izabranoj skali i kriterije tolerancije rizika na izabranoj skali;
- U planu, projektu ili procesu na opisanim aktivnostima identificirati opasnosti i povezati ih sa izvorima opasnosti;
- Prema utvrđenim kriterijima izvršiti analizu rizika prema utvrđenim aspektima;
- Analizirane rizike evaluirati prema kriterijima tolerancije rizika;
- Odabrati i tretirati visoke rizike (radi se poseban plan obrade svakog rizika);
- Nadzirati implementirane mjere i aktivnosti smanjenja visokih rizika.

6. ZAKLJUČAK

Neučinkovito gospodarenje otpadom vezano je za niz faktora od kojih su najvažniji oni systemske prirode kao:

- Niska svijest o rizicima gospodarenja otpadom;
- Nisko znanje o upravljanju rizicima gospodarenja otpadom;
- Korištenje neodgovarajućih metodologija i alata u upravljanju rizicima gospodarenja otpadom;
- Proces gospodarenja otpadom nije dizajniran, opisan i upravljan;
- Nerazumijevanje Procesu upravljanja rizicima gospodarenja otpadom;
- Niska društvena i politička odgovornost subjekata gospodarenja otpadom;
- Nerazvijena kultura gospodarenja otpadom;
- Tradicionalni pristup gospodarenja otpadom;

- U praksi se ne primjenjuju u cijelosti zakoni, propisi i norme; te
- Nedostatak jeftinijih opcija gospodarenja otpadom.

Očito se problem može ublažiti ako se intenzivira edukacija subjekata gospodarenja otpadom te poveća svijest i odgovornost za neodgovarajuću primjenu zakona, zahtjeva normi i propisa gospodarenja otpadom.

Abstract:

THE PROCESS OF WASTE MANAGEMENT
AND THE RISK OF INEFFICIENCY

This paper analyses the implementation ways of the legal and regulatory requirements for waste management in Croatia. The analysis showed that there are a number of weaknesses in meeting the requirements. Most of the identified weaknesses relating to the absence of a defined process of waste management that integrates waste risk management process. The general message is that the current weakness can be mitigated with the intensive operators training approaches in the waste management process control field and risk management within them.

Key words: waste management, environmental management, environmental risks.

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3. Uredba o strateškoj procjeni utjecaja plana i programa na okoliš (NN 64/08).
4. Zakon o održivom gospodarenju otpadom (NN 94/13).
5. Zakon o zaštiti okoliša (NN 80/13, NN 78/15).

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DEFINISANJE PRIORITETA U ISPUNJAVANJU OČEKIVANJA STUDENATA PRIMENOM FAKTORSKE ANALIZE

**DEFINING THE STUDENTS' EXPECTATIONS PRIORITIES
USING THE FACTOR ANALYSIS**

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SAŽETAK

Poput drugih sistema, i u okruženju visokog obrazovanja, očekivanja studenata predstavljaju značajnu ulaznu informaciju u procesu ostvarivanja akademskih i poslovnih performansi ustanove. Protekla decenija obeležena je značajnim promenama u sistemu visokog obrazovanja u Srbiji, koje su znatno uticale na promenu pristupa u pogledu pozicije i uloge visokoškolskih ustanova i studenata, kao i na očekivanja

studentata u pogledu ostvarivanja akademskih ciljeva. Ova očekivanja su, sada, mnogo složenija i dinamičnija, pa je i za visokoškolske ustanove od značaja da obezbede njihovo bolje razumevanje i efektivnije ostvarivanje. Generalno, očekivanja studentata mogu se svrstati u dve osnovne kategorije – akademska i društvena, poput ciljeva čijem ostvarivanju studenti teže. Na osnovu odgovora 371 studenta Visoke škole strukovnih studija – Beogradska politehnika u vezi 49 ispitivanih varijabli mogućih akademskih očekivanja, primenom faktorske analize ekstrahovano je 11 faktora sa ciljem prevođenja njihovih očekivanja u specifikacije za uslugu visokog obrazovanja.

Ključne reči: očekivanja studentata, faktorska analiza, strukovno obrazovanje, kvalitet.

1. UVOD

Za razliku od ostalih uslužnih delatnosti, prema svojoj prirodi, usluge obrazovanja su najneopipljivije, najsloženije, heterogene i prolazne.¹ Jedinственost ovih usluga ogleda se i u efektivnosti koja jednako zavisi od uloženog napora studentata, kao korisnika i osoblja kao onih koji pružaju uslugu obrazovanja.² Složenost i heterogenost ovih usluga vezuje se za različite i specifične grupe korisnika, koje visokoškolske ustanove u svakom trenutku opslužuju. U odnosu na druge organizacije koje se mogu opredeliti za određene segmente tržišta i opsluživati izabrane grupe korisnika, visokoškolske ustanove uvek imaju iste korisnike – studente, roditelje, poslodavce, državu i širu društvenu zajednicu. Svako od pomenutih korisnika ima i svoja očekivanja. U najvećem procentu očekivanja studentata vezuju se za ostvarivanje društvenih, a znatno manje za ostvarivanje akademskih ciljeva. Roditelji, kao korisnici koji u najvećoj meri finansiraju obrazovanje svoje dece, očekuju zadovoljavajući kvalitet obrazovanja koji će omogućiti studentima brzo zaposlenje po završetku studija. Država zajedno sa poslodavcima postavlja zahteve u pogledu visokog nivoa kvaliteta stečenih kvalifikacija svršenih studentata koji bi trebalo svojim budućim angažovanjem da doprinesu ekonomskom prosperitetu države. Šira društvena zajednica, koja jednim delom ulaže u nauku i obrazovanje, očekuje tehnološki i društveni napredak kroz primenu znanja svršenih studentata.

U uslovima visoke stope nezaposlenosti, narušenog sistema vrednosti, narastajućeg procenta ‘odliva mozgova’, nedovoljnog prethodnog nivoa obrazovanja, visokoškolske ustanove suočavaju se sa ozbiljnim izazovima u po-

¹ J. C. Davis and Scott R. Swanson, „Navigating satisfactory and dissatisfactory classroom incidents“, Journal of Education for Business, Vol. 76, No. 5, 2001, p. 245-250.

² Paul Cooper, „Knowing your ‘lemons’: quality uncertainty in UK higher education“, Quality in Higher Education, Vol. 13, No. 1, 2007, p. 19-29.

gledu uspostavljanja saglasja između očekivanja različitih grupa korisnika. Veliki broj različitih očekivanja, u nekim slučajevima, za visokoškolske ustanove predstavlja problem u kontekstu izdvajanja onih koji najviše doprinose zadovoljstvu studenata i ostvarivanju akademskih i poslovnih performansi ustanove. Shodno prethodnom, osnovna ideja ovog rada vezuje se za definisanje prioriteta u ispunjavanju akademskih očekivanja studenata, primenom faktorske analize.

2. TEORIJSKI OKVIR

Visokoobrazovni sistem u Srbiji već duže od jedne decenije se nalazi u procesu reforme i prilagođavanja principima Bolonske deklaracije i pratećih dokumenata u cilju prevazilaženja uočenih slabosti. Uloga i položaj ustanova, a samim tim i očekivanja studenata, pretrpeli su određene promene i postali znatno složeniji i dinamičniji, naročito u uslovima povećane konkurentnosti na tržištu rada i obrazovanja. Jedan od osnovnih problema sa kojim se ustanove suočavaju jeste sagledavanje podsticaja koji motivišu studente u ostvarivanju željenih ishoda učenja i sticanju programom definisanih kvalifikacija.

U ranim studijama prepoznaju se dva pristupa koja su pokušala da objasne fenomen očekivanja studenata. Prvi, koji se oslanja na teoriju razmene i koji ističe princip reciprociteta, tj. ako su ispunjena očekivanja studenata posledično dolazi do pojave zadovoljstva koje prouzrokuje želju kod studenata za većim zalaganjem. Drugi pristup oslanja se na atributivnu teoriju koja se fokusira na procese kojima se objašnjavaju neočekivani događaji. Atributivni pristup insistira na utvrđivanju razloga isporučivanja veće ili manje vrednosti usluge u odnosu na očekivanja studenata. Emotivni odgovor studenata (zadovoljstvo/ nezadovoljstvo) zavisiće od njihove percepcije događaja u pogledu uzroka nastanka, mogućnosti ponavljanja događaja i mogućnosti sopstvene kontrole događaja. Iz perspektive ove teorije, buduće ponašanje studenata je u funkciji specifičnih atributa koje studenti dodeljuju neočekivanim događajima. Upisom na studije, studenti mogu imati veoma različita očekivanja u pogledu ostvarivanja akademskih i društvenih ciljeva, što zavisi od njihovog prethodnog iskustva, verovanja, sistema vrednosti, potreba i ciljeva.³

Studenti se mogu opredeliti za one ustanove i programe koji će im doneti najveću materijalnu korist, odnosno omogućiti željeno zaposlenje. Ne sme se zanemariti uticaj društvenog okruženja, odnosno očekivanja i pritisaka okoli-

³ Koviljka Banjević, Aleksandra Nastasić i Dragana Rošulj, „Ocena ispunjenosti očekivanja studenata posle određenog ciklusa studija“, Zbornik radova 16. međunarodni simpozij o kvaliteti *Kvaliteta i konkurentnost*, Hrvatsko društvo menadžera kvalitete, Zagreb, Opatija, 2015.

ne, pa nije retkost da deca nastavljaju zanimanje roditelja ili upisuju fakultete ne prema svojim preferencijama nego u skladu sa očekivanjima roditelja. Pored toga, značajno je i sticanje prestiža i ugleda koje donose određena zvanja i diplome u pojedinim sredinama. Značajan uticaj imaju i lične sklonosti studenata, kao i pristupačnost određenih programa, usled finansijskih ograničenja i izražene konkurencije.

Generalno, društvena očekivanja okrenuta su ka ostvarivanju društvenih ciljeva – pridruživanju određenim grupama vršnjaka, dok su akademska očekivanja usmerena na ostvarivanje ciljeva koji direktno doprinose kvalitetu stečenih kvalifikacija. Poput ciljeva, i u pogledu očekivanja potrebno je definisati one koji predstavljaju prioritete iz perspektive korisnika.

U tom smislu moguće je primeniti faktorsku analizu kao multivarijacionu statističku tehniku koja služi za efektivno ekstrahovanje informacija iz velikih skupova podataka. U slučajevima kada ju je moguće izvesti, faktorska analiza ukazuje na interesantne odnose koji ne moraju biti očigledni iz ispitivanja sirovih podataka – identifikuje skupove srodnih varijabli čime omogućuje istraživaču moćan alat u ostvarenju boljeg razumevanja strukture podataka. Faktorska analiza predstavlja skup više različitih tehnika koje imaju neke zajedničke osobine i sažimaju veći broj međusobno povezanih izvornih varijabli u manji broj zajedničkih faktora koji će ih opisivati i objasniti njihovu međusobnu povezanost, zadržavajući karakter originalnih varijabli, u cilju pojednostavljenja dalje analize.⁴

3. METODOLOŠKI PRISTUP

Svake školske godine, na početku prvog semestra, sprovodi se merenje očekivanja novo-upisanih studenata. Strategija ispitivanja zasnovana je na kombinaciji kvantitativnih i kvalitativnih metoda. Primenom kvantitativnih metoda omogućeno je prikupljanje podataka o značaju koji studenti dodeljuju varijablama koje bliže opisuju moguća akademska očekivanja, dok je kvalitativnim pristupom, kroz otvorena pitanja, omogućeno detaljnije razmatranje njihovih očekivanja. Kao istraživački metod u procesu prikupljanja podataka primenjuje se anketno istraživanje, sa petostepenom skalom.

U ovom radu predstavljeni su rezultati merenja za dve generacije studenata. Posmatranu populaciju (novo-upisanih) činilo je 832 studenata (prva generacija 413 i druga generacija 419). U odnosu na ovaj broj, relevantna ve-

⁴ Dragana Gardašević i Kovička Banjević, „Zadovoljstvo studenata Beogradske politehnike jezikom faktorske analize, 3. naučno-stručni skup *Politehnika 2015, sa međunarodnim učesćem, Beograd, 2015, str: 559-565.*

ličina uzorka obuhvata 263 ispitanika. U procesu ispitivanja očekivanja studenata odazvao se 371 ispitanik, čime je interval poverenja pomećen, sa uobičajenih 5%, na 3,79%.

4. DEFINISANJE PRIORITETA U OČEKIVANJIMA STUDENATA

Prvi korak u procesu analize podataka podrazumevao je proveru validnosti i opravdanosti faktorske analize za posmatrani broj varijabli i broj ispitanika koji se odazvao u procesu anketiranja. Kako su anketiranjem dobijeni podaci od 371 ispitanika (studenta) što predstavlja 7,6 upitnika po varijabli (49 ispitivanih varijabli), ispunjen je minimalan zahtev za validnu analizu. Izvođenjem testova opravdanosti faktorske analize, Kajzer-Mejer Olkinov pokazatelj dao je odličnih 0,874, a Bartletov test sferičnosti pokazao je statističku značajnost, što ukazuje na to da su obrasci korelacija relativno kompaktni, pa je i faktorska analiza pogodna za posmatrani skup podataka.⁵

Faktorska analiza je sprovedena u dve faze. Prva faza obuhvatala je pronalaženje broja faktora koje treba upotrebiti u drugoj fazi, dok je druga faza dala detaljnija objašnjenja. Tablica komunaliteta (Tabela 1) daje prikaz varijabli uključenih u faktorsku analizu. Budući da je faktorska analiza izvedena na matrici korelacija, varijable su standardizovane, što je predstavljeno brojem 1 u drugoj koloni Tabele 1. Može se primetiti veliki broj varijabli koje imaju značajan uticaj u analizi (vrednosti veće od 0,6). Tako npr. varijabla «Izvođenje vežbi i praktične nastave u malim grupama» objašnjava 55,7% ukupne varijanse, dok varijabla «Kontinualno vrednovanje rada studenata» objašnjava 64,6% ukupne varijanse. Validnim varijablama su se smatrale one čiji su komunaliteti veći ili jednaki od 0,6, tj. one koje objašnjavaju najmanje 60% ukupne varijanse.⁶

⁵ Joseph F. Hair, William Black, Barry J. Babin and Rolph E. Anderson, *Multivariate Data Analysis - A Global Perspective*, Ed. Pearsib, R., New Jersey, 2010; Jonw W. Hoetler, *The analysis of covariance structures: goodness of fit indices*, *Social Methods and Research*, 1983, Vol. 11(3), p. 325-344.; Petar Kostić i Vladimir Hedrih, *Psihološka računarska statistika*, Filozofski fakultet, Niš, 2005.

⁶ Edward G., Carmines and John P. Mclver, *Analyzing models with unobserved variables: analysis of covariance structures*, Eds. G.W.Bronstedt, & E.F.Borgatta, *Social measurement: current issues*. Beverly Hills, CA: Sage.; Myers, J. H., & Mullet, G. M., *Managerial Applications of Multivariate Analysis in Marketing*, American Marketing Association, Chicago, 2003; Ivana Rašić Bakarić, *Primjena faktorske i klaster analize u otkrivanju regionalnih nejednakosti*, *Privredna kretanja i ekonomska politika*, 2006, Vol 15, No, 105, p 54-76.

Tabela 1. Komunaliteti

Communalities	Initial	Extraction
Izvođenje vežbi i praktične nastave u malim grupama	1.000	.557
Mogućnost isticanja i iznošenja stavova studenata (diskusija)	1.000	.590
Mogućnost sticanja poena kroz aktivnosti u nastavi	1.000	.706
Kontinualno vrednovanje rada studenata	1.000	.646
Postojanje sistema nagrađivanja dodatnim poenima za aktivnost na času	1.000	.679
Samostalno, usmeno prezentovanje studentskih radova	1.000	.591
Učešće na projektima, izložbama studentskih radova, itd...	1.000	.621
Pokrivenost predmeta literaturom	1.000	.612
Mogućnost nadoknade nastave ukoliko student izostane sa nekog dela nastave	1.000	.528
Mogućnost polaganja ispita usmenim putem	1.000	.480
Mogućnost polaganja ispita pisanim putem	1.000	.622
Razumljivo izlaganje sadržaja predmeta	1.000	.678
Usmeravanje studenta prilikom izrade samostalnih radova	1.000	.604
Korektan odnos prema studentu	1.000	.589
Redovnost i tačnost u održavanju nastave	1.000	.576
Praćenje novih dostignuća u struci	1.000	.626
Izlaganje sadržaja predmeta jasno i zanimljivo	1.000	.607
Pravovremenost informisanja studenta o obavezama u nastavi	1.000	.634
Sposobnost kreiranja radne atmosfere na času	1.000	.578
Sposobnost motivisanja i podsticanja studenata na kreativan i samostalan rad i na izvršavanje obaveza	1.000	.642
Objektivnost u ocenjivanju	1.000	.520
Spremnost na pružanje pomoći i podrške u toku studija (ne samo na predmetu)	1.000	.580
Podsticanje uključivanja studenata u aktivnosti od značaja za njihov profesionalni razvoj i napredak	1.000	.609
Dostupnost za konsultacije i van predviđenog vremena	1.000	.673
Mogućnost kontaktiranja elektronskim putem (e-mail, facebook, skype, itd.)	1.000	.646
Aktivna primena softverskih paketa	1.000	.644
Korišćenje engleskog jezika	1.000	.763
Upotreba literature na engleskom jeziku	1.000	.746
Insistiranje na radu u timovima	1.000	.581
Insistiranje na samostalnom radu	1.000	.547
Insistiranje na praktičnom radu	1.000	.638
Mogućnost učenja na daljinu	1.000	.786
Mogućnost elektronskog učenja	1.000	.751
Uključivanje stručnjaka iz privrede	1.000	.652
Saradnja Škole sa privredom u definisanju potrebnih znanja svršenih studenata	1.000	.706

Organizovanje prakse izvan Škole u saradnji sa privrednim organizacijama	1.000	.622
Izvodjenje nastave u dve smene	1.000	.586
Vise slobodnih dana u toku radne nedelje (bez angažovanja u Školi)	1.000	.668
Vise angažovanja u Školi nego kod kuće	1.000	.590
Svakodnevna dostupnost nastavnika studentima	1.000	.664
Obezbedjenje prostora i opreme za izvodjenje samostalnih radova	1.000	.493
Izvođenje nastave samo radnim danima (ne vikendom)	1.000	.733
Tačnost i pravovremenost pružanja informacija o promenama u organizaciji nastave	1.000	.750
Primena znanja u praksi	1.000	.631
Brzo zaposlenje u struci, u zemlji i/ili inostranstvu	1.000	.698
Prohodnost na tržištu rada u odnosu na druge visokoškolske ustanove	1.000	.712
Mogućnost nastavka studija u zemlji i/ili inostranstvu	1.000	.742
Dobra zarada po osnovu struke	1.000	.738
Stručnjak u svojoj oblasti	1.000	.660
Extraction Method: Principal Component Analysis.		

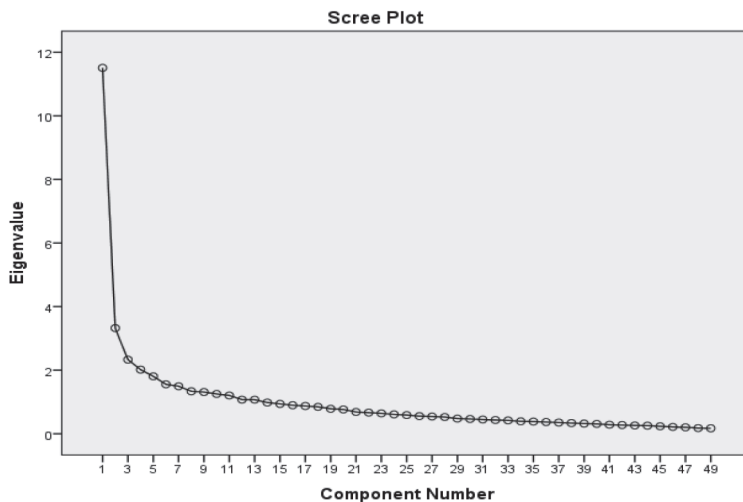
Izvor: Izvorno autorsko.

Kako je izračunavanjem korelacione matrice dobijen veliki broj korelacija varijabli sa apsolutnim vrednostima većim od 0,3 (koliko iznosi minimalna korelacija između posmatrane dve varijable značajna za analizu), prišlo se izračunavanju totalne varijanse. Početni broj faktora jednak je početnom broju ispitivanih indikatora očekivanja studenata (49 u ovom slučaju). Analizom glavnih komponenti sa Varimax rotacijom (koja maksimizira varijansu svakog faktora) izdvojeno je 13 komponenti s karakterističnim vrednostima većim od 1, koje objašnjavaju 23,49%, 6,78%, 4,76%, 4,12%, 3,69%, 3,18%, 3,05%, 2,73%, 2,68%, 2,56%, 2,46%, 2,19% i 2,19% varijanse, ukupno 63,87% varijanse, što premašuje preporučeni minimum od 60%.⁷

Scree plot (Slika 1) izdvaja 13 faktora, mada se zglob može primetiti i na 11 faktora, čime je opravdano da bi se moglo uzeti u obzir da ukupan broj ekstrahovanih faktora koji će objasniti zadovoljavajući procenat varijanse bude 11.

⁷ Joseph F. Hair, William Black, Barry J. Babin and Rolph E. Anderson, *Multivariate Data Analysis - A Global Perspective*, Ed. Pearsib, R., New Jersey, 2010.

Slika 1. Scree plot



Izvor: Izvorno autorsko.

Rotirana matrica komponenti je ključni podatak za faktorsku analizu metodom glavnih komponenti jer sadrži procene korelacija između svake varijable i ocenjenih komponenti. Izračunavanjem rotirane matrice komponenti, izdvojene su varijable značajne za definisanje svakog od ekstrahovanih 11 faktora, dok se varijable koje imaju veoma mali doprinos faktoru ignorišu. Primenom tehnika faktorske analize, na osnovu teorijskih pretpostavki, korišćenjem kriterijuma objašnjenja procenta varijanse, analizom glavnih komponenti, kriterijumom latentnog korena, iz posmatranih 49 indikatora očekivanja studenata, kao i daljom korekcijom prema sadržaju i pripadnosti odgovarajućem faktoru, ekstrahovano je 11 faktora. Faktori objašnjavaju očekivanja studenata u posmatranim indikatorima u obimu od 63,87%, što predstavlja veoma dobru ocenu kriterijuma očekivanja studenata Beogradske politehlike izrazito smanjenim brojem parametara, kojim se dalja analiza značajno olakšava. Dakle, primenom faktorske analize izdvojeno je 11 prioriteta u akademskim očekivanjima studenata, i to:

- 1. Profesionalnost nastavnog osoblja** – sadrži jednu varijablu sa indikativnim opterećenjem (“Razumljivo izlaganje sadržaja predmeta”), četiri varijable sa praktično signifikantnim zasićenjem (“Usmeravanje studenata prilikom izrade samostalnih radova”, “Korektan odnos prema studentu”, “Izlaganje sadržaja predmeta jasno i zanimljivo” i “Pravovremenost informisanja studenta o

obavezama u nastavi”), tri varijable sa signifikantnim zasićenjem (“Sposobnost kreiranja radne atmosfere na času”, ,’Sposobnost motivisanja i podsticanja studenata na kreativan i samostalan rad i izvršavanje obaveza” i ,’Objektivnost u ocenjivanju”) i pet varijabli koje ispunjavaju minimalne zahteve;

2. **Kvalitet kvalifikacija** – sadrži pet varijabli sa veoma indikativnim opterećenjem (,’Prohodnost na tržištu rada u odnosu na druge visokoškolske ustanove”, ,’Brzo zaposlenje u struci, u zemlji i/ili inostranstvu”, ,’Mogućnost nastavka studija u zemlji ili inostranstvu”, ,’Dobra zarada po osnovu struke” i ,’Stručnjak u svojoj oblasti”), jednu varijablu sa signifikantnim zasićenjem (,’Primena znanja u praksi”) i tri varijable koje ispunjavaju minimalne zahteve;
3. **Vrednovanje zalaganja studenata** – sadrži tri varijable sa veoma indikativnim opterećenjem (,’Mogućnost sticanja poena kroz aktivnosti u nastavi», ‹Kontinualno vrednovanje rada studenata” i ,’Postojanje sistema nagrađivanja dodatnim poenima za aktivnost na času”), jednu varijablu sa signifikantnim zasićenjem (,’Mogućnost isticanja i iznošenja stavova studenata (diskusija)”) i dve varijable koje ispunjavaju minimalne zahteve;
4. **Razvijanje samostalnosti** – sadrži jednu varijablu sa veoma indikativnim zasićenjem (,’Insistiranje na praktičnom radu»), jednu varijablu sa praktično signifikantnim zasićenjem (‹Insistiranje na samostalnom radu»), tri varijable sa signifikantnim zasićenjem (‹Samostalno, usmeno prezentovanje studentskih radova”, ,’Podsticanje uključivanja studenata u aktivnosti od značaja za njihov profesionalni razvoj i napredak” i ,’Učešće na projektima, izložbama studentskih radova, itd.”) i dve varijable koje ispunjavaju minimalne zahteve;
5. **Saradnja sa privredom** – sadrži jednu varijablu sa veoma indikativnim opterećenjem (,’Saradnja privrede sa školom u definisanju potrebnih znanja svršenih studenata”), jednu varijablu sa indikativnim zasićenjem (,’Uključivanje stručnjaka iz privrede”), dve varijable sa signifikantnim zasićenjem (,’Pokrivenost predmeta literaturom” i ,’Organizovanje prakse izvan škole u saradnji sa privrednim organizacijama») i jednu sa minimalnim zasićenjem;
6. **Poznavanje engleskog jezika i primena softverskih paketa** – sadrži dve varijable sa veoma indikativnim opterećenjem (‹Korišćenje engleskog jezika» i ‹Upotreba literature na engleskom jeziku»), dve varijable sa signifikantnim zasićenjem (‹Mogućnost

- polaganja ispita usmenim putem» i «Aktivna primena softverskih paketa») i jednu varijablu koja ispunjava minimalne zahteve;
7. **Permanentna dostupnost nastavnog osoblja** – sadrži jednu varijablu sa indikativnim opterećenjem («Dostupnost za konsultacije i van predviđenog vremena»), jednu varijablu sa praktično signifikantnim zasićenjem («Mogućnost kontaktiranja elektronskim putem»), dve varijable sa signifikantnim zasićenjima («Svakodnevna dostupnost nastavnika studentima» i «Mogućnost nadoknade nastave») i dve varijable koje ispunjavaju minimalne zahteve;
 8. **E - learning** – sadrži dve varijable sa izuzetno indikativnim zasićenjima («Mogućnost učenja na daljinu» i «Mogućnost elektronskog učenja») i dve varijable koje ispunjavaju minimalne zahteve;
 9. **Efikasna organizacija nastave** – sadrži dve varijable sa izuzetno indikativnim zasićenjima («Izvođenje nastave samo radnim danima bez vikenda» i «Mogućnost polaganja ispita pisanim putem»), pet varijabli sa praktično signifikantnim zasićenjem («Više angažovanja u školi nego kod kuće», «Izvođenje nastave u dve smene», «Više slobodnih dana», «Redovnost i tačnost u održavanju nastave» i «Mogućnost kontaktiranja elektronskim putem»);
 10. **Pravovremenost informisanja** – sadrži jednu varijablu sa izuzetno indikativnim zasićenjima («Tačnost i pravovremenost pružanja informacija o promenama u organizaciji nastave») i dve varijable sa signifikantnim zasićenjem («Pravovremenost informisanja studenata o obavezama u nastavi» i «Izvođenje vežbi i praktične nastave u malim grupama»);
 11. **Inovativnost i timski rad** – sadrži dve varijable sa signifikantnim zasićenjem («Insistiranje u radu u timovima» i «Praćenje novih dostignuća u struci») i četiri varijable koje ispunjavaju minimalne zahteve.

5. ZAKLJUČAK

Pregledom dobijenih faktora i zasićenja vodećih varijabli u svakom faktoru, može se zaključiti da studenti daju prednost praktičnoj svrsishodnosti sticanja diplome (‘Prohodnost na tržištu rada u odnosu na druge visokoškolske ustanove’, ‘Brzo zaposlenje u struci, u zemlji i/ili inostranstvu’, ‘Mogućnost nastavka studija u zemlji ili inostranstvu’, ‘Dobra zarada po osnovu struke’ i ‘Stručnjak u svojoj oblasti’); imaju visoka očekivanja u pogledu aktivne interakcije sa profesorima (‘Mogućnost sticanja poena kroz aktivnosti

u nastavi», «Kontinualno vrednovanje rada studenata», , 'Postojanje sistema nagrađivanja dodatnim poenima za aktivnost na času», , 'Insistiranje na praktičnom radu») i privredom u cilju korišćenja akademski stečenih znanja i veština («Saradnja privrede sa školom u definisanju potrebnih znanja svršenih studenata»); razumeju neophodnost poznavanja stranog jezika kao osnovnog alata u komunikaciji sa budućim klijentima («Korišćenje engleskog jezika» i «Upotreba literature na engleskom jeziku»); ali daju prednost olakšicama u izvođenju procesa nastave i učenja («Mogućnost učenja na daljinu», «Mogućnost elektronskog učenja», «Izvođenje nastave samo radnim danima bez vikenda», «Mogućnost polaganja ispita pisanim putem» i «Tačnost i pravovremenost pružanja informacija o promenama u organizaciji nastave»), dok ostalim ponuđenim varijablama ne pridaju suštinski značaj, i na taj način sužavaju obim ispitivanja njihovih očekivanja.

Abstract:

DEFINING THE STUDENTS' EXPECTATIONS PRIORITIES
USING THE FACTOR ANALYSIS

Like the others, the system of Higher Education (HE) also recognizes the importance of the students' expectations as significant input for the process of achieving institutional academic and business performance. In the past decade, the system of HE in Serbia has undergone the significant changes that caused modifications in approaches to students' role and the role of HE institutions as well as changes in students' expectations about achieving the academic objectives. As these expectations are, now, more complex and dynamic, could be important for HE institutions to ensure their better understanding and effective realization. In general, students' expectations could be classified in the two main categories – academic and social, like the objectives that students have tried to achieve. Based on 371 responses of students of College of Vocational Studies – Belgrade Polytechnic about 49 variables of potential academic expectations, 11 factors were extracted using the factor analysis, with the aim of converting their real expectations in the specifications for the service of higher education.

Key words: students' expectations, the factor analysis, professional studies, quality.

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DESIGNING LEAN MANAGEMENT IN A HIGHER EDUCATION INSTITUTION: A CASE STUDY

PROJEKTIRANJE LEAN MENADŽMENTA
U INSTITUCIJI VISOKOG OBRAZOVANJA: STUDIJ SLUČAJA

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ABSTRACT:

Purpose: The purpose of this paper is to analyze the development of Lean Management concept and to identify the relevant opportunities for the application of Lean in the university setting. The paper also discusses the challenges of Lean-Kaizen implementation in higher education, as well as the cultural changes necessary to provide an appropriate climate for its long-term success.

Design/methodology/approach: The paper contains a comprehensive discussion of the development of Lean Management. Additionally, the paper describes how Lean may be applied in the university setting to improve the management processes.

Findings: Lean Kaizen can be applied to facilitate process improvements at the university management level. While obstacles to Lean implementation exist, the process improvements and resulting cultural changes are noteworthy.

Research limitations/implications: The concept "Together in learning – Together in practice" developed by the executive management team at Transilvania University of Braşov, serves as a guide for how Lean can be utilized in the higher education set-

ting. Other researchers and practitioners may use the paper as a practical orientation to Lean in the university management.

Originality/value: The paper provides a needed orientation as to how new concept of university organizational culture at Transilvania University of Brasov, based on actions for student motivation and involvement in the university life and in the development of their career may be applied in order to improve some of the most important functional aspects of the university.

Key words: Lean management, Higher education, Innovative projects, Employability

1. INTRODUCTION

The correlation of didactic, educational and research activities with the stakeholders needs is one of the main objectives of the university. The rapid changes in the economic and technological environment, combined with the IT challenges and with an increased competition on the educational market has led the academic environment to the necessity of adapting itself, of seeking to implement new learning methods and techniques in order to become more efficient. In this respect, an indicator used to analyse a university, for the purposes of fulfilling its mission, respectively for the purposes of streamlining its didactic and scientific activity, is related to the number of graduates on the labour market, acting in their area of specialization.

In this context, adapting the industrial management models to the specific of the educational institutions is a permanent challenge.

2. LITERATURE REVIEW ON LEAN MANAGEMENT IN EDUCATION

Lean management is defined as a management system focused on creating value for customers and eliminating waste, unevenness and unreasonableness using the scientific method¹.

¹ Jiju Antony, "Readiness factors for the Lean Six Sigma journey in the higher education sector", International Journal of Productivity and Performance Management, Vol. 63, No. 2, 2014.

The main Lean principles are *Continuous Improvement and Respect for People, while Lean practices are the tools and methods commonly associated with the Toyota production system*².

Lean education is the application of Lean principles and practices to the education field³. The purpose of Lean teaching parallels the purpose of Lean management, as used in organizations, which is to improve the value of goods and services (higher education) for end-use customers (students, payers, employers and society). Emiliani⁴ described the application of Lean principles and practices to improve a graduate business course on leadership course consistency. Course elements discussed were business principles, syllabus, required reading, assignments, examinations, student feedback and course remembrance. Kaizen process was used by Emiliani⁵ for ten courses contained in a part-time executive MS degree program in management and the conclusion was that Kaizen is an effective process for improving graduate business school courses and the value proposition for students.

Doman⁶ used Lean principles and practices to improve university's grade change administrative processes in higher education through learning experience involving undergraduate students working as a team to identify waste and redesign process in a seminar course. The authors have emphasized that team used process mapping and value stream mapping Lean tools to predominantly focus on four wastes namely delay, over processing or incorrect processing, correction and knowledge disconnection.

A study of use of continuous improvement to achieve instructional improvement and instructional technology improvement with the help of an example of a high school which applied Lean framework and resulted at use of screen capture technology was presented by Flumerfelt⁷ and Green, in 2013. The conclusion presented the ratio of time allocated to task/relational activities, the ratio of time allocated to passive/active learning, the amount of time

² Jeffrey K. Liker, *The Toyota Way - 14 Management Principles from the World's Greatest Manufacturer*, McGraw Hill, 2004.

³ Jiju Antony, "Challenges in the deployment of LSS in the higher education sector", *International Journal of Productivity and Performance Management*, Vol. 64, No. 6 2015, p. 893-899.

⁴ M. L. Emiliani, "Improving business school courses by applying lean principles and practices", *Quality Assurance in Education*, Vol. 12, No. 4, 2004.

⁵ M. L. Emiliani, "Using kaizen to improve graduate business school degree programs, *Quality Assurance in Education*, Vol. 13, No. 1, 2005.

⁶ Mark S. Doman, "A new lean paradigm in higher education: a case study", *Quality Assurance in Education*, Vol. 19, No. 3, 2011.

⁷ Shannon Flumerfelt and Greg Green, "Using Lean in the Flipped Classroom for At Risk Students", *Educational Technology & Society*, Vol. 16, No. 1, 2013.

allocated to new learning opportunity, the amount of time allocated to individualization, and the amount of time allocated to differentiation.

3. A LEAN VISION FOR THE RELATION STUDENTS – UNIVERSITY – COMPANIES AT TRANSILVANIA UNIVERSITY OF BRASOV

Transilvania University of Brasov is an institution of higher education with more than 20.000 students attending courses, at undergraduate level including both long and short cycle higher education, post-graduate and PhD programs, in the technical, economic, humanities and medicine fields.

3.1. Organizational approach

The University consists of 18 faculties that have as main objectives of their activity the initial training in specific fields and education, continuing and life-long education, academic research. It contributes significantly to the local, regional and national economy.

The strategic management plan of the Transilvania University formulates the mid- and long-term aims of our university, by considering the actual and future necessities of the working market. Through the perspective of the bounds established with the economic environment, the strategy aims to determine how the university can achieve the best competitive impact for industry-university collaboration.

The team management proposes, in order to improve the educational process, the implementation of the Lean strategy – *Together in learning – Together in practice using PDSA improvement cycle*.

The implementation of the strategy is accomplished through projects developed together with the economic environment.

3.2. Plan Do Study Act cycle

In order to apply the Together in learning-together in practice the PDSA cycle will be used.

Following the conceptual framework's logic of PDSA, the process of improvement application started with the Plan phase, in which a detailed program was designed 100% student-centred (customer focused).

- a) *Plan* part suppose opportunity identifier, process analyse, optimal solution development.

Together in learning-together in practice are materialized in two projects:

- Organization of an annual conference, where graduating students of the BSc or MSc programs, who want to participate, have the possibility to present in front of company representatives the diploma or dissertation project. The Graduates in Front of Companies (AFCO) bring face to face our alumni and the representatives of the economic and socio-cultural environment; specifically, the students may enrol for this conference and may present, as poster, significant aspects of diploma paper;
- Furthermore, the university has developed the project Podium of the Companies. The project's objective is to improve the cooperation with the socio-economic environment and the regional integration. Proposed activities: the promotion of partner companies' activities in which the university's students can be involved; presenting to the students the characteristics of the partner companies and the opportunity that the students are recruited by these companies; other activities proposed by the companies that respect the objectives of the project in agreement with the university structures responsible for the relationship with the companies.

b) The *Do phase* of the continuous improvement cycle comes next.

During this phase, the projects were implemented (2012-starting date for AFCO, 2013-starting date for PC).

a) The third phase of the PDSA cycle is the *Validation (Study)* phase.

During this phase, university gets to know the evaluation process in a Lean oriented approach. The evaluation of the *Together in learning-together in practice* strategy was carried out on the platform of the INFO-HE project (Figure 3). The study encompassed quantitative, survey data obtained from questionnaire-based surveys (with graduates and employers) from 2010 and 2014 graduates. In order to assess the effectiveness of the projects implemented by Transilvania University of Brasov, the chapters on personal development and professional career included specific questions aiming at measuring the usefulness of the graduates' skills specific to the field of studies followed.

Figure 1. The Platform INFO-HE interface



Source: apm.uefiscdi.ro – Transilvania University user.

The first set of questions (C) relates to the teaching methods used in university.

C9. To what extent have been used the following teaching – learning methods within the license program you graduated in our university?

Table 1. Option – Practical Placements

		2010		2014	
		Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Practical Placement	1 – Strongly Disagree	20	51.28	84	34.57
	2	10	25.64	42	17.28
	3	5	12.82	54	22.22
	4	2	5.13	34	13.99
	5 –Strongly Agree	2	5.13	29	11.93
	Total:	39		243	
	Average		1.87		2.51
	Standard deviation		1.81		1.5

Source: Made by authors.

Starting from the Lean project objective, which is to correlate the academic offer and the learning outcomes with the employment requirements using the Lean methodology (questions F from students’ survey).

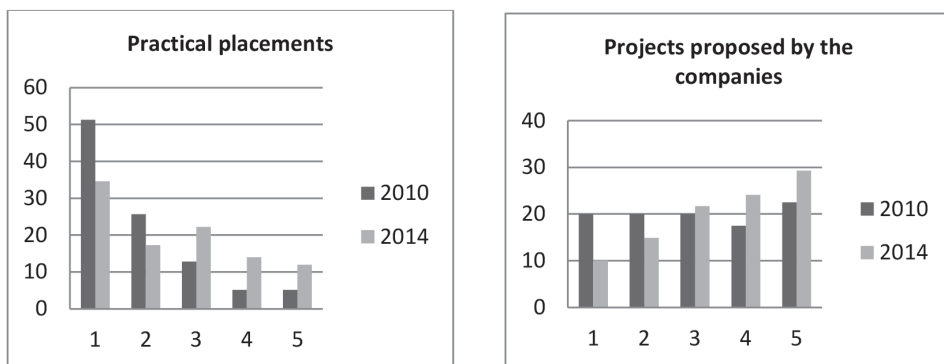
Table 2. Option- Projects proposed by the companies

		2010		2014	
		Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
Projects proposed by the companies	1 – Strongly Disagree	8	20	25	10.04
	2	8	20	37	14.86
	3	8	20	54	21.69
	4	7	17.5	60	24.1
	5 –Strongly Agree	9	22.5	73	29.32
	Total:	40		249	
	Average	3.42		3.48	
Standard deviation	1.48		1.49		

Source: Made by authors.

According to the survey of 2010 graduates, during the first 6 months from graduation, 13.4% of graduates were hired in a corresponding domain.

Figure 2. Survey results



Source: Made by authors.

The question in the questionnaire is:

F1. Which of the following would suit best your situation within the first six months after graduation?

The results below (Table 3 and Figure 3) refer to promotion of 2014.

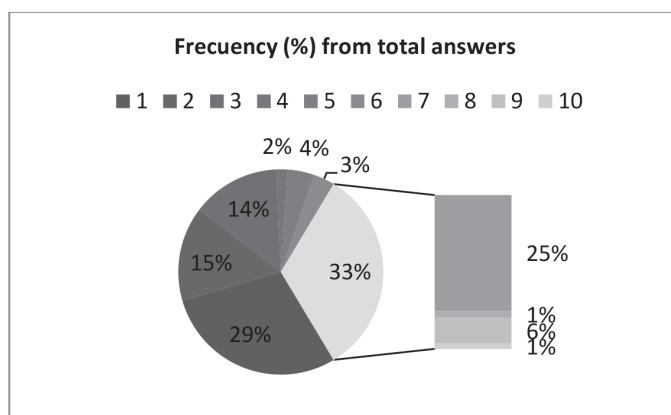
Table 3. Results of F1 question

		No of people who answered the question	Frequency (%) of the total no of people	Frequency (%) of total responses
1.	I work in a field that corresponds to the license program I graduated	104	42.62	28.34
2.	I work in a different field	53	21.72	14.44
3.	I continued to work where I have already worked	50	20.49	13.62
4.	I opened my own business	6	2.46	1.63
5.	I performed an internship	15	6.15	4.09
6.	I began to work as a volunteer	12	4.92	3.27
7.	I enrolled in Master’s or other postgraduate university courses	88	36.07	23.98
8.	I enrolled in a new college (undergraduate)	5	2.05	1.36
9.	I looked for a job without success	20	8.2	5.45
10.	Other	4	1.64	1.09
Total:		367		
244 respondents, 367 answers recorded				

Source: Made by authors.

Note: In Table 3, Frequency (%) of the total number of people is over 100% because it is a multiple choice question.

Figure 3. Frequency of answers



Source: Made by authors

29% of the respondents (graduated in 2014) are currently working in a position which corresponds to the study program they have graduated from.

d) Each quarter, the PDSA cycle allows generating the *Act phase: the opportunity to improve the educational process*.

Following stakeholders' feedback, the university management team standardises the good practices oriented towards the Lean philosophy, in other words, towards continuous improvement. As such, the correction cycle is presented in a continuous way each quarter, in that same order of ideas.

4. RESULTS AND DISCUSSIONS

The study leads to the conclusion that the *Together in practice-together in learning* approach led to enhance of Transilvania University of Brasov graduates' employability (Table 4).

Table 4. Results of improvement cycle

Improvement opportunity	Improvement made
PLAN	First, a general frame goal was established, oriented by the <i>Together in learning-Together in practice</i>
DO	Accomplishing projects
STUDY	The evaluation have been made with the implication of the main stakeholders
ACT	Given the results of the evaluation, the existing projects will improve and new projects will be implemented

Source: Made by authors

The 2014 graduates are characterized by a higher employability than those that graduated in 2010. The qualitative and quantitative indicators are superior to the 2014 graduates compared to the 2010 graduates.

5. CONCLUSION

The cooperation with the economic and socio-cultural community knew a real improvement lately at Transilvania University of Brasov the correlation between the companies' needs and students didactical and research activities, being one of the main objectives considered by executive management team

at Transilvania University. In this respect, a preliminary study on applying Lean Management was carried out for the university. The identified improvements were mapped with standard Lean tools from manufacturing. The improvements and changes that were and are being made are centred on the PDSA improvement cycle and aligned with the students' needs. Positive results were obtained. This can be achieved with a strong industry-academia relationship grounded on a multitude of partnerships (Project-Based learning, internships, final projects, capstone projects) that provide students and faculty with real life projects, following what many authors have been advocating.

Sažetak:

PROJEKTIRANJE LEAN MENADŽMENTA U INSTITUCIJI VISOKOG OBRAZOVANJA: STUDIJ SLUČAJA

Jedan od glavnih ciljeva sveučilišta je postizanje korelacije između didaktičkih, edukacijskih i istraživačkih aktivnosti s potrebama korisnika. U ovom pogledu, pokazatelj korišten za analizu sveučilišta, za potrebe ispunjavanja njegove misije, odnosno za potrebe usmjeravanja njegove didaktičke i znanstvene aktivnosti, povezan je s brojem diplomanata na tržištu rada koji su aktivni u poručju svoje specijalizacije. Ovaj rad prezentira najbolju praksu lean menadžmenta na Transilvanijskom Sveučilištu u Brašovu, Rumunjska.

Ključne riječi: lean menadžment, visoko obrazovanje, inovacijski projekti, zapošljavanje.

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E-LEARNING AS A TOOL OF EDUCATION QUALITY ENHANCEMENT AT THE TECHNICAL UNIVERSITY IN ZVOLEN

E-UČENJE KAO ALAT ZA POBOLJŠANJA KVALITETE
OBRAZOVANJA NA TEHNIČKOM SVEUČILIŠTU ZVOLEN

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ABSTRACT

Time and its savings are a critical issue of progress and development of any modern society. The field which is affected significantly by the constant and rapid spread of information is education. Education as one of the most important factors determining the level and culture of the society is worthy of particular attention. Electronic education presents a new dimension of the process of education. E-learning carries its advantages and disadvantages different to an individual school or a teacher. The aim of the paper is to present an option to apply e-learning into the education of the regular form of university studies at the Technical University in Zvolen. Based on the survey of students feedback on e-learning in the regular form of the study. The survey results point out that e-learning enhances attractiveness, easiness and overall quality of instruction giving suggestions for particular improvements.

Key words: e-learning, education, information, LMS systems.

1. DIDACTICS OF MODERN INFORMATION TECHNOLOGIES

Information technologies have become an effective tool to provide, process and store information which presents the main item of learning in education. E-learning is a very powerful tool in education making education more attractive and more economical in certain conditions. E-learning as a modern method of education helps to make traditional face-to-face education of higher quality and more attractive. As the internet is becoming more and more widespread in a lot of social fields, also education positively reflects the use of e-learning.

E-learning may be defined as the process which describes and interlinks creation of the materials, distribution of them, management of educational process and its feedback based on computer use which is more and more often called e-learning courses. However, e-learning covers not only 100% computerised instruction but also so-called blended learning or CAL¹ which is a share of face-to-face learning and computerised learning. The applications contain simulations, multimedia lessons i.e. combinations of text and graphics, animations, audio or video files or electronic tests. E-learning encourages individual or autonomous education because it lets a student choose the form of education which suits him/her most. The current education offers students the didactic approach supported by modern information technologies more and more often. That means that the traditional system of teaching is definitely retreating from its positions.

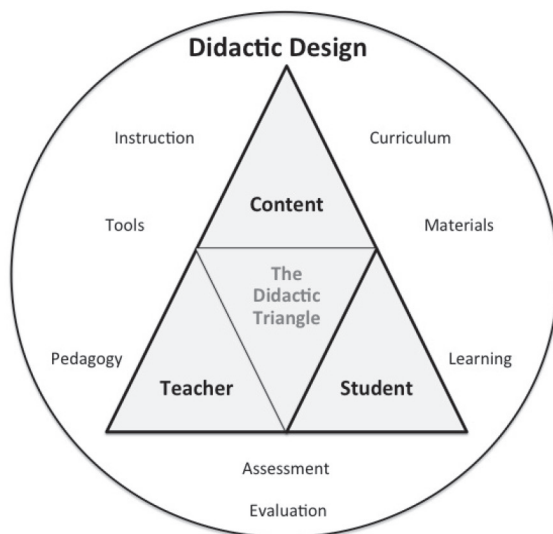
Experts on e-learning applications claim that implementation of e-learning into the practice is the most difficult part of e-learning applications². Economic and financial aspects prioritise this new method of instruction, but the reality shows the contrary.

There are several issues associated with the topic of e-learning as it interferes with all segments of the didactic design (Fig.1): there is a teacher with computer skills at a certain level or instead of the teacher there is provided a learning management system (LMS). The instruction may be delivered via a computer (the internet, email, chat). The materials may be provided by electronic application (internet course, interactive exercises, PPT presentations, audio and video files, etc.). A student with a certain level of computer skills produces his/her school tasks via computer and may be assessed again via a computerised test.

¹ Katerina Gajdačova Veselá, *Teaching ESP in New Environments*, Nitra, ASPA, 2012.

² Carlos Muñoz, Miguel Angel Conde, Jorge Reyero, Francisco J. García, „Open source LMS customization a moodle stadistical control aplicacion“, WEBIST 2008 - 4th International Conference on Web Information Systems and Technologies, Proceedings. Volume 1, 2008, Pages 402-407.

Figure 1. Didactic design



Source: <https://marianneriis.files.wordpress.com/2013/03/dd.jpg>.

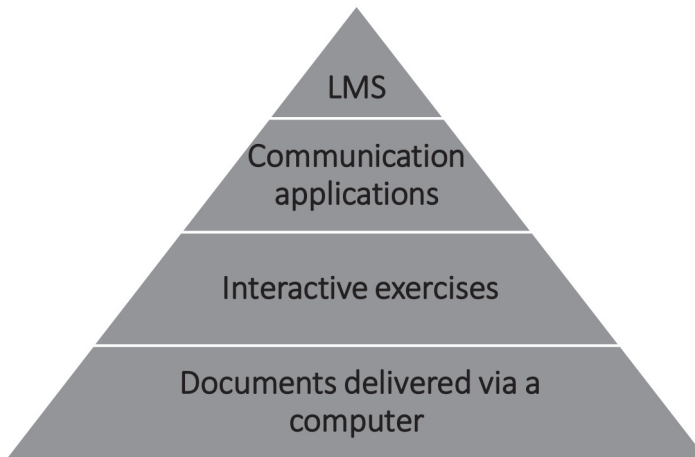
One of the main difficulties lies in the teacher: they are not able to use e-learning in the instruction because they do not know what to expect and how it works within the classroom. Another aspect is to realise what form/system/application of e-learning the users (teachers) want to work with. Some applications are restricted to the transformation of text documents to electronic form and consequent burning to CDs. The impact of the electronic material increases directly with an increase of the students' involvement with the electronic activity as mentioned by Štefková and Balážová³. Other applications work as on-line lectures where the teacher is not in the direct contact with students. The electronic applications are illustrated in the pyramid of the complexity of e-learning applications as it can be seen in Figure 2. It partially reflects the basic division of e-learning materials as on-line and off-line ones, both having their strong and weak points and suitability.

There are various definitions of e-learning including blended learning starting with the use of electronic materials during lessons, through interactive applications with feedback, ending with the definitions with LMS as a complex environment facilitating a complete process of education. We under-

³ Jaroslava Štefková and Eva Ž. Balážová, „Learning na univerzite – formy praktického použitia“, In *Aplikované jazyky v univerzitním kontexte – elektronická podpora vzdelávania*, Technická univerzita vo Zvolene, 2015, str. 102-115, Dostupné na CD-rom.

stand e-learning as a complex system of services and relations in the internet environment providing student not only with electronic studying materials but also feedback i.e. tests, exercises, discussion groups, chat, etc. and including mentor's approach as well. E-learning system should definitely be clear, comprehensive, as for a student so for a teacher, so that its users can focus on the content of e-learning course and not on the use of the system.

Figure 2. Complexity of e-learning applications



Source: Štefková, Balážová, 2015.

Is clearly visible that if universities want to stay comparable o with benchmarked trends in the European educational environment they cannot stay negligent to this trend.

2. ELECTRONIC EDUCATION IN A REGULAR FORM OF UNIVERSITY STUDIES AT THE TECHNICAL UNIVERSITY IN ZVOLEN

Referring to the Act on Higher Education (*Act No. 131/2002 Coll. on Higher Education*) there are generally recognised and defined two independent forms of education. The face-to-face form commonly used and preferred system of education where the physical contact of a student and a teacher is implicit and natural. Information is transferred to students by the lecturer at lessons or lectures. Feedback is received at lessons. At this form, the technol-

ogy serves as a supportive but not inevitable segment. The distance of education requires minimal or a very limited physical contact between a student and a teacher. An essential segment of the distance education is technology which enables the student to learn individually and that especially thanks to instructional and self-studying materials (specially designed textbooks, exercise books, multimedia packets) and web materials. This form includes e-learning to a higher extent and more often.

The collective of employees at the Technical University in Zvolen decided to implement e-learning education into the regular form of study to catch up with the trends and utilise the advantages e-learning offers despite many difficulties and disadvantages. The e-learning support was carried out using university information system (UIS) in a combination of LMS system of „e-education“ by Empire Systems Ltd firm.

Currently, the Technical University in Zvolen, as most universities in Slovakia, uses own information and education management portal. It is University Information System (UIS) accessible for employees, students of the university through a website <https://is.tuzvo.sk/> (Figure 1). That offers a number of functionalities including a possibility of creation and sharing electronic materials for individual subjects of the study programmes. Though, it is a free form of e-learning with the possibility of students' evaluation via didactic tests. Parallely, LMS system of *e-education* is being used for certain subjects of economic study programmes as an e-learning support. The LMS is accessible after free registration at the web page <http://www.e-ducation.com/my/login/mylogin.php>

Both systems offer wide instances of the creation of e-learning materials (consisting of multimedia presentations, combinations of animations, videos, sound and textual lectures), their gradual sharing, assigning of on-course tasks and their collection in a free storage site also including evaluation of didactic tests.

In the field of education ICT and virtual space offer a number of advantages compared to traditional form called presence education and they make it more attractive and modern. This is because of the following attributes:⁴

- *great instruction potential* – traditional textbooks cannot compete with the information flood offered by ICT,
- *the speed of work* – ICT can process, save, analyse, evaluate, update a high amount of information,

⁴ A. Kučerová, Maria Pálušová, „IKT ako moderný didaktický prostriedok“ in Zborník z konferencie Uninfos, Nitra, 2006, str. 250-254.

- *interactivity* – ICT are not passive media, they enable communication between a teacher and a student,
- *creativity* – ICT present space for thinking and for effective and creative work,
- *motivation* – the use of ICT often motivates more to acquire new knowledge because these technologies are a common part of everyday life so that they are also more effective.

Pejša⁵ states different advantages for synchronous and asynchronous e-learning from the point of view of the choice of the most suitable form. The most important advantages of synchronous teaching, i.e. on-line teaching comprise mutual interaction of a student and a teacher, easy and fast adjustment of contents and quite an important aspect, it is cheaper. As for asynchronous teaching, i.e. off-line teaching, it offers easy distribution of factual information and regarding a student, it offers a possibility of the own pace and time of the study. Use of e-learning ultimately needs modification of teaching methods which consider coordination of time and space for and a particular home environment of students, and also computer competency of teacher preparing e-learning courses. Another approach describes a more complex system of assessment of e-learning support⁶ with several areas of assessment (student's personality, a didactic aspect of learning, a form of the contents, specifics of e-learning support, and ergonomic aspects of e-support).

3. SURVEY ON E-LEARNING USE AT THE TECHNICAL UNIVERSITY IN ZVOLEN

Within the execution of KEGA № 013TU Z-4/2014 grant project: Implementation of electronic foreign language education based on multimedia teaching materials at the technical university in Zvolen, we have carried out a survey among students of the university aimed at e-learning via used application. The survey focused on working with the systems themselves and their effectivity of their use. The survey addressed 236 students of seven study branches from two faculties of the university. The questionnaire return was 100%. The survey carried out through questionnaires was divided into three parts related to:

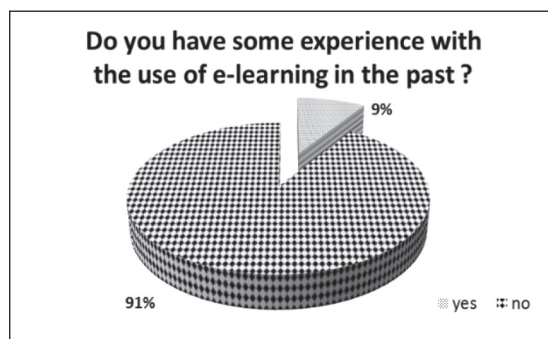
⁵ Jan Pejša, e-learning - trendy, měření efektivity, ROI, případové studie [online] In *Kontis – e-learning* [cit. 2015.7.7. Dostupné na: http://www.kontis.sk/soubory/e-learning_trends_ROI.pdf

⁶ Milan Klement, „Přístupy k hodnocení elektronických opor určených pro realizaci výuky formou e-learningu“, Olomouc, 2011, str. 124.

- general information (identification of the study programme and the year of study, as well as the experience with e-learning during the previous study at a university or secondary school,
- the use of LMS e-ducation, its use for a regular form of study (assessment of working with the LMS, its use, and design. The survey contained also the questions on possible improvements of e-learning education at the university as well as the suggestion for the improvements of the particular applications,
- evaluation of the study via the electronic form (the comparison and assessment of the attractiveness of e-learning compared to the face-to-face form, evaluation of own study results and specifying possible drawbacks).

Regarding size limitations of the article, we shall try to present the partial results of the survey focusing on attractiveness assessment, benefits, future prospectives including application improvements suggestions.

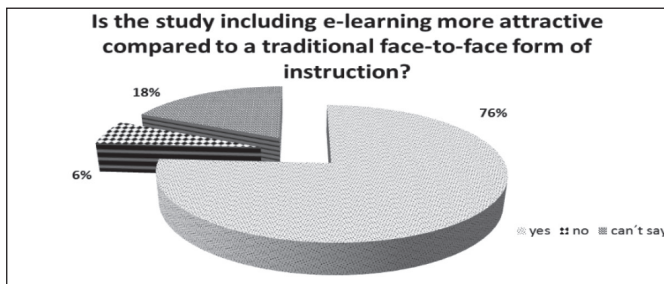
Figure 3. Pie chart of e-learning uses in the instructional process



Source: Made by authors.

The results of the survey confirmed undoubtedly the assumption that the situation in the area of e-learning in education at the secondary schools (possibly universities) in the Slovak republic is still in the phase of its establishing. 91% of students have not come across any form of e-learning (Fig. 3). Though, face-to-face education definitely prevails so far, while students share the opinion on the attractiveness of studying supported by modern information technologies. This opinion was declared by 76% of students. (Fig. 4)

Figure 4. Pie chart on attractiveness of e-learning education

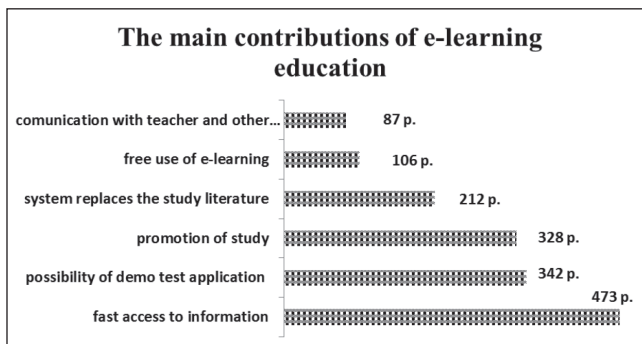


Source: Made by authors.

Connected to the assessment of the study we also defined the factors which present the main contributions of e-learning form for students. Students were able to choose from the offered options or to define their own understanding of the contribution. They also marked the order of importance from 3 (the most important) to 1 (the least important) points.

The students see the main contribution of e-learning education (Fig. 4) in the possibility of the access to the provided information from any place where there is an internet connection (specialised classroom, home, a mobile phone, a smartphone, a tablet,...). Another important aspect, besides others, is also a possibility of self-assessment of their knowledge by practise didactic tests, and then a simpler form of obtaining the information. However, the opinion that e-learning should substitute necessary studying literature or actual presence at lesson seems to be quite risky.

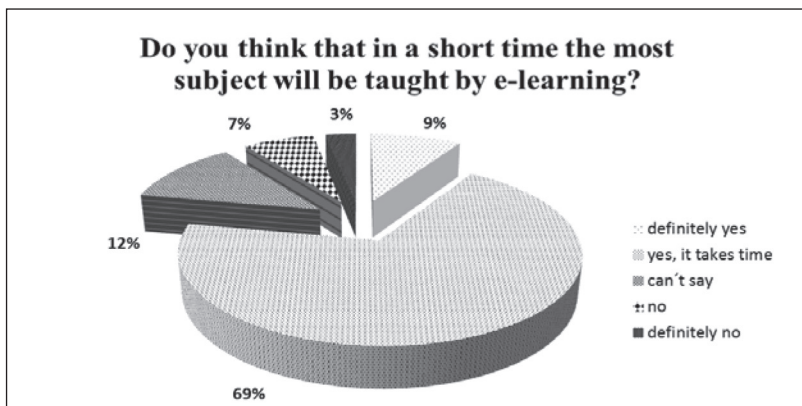
Figure 5. The main contributions of e-learning education



Source: Made by authors.

E-learning has, along with the advantages which it provides in the area of savings in time and costs, a prospect of development in the future as suggested by the students' opinion on the possibility of having the other subjects taught by modern information and communication technologies. (Fig. 5)

Figure 6. A possibility to teach other subjects by e-learning



Source: Made by authors.

Whereas there is still testing of the whole system for the target group of students and pedagogues in progress trying to eliminate the drawbacks of the system and improving its visual and content part gradually, it was important for us to collect some suggestions and ideas on improvements of the system functionality. To improve the process of e-learning in education the students suggested the following:

- creation of other subjects (modules) by this form of education,
- accessibility of the system in the education of all studying programmes,
- making individual documents more comprehensive and distinguished by the use of graphical icons,
- accessibility of exporting files for offline mode,
- usage of social networks functions – communication, making friends, sharing and liking of messages,
- a possibility to process and send school projects,
- flexible content modification and wider scale of didactic tests,
- renewing the content more often.

4. CONCLUSION

Despite the difficulties and issues which application of e-learning brings into the process of education, our personal experience on e-learning in education at university suggests that this form makes a teaching-learning process more attractive and of higher quality to a significant extent and, therefore, we definitely recommend it for the use at other universities or secondary schools.

Education process even in an information society will never present automation of education via computers with no presence of the people involved in the process of education. The student will still need a direct contact with a teacher so probably, e-learning will never substitute completely traditional forms of education. It concerns especially certain specific areas such as (teaching of languages, technological procedures,...), where there is necessary a personal contact between a student and a teacher. In the case of e-learning, e-learning stays a very progressive possibility of education support which can make education more effective and more accelerate in certain ways.

Sažetak:

E-UČENJE KAO ALAT ZA POBOLJŠANJA KVALITETE OBRAZOVANJA NA TEHNIČKOM SVEUČILIŠTU ZVOLEN

Vrijeme i njegova ušteda ključni su problem prosperiteta i razvoja svakog modernog društva. Obrazovanje je djelatnost koja pri tome može znatno pomoći. Obrazovanje je jedan od najvažnijih faktora koji utječu na razinu i kulturu društva i zavrjeđuje osobitu pozornost. Elektroničko učenje predstavlja novu dimenziju procesa obrazovanja. E-učenje donosi prednosti i nedostatke u odnosu na klasičnu školu ili nastavnika. Cilj ovog rada je prezentirati način primjene e-učenja u postojećem službenom okviru obrazovanja na sveučilišnom studiju na Tehničkom sveučilištu Zvolen. Povratne informacije studenata o e-učenju u postojećem okviru obrazovanja na studiju ukazuje da e-učenje doprinosi zanimljivosti, jednostavnosti i sveukupnj kvaliteti i daje okvir za daljnje poboljšanje.

Ključne riječi: e-učenje, edukacija, informacija, LMS sustav.

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QUALITY MANAGEMENT AT CZESTOCHOWA UNIVERSITY OF TECHNOLOGY

UPRAVLJANJE KVALITETOM NA CZESTOCHOWA
TEHNOLOŠKOM SVEUČILIŠTU

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ABSTRACT

This work analyses the development of the quality assurance system and changes in market forces at the Czestochowa University of Technology in Poland. The work focuses on the function and impact of self-monitoring and self-evaluation systems as processes oriented towards internal and external clients. The work includes analysis of influence of the external environment of the university on quality education and issues of the evaluation of institutions by the Polish Accreditation Committee.

Key words: quality, improvement, education, management, accreditation.

1. INTRODUCTION

The concept of “ensuring the quality of education” as a general term functioning in higher education offers many interpretations. In the “Declaration from Graz from July 2003,” published by the European University Association, there was included record that the aim of the European dimension of quality assurance is to promote mutual trust and improving transparency, while respecting the diversity of national circumstances.¹

One of the main documents dealing with the issues of quality assurance is a report developed by the European Association for Quality Assurance in Higher Education, containing standards and guidelines for internal and external quality assurance in higher education. Within the internal systems following actions are proposed:²

- developing policies and procedures for quality assurance (institutions should have a policy and associated procedures in terms of quality and standards of offered by them programs and their effects, they should also assume the obligation to develop a culture of quality);
- approval, monitoring and periodic review of programs and their effects (institutions should have mechanisms for approval, periodic review and monitoring of their programs and their effects);
- assessment of students (students should be assessed according to published and consistently applied criteria, regulations and procedures);
- ensuring the quality of teaching staff (institutions should ensure that teaching staff have appropriate qualifications and competences);
- resources for learning and support measures for students (student learning support resources should be adequate and appropriate for each program);
- information systems (institutions should collect, analyse and use information for the effective management of offered study programs and other activities);
- publication of information (institutions should at regular intervals publish up to date and objective information, quantitative and qualitative, on the programs they offer and their effects).

¹ *Standardy i wskazówki dotyczące zapewnienia jakości kształcenia w Europejskim Obszarze Szkolnictwa Wyższego*, Europejskie Stowarzyszenie na rzecz Zapewnienia Jakości w Szkolnictwie Wyższym, Helsinki 2005.

² *Standardy i wskazówki dotyczące zapewnienia jakości kształcenia w Europejskim Obszarze Szkolnictwa Wyższego*, Europejskie Stowarzyszenie na rzecz Zapewnienia Jakości w Szkolnictwie Wyższym, Helsinki 2005.

In contrast, European standards of external quality assurance in higher education should be reflected in activities such as:³

- use of internal procedures of quality assurance of education (should take into account the effectiveness of internal quality assurance processes),
- the development of external quality assurance processes (first you should define their objectives and tasks, which should be published together with the description provided for the procedures),
- criteria for the decision (decisions should be based on clearly defined, published and consistently applied criteria),
- processes suitable for a particular purpose (processes should be designed in a way that guarantees their suitability to meet the set goals and tasks),
- reporting (should be published understandable and affordable for customers reports),
- supplementary procedures,
- periodicity of review (you should periodically take actions in the field of external quality assurance of institutions and or programs and define the procedures concerning inspection), system analysis (should be periodically prepared summary reports containing discussion and analysis of the general conclusions of the surveys).

2. THE LEGAL REQUIREMENT FOR THE QUALITY OF EDUCATION IN POLAND

Public and private schools of higher education in Poland are guided by the principle of freedom to teach, subject to certain guidelines at the same time specified by the Law on Higher Education (Act of 27 July 2005). According to § 9, paragraph 1, point 9 of the Ordinance of the Minister of Science and Higher Education dated 5 October 2011 on conditions for conducting studies at a specific field and level of education (Journal of Laws No. 243, item 1445) one of the conditions for conducting the studies is to implement an internal quality assurance system of education, including mechanisms to improve the learning program on conducted field of study. The obligation to create by the Universities the internal quality assurance system was introduced by the Ordinance of the Minister of Science and Higher Education dated 12 July 2007 on education standards for particular fields and levels of education, as well as the mode of cre-

³ *Standardy i wskazówki dotyczące zapewnienia jakości kształcenia w Europejskim Obszarze Szkolnictwa Wyższego*, Europejskie Stowarzyszenie na rzecz Zapewnienia Jakości w Szkolnictwie Wyższym, Helsinki 2005.

ation and the conditions that must be met by the university in order to conduct interdisciplinary studies and macro-fields (Journal of Laws 2007, No. 164, item 1166). New challenges in terms of the quality of education has set the universities amended in 2011 Act dated 18 March 2011 on amending the Act - Law on Higher Education, the Act on Academic Degrees and Title and on Degrees and Title in Art and amending certain other acts (Journal of Laws 201,1 No. 84, item 455). They concern the implementation by universities of the internal system of quality assurance of education, which takes into account measures to improve education programs on conducted fields of studies. Internal system of quality assurance of education according to § 11, point 1 of the Ordinance of the Minister of Science and Higher Education dated 5 October 2011 on the conditions for conducting studies at a particular field and level of education (Journal of Laws No. 243, item 1445) should take into account, in particular all forms of verifying effects of education on particular fields of study achieved by the student in terms of knowledge, skills and social competence as well as assessments made by students and conclusions of the monitoring career of university graduates. External institutions working independently to improve the quality of education are the Accreditation Committees, such as Polish Accreditation Committee, performing assessment in a given field of study, decision making about having the rights of individuals to carry out studies in given field. The Polish Accreditation Committee is an independent institution working on behalf of education quality improvement. The primary objectives of the Committee is to observe fulfilment of standards agreed for higher education referring to best models adopted in European and global academic area as well as to support public and non-public higher education institutions in the process of enhancement of quality education and building of culture of quality. These activities aim to ensure that graduates of Polish higher education institutions rank high on the national and international labour markets, and to enhance the competitiveness of Polish higher education institutions as European organizations. Polish Accreditation Committee which is carrying out an assessment of programs on given field of study and assessment of the institutional functioning of the whole system in case when 60% of carried out fields was given a positive assessment of programs.

3. QUALITY MANAGEMENT

Among the quality control system solutions purposeful character has Total Quality Management.⁴ In this system, obtaining the desired quality (excel-

⁴ Robert Ulewicz, *Application of servqual method for evaluation of quality of educational services at the university of higher education*. Polish Journal of Management Studies. Vol. 9, 2014, pp. 254-264.

lence of a graduate) is possible through the full participation of all interested in the process of quality shaping, the main motive for action of management institute, faculty, and the university is to meet the needs of stakeholders and to direct all activities on their acquisition and retention. A very important element is responsibility and leadership.⁵ Academics, who by tradition exercise considerable autonomy in respect of teaching, necessarily have to assume responsibility themselves for the quality of the student experience: at times this responsibility is discharged collectively, at times individually. The role of those with larger spans of authority, such as heads of department, is to create conditions within which a commitment to quality can flourish. Here the distinction between management and leadership becomes elided, since the evolving expectations of the higher education system require more than a mere seeing that existing policies are carried out.⁶ There is the question whether the leader (Rector, Dean, lecturer) should be at the same time quality manager. In many cases manages to combine both functions of leader and manager. But given the diverse academic environment, according to the authors of the publication it is not possible to combine these two features in each case. For this reason, at the Czestochowa University of Technology was approved the idea that the quality manager and the person responsible for improving the quality of education is plenipotentiary of the Rector of the quality of education and at individual faculties plenipotentiaries of deans. The scope of their responsibilities is broadly understood pro-quality activities aimed at the development of qualitative culture at individual faculties and the involvement of internal stakeholders (including managers of individual Institutes and Chairs) and external in its creation.⁷ Figure 1 shows the structure of internal and external stakeholders of the quality system of education. In scope of the plenipotentiaries is also conducting reporting on the internal system of quality assurance of education for the needs of external institutions, e.g. Polish Accreditation Committee.

⁵ Yonezawa Akiyoshi, *The quality assurance system and market forces in Japanese higher education*. Higher Education 43, 2002, pp. 127–139.

⁶ Y. Mmantz, *Developing a quality culture in higher education*. Tertiary Education and Management Vol. 6. .p. 19–36. Martina Blaskova, Michal Bizik and Radoslav Jankal, 2015. *Model of decision making in motivating employees and managers*, Engineering Economics Vol. 26, Issue 5, 2000, pp. 517-529.

⁷ Janusz Grabara, *Kształcenie inżynierów jako system logistyczny* (2000), Prace Wydziału Zarządzania Politechniki Czestochowskiej, Vol. 4. Seria Seminaria i Konferencje, Czestochowa. Ślusarczy, B., Kot, S. 2010. *Survey on requirements for logistics employee*, ALS. ALS. Advanced Logistic Systems (2010) Theory and Practice, Vol. 4, pp. 27-32. Stasiak-Betlejewska, R. 2012. *Value engineering as the way of quality problems solving in the steel construction management*, Manufacturing Technology Vol. 12, Issue 13, 2000.

Figure 1. Interested sites of the education process

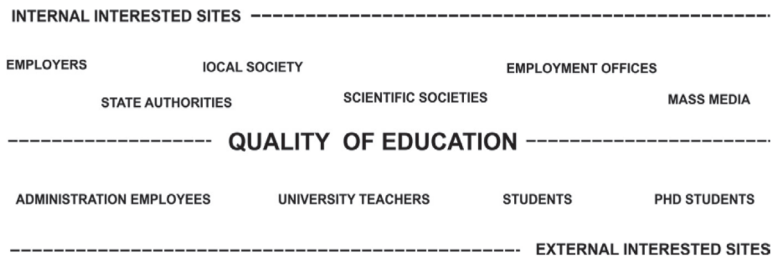
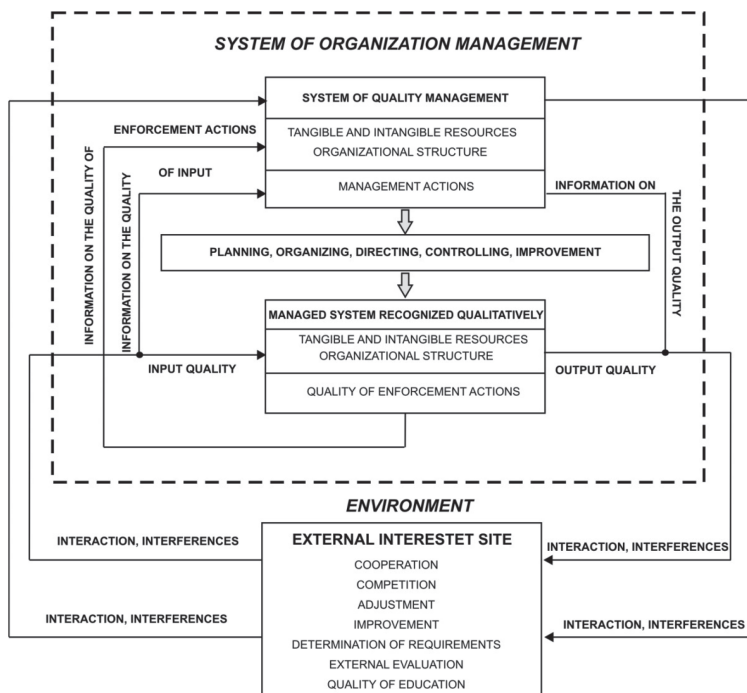


Figure 2 shows a model of organization and quality management at the Czestochowa University of Technology.

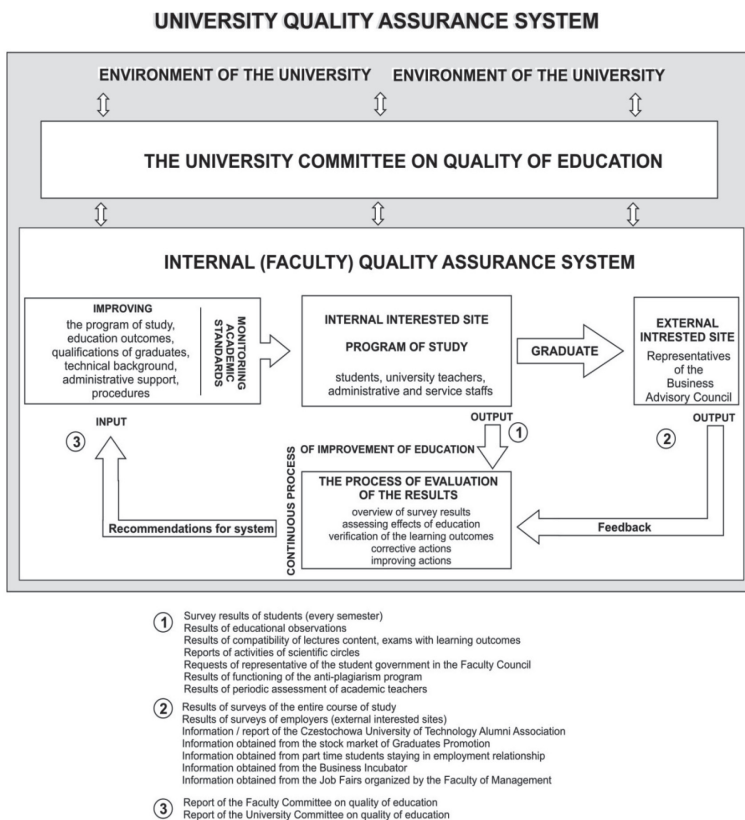
Figure 2. The model of management of organization and quality at the Czestochowa University of Technology



The big problem with which we are dealing is reporting that significantly goes beyond the standards of quality management system based on ISO 9001: 2008 or an amendment to the ISO 9001:2015. Requirements of the Polish Accreditation Committee require documenting almost all activities, the minutes

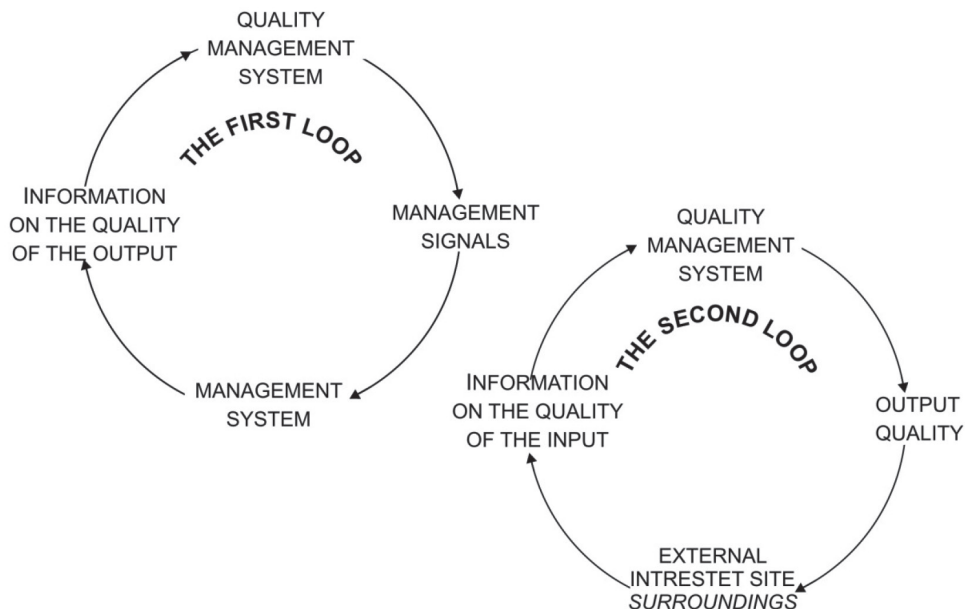
of meetings, the exact procedures. The authors observe dangerous tendency of development of procedural approach that focuses on the implementation of procedures and records from their implementation forgetting the process approach that is focusing on results. The procedure is the way to improve the quality and it is not a goal in itself. However, in many cases, the procedure is created artificially, although in a given area are adequate good practices and analysis of data on input and output of given process. However, such solution frequently encounters a lack of understanding from the body accrediting given field of study. Figure 3 shows the model of internal quality assurance system at the Faculty of Management. Each faculty creates its own quality assurance system in accordance with the guidelines of the university committee on the quality of education, which reports directly to the Rector. Annual reports of individual faculties are approved by a committee of university and conclusions and recommendations are proceeded to the Senate.

Figure 3. The model of system of quality assurance of education at the Czestochowa University of Technology



The problem of the functioning model resulting from the existing requirements of Polish Accreditation Committee is a procedural approach.

Figure 4. Double loop quality



The purpose of pro-quality activities at the Czestochowa University of Technology is to develop a simple model based on quality double loop Fig. 4.

4. CONCLUSION

Tough market requirements and unfavourable demographic situation in Poland very brutally verifies the quality of education. On the market stay universities most adapted to changes in a turbulent environment, which in a short time are able to adapt to the expectations of external stakeholders as well as internal (students and doctoral students). From 520 higher education institutions in Poland as of 21 January 2015, 33 universities are under liquidation and 58 universities have been liquidated. Polish Accreditation Committee until 21 January 2016 for the year 2015 issued 12 decisions to revoke the authorization to conduct fields of study at universities, public and private.

The process of verifying the quality of education is carried out on a regular basis by the market by employers, which translates directly to the num-

ber of students. A very important element in quality management of education and adapting the offer to the labour market is feedback from employers. Mechanisms developed at the Czestochowa University of Technology exclude the ability to run fields of study without a positive recommendation of business environment including chamber of commerce and office work. A major administrative problem in quality management, not necessarily in improving the quality of education, is the need to use procedural approach rather than an effective process approach. Czestochowa University of Technology in order to improve the quality of education cooperates with foreign universities (including the University of Žilina) for independent verification and assessment of their own solutions in the field of the quality of education.

Sažetak:

UPRAVLJANJE KVALITETOM NA CZESTOCHOWA TEHNOLOŠKOM SVEUČILIŠTU

Ovaj rad analizira razvoj sustava osiguranja kvalitete i promjena tržišne pozicije na Czestochowa Tehničkom sveučilištu u Poljskoj. Rad je usmjeren na funkciju i utjecaj samokontrole i samoprocjene procesno orijentiranog sustava prema unutarnjim i vanjskim korisnicima. Rad uključuje analizu utjecaja vanjskog okruženja sveučilišta na kvalitetu obrazovanja i pitanja procjene od strane Poljske akreditacijske agencije.

Ključne riječi: kvaliteta, poboljšanje, obrazovanje, upravljanje, akreditacija.

5. LITERATURE

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KVALITETA U PODUCI STRANIH JEZIKA – INSPEKCIJSKA SHEMA

QUALITY IN FOREIGN LANGUAGE TEACHING – THE INSPECTION SCHEME

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SAŽETAK

Kako bi se osigurali visoki standardi kvalitete u školama za strane jezike u Republici Hrvatskoj (RH) provodi se inspekcija škola. Ona se provodi prema Pravilniku inspekcije i Priručniku o inspekciji tj. „Inspeksijskoj shemi“. Inspeksijska shema sadrži sve aspekte kontrole kvalitete kao što su: Uprava i ustroj škole, Radni prostor i oprema, Profesionalni standard te Kvaliteta nastave. Uprava i ustroj provjerava pravnu i financijsku legalnost djelovanja u skladu sa zakonima i propisima RH. Radni prostor i oprema provjerava zaštitu na radu i protupožarnu zaštitu te propisane uvjete za opremu. Profesionalni standard provjerava nastavne planove i programe za svaki pojedini stupanj. Kvaliteta nastave provjerava tijekom nastavnog sata te pripremu voditelja nastave profesora. Inspeksijska shema stalno prolazi nove revizije te je tek nedavno dobila svoj konačni oblik koji će se i dalje nastaviti mjenjati. Time se osigurava značaj jamstva kvalitete kao i uvedenim Sustavom upravljanja kvalitetom (SUK) sukladno normi ISO 9001:2015.

Ključne riječi: kvaliteta, učenje stranih jezika, inspeksijska shema.

1. UVOD

Jedan od značajnih aspekata poduke stranih jezika u RH je i djelatnost škola za strane jezike. Iako imaju različite pravne oblike, jedna od najvažnijih značajki njihovog djelovanja je upravo kvaliteta. Ona se ogleda, ne samo u provođenju nastave, nego i zadovoljstvu polaznika te stečenom znanju. Kvalitetne škole stranih jezika, bez obzira da li su registrirane kao društva sa ograničenom odgovornošću (d.o.o.), ustanove, pa čak i udruge, nedvojbeno pridonose promicanju kvalitete jezičnih usluga i širenju kulture višejezičnosti.

Voditelji kvalitetnih škola za strane jezike redom su osvjedočeni stručnjaci koji svojim dugogodišnjim predanim radom pridonose, ne samo kvaliteti škola koje vode, nego i sudjeluju u radu mnogobrojnih državnih institucija kao što su Ministarstvo obrazovanja, Hrvatska gospodarska komora, Hrvatsko društvo za kvalitetu te Hrvatsko društvo menadžera kvalitete i dr. Dugogodišnja uspješna suradnja s europskim i svjetskim stručnjacima na području lingvistike i metodike nastave rezultirala je članstvom u brojnim tuzemnim i europskim asocijacijama koje se bave istim područjem ekspertize. Razmjenom mišljenja, iskustava i novih ideja postižu se značajni pomaci ne samo u samom procesu provođenja nastave već i u razvoju svijesti korisnika o važnosti kvalitete jezičnih usluga.

2. INSPEKCIJSKA SHEMA

Postoje različite metode mjerenja kvalitete u obrazovanju.¹ Primjenjuju se na svim razinama obrazovanja² i u gotovo svim zemljama svijeta.³ Inspekcijska shema izrađena je u okviru projekta Grundtvig obrazovnog partnerstva "Improving Standards of Quality in Adult Education" i uvažavajući temeljna načela osiguranja kvalitete koje promiče EAQUALS. Pri izradi ovog materijala uvaženi su i dijelovi inspekcijske sheme koju je u prethodnom razdoblju razradila PRIMA, prva hrvatska udruga privatnih škola stranih jezika.

¹ Jelena Legčević, Nihada Mujić, Martina Mikrut, „Kvalimeter kao mjerni instrument za upravljanje kvalitetom na Sveučilištu u Osijeku,“ Zbornik radova 13. međunarodnog simpozija o kvaliteti *Kvaliteta i društvena odgovornost*, Hrvatsko društvo menadžera kvalitete, Solin, Zagreb, 2012, str. 271-283.

² Polina A. Bavina, „Объекты и критерии оценки качества образовательных программ профессиональной подготовки менеджеров образовани“, Zbornik radova 13. međunarodnog simpozija o kvaliteti *Kvaliteta i društvena odgovornost*, Hrvatsko društvo menadžera kvalitete, Solin, Zagreb, 2012, str. 321-330.

³ Sergey Yu. Trapitsin i Daria A. Rusanova, „Quality Conceptions of Learning,“ Zbornik radova 14. međunarodnog simpozija o kvaliteti *Kvalitetom protiv recesije*, Hrvatsko društvo menadžera kvalitete, Rovinj, Zagreb, 2013, str. 399-404.

Visokom kvalitetom usluga polaznici škola za strane jezike postižu razinu znanja propisanu za određeni stupanj. On je definiran sažetim opisom samog stupnja te kontrolom kvalitete koja se provodi pri samoj inspekciji škole. Sveobuhvatna procjena kvalitete usluga provodi se uz pomoć „Inspeksijske sheme“ koja sadrži sve aspekte kontrole kao što su:

- uprava i ustroj škole – pravna i financijska legalnost djelovanja u skladu sa zakonskim propisima RH;
- radni prostor i oprema – zaštita na radu, protupožarna zaštita te propisani uvjeti za opremu;
- profesionalni standard – nastavni planovi i programi za svaki pojedini stupanj (mikro i makro planovi);
- kvaliteta nastave – provjera nastavnog sata te priprema voditelja nastave/ profesora.

Time se osigurava značaj jamstva kvalitete kao i s uvedenim SUK-om prema normi ISO 9001:2015. Inspeksijska shema stalno prolazi nove revizije te je nedavno dobila svoj konačni oblik koji će se i dalje nastaviti mjenjati.

Tablica 1. Inspeksijska shema

Struktura	Max 100	Min 70	Postignuto bodova	%
I. Uprava i ustroj škole	18	9		
II. Radni prostor i oprema škole	12	6		
III. Profesionalni standard škole	30	21		
IV. Kvaliteta nastave stranih jezika	40	28		
Ukupno postignuto bodova:				

Izvor: Inspeksijska shema.

Temeljna struktura Inspeksijske sheme (Tablica 1) sastoji se od četiri grupe kriterija: 1) Uprava i ustroj škole, 2) Radni prostor i oprema škole; 3) Profesionalni standard škole i 4) Kvaliteta nastave stranih jezika. Međutim, svaka od navedenih grupa ima niz pojedinačnih kriterija koji se ocjenjuju, kako bi se dobio agregatni rezultat za pojedinu grupu kriterija.

Tablica 2. Prikaz kriterija u okviru grupe kriterija Uprava i ustroj škole

I. UPRAVA I USTROJ ŠKOLE		Max 18	Min 9
Registracija	ne postoji - prekid inspekcije		
Ugovori s osobljem	ne postoje - prekid inspekcije		
Ugovori o zakupu/vlasništvu poslovnog prostora	ne postoje - prekid inspekcije		
Poslovne knjige i financijska legalnost	ne postoje - prekid inspekcije		
Opće odredbe poslovanja		1	0
Pravila o disciplini i kućnom redu škole te o stegovnim postupcima		1	0
Pravila o o općim uvjetima oglašavanja i promidžbe tečajeva stranih jezika	ne postoje - prekid inspekcije		
Dokumentacija kojom se dokazuje poštivanje gore navedenih pravila		1	0
Pravila o organiziranju i vođenju upisa na tečajeve stranih jezika		1	0
Dokumentacija kojom se dokazuje poštivanje gore navedenih pravila		1	0
Pravila o organiziranju i vođenju tečajeva stranih jezika		1	0
Pravila o testiranju i potvrđivanju postignuća polaznika		1	0
Pravila o primanju te potrebnoj kompetenciji zaposlenih i suradnika		1	0
Dokumentacija kojom se dokazuje primjena pravila o primanju te potrebnoj kompetenciji zaposlenih i suradnika		1	0
Pravila o permanentnom stručnom usavršavanju zaposlenih i suradnika i dokumentacija kojom se dokazuje primjena pravila		1	0
Pravila o radu uprave		1	0
Dokumentacija kojom se dokazuje primjena pravila o radu uprave		1	0
Pravila o prostoru i opremi		1	0
Dokumentacija kojom se dokazuje primjena pravila o prostoru i opremi		1	0
Pravila o zaštiti na radu i zaštiti od požara	ne postoje - prekid inspekcije		
Pravila o praćenju i ocjenjivanju rada i napretka polaznika		1	0
Dokumentacija kojom se dokazuje primjena pravila o praćenju i ocjenjivanju rada i napretka polaznika		1	0
Pravila o praćenju i ocjenjivanju rada i napretka zaposlenih i suradnika		1	0
Dokumentacija kojom se dokazuje primjena pravila o praćenju i ocjenjivanju rada i napretka zaposlenih i suradnika		1	0

Izvor: Inspeksijska shema.

Kriteriji iz Tablice 2 pokazuju da se radi o vrlo zahtjevnim kriterijima kod ocjene Uprave i ustroja škole. Tome ide u prilog činjenica da ne ispunjavanje pojedinih kriterija kao što su: registracija, ugovori s osobljem, ugovori o zakupu ili vlasništvu poslovnog prostora, poslevne knjige i legalnost poslovanja te pravila o zaštiti na radu i zaštiti od požara, znači ujedno i prekid inspekcije jer bez ispunjavanja ovih kriterija škola ne može raditi.

Tablica 3. Prikaz kriterija u okviru grupe kriterija Radni prostor i oprema škole

II. RADNI PROSTOR I OPREMA ŠKOLE		Max 12	Min 6
Učionice	Izgled prostora odgovara Pravilima (osvijetljen, prozračan, uredan)	1	0
	Izgled prostora odgovara Pravilima (adekvatna veličina, namještaj primjeren namjeni)	1	0
	Uređenost u skladu s Pravilima o protupožarnoj zaštiti i sigurnosti na radu (adekvatan broj, veličina i servisiranje protupožarnih aparata te opći izgled u smislu sigurnosti boravka u prostoru, postojanje pribora za prvu pomoć i sl.)	1	0
	Dostatnost nastavnih sredstava i pomagala (npr. ploča, kreda, kazetofon, VCR te OHP ako je predviđen pravilima i sl.)	1	0
Ostale prostorije	Izgled prostora odgovara Pravilima (osvijetljen, prozračan, uredan)	1	0
	Izgled prostora odgovara Pravilima (adekvatna veličina, namještaj primjeren namjeni)	1	0
	Uređenost u skladu s Pravilima o protupožarnoj zaštiti i sigurnosti na radu (adekvatan broj, veličina i servisiranje protupožarnih aparata te opći izgled u smislu sigurnosti boravka u prostoru, postojanje pribora za prvu pomoć i sl.)	1	0
Pristup školi	Uređenost pristupa školi (ulaznog prostora i stepeništa)	1	0
	Sigurnost za život i zdravlje	1	0
	Omogućen je pristup i učenje osobama s posebnim potrebama	1	0
Općenito	Prostor i oprema škole odaje zdrav ekološki pristup (radni okoliš i atmosfera, količina buke, odlaganje otpada, rad na recikliranom papiru, štedljivost žarulja, i sl.)	1	0
	Sav oglasni materijal i ploče su uredni i up-to-date	1	0

Izvor: Inspeksijska shema.

Kriteriji iz Tablice 3. odnose se na radni prostor (četiri grupe pod kriterija), ostale prostorije (tri grupe pod kriterija), pristup školi (tri grupe kriterija) i općenito (dvije grupe kriterija). Radi se o vrlo zahtjevnim kriterijima koji podrazumijevaju:

- organizacijske sposobnosti;
- estetski učinak;

- poštivanje raznih pravilnika koji reguliraju sigurnost i zaštitu;
- opremljenost nastavnim sredstvima;
- fizički pristup školi (objektu);
- sigurnost u najširem smislu značenja;
- informiranje;
- investicije u infrastrukturu, osbolje i know-how.

To znači da nije moguće osnovati, organizirati i voditi školu stranih jezika na kvalitetan način ukoliko ne postoji spremnost, resursi i sukladnost s navedenim zahtjevima vezano za radni prostor i opremu škole.

Tablica 4. Prikaz kriterija u okviru grupe kriterija Profesionalni standard škole

III. PROFESIONALNI STANDARD ŠKOLE		Max 30	Min 21
Opće odredbe	Postoje jasni opći uvjeti pohađanja tečajeva stranih jezika	1	0
	Polaznici se u grupe svrstavaju u skladu s razinom znanja i metodičkim pristupom škole	1	0
	Škola je poduzela sve razumne mjere kako bi polaznici bili upoznati sa svim do sad navedenim u vezi s Općim odredbama	1	0
	Postoje jasni opći uvjeti održavanja tečajeva stranih jezika	1	0
	Polaznici smatraju da stvarno stanje odgovara tvrdnjama iz gore navedene dokumentacije	1	0
	Postoje jasne odredbe o obvezi čuvanja dokumentacije	1	0
	Uprava, svi zaposleni i suradnici su upućeni u sve do sad navedeno u vezi s Općim odredbama	1	0
	Uprava, svi zaposleni i suradnici smatraju da stvarno stanje odgovara svemu navedenom u Općim odredbama	1	0
Nastavni plan i program	Postoji okvirni nastavni plan i program škole	1	0
	Postoji sažeti opis stupnja za svaki pojedini stupanj i jezik tečajeva koji se održavaju u tekućoj godini u skladu s Portfolio-m.	1	0
	Škola je poduzela sve razumne mjere kako bi polaznici bili upoznati sa svim do sad navedenim u vezi s Nastavnim planom i programom	1	0
	Polaznici smatraju da stvarno stanje odgovara podacima u svemu do sad navedenom u Nastavnom planu i programu	1	0
	Postoji dostupan detaljni nastavni plan i program za svaki pojedini stupanj i jezik tečajeva koji se održavaju u tekućoj godini	1	0
	Postoji dostupan obvezni i alternativni te dodatni nastavni materijal ako je predviđen detaljnim nastavnim planom i programom	1	0
	Uprava, svi zaposleni i suradnici smatraju da stvarno stanje odgovara svemu navedenom u Nastavni plan i program	1	0

Organiziranost nastave stranih jezika	Postoje jasna pravila za komunikaciju s polaznicima	1	0
	Postoje jasna pravila o načinu, mjestu i vremenu izražavanja primjedbi te zadovoljstva/nezadovoljstva polaznika	1	0
	Postoje jasna pravila u slučaju odgode nastave	1	0
	Škola je poduzela razumne mjere da polaznike upozna s pravilima komunikacije, načinu, mjestu i vremenu izražavanja primjedbi te zadovoljstva/nezadovoljstva te s postupkom kod odgode nastave	1	0
	Postoji školska knjižnica za potrebe zaposlenih i suradnika i svi su upoznati sa sadržajem i mogućnostima korištenja knjižnog fonda	1	0
	Postoji školska knjižnica za potrebe polaznika i svi su oni upoznati sa sadržajem knjižnice i mogućnostima korištenja knjižnog fonda	1	0
Praćenje i ocjenjivanje rada i napretka polaznika	Postoje jasna pravila o evidenciji pohađanja, rada i napretka polaznika	1	0
	Postoje jasna pravila o izradi, pristupu, provedbi i prolaznosti testova i ispita	1	0
	Postoji procedura za akceleraciju/deceleraciju polaznika	1	0
	Polaznici su upoznati s tim da postoji evidencija pohađanja, rada i napretka te s pragom prolaznosti testova i procedurom za akceleraciju /deceleraciju	1	0
	Zaposleni i suradnici su upoznati sa svim u vezi Praćenja i ocjenjivanja rada i napretka polaznika	1	0
Praćenje i ocjenjivanje rada i napretka zaposlenih i suradnika	Postoje jasna pravila o tome kako se prati, kontrolira i poboljšava kvaliteta tečajeva	1	0
	Postoje jasna pravila o tome kako se planira i provodi nastava	1	0
	Svi zaposleni i suradnici su upoznati s navedenim pravilima	1	0
	Stvarno stanje praćenja, kontrole i poboljšavanja kvalitete tečajeva odgovara navedenim pravilima	1	0

Izvor: Inspekcijska shema.

Skupina kriterija Profesionalni standard škole ima pet grupa pod kriterija: 1) opće odredbe; 2) nastavni plan i program; 3) organiziranost nastave stranih jezika; 4) praćenje i ocjenjivanje rada i napretka polaznika i 5) praćenje i ocjenjivanje rada i napretka zaposlenih i suradnika. Svaka od navedenih grupa pod kriterija ima 5 do 8 daljnjih kriterija koji trebaju biti ispunjeni u svrhu podizanja razine kvalitete nastave u školama stranih jezika.

Tablica 5. Prikaz kriterija u okviru grupe kriterija Kvaliteta nastave stranih jezika

KVALITETA NASTAVE STRANIH JEZIKA		Max 40	Min 28
Pisana priprema promatranog sata stranog jezika	Jasna je i pregledna	1	0
	Ciljevi i sadržaj su u skladu s detaljnim planom i programom	1	0
	Ciljevi i sadržaj su u skladu sa stupnjem i trajanjem aktivnosti	1	0
	Planirani didaktički materijal i oprema su u skladu s ciljevima sata	1	0
Provedba promatranog sata stranog jezika	Faze sata su jasne	1	0
	Faze sata su povezane	1	0
	Nastavnik/ca je jezično kompetentna	1	0
	Rad na satu je povezan s prethodnim radom	1	0
	Aktivnosti su stupnjevite i povezane	1	0
	Oprema i didaktički materijal se svrsishodno i upućeno koriste	1	0
	Upute nastavnika/ce su jasne	1	0
	Nastavnik/ca se fleksibilno prilagođava polaznicima	1	0
	Zastupljenost stranog jezika je primjerena stupnju i aktivnosti	1	0
	Neverbalna komunikacija pokazuje pozitivno raspoloženje nastavnika i potiče povjerenje i samostalnost polaznika	1	0
	Zastupljeni su jasni signali za početak i kraj sata i aktivnosti	1	0
	Ploča se pravovaljano koristi	1	0
	Zastupljeni su razni oblici rada (individualni, grupni, u paru)	1	0
	Dom. zadaća je jasna, sukladna dobi, stupnju i primjerene duljine	1	0
	Zastupljene su relevantne jezične vještine sukladno stupnju i dobi	1	0
	Svi polaznici aktivno sudjeluju	1	0
	Aktivnosti su primjerene stupnju i dobi i polaznicima zanimljive	1	0
	Vrijeme sata se učinkovito koristi	1	0
	Ispravljanje pogrešaka je učinkovito i pedagoški primjereno	1	0
	Pažnja svih polaznika se učinkovito održava	1	0
	Motivacija polaznika je pozitivna	1	0
	Atmosfera u grupi je radna i suradljiva	1	0
	Prisutna je atmosfera uzajamne suradnje i pomoći	1	0
	Prisutna je briga za specifične potrebe pojedinih polaznika	1	0
	Nastavniku/ci je stalo da polaznike podučiti ciljanim vještinama	1	0
	Nastavnik/ca pokazuje obrazovanje koje obogaćuje poduku	1	0
	Raspored sjedenja omogućuje komunikaciju	1	0
	Nastavnik/ca prilagođava pristup u skladu s osobnim kvalitetama pojedinog polaznika te sveukupnim osobinama grupe	1	0
	Nastavnik vodi sat tako da polaznik razumije što i zašto radi	1	0
	Polaznik je uključen u pozitivno odlučivanje	1	0
	Polaznik je naučen na uzajamnu i samokorekciju	1	0
	Unutar grupe se potiče samopouzdanje i nezavisnost polaznika	1	0
Unutar grupe se potiče uzajamno poštovanje	1	0	
Unutar grupe se potiče kreativnost i znatiželja polaznika	1	0	
Unutar grupe se potiče razmišljanje i logičko zaključivanje	1	0	
Opći utisak		1	0

Izvor: Inspeksijska shema.

U okviru skupine kriterija Kvaliteta nastave stranih jezika postoje dvije pod grupe kriterija: 1) pisana priprema promatranog sata nastave stranog jezika i 2) provedba promatranog sata stranog jezika, s ukupno 39 razrađenih kriterija, koji se odnose na kvalitetu nastave stranih jezika. Kriteriji su vrlo egzaktni. Ispunjavanje svih navedenih kriterija zaista jamči visoku razinu kvalitete nastave stranog jezika, orijentiranu polazniku. Na kraju inspekcije po svim kriterijima iz tablica 2, 3, 4 i 5 izvodi se Opći utisak. Ta ocjena predstavlja sveukupnu ocjenu škole stranih jezika prema četiri navedene skupine kriterija.

3. ZAKLJUČAK

Krajnji korisnici usluga škole stranih jezika, tj. polaznici, bez obzira na stupanj koji polaze, time dobivaju dobar uvid u zahtjeve koje bi svaka kvalitetna škola za strane jezike morala ispuniti. Ujedno su informirani i o razini znanja koju bi trebali postići završetkom svakog pojedinog stupnja. Bitni element za postizanje kvalitete u školama za strane jezike je Kodeks ponašanja prema korisnicima usluga čime se održava određena razina kvalitetne poduke kao i samo ponašanje svih djelatnika škole prema polaznicima odnosno njihovim roditeljima ili starateljima. Održavana razina kvalitete podrazumjeva uvažavanje mišljenja polaznika koji su korisnici usluga škola za strane jezike te način kako postići poboljšanja. To osiguravaju djelatnici škola koji funkcioniraju kao tim.

Jedna od najvažnijih karakteristika je usklađenost nastavnih programa, djelova nastavnog sata kao i profesionalnost nastavnog kadra. Osim vrhunske educiranosti u području svog djelovanja profesori škola za strane jezike imaju široku mogućnost upotrebe svoje kreativnosti čime neupitno podižu razinu kvalitete nastave. Time se postiže viši stupanj zadovoljstva polaznika kvalitetnih škola za strane jezike. Važnost učenja stranih jezika stalna je potreba svakog pojedinca koji time pridonosi, ne samo svom osobnom razvoju, nego i društvu u cjelini. U vrijeme kada se brišu granice između država, a mobilnost postaje realitet naših života učenje stranih jezika u kvalitetnim školama stranih jezika postaje više od osobne odgovornosti pojedinca. Postaje faktorom konkurentnosti pojedinca, kao što SUK predstavlja faktor konkurentnosti svake škole stranog jezika koja ga implementira i održava.

Summary:

QUALITY IN FOREIGN LANGUAGE TEACHING – THE INSPECTION SCHEME

In order to ensure high quality standards in language centers in Croatia, inspection of schools is carried out. It is carried out according to the regulations on the inspection and inspection manual so called the INSPECTION SCHEME. The inspection scheme includes all aspects of quality control, such as: administration and organization of the school; work space and equipment; professional standard and quality of teaching. Management and organization of the school checks legal and financial activity of school for foreign languages being in accordance with the laws and regulations of the Republic of Croatia. The workspace and equipment checks occupational safety and fire protection as well as legal requirements for the equipment. Professional Standard - checks curricula for each level. The quality of teaching - checks the flow of the lesson preparation. The inspection scheme is being revised continuously and has only recently received its final form. This ensures the importance of quality assurance as well as introduced Quality Management System according to ISO 9001: 2015.

Key words: quality, teaching, the inspection scheme.

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**SUSTAV UPRAVLJANJA KVALITETOM NA
SVEUČILIŠTU JOSIPA JURJA STROSSMAYERA U
OSIJEKU TEMELJEN NA ESG STANDARDIMA I
SMJERNICAMA I ZAHTJEVIMA NORME ISO 9001**

QUALITY MANAGEMENT SYSTEM AT JOSIP JURAJ
STROSSMAYER UNIVERSITY OF OSIJEK BASED ON ESG
STANDARDS AND GUIDELINES AND THE REQUIREMENTS
OF THE ISO 9001 STANDARD

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SAŽETAK

U radu se prikazuju značajke u području sustava upravljanja kvalitetom na Sveučilištu Josipa Jurja Strossmayera u Osijeku koji se temelji na ESG standardima i smjer-

nicama i zahtjevima norme ISO 9001. Ovakav sustav upravljanja kvalitetom ustrojen je 2012. godine, definiran je izradom prve verzije Priručnika kvalitete i postupaka sustava upravljanja kvalitetom i certificiran je sukladno zahtjevima norme ISO 9001 za upravljanje nastavnim, znanstveno-istraživačkim i poslovnim procesima. Unaprjeđenje sustava upravljanja kvalitetom karakterizira: donošenje revidiranih ESG standarda i smjernica; revizija norme ISO 9001:2015 koja predstavlja podlogu za daljnji razvoj i unaprjeđenje sustava upravljanja kvalitetom na osječkom Sveučilištu; revizija Priručnika kvalitete; revizija postupaka sustava upravljanja kvalitetom; donošenje nove Politike kvalitete, provedba recertifikacijskog audita sukladno zahtjevima norme ISO 9001 koji je rezultirao obnavljanjem certifikata za naredno trogodišnje razdoblje (do 2018. godine) kao i formalno odvajanje Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja od Rektorata Sveučilišta Josipa Jurja Strossmayera u Osijeku.

Ključne riječi: sveučilište, ESG standardi i smjernice, norma ISO 9001, unaprjeđenje sustava upravljanja kvalitetom.

1. UVOD

Sustav upravljanja kvalitetom¹ Sveučilišta Josipa Jurja Strossmayera u Osijeku kreiran je tako da uvažava *Standarde i smjernice za osiguranje kvalitete u europskom prostoru visokog obrazovanja* (ESG) te ispunjava zahtjeve norme ISO 9001. Sustav je certificiran sukladno zahtjevima norme ISO 9001 za upravljanje nastavnim, znanstveno-istraživačkim i poslovnim procesima. *Ovakav sustav* ustrojen je 2012. godine, definiran je izradom Priručnika kvalitete (1.0) koji ima zadaću prikazati sustavni pristup osiguranju i unaprjeđenju kvalitete na Sveučilištu uz istovremeno postizanje standarda definiranih u *Standardima i smjernicama za osiguravanje kvalitete u Europskom prostoru visokoga obrazovanja* (ESG) i ispunjavanje zahtjeva norme ISO 9001. S ciljem osiguranja i unaprjeđenja SUK-a Sveučilište je prihvatilo dokumente koji uređuju područje sustava upravljanja

¹ U daljnjem tekstu: SUK.

kvalitetom². Elaboratom o opravdanosti osnutka i načinu ustroja sveučilišnog Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (Centar za kvalitetu) iz 2012. godine³ definirana je pravna utemeljenost osnivanja Centra. Centar za kvalitetu osnovan je 2012. godine, no u organizacijskom ustroju Rektorata Sveučilišta ostao je do 2014. godine kada se i formalno odvojio od Rektorata kao posebna sastavnica Sveučilišta i njegova podružnica. Ustrojavanje Centra regulirano je institucijskom regulativom novijeg datuma⁴. U organizacijskom smislu ustrojena su tijela za provedbu SUK-a: Rektor Sveučilišta, Senat Sveučilišta, Savjet Sveučilišta, Odbor za unaprjeđivanje i osiguranje kvalitete visokog obrazovanja (Odbor za kvalitetu), Vijeće Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (Vijeće Centra za kvalitetu), Pročelnik Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (Pročelnik Centra za kvalitetu), povjerenstva za kvalitetu na znanstveno - na-

² Pravilnik o ustroju i djelovanju sustava za osiguranje kvalitete na Sveučilištu Josipa Jurja Strossmayera u Osijeku (rujan 2006. godine), Pravilnik o ustroju i djelovanju sustava za osiguranje kvalitete na Sveučilištu Josipa Jurja Strossmayera u Osijeku – pročišćeni tekst (srpanj 2012. godine), Odluka Senata Sveučilišta Josipa Jurja Strossmayera u Osijeku o izmjenama i dopunama Pravilnika o ustroju i djelovanju sustava za osiguranje kvalitete na Sveučilištu Josipa Jurja Strossmayera u Osijeku (od 26. lipnja 2012. godine), Odluka Rektorice o osnivanju Odbora za unaprjeđivanje i osiguranje kvalitete visokog obrazovanja (od 9. siječnja 2006. godine), Odluka Senata Sveučilišta o imenovanju predsjednika i članova Odbora za unaprjeđivanje i osiguranje kvalitete visokog obrazovanja (od 2. travnja 2012. godine), Elaborat o opravdanosti osnutka Sveučilišnog centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (lipanj 2012. godine), Odluka Senata Sveučilišta Josipa Jurja Strossmayera u Osijeku o ustroju Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (od 26. lipnja 2012. godine), Odluka Senata Sveučilišta Josipa Jurja Strossmayera u Osijeku o imenovanju privremenog voditelja Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (od 26. lipnja 2012. godine), Odluka Rektorice o imenovanju voditelja sustava kvalitete na Sveučilištu Josipa Jurja Strossmayera u Osijeku (od 25. lipnja 2012. godine), Odluka o izmjenama i dopunama Pravilnika o ustroju i djelovanju sustava za osiguranje kvalitete na Sveučilištu Josipa Jurja Strossmayera u Osijeku (od 15. srpnja 2013. godine), Odluka o izmjeni i dopuni Odluke o imenovanju predsjednika i članova Odbora za unaprjeđivanje i osiguranje kvalitete visokog obrazovanja (od 15. srpnja 2013. godine), Pravilnik Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja (prosinac 2013. godine), Poslovnik Odbora za unaprjeđivanje i osiguranje kvalitete visokog obrazovanja (siječanj 2013. godine).

³ Do 2012. godine aktivnosti vezane uz unaprjeđenje i osiguranje kvalitete visokog obrazovanja na Sveučilištu provodio je Ured za kvalitetu.

⁴ Odluka o konstituiranju Vijeća Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja Sveučilišta Josipa Jurja Strossmayera u Osijeku (siječanj 2014. godine), Odluka o imenovanju pročelnice Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja Sveučilišta Josipa Jurja Strossmayera u Osijeku za mandatno razdoblje 2014. – 2018. (siječanj 2014. godine), Poslovnik Vijeća Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja Sveučilišta Josipa Jurja Strossmayera u Osijeku (siječanj 2015. godine), Odluka o ustrojstvu radnih mjesta Centra za unaprjeđenje i osiguranje kvalitete visokog obrazovanja Sveučilišta Josipa Jurja Strossmayera u Osijeku (ožujak 2015. godine).

stavnim i umjetničko - nastavnoj sastavnici Sveučilišta (povjerenstva za kvalitetu) i povjerenstva za kvalitetu ostalih sastavnica Sveučilišta.

2. PROSUDBE SUSTAVA UPRAVLJANJA KVALITETOM

SUK Sveučilišta Josipa Jurja Strossmayera u Osijeku unaprjeđuje se sukladno preporukama i zaključcima vanjske neovisne periodične prosudbe sustava kvalitete koja je na Sveučilištu provedena 2012. godine prema *Kriterijima za prosudbu stupnja razvijenosti i učinkovitosti sustava osiguravanja kvalitete visokih učilišta u Republici Hrvatskoj (AZVO) i temeljem Standarda i smjernica za osiguranje kvalitete u europskom prostoru visokog obrazovanja (ESG)*. SUK se također poboljšava prevencijom ili otklanjanjem nesukladnosti uočenih na nadzornim auditima sustava sukladno zahtjevima norme ISO 9001.

Prosudbe SUK-a Sveučilišta koje provodi Centar za kvalitetu uključuju unutarnje prosudbe sustava na svim razinama upravljanja: prosudbe Rektorata Sveučilišta Josipa Jurja Strossmayera u Osijeku, prosudbe znanstveno-nastavnih i umjetničko-nastavne sastavnice Sveučilišta i prosudbe ostalih sastavnica Sveučilišta.

2.1. Vanjske prosudbe SUK-a

Temeljem Izvješća Povjerenstva za provođenje vanjske neovisne periodične prosudbe sustava osiguravanja kvalitete Sveučilišta iz 2012. godine, zaključeno je kako se uspostavljeni sustav osiguravanja kvalitete Sveučilišta prema stupnju razvijenosti nalazi između početne i razvijene faze.

2.1.1. Vanjska neovisna periodična prosudba sustava kvalitete

Sa svrhom unaprjeđenja stupnja razvijenosti sustava sukladno ESG kriterijima, SUK Sveučilišta kontinuirano se unaprjeđuje sukladno preporukama Povjerenstva za vanjsko vrednovanje (Follow up plan) i realizacijom aktivnosti definiranih godišnjim planovima rada Centra za kvalitetu.

2.1.1.1. Poboljšanja sustava nakon vanjske neovisne periodične prosudbe sustava kvalitete

Na Sveučilištu je definirana nova Politika kvalitete koja je u primjeni od 23. rujna 2015. godine. Sa sadržajem Politike kvalitete upoznati su svi djelatnici Sveučilišta i sveučilišnih sastavnica. Od 28 postupaka SUK-a u 2015. godini revidirano je 13 postupaka sukladno potrebama sustava. Politika, misija i vizija sastavnica Sveučilišta definirane su na svim sveučilišnim sastavnicama.

Ishodi učenja definirani su za sve preddiplomske, diplomske, integrirane i stručne studije na razini kolegija i studijskih programa. Postupkom UNI-PO-7.1 *Vrednovanje studijskih programa preddiplomskih, integriranih, diplomskih i stručnih studija* definiran je proces vrednovanja novih i izmjene i dopune odobrenih studijskih programa sveučilišnih preddiplomskih, integriranih, diplomskih i stručnih studija. Studenti sastavnica Sveučilišta upoznati su s kriterijima, pravilima i postupcima za ocjenjivanje ishoda učenja preko predmetnog nastavnika na prvim (uvodnim) satima predavanja na kojima se predstavlja sadržaj kolegija, pravila i postupci provjere i ocjenjivanja kao i ishodi učenja. Studenti se informiraju putem web stranica i putem javno objavljenih izvedbenih programa. Na većini sastavnica objavljeni kriteriji nalaze se u izvedbenom planu sastavnice koji se donosi početkom svake akademske godine.

Mehanizmi usavršavanja i potpore nastavnog osoblja na Sveučilištu Josipa Jurja Strossmayera u Osijeku definirani su postupkom UNI-PO-6.10 *Usavršavanje i načini potpore nastavnicima i djelatnicima*. Sastavnice Sveučilišta dodatno potiču osposobljavanje i unaprjeđivanje nastavničkih kompetencija. Poticanje se vrši putem psihološko-pedagoško-didaktičke izobrazbe, kroz predavanja gostujućih predavača, održavanjem stručnih radionica, kroz projekte, predavanjima vezanim za e-alate koji se koriste u nastavi, programima stručnog usavršavanja koji u najvećoj mjeri podrazumijeva unaprjeđivanje nastavničkih kompetencija, organiziranjem financijske potpore za niz dodatnih aktivnosti (Erasmus mobilnost, prisustvovanje skupovima), pohađanjem stručnih konferencija, seminara i sl. Također se potiče odlazak nastavnog osoblja na znanstveno i stručno usavršavanje u zemlji i inozemstvu. U akademskoj 2014./2015. godini na Fakultetu za odgojne i obrazovne znanosti PPDMI program završilo je 30 pristupnika (Građevinski fakultet Osijek – 4 pristupnika, Odjel za fiziku – jedan pristupnik, Prehrambeno-tehnološki fakultet Osijek – 2 pristupnika, Ekonomski fakultet u Osijeku – 5 pristupnika, Umjetnička akademija u Osijeku – 3 pristupnika, Elektrotehnički fakultet Osijek – 3 pristupnika, Odjel za kulturologiju – jedan pristupnik, Medicinski fakultet Osijek – 3 pristupnika, Odjel za kemiju – jedan pristupnik, Strojarski fakultet u Slavonskom Brodu – 3 pristupnika, Veleučilište u Požegi – 4 pristupnika). Na Filozofskom fakultetu u Osijeku u upisnom roku u rujnu 2014. godine nije bilo upisanih nastavnika na PPDMI program sa sveučilišnih sastavnica. U upisnom roku koji je bio 31. siječnja 2015. godine bila je upisana jedna polaznica zaposlena na zamjeni na Odsjeku za psihologiju Filozofskog fakulteta u Osijeku.

Provjera postojećih resursa za učenje i pomoć studentima na sastavnicama Sveučilišta uključena je u sustav osiguravanja kvalitete. Računala su studentima dostupna izvan nastave ovisno o sastavnici. Sastavnice studentima nude psihološka savjetovanja, organiziraju se sportske aktivnosti, borilačke vještine, ples,

unaprjeđenje osobnih vještina unutar radionica, mentorski sustav, Alumni klubovi, natjecanja, stručna putovanja, studijska putovanja, radionice stranih jezika, individualne edukacije o korištenju baza podataka, izvannastavne aktivnosti, izložbe radova, tribine, humanitarne akcije, Osječko ljeto mladih, Festival znanosti, Dani mozga, Dani pedagogije, Tjedan mozga. Za studente u radnom odnosu prilagođeni su termini predavanja, ispita, rada studentske službe i knjižnice. Učinkovitost službi potpore za studente unaprjeđuje se prilagodbom radnog vremena, dostupnošću literature, informacijama putem studentskog zbora, on-line pristupom službama, provedbom anketa o službama koja uključuju i studentske službe, stručno administrativne službe, tehničke službe i knjižnicu, službom za računalnu podršku kao i kroz sustav ISO 9001. Na sveučilišnim sastavnicama postoje pogodnosti za studente s invaliditetom u vidu rampi, liftova, sanitarnih čvorova, obilježenih parkirnih mjesta i invalidskih toaleta. Prilagođen je pristup prostoru knjižnice, čitaonice i studentske referade.

Trenutno je u izradi nova sveučilišna stranica pa tako i novo sučelje za domenu Kvalitete. Sveučilište na svojoj internetskoj stranici www.unios.hr pruža informacije o svim sveučilišnim sastavnicama. Dostupne su redovito ažurirane informacije o studijskim programima i stupnjevima obrazovanja koje se izvode na sastavnicama (<http://www.unios.hr/?g=7&i=18>).

Studijski programi prikazani su po područjima znanosti, a na početnoj internetskoj stranici Sveučilišta kreiran je link "Kvaliteta". Informiranje javnosti o djelatnosti Sveučilišta provodi se i putem University Newsa - online baze podataka o znanstvenicima i znanstveno-istraživačkom radu sa sastavnica Sveučilišta koja se redovito objavljuje na stranicama Sveučilišta - <http://news.unios.hr/>.

Sveučilišni glasnik izlazi u tiskanom i online izdanju - <http://www.unios.hr/glasnik/index.html>. Time se osigurava vidljivost sadržaja Glasnika i izvan granica Osijeka i Sveučilišta. Primarna ciljana publika Sveučilišnog glasnika su studenti, nastavnici i sveučilišni suradnici.

Studentski radio UNIOS donesi sadržaje kroz koje studenti mogu obraditi tematiku medijske kulture i predstaviti brojne kulturno-umjetničke sadržaje koje kreiraju u nastavnom procesu. S ciljem informiranja šire javnosti o studijima koji se izvode na Sveučilištu izdaju se publikacije: Sveučilišni godišnjak⁵ i Vodič za buduće studente⁶.

⁵ Sveučilišni godišnjak sadrži pregled sveučilišne djelatnosti, podatke o sastavnicama s pregledom izvedbenih planova sveučilišnih i stručnih studija, pregled sveučilišnih nastavnika koji izvode nastavu u tekućoj akademskoj godini, podatke o studentima te pregled djelatnosti sveučilišnih ustanova

⁶ Vodič za buduće studente namijenjen je budućim studentima te sadrži osnovne podatke o sastavnicama, uvjetima upisa, pregled sveučilišnih i stručnih studija te trajanje studija. U Vodiču su dostupne informacije o studijskim programima, njihovom trajanju, akademskom nazivu po završetku studija i kompetencije koje se stječu završetkom pojedinog studijskog programa.

Jedinstvena sveučilišna studentska anketa pokrenuta je u okviru uspostavljanja sustava osiguravanja i unaprjeđivanja kvalitete studiranja na Sveučilištu. Na internetskim stranicama Sveučilišta dostupni su rezultati provedbe anketa (<http://www.unios.hr/?g=7&i=46&j=71>). Od akademske 2014./2015. godine novim Pravilnikom o studijima i studiranju na Sveučilištu Josipa Jurja Strossmayera u Osijeku definirana je obveza pristupanja studenata anketi. Zaključno s akademskom 2014./2015. godinom ISVU sustav uvele su sve sastavnice Sveučilišta što je pridonijelo jednostavnijoj provedbi ankete.

Smotra Sveučilišta upoznaje buduće studente sa studijskim programima, njihovom trajanju, poslovima za koje ih ti studiji osposobljavaju i o uvjetima upisa na pojedina visoka učilišta, uvjetima smještaja tijekom studija u Osijeku i studentskom životu. Program Smotre Sveučilišta obuhvaća predstavljanje sastavnica Sveučilišta, predstavljanje Studentskog zbora Sveučilišta i otvaranje izložbenih prostora na kojima se predstavljaju sve sastavnice.

Festival znanosti motivira mlade ljude za istraživanje i stjecanje novih znanja. Služba za međunarodnu i međusveučilišnu suradnju Sveučilišta u suradnji sa svim sastavnicama priprema ovu manifestaciju.

2.1.2. Nadzorni auditi sukladno zahtjevima norme ISO 9001

Budući da se SUK Sveučilišta Josipa Jurja Strossmayera u Osijeku temelji i na zahtjevima norme ISO 9001, kao takav svake godine podliježe redovitim nadzornim auditima. Na kraju trogodišnjeg ciklusa od zadnjeg dobivanja certifikata provodi se recertifikacijski audit sustava. Prvi nadzorni audit na Sveučilištu proveden je 20. studenoga 2013. godine, drugi nadzorni audit 29. rujna 2014. godine, a recertifikacijski audit 13. listopada 2015. godine.

2.1.2.1. Poboljšanja sustava nakon nadzornih audita SUK-a sukladno zahtjevima norme ISO 9001

Sukladno preporukama auditora za poboljšanje sustava danih na I. i II. nadzornom auditu, SUK je unaprijeđen revidiranjem postojećih postupaka sustava, pisanjem novih postupaka u skladu s razvojem sustava, donesene su Upravine ocjene sustava, prosuđivani su svi procesi na Sveučilištu (Uprava, Nastavni proces, Znanstveno-istraživački proces, Poslovni proces i Upravljanje kvalitetom). Također je donesena Strategija SUK-a koja je sastavni dio sveučilišne Strategije iz 2014. godine. Budući da se SUK na Sveučilištu kontinuirano unaprjeđuje, revidiran je Priručnik kvalitete (1.0) koji je na Sveučilištu u primjeni od 3. rujna 2012. godine zajedno s postupcima SUK-a. Uz prvu verziju Priručnika kvalitete napisano je 20 općenitih postupaka SUK-a, a u skladu s

potrebama sustava broj postupaka povećao se na 28 revizijom u 2015. godini. Priručnik kvalitete (2.0) revidiran je 15. srpnja 2013. godine, a 2015. godine revidiran je Priručnik kvalitete (3.0). Recertifikacijski audit SUK-a proveden je 13. listopada 2015. godine i rezultirao je produljenjem certifikata Sveučilištu za nastavni, znanstveno-istraživački i poslovni proces za naredno trogodišnje razdoblje (do 2018. godine). Pozitivni komentari auditora odnosili su se na vrlo dobro organizirano provođenje i dokumentiranje Upravine ocjene.

2.2. Unutarnje prosudbe SUK-a

SUK Sveučilišta obuhvaća 3 faze aktivnosti: planiranje, provedbu i unaprjeđenje sustava. Tri faze upravljanja sustavom predstavljaju mehanizam praćenja i informiranja o stupnju razvijenosti sustava, a njihovom realizacijom podižu se granice stupnja razvijenosti sustava po ESG standardima i ispunjavaju se zahtjevi norme ISO 9001. Unaprjeđivanje SUK-a obuhvaća inicijalne radnje vezane za planiranje unaprjeđenja sustava (planiranje unutarnje prosudbe SUK-a sastavnica Sveučilišta i planiranje unutarnje prosudbe SUK-a Rektorata Sveučilišta).

2.2.1. Unutarnja prosudba sastavnica Sveučilišta

Unutarnja prosudba SUK-a sastavnica Sveučilišta sastoji se od slanja obrasca *Izvešća sastavnice o funkcioniranju i učinkovitosti sustava upravljanja kvalitetom (UNI-OB-8-12)* predsjednicima povjerenstava za kvalitetu sastavnica Sveučilišta od strane Centra za kvalitetu. Obrazac UNI-OB-8-12 za znanstveno-nastavne i umjetničko-nastavnu sastavnicu Sveučilišta sadrži 50 pitanja, a UNI-OB-8-12 za ostale sastavnice Sveučilišta sadrži 33 pitanja⁷.

Unutarnja prosudba sastavnica provedena je tijekom svibnja i lipnja 2015. godine. Ispunjeni obrasci UNI-OB-8-12 vraćeni su Centru za kvalitetu u definiranim rokovima nakon čega je uslijedila obrada podataka sa svrhom dobivanja informacija o stupnju razvijenosti SUK-a na razini sastavnica. Unutarnjom prosudbom znanstveno-nastavnih i umjetničko-nastavne sastavnice obuhvaćeno je 11 znanstveno-nastavnih sastavnica, jedna umjetničko-nastavna sastavnica i 5 sveučilišnih odjela, a prosudbom ostalih sastavnica Sveučilišta obuhvaćene su Gradska i sveučilišna knjižnica Osijek, Studentski centar u Osijeku, Studentski centar u Slavonskom Brodu, Tehnologijsko-razvojni centar Osijek d.o.o. i Sveučilišni centar za bibliografsko-dokumentacijsku građu o Josipu Jurju Strossmayeru i crkvenoj povijesti.

⁷ Obrazac za znanstveno-nastavne i umjetničko-nastavnu sastavnicu Sveučilišta kao i obrazac za ostale sastavnice Sveučilišta uključuju, između ostalog, pitanja relevantna za poboljšanje kriterija ESG standarda i smjernica.

2.2.1.1. Poboljšanja sustava nakon unutarnje prosudbe sastavnica Sveučilišta

Analizom ispunjenih obrazaca uočena je potreba za pokretanjem preventivnih radnji na pojedinim sastavnicama Sveučilišta. Preventivne radnje pokrenute su sa svrhom unaprjeđenja SUK-a na tim sastavnicama. Radnje su pokrenute 27. listopada 2015. godine slanjem obrazaca UNI-OB-8-6 (Zahtjev za preventivnu radnju) predsjednicima povjerenstava za kvalitetu sastavnica Sveučilišta, a odnose se na: imenovanje djelatnika za potrebe osiguravanja kvalitete, osnivanje ureda za kvalitetu i uključivanje vanjskih dionika u povjerenstva za kvalitetu sastavnica. Nakon definiranog roka za postupanje po preventivnim radnjama (kraj srpnja 2016. godine) analizirat će se provedene aktivnosti koje se odnose na pokrenute preventivne radnje i uspjeh poduzetih radnji. Svim uredima za kvalitetu na sastavnicama Sveučilišta i predsjednicima povjerenstava za kvalitetu sastavnica poslano je na uvid opsežno *Godišnje izvješće o funkcioniranju i učinkovitosti sustava upravljanja kvalitetom* UNI-OB-8-8. Izvješće je dostupno i na stranicama Kvalitete (<http://www.unios.hr/index.php?t=13&g=7&i=46&j=74>). Na ovaj način unaprjeđeni su komunikacijski kanali između Sveučilišta i njegovih sastavnica.

2.2.2. Unutarnja prosudba Rektorata Sveučilišta

Unutarnja prosudba SUK-a Rektorata Sveučilišta provodi se sa svrhom ostvarenja nadzora nad stanjem SUK-a na razini Rektorata. Unutarnjom prosudbom se potvrđuje sukladnost djelovanja ustrojbenih jedinica Rektorata prema zahtjevima norme ISO 9001. Prosudbom su obuhvaćeni procesi SUK-a Sveučilišta: Uprava, Nastavni proces, Poslovni proces, Upravljanje kvalitetom i Znanstveno-istraživački proces. Provedbom unutarnje prosudbe detektiraju se eventualne nesukladnosti te se definira razuman rok za njihovo otklanjanje. Zadnja unutarnja prosudba Rektorata Sveučilišta provedena je 15. lipnja 2015. godine.

2.2.2.1. Poboljšanja sustava nakon unutarnje prosudbe Rektorata Sveučilišta

Nakon zadnje unutarnje prosudbe Rektorata Sveučilišta pokrenute su preventivne i popravne radnje u procesima: Uprava, Nastavni proces, Poslovni proces i Znanstveno-istraživački proces. Pokrenute su 3 popravne i jedna preventivna radnja koje su otklonjene u definiranim rokovima s ciljem unaprjeđenja učinkovitosti SUK-a čime se osiguravaju osnove za njegov stalni razvoj i poboljšanje.

3. ZAKLJUČAK

Unaprjeđenja sustava upravljanja kvalitetom na Sveučilištu Josipa Jurja Strossmayera u Osijeku provedena su revizijom Priručnika kvalitete (3.0) u 2015. godini čiji su sastavni dio novi ESG standardi i smjernice. Revidirani Priručnik kvalitete, revizija postojećih postupaka sustava upravljanja kvalitetom, izrada novih postupaka, definiranje nove Politike kvalitete kao i postavljanje ciljeva kvalitete na razini akademske godine od strane sveučilišnih tijela za osiguravanje kvalitete rezultat su zajedničkog rada svih dionika SUK-a Sveučilišta.

Sveučilište planira unaprijediti sustav upravljanja kvalitetom uvažavajući odredbe nove Politike kvalitete, Strategije Sveučilišta Josipa Jurja Strossmayera u Osijeku 2011. - 2020. - izmjene i dopune, godišnjih planova rada Centra za kvalitetu na razini akademske godine (unaprjeđenje ESG kriterija) i godišnjih planova provedbe unutarnjim prosudbi (udovoljavanje zahtjevima norme ISO 9001).

U nadolazećem periodu dokumentacija sustava upravljanja kvalitetom uskladit će se s novim zahtjevima norme ISO 9001:2015 unutar razdoblja prilagodbe od tri godine.

Promjena u sustavu upravljanja kvalitetom Sveučilišta također uključuje odvajanje Centra za kvalitetu iz organizacijskog ustroja Rektorata. Odvajanje Centra rezultat je razvoja sustavnog pristupa kvaliteti visokog obrazovanja koji na Sveučilištu traje od 2006. godine. Ova promjena nije utjecala na dosadašnje aktivnosti i rad Centra za kvalitetu koji postaje trajno mjesto susreta i komunikacije različitih dionika visokog obrazovanja. Tako se interakcijom studenata, nastavnika, poslodavaca, završenih studenata i stručnjaka, Hrvatskog zavoda za zapošljavanje, lokalne i regionalne uprave i samouprave unaprjeđuje kvaliteta studiranja na Sveučilištu Josipa Jurja Strossmayera u Osijeku.

Abstract:

QUALITY MANAGEMENT SYSTEM AT JOSIP JURAJ STROSSMAYER UNIVERSITY OF OSIJEK BASED ON ESG STANDARDS AND GUIDELINES AND THE REQUIREMENTS OF THE ISO 9001 STANDARD

This paper refers to innovations regarding quality management system at Josip Juraj Strossmayer University of Osijek which is based on ESG standards and guidelines and the requirements of ISO 9001 standard. Such quality management system was established in 2012 and was defined by drafting the first version of the Quality manual, quality management system procedures and Quality policy of the University. Quality management system was and still is certified according to ISO 9001 standards for managing teaching, research and business processes. Innovations in the scope of quality management system and further upgrade of the system are characterized by: adoption of the revised ESG standards and guidelines; revision of the ISO 9001:2015 standard which represents the foundation for further development and improvement of the quality management system at the University; revision of Quality manual; revision of quality management system procedures; adoption of the new Quality policy; implementation of the recertification audit according to the requirements of ISO:9001 standard which resulted in the renewal of the certificate for the next three years (till 2018); Quality assurance Center formal separation from the Rector's Office of Josip Juraj Strossmayer University of Osijek.

Key words: University, ESG standards and guidelines, ISO 9001 standard, development of quality assurance system.

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AUDITORS' COMPETENCE TO PURSUE THE NEW QUALITY MANAGEMENT SYSTEM STANDARD

KOMPETENTNOST ODITORA ZA PRIMENU NOVOG
STANDARDA ZA SISTEM MENADŽMENTA KVALITETOM

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SAŽETAK

The change in the structure and comprehension of ISO 9001:2015 brings new challenges for auditors to apply their competencies to the accomplishment of audits. The mere use of checklists aligned with a set of standard clauses will no longer work as auditing moves toward interviewing techniques rather than review of records, corrective action data, and policy. Such a change in the communication manner will require higher level of auditor's competence thus to possess knowledge and experience not only in certain management system standard but also in specific technical area and specific business sector. In addition, most current audit professionals are lacking credentials in risk management what may undermine the value of future audits. The paper aspires to enlighten the changes in the new ISO 9001 that make a significant influence to the auditing process requiring the auditors to make certain knowledge and skills upgrading to underpin confidence in audit results they produce.

Key words: ISO 9001:2015, auditors, competence, management systems.

1. INTRODUCTION

Nowadays many organizations around the world want to implement and certify multiple management system standards what generates a need to combine and integrate these standards in an effective and efficient way. Annex SL offered an optimum framework for a generic management system that will provide a high level of compatibility among different quality system standards. The appearance of Annex SL was welcome with a relief by key interested parties. Management system standard writers saw it as a convenient template for their work since they will be in the position to focus their efforts on the discipline-specific requirements. For the other party that may be referred to as management system implementers, it was a good news because they got the management system framework and it was left to them to opt what discipline-specific requirements to include and implement in their organizations. Finally, the auditors should also benefit from the new array. Majority of requirements to be audited belong to the core set of requirements, invariant of specific management system standard, what significantly facilitates auditors to refer to them in the reports.¹

The newest change in quality management standard was not inspired by dissatisfaction with the requirements in the previous standard. It was rather a reflection of new approaches to management accompanied by certain terminology amendments. It is too early to discuss on ultimate effects it will produce but the goals for the new standard, set on the beginning of the revision process, are worth mentioning:

- To provide a stable framework for next ten years, at least;
- To be generic enough, but successfully applicable in organizations of all sectors;
- To reflect changes in fairly complex and dynamic business environment;
- To provide the adequate response to changes in quality management practice and technology that took place after 2000;
- To facilitate the effective implementation of the standard; and
- To simplify phrasing thus to ensure common understanding and consistent interpretation.²

¹ CQI, CQI Briefing note - Annex SL, London, UK, 2014.

² Paula Oddy, *Getting Ready for ISO 9001:2015*, 2014.

<http://www.qualitydigest.com/inside/quality-insider-article/getting-ready-iso-90012015.html>, 2014.

After the new standard has been endorsed, it became evident that the users are faced with the major revision where all interested parties will have a lot of work ahead. However, as for auditors, the revision poses serious questions relating to their new role and responsibilities, namely: In what direction the relationship between organization management and auditor will change? How will the auditor interpret the emphasis on “risk-based-thinking”? How will the auditor deliver the added value to organization under increasing commercial and time-limit pressure?³

2. MAJOR STANDARD CHANGES

The changes of ISO 9001 standard can be classified in those that have been prompted by Annex SL endorsement (as the basis for the standard) and the other ones that came up as a consequence of the intention to upgrade the requirements of current quality management system. Pursuing Annex SL the new standard takes over high level structure and common terms and definitions. Consequently, even the requirements that virtually remained the same in this transition may be found under a new heading or a new sub-clause.

“Sustainable success” as the mantra in quality management in recent years shifted “manager” a bit in shade and highlighted “leader” as a new key player in the system⁴. Consequently, the previous clause named “Management Responsibility” turned into “Leadership”. Virtually, the managing board is required to show that they are (personally) involved in key quality management system activities as opposed to earlier obligation to provide that these activities take place. In other words, top management will actively participate in quality management system operation what strongly reflects to earlier important role of “management representative”.

Omission of the clause on management representative in the new standard does not imply that management representative is to be excluded from the system. However, if he continues to exist in the system his role will be evidently weaker than it used to be. The reason lies in the fact that the new standard is strongly intentional to verify quality management system embedded into routine business operation unlike an independent system operating within own dedicated management structure.

Another noticeable difference between the two versions that has prompted so many discussions lies in the omission of Quality Manual as a mandato-

³ IRCA, Next Generation Auditing –The evolving role of the auditor under ISO 9001:2015, 2015.

⁴ Miloš Jelić, „Sistemi menadžmenta kvalitetom i njihova budućnost“, Politehnika, 2013, Beograd, 2013.

ry document. Such a document has served for years to provide the impression on organization, its quality system and its approach to quality management. When it happened to be short and clear such a Manual facilitated the job of an auditor putting him in better position to audit the system and to generate observations that may contribute its improvement. In addition, such a manual was very helpful to Management Representative and process owners since they could easily refer to it any time and to refresh an overall insight into the quality system.

With or without Quality Manual the need for an overarching management system document has not vanished. It should be taken into the account that the scope of QMS and interactions of the processes are still to be defined and communicated in a sort of documented information, particularly due to the fact that some requirements are more detailed in the new standard version (e.g. the context of the organization). Such new documented information should include: company identification, product/services portfolio, processes presentation and their interaction, but also mission and vision of the organization⁵.

Although the subsection in the standard: *Understanding the organization and its context* is the new one, the question arises: To what extent it can be regarded as quite new issue. ISO 9001:2008 acknowledges organizational environment, changes in that environment and associated risks as relevant for quality management system design. However, ISO 9001:2015 expands the concept of the organizational environment to include not only the business environment, but both internal factors (e.g. organizational culture) and the external factors (PESTLE conditions) under which it operates.

On the other hand, the subsection: *Understanding the need and expectation of interested parties* may be regarded as new in ISO 9001:2015 since it diminishes the dominant position of customer from the previous standard. While introducing interested parties in focus the new standard requires the organization to determine *relevant requirements of relevant interested parties*. The term “relevant interested parties” now refers to groups or individuals who have the ability to (potentially) impact the organization’s ability to supply consistently products/services that meet customer and applicable statutory and regulatory requirements. It shall be noted that not all requirements but only the requirements that are *relevant* to a particular organization’s QMS are to be captured and monitored⁶.

⁵ Strahinja Stojanović, *The future of the Quality Manual in ISO 9001:2015*, 9001 Academy, 2015.

⁶ Miloš Jelić i Miomir Stanković, „Compliance with ISO 9001:2015 – Auditing or assessment“, ICDQM, Prijedor, 2015.

The prevalence of electronic media prompted the change in the standard: documents and records coalesced into documented information. While ISO 9001:2008 contains requirements for controls in respect of distribution and retrieval of documents, the new standard extends these to cover the „access“ and „usage“ of documented information required by the organizational QMS and by the new standard. It imposes organization to establish information system access controls and authorization levels but also to demonstrate how the integrity of documentation is secured.

While the previous standard was primarily grounded on two pillars: identification of processes needed to achieve planned results and managing the processes and the system using „PDCA“-cycle, ISO 9001:2015 introduces the third pillar – monitoring the risks through understanding „cause and effect“⁷. In the previous standard, the risk based consideration may only be encountered in preventive action clauses (where organization was due to take into consideration potential occurrence of inadvertent events that may lead to product non-conformity), the new standard promotes *risk-based-thinking* and *risk-based-approach* requiring organization to determine the risks and opportunities that need to be addressed, to consider probability of desired/undesired events, including benefits and damages appearing as the consequence⁸.

All above changes but also numerous minor ones not mentioned above set a serious challenge to all standard users, but a biggest challenge is in front the auditors who are to judge about the compliance of an real quality management system to the new normative document.

3. NEW CAPABILITIES REQUIRED FOR AUDITORS

Regarding *Understanding the organization and its context* subsection, auditors will need an extra time to learn about the context an audited organization is operating in.

3.1. Auditing context of the organization

It includes sound understanding both external and internal issues that are customary encountered in such type of organizations. In this sense auditors shall be able to challenge an organization during the audit once they be-

⁷ Croft N, Understanding, knowledge and awareness of ISO 9001:2015, TUV Sud America, June 2014

⁸ Vitomir Miladinović, Approach to risk management in the integrated management system according to the new editions of ISO 9001 and ISO 14001”, Politehnika, 2015, Beograd, 2015.

lieve that the interpretation of the organization is inadequate. Similarly, an additional time in auditor's planning is to be reserved for *understanding the need and expectation of interested parties* to complete the picture who are the relevant parties and which are their relevant interests. If this picture does not match with the perception of the organization, the auditor shall have capacity to open discussion on this issue and to persuade representatives of the organization that their view is deficient. Auditors shall assure that the organization has completed the process of recognizing relevant interest groups as well as respective interests that are relevant for quality management system and timely reiterates the process to respond to changes.

When the scope of quality management system is concerned, the auditor shall disclose evidence that such documented information is generated grounding on organization's context and its products and services. Once organization has decided to limit its scope and to declare exclusions, the auditor have to ensure that such documented information exists but also the explanation for such a decision is stated and grounded. Unlike previous standard where process-based quality management system was merely a principle, ISO 9001:2015 converted it to be an explicit requirement. The requirements for processes are significantly upgraded. Auditors must be able to assess whether process performance indicators are adequate to control and monitor the process and what is the process from risk and opportunity perspective.

3.2. Auditing leadership and QMS planning

Since the role of top management became strongly proactive, the auditor must have a clear understanding which requirements may be transferred to others to fulfil and which must not. Auditing top management commitment to own quality management system is a big challenge for auditors. To be effective and provide consent from audited organization, the auditor shall have a sound understanding of management activities and be able to open discussion with top management on the series of topics while using the language spoken in the organization. Auditors shall also look for evidence that risks and opportunities, that may affect ability of the organization to supply products/services to align regulatory requirements or to meet customer satisfaction, are properly recognized and addressed. This means that the auditor is to be able not only to identify risk, but also to judge about the opportunities the organization may have.

Since standard requires top management to establish a quality policy that is consistent with the purpose and context of the organization, this fact amplifies the need for auditors to build own understanding of the context where the

audited organization operates in. It means that auditors shall ensure and uncover the evidences about: active participation of top management in generating and reviewing quality policy, its compatibility with strategic direction an organizational context and top management commitment to improve quality management system. Since the requirement for „documented quality policy“ ceased to exist and quality policy is now maintained as „documented information“, the auditor must find the evidence that quality policy is duly applied in the organization and is made available to relevant interested parties. Similarly, auditors must ensure that people are not only informed about assigned responsibilities but they understand what role the responsibilities play in fulfilling quality objectives⁹.

In auditing quality management system planning the auditor has to ensure that the organization has its own methodology that effectively identify the risks and opportunities while planning quality management system. In this part of auditing process, the auditor should refrain from imposing its own view on risks and opportunities but he should get confident the organization is pursuing own methodology in a consistent and effective way. However, once the auditor determines the organization was deficient to identify a widely-known risk or opportunity (in a given organizational context), he must be capable to open discussion on this issue.

3.3. Auditing infrastructure

Instead of obligation „to determine and manage work environment“ (ISO 9001:2008), the organization is now due to determine, provide and maintain a suitable environment for the operation of processes. Such an extension in the requirement makes the task for auditor more complex. The extension goes in two directions; it now relates to all processes (not only to work processes) and it includes social, psychological and environmental factors (in addition to physical factors). This means that the auditor must possess ability not only to identify these factors but also to judge how these factors are maintained throughout the organization.

The new requirement relating to organizational knowledge obliges organization to capture and preserve knowledge and learning when necessary to ensure conformity of products/services. The auditor is to ensure the organization took steps to identify such knowledge as well as that the knowledge has been communicated through the organization. The auditor has to possess capability to verify the knowledge is maintained and protected what implies a

⁹ IRCA, DIS 9001 2014 – Understanding the draft international standard, 2014.

high level of auditor's familiarity with the matter and current communication processes within the organization.

The changeover to „documented information“ is much more deep than pure change in terminology might tell since it reflects the change in information carrier. The organization has to solve how will distribute, access, retrieve and use documented information when the issues of protection and integrity of the information within the information system are highlighted, but the problem is even heavy for auditors. They are now faced with the situation to directly access and use organisation information system to provide evidence how the organization control its documented information. Such an activity requires serious upskilling of actual ISO 9001 auditors. In addition, before the audit begins, the auditor shall make certain whether an electronic system of the organization is in place but also make the arrangement on his access and use of the system during the audit.

4. AUDITOR'S COMPETENCE AND UPSKILLING

Referring to relevant sections of *Guidelines for auditing management systems*¹⁰ (section 7.2 and Annex A – section A4 it can be inferred what knowledge and skills are needed for a competent ISO 9001:2015 auditor. However, since the major part of future ISO 9001:2015 auditors will be recruited from current ISO 9001:2008 auditors, the following consideration will focus on those issues where even the auditors who are regarded well-competent for ISO 9001:2008 standard may fall short in knowledge and skills.

As for auditor's personal behaviour, since it is obvious that interviewing technique becomes prevalent, his diplomatic virtues have to be enhanced in ISO 9001:2015 use. On the other hand the absence of documented objective evidences will compel auditors to become more observant, i.e. to more actively observe activities and surrounding (e.g. social, psychological and environmental factors). Consequently, the auditor shall raise his ability to set priorities among so many activities taking place in the audited organization and to maintain focus on matters of significance. When verifying relevance and accuracy of collected documented information, the auditor will have to upgrade his capacity to confirm sufficiency and appropriateness of audit evidence that is needed to support audit findings.

Though adequate knowledge and skills concerning organizational context existed in standards issued earlier, it remained on more general level so far. Now, when *Organizational context* has become an explicit standard require-

¹⁰ ISO 19011:2011, Guidelines for auditing management systems.

ment, the auditor is obliged to improve his knowledge particularly in the area of processes and related terminology, and to get more thoroughly acquainted with cultural and social aspects of the audited organization.

In preparing audit against new quality management system standard, auditors will have to upgrade their sector-specific knowledge and develop skills proper to specific sector. There are at least two areas where elevating of auditors' knowledge and competence is indispensable. Requirements of interested parties, their needs and expectation and their relevance are so specific is the new issue for auditors but at the same time they are the pillar for developing quality management system and every auditor is to raise up his knowledge in that regard. Risk is another issue that requires serious upskilling. Unlike previous standard where risk was mentioned fragmentary, ISO 9001:2015 unambiguously asks for auditor's competence in risk-based-approaches and risk-based-thinking. Having in mind that ISO 9001:2015 does not refer to ISO 31000 – *Risk Management – Principles and standards*, it turns out that both organization and the auditor need to identify concepts, tools and methods to solve risk issues.

5. CONCLUSION

Although it is not visible from the text of the standard, the role and importance of external auditor is enhanced. Unlike the position auditor had in previous ISO 9001 version where he was more-or-less expected only to verify conformance of QMS with the standard, the expectations from new standard perspective are significantly higher. On one hand, increased commercial pressure and changing regulatory conditions will exert additional pressure to auditors, and on the other, top management from will expect deep insight in business processes and outputs as actual added value provided by audit team. To respond adequately to such an expectation auditors are to elevate their knowledge and upgrade their auditing skills.

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Sažetak:

KOMPETENTNOST ODITORA ZA PRIMENU NOVOG STANDARDA ZA SISTEM MENADŽMENTA KVALITETOM

Promene u strukturi i razumevanju ISO 9001:2015 predstavljaju nove izazove za oditore u pogledu korišćenja svojih kompetencija za sprovođenje odita. Korišćenje ček-lista koje su uređene prema zahtevima standarda izlazi iz upotrebe jer se oditiranje sve više pomera ka tehnicima intervjua udaljavajući se od pregleda zapisa, podataka o korektivnim merama i politici. Takva promena u načinu komunikacije zahteva od oditora viši nivo njegove kompetentnosti, oličeno u znanju i veštinama ne samo za određeni standard za sistem menadžmenta već za određenu tehničku oblast, odnosno za određeni sektor poslovanja. Pored navedenog, najvećem broju profesionalaca koji se bave oditom nedostaje priznato poznavanje menadžmenta rizikom, što može ugroziti reputaciju budućih odita. Rad nastoji da baci svetlost na promene u novom ISO 9001 koje značajno utiču na process oditiranja, te zahtevaju da oditori unaprede određena znanja i veštine čime bi stvorili poverenje u rezultate koji u oditu nastaju

Ključne reči: ISO 9001:2015, oditori, kompetentnost, sistemi menadžmenta.

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POTREBE I IZAZOVI PRILAGODBE STUDIJSKIH PROGRAMA VISOKOG OBRAZOVANJA U POLJOPRIVREDI ZAHTJEVIMA TRŽIŠTA

NEEDS AND CHALLENGES OF ADAPTATION OF
AGRICULTURAL STUDY PROGRAMMES IN HIGHER EDUCATION
ACCORDING TO MARKET REQUIREMENTS

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Sažetak

Različite grane gospodarstva razvile su različite standarde osiguranja kvalitete. Prema tome i visoko obrazovanje mora kontinuirano vršiti prilagodbe svojih obrazovnih programa iz područja upravljanja kvalitetom u skladu s potrebama tržišta. U ovom radu napravljena je analiza inovacija studijskih programa koje su provedene na Visokom gospodarskom učilištu u Križevcima u razdoblju od 5 godina. Dan je prikaz porasta broja izbornih modula s posebnim naglaskom na porast interesa studenata za stjecanjem znanja iz područja upravljanja kvalitetom, mjereno brojem studenata i brojem završnih radova. S jedne strane, istraživanjem se želi istaknuti nužnost, a s druge strane, mogućnosti prilagodbe studijskih programa visokog obrazovanja potrebama tržišta i standardima u poljoprivredno-prehrambenoj proizvodnji te poljoprivrednom zakonodavstvu EU i RH.

Ključne riječi: visoko obrazovanje u poljoprivredi, prilagodbe studijskih programa, upravljanje kvalitetom.

1. UVOD

Sve veći zahtjevi društva prema visokoškolskim institucijama u smislu stalnog prilagođavanja promjenama koje se događaju u gospodarstvu svake zemlje, zbog ubrzanog tehničko-tehnološkog i socijalnog razvoja, nameću potrebu za uspostavljanjem visokog obrazovanja koje će biti u mogućnosti svojim obrazovnim programima odgovoriti svim promjenama i zahtjevima tržišta. Najznačajniji zadatak svake visokoškolske ustanove je stvoriti „dinamičan“ sustav obrazovanja koji će pratiti trendove i zahtjeve tržišta. To znači da visokoobrazovne institucije trebaju prepoznati koje kompetencije i vještine se traže i u kojoj mjeri ih studenti mogu dobiti. Novi studijski programi trebaju biti bazirani na ishodima učenja i potrebama tržišta rada. U analizi problema usklađivanja potreba tržišta rada i kompetencija koje studenti stječu kroz visoko obrazovanje treba uzeti u obzir stjecanje:

- novih znanja kroz programe formalnog obrazovanja;
- profesionalnih vještina koje se razvijaju kroz praksu;
- ključnih kompetencija nužnih za obavljanje određenih poslova.

Tema rada je detektirati eventualne probleme i ukazati na uočene nedostatke u prilagodbi studijskih programa visokog obrazovanja potrebama tržišta i standardima u poljoprivredno-prehrambenoj proizvodnji te poljoprivrednom zakonodavstvu EU i RH.

Cilj rada je analiza inovacija studijskih programa koje su provedene na Visokom gospodarskom učilištu u Križevcima (VGUK) u razdoblju od 5 godina. Dan je prikaz porasta broja izbornih modula s posebnim naglaskom na porast interesa studenata za stjecanjem znanja iz područja upravljanja kvalitetom, mjereno brojem studenata i brojem završnih radova. Ukazano je na potrebe i izazove s kojima se susreću visokoobrazovne institucije prilikom prilagodbe studijskih programa visokog obrazovanja zahtjevima tržišta.

2. POTREBE I IZAZOVI PRILAGODBE STUDIJSKIH PROGRAMA VISOKOG OBRAZOVANJA U POLJOPRIVREDNO-PREHRAMBENOJ PROIZVODNJI ZAHTJEVIMA TRŽIŠTA

Politika kvalitete, sigurnost hrane i uređenje tržišta poljoprivredno-prehrambenih proizvoda bitni su elementi Zajedničke poljoprivredne politike EU (ZPP).¹ Iz toga proizlaze određene obveze za proizvođače kao što su: ispu-

¹ http://ec.europa.eu/agriculture/cap-for-our-roots/index_hr.htm (The Common Agricultural Policy, CAP)

njavanje zahtjeva dobre proizvođačke prakse (DPP), dobre higijenske prakse (DHP), proizvodnih pravila i ograničenja, međunarodnih standarada, sigurnosti hrane, zdravlja ljudi i životinja, označavanja hrane i dr. Postavlja se pitanje „Koje su potrebe gospodarstva i kako se obrazovni sustav prilagođava?“

Svrha visokog obrazovanja je višestruka i uključuje pripremanje studenata za aktivno sudjelovanje u društvu, za buduću karijeru, stvaranjem široke baze njihovih znanja doprinoseći njihovoj zapošljivosti. To znači da svaka visokoškolska ustanova treba ustrojiti kvalitetan obrazovni sustav koji će na vrijeme stvarati potrebna znanja, omogućavati zapošljivost radne snage i prilagodljivost zahtjevima poslodavaca u promjenljivim gospodarskim uvjetima. Zbog razlike u dinamici pojave novih potreba tržišta rada i promjena obrazovnih planova i programa, stvara se jaz čije prevladavanje u pravilu nije glatko, već se radi o skokovitim promjenama iniciranim uglavnom kad se uoče indikatori značajnih razlika između usluge i potreba.² Visokoobrazovne institucije trebaju prepoznati koje kompetencije i vještine se traže i u kojoj mjeri ih studenti mogu dobiti. Novi studijski programi trebaju biti bazirani na ishodišta učenja i potrebama tržišta rada.

Ishodi učenja su znanja, vještine i sposobnosti studenata stečen tijekom studija koje oni mogu praktično primijeniti i koristiti u rješavanju nekog konkretnog problema. Kroz ishode učenja akumuliraju se kompetencije studenata za neposrednu praksu. Što je viša njihova razina to su oni spremniji za svoja buduća zanimanja.³ Ishodi učenja jedan su od parametara (indikatora) sustav osiguravanja kvalitete u visokom obrazovanju. Iako kvalitetu nije lako definirati, u obrazovnom sustavu ona uglavnom proizlazi iz interakcije studenata, nastavnika i institucionalnog okruženja.

Pojam „osiguravanje kvalitete“ u visokom obrazovanju podrazumijeva odgovornost visokog učilišta prema svojim dionicima i aktivnosti kontinuiranog poboljšavanja kvalitete. Većina metoda i alata za mjerenje kvalitete usluge u visokom obrazovanju se temelji na zadovoljstvu korisnika i njihovoj percepciji kvalitete usluge. U Hrvatskoj kao i u većini europskih zemalja prihvaćen je i implementiran sustav praćenja i vrednovanja kvalitete koji se temelji na Europskim standardima i smjernicama za osiguranje kvalitete u visokom obrazovanju (ESG). Agencija za znanost i visoko obrazovanje (AZVO) provodi vanjsko vrednovanje svih visokih učilišta. Međutim, vanjsko vrednovanje utvrđuje da li je postignuta određena razina kvalitete, ali ne može unaprijedi-

² Tihomir Hunjak, *Ishodi učenja u visokom školstvu, Fakultet organizacija i informatike u Varaždinu, Varaždin, 2008, str. 101-108.*

³ Zdravji Krakar, *Ishodi učenja u visokom školstvu, Fakultet organizacija i informatike u Varaždinu, Varaždin, 2008, str. 119-132.*

ti kvalitetu visoko obrazovne institucije. Rezultati se mogu postići samo ako se unutarnje vrednovanje razvije kao kontinuirani interni proces unutar visoko obrazovne institucije koji generira informacije potrebne vodstvu institucije za donošenje strateških i operativnih odluka i ciljeva.⁴

Iako se kvaliteta visokoškolskih ustanova prosuđuje prema više različitih varijabli ili pokazatelja kvalitete⁵, autori rada su u svojim ranijim istraživanjima utvrdili da je potrebno stalno uvoditi nove pokazatelje kvalitete koji će omogućiti različite aspekte praćenja kvalitete visokog obrazovanja. Osobito je važno da to budu varijable kojima će se mjeriti i pratiti kvaliteta studentskog iskustva i zadovoljstva s obzirom da studenti kao korisnici obrazovanja imaju bolji uvid u slabosti sustava. Unutar sustava kvalitete u visoko obrazovnoj instituciji trebaju postojati mjere za utvrđivanje studentskih potreba i očekivanja.⁶

Autori smatraju varijablu „procjena studijskih programa“ važnim, ali nedovoljno zastupljenim pokazateljem kvalitete. Osim toga treba naglasiti da je odobravanje, promatranje i periodična revizija studijskih programa sastavni dio ESG standarda na temelju kojih se vrši vanjska prosudba sustava osiguranja kvalitete (SOK) visokih učilišta.⁷ Prema novim ESG standardima i smjernicama⁸ visoka učilišta moraju imati postupke za izradu i odobravanje svojih studijskih programa. Oni moraju biti izrađeni tako da ispunjavanju postavljene im ciljeve, uključujući i predviđene ishode učenja, a jedna od preporuka je i da se izrađuju u suradnji sa studentima i drugim dionicima. Osim toga ESG standardi predviđaju kontinuirano praćenje, revidiranje i izmjene studijskih programa kako bi se osiguralo da oni postižu postavljene ciljeve i ispunjavaju potrebe studenata i društva.

Međutim, javlja se problem neusklađenosti obrazovnih ishoda učenja za određena zanimanja u poljoprivredno-prehrambenoj proizvodnji s potrebama tržišta odnosno poslodavaca. Neki od osnovnih problema u povezanosti obrazovnog sustava i tržišta rada su:

⁴ Ines Sutić i sur., „Vrednovanje kvalitete usluge iz perspektive korisnika u visokom obrazovanju – primjena CIT tehnike“, *Zbornik radova 13. međunarodnog simpozija o kvaliteti Kvaliteta i društvena odgovornost, Hrvatsko društvo menadžera kvalitete, Zagreb, Solin, 2012, str. 331-342.*

⁵ Više o tome: Hilbert Eyer, *Što je dobra nastava*, Zagreb, 2005., p. 87.; Jelena Legčević, *Determinants of service quality in higher education, The J.J.Strossmayer of Osijek, Faculty of Economics in Osijek, Hochschule Pforzheim University, Interdisciplinary management research VI, Osijek, 2010, p. 631.*

⁶ Edward Sallis, *Total Quality Management in Education*, 3rd Ed. Taylor and Francis e-library, 2005.

⁷ Dušanka Gajdić i sur., „Unapređenje kvalitete na Visokom gospodarskom učilištu u Križevcima kroz inovacije programa“, *11. hrvatska konferencija o kvaliteti, HDK, Vodice, 2011.*

⁸ https://www.azvo.hr/images/stories/kvaliteta/ESG_HR_final.pdf

- u prilagodbi sustava obrazovanja ZPP-i i standardima u poljoprivredno-prehrambenoj proizvodnji;
- izmjene u programima ne mogu pratiti brze promjene na tržištu;
- kratak vijek trajanja stečenih znanja i vještina zbog sve bržeg tehnčko-tehnološkog napretka u poljoprivredno-prehrambenoj proizvodnji;
- sve izraženiji proces profesionalizacije poljoprivrede;
- prisutne su promjene zajedničke poljoprivredne politike s otklonom od proizvodnje prema sigurnosti hrane i proizvodnom prostoru;
- dug period akreditacije novih programa;
- nefleksibilan sustav kod izmjene postojećih programa.

3. ANALIZA PROVEDNEIH INOVACIJA STUDIJSKIH PROGRAMA NA VGUK U RAZDOBLJU OD 5 GODINA

Visoko gospodarsko učilište ima višegodišnje iskustvo u provođenju stručnih studija u području poljoprivrede i svjesno je iznimne važnosti neprekidnog unapređivanja studijskih programa. Za Studente VGUK koji se pripremaju za praktično poslovanje u području poljoprivredne i prehrambene proizvodnje, izučavanje kvalitete trebalo bi biti sve prisutnije jer je danas sasvim jasno da je kvaliteta prerasla iz objekta kontrole proizvoda u strateški cilj svake organizacije bez obzira na vrstu djelatnosti kojom se bavi i činitelj je konkurentnosti na domaćem, a osobito na svjetskom tržištu. Studentima se usvajanjem znanja iz područja kvalitete omogućuje novi pogledi na pitanje kvalitete u hrvatskom pa i svjetskom gospodarstvu. Stručni bi studiji trebali, uz formalnu osnovu, omogućiti stjecanja znanja i vještina za obavljanje specifičnih poslova, nužno potrebnih i traženih na tržištu rada. Naime, kako bi opstali u iznimno konkurentnom okruženju i zadržali radna mjesta, od zaposlenika se očekuje da svojim proizvodima i uslugama dodaju više vrijednosti, a za to su im potrebna znanja, vještine i sposobnosti.⁹

Prema postojećim programima koji se provode na VGUK predviđeno je da studenti nakon završenog studija usvoje i određena specifična znanja i kvalifikacije iz područja kvalitete kao što su:

- upravljanje kvalitetom poljoprivrednih proizvoda;
- upravljanje kvalitetom u poslovanju gospodarstva (standardiziranje, certificiranje);
- odgovorno ponašanje prema prirodnom okolišu i društvenoj sredini;
- efikasno upravljanje poljoprivrednim gospodarstvom.

⁹ Dubravka Krivačić: *Poslovna strategija veleučilišta i visokih škola, Poslovna izvrsnost, Vol. 4, No. 2, Zagreb, 2010, p. 121-131.*

Kako bi se osiguralo da se odobreni programi tijekom vremena prilagođavaju razvoju određenog znanstvenog područja i razvoju prakse u određenoj struci, (u ovom slučaju poljoprivredne proizvodnje), na VGUK se redovito provodi institucijsko vrednovanje i nadziranje studijskih programa (samovrednovanje). Priručnikom kvalitete VGUK¹⁰ definirane su postupci i aktivnosti revizije postojećih studijskih programa. Cilj te aktivnosti je kontinuirano unapređivanje studijskih programa kako bi ishodi učenja što bolje odgovarali potrebama i očekivanjima studenata odnosno potrebama tržišta rada. Promjene u studijskom programu predlažu se i provode na temelju kontinuirane analize kvalitete studijskih programa, a glavni indikatori za korektivne i preventivne postupke su:

- kontinuirane analize anketa o zadovoljstvu studenata studijskim programima;
- panel diskusije putem kojih studenti predlažu mjere za poboljšanje;
- ispitivanje tržišta rada putem ankete o zadovoljstvu poslodavaca programom studija;
- rezultati prolaznosti na kolegijem te
- prijedlozi nastavnika na temelju samoevaluacije.

Godine 2005. VGUK dobilo je TEMPUS projekt *Razvoj stručnih studijskih BSc i MSc programa te kratkih specijalističkih seminara u području poljoprivredne proizvodnje i menadžmenta*.¹¹ Jedan od ciljeva Projekta bio je razvoj stručnih preddiplomskih i diplomskih studijskih programa u poljoprivrednoj proizvodnji i menadžmentu te usavršavanje nastavnog procesa. Od tada su predložene i odobrene promjene prema TEMPUS projektu, od strane Agencije za znanost i visoko obrazovanje, i provedene zaključno s 2011. godinom. Relevantno polazište za daljnje unapređivanje studijskih programa su studentske ankete koje se provode svake godine kod studenata treće godine stručnog preddiplomskog studija Poljoprivreda i studenata druge godine Specijalističkog diplomskog stručnog studija (SDSS). Smatralo se da su anketirani studenti odgovarajući uzorak za dobivanje potrebnih informacija jer su studenti treće godine s već određenim iskustvom studiranja na temelju kojeg mogu formirati stavove o kvaliteti studijskih programa, dok većina studenata specijalističkog studija studira uz rad pa dolaze s već određenim željama za stjecanjem specifičnih znanja prema potrebama tržišta.

¹⁰ <http://www.vguk.hr/?gid=97>, Priručnik za osiguravanje i unapređivanje kvalitete Visokoga gospodarskog učilišta u Križevcima.

¹¹ Development of a Professional BSc and MSc Course and Short Professional Courses in Farm Production and Management JEP-19052-2004.

Godine 2011. na VGUK je provedeno anketno istraživanje kojem je temeljni cilj bio utvrditi kolika je informiranost i kvaliteta usvojenih znanja studenata o temama vezanim uz pojmove iz područja kvalitete i sustava upravljanja kvalitetom. Osim toga željelo se dobiti informacije o zadovoljstvu studenata ponuđenim programima te općenito stavova studenata o mogućnostima poboljšanja studiranja kroz uvođenje novih modula, a osobito modula koji bi studentima ponudio temeljne informacije i znanja iz područja upravljanja kvalitetom u poslovanju poljoprivrednih gospodarstava.¹²

Rezultati su pokazali da 84% anketiranih studenata smatra da bi u postojeće programe trebalo uvesti nove module s temama koje su aktualne u europskoj i svjetskoj ekonomiji. Dobiveni rezultati bili su indikator za pokretanje postupka uvođenja novih izbornih programa na oba studija. Od 2011. do 2015. uvedeni su slijedeći izborni moduli:

1. Upravljanje kvalitetom u poljoprivrednoj proizvodnji;
2. Tržište i distribucija poljoprivredno-prehrambenih proizvoda;
3. Poslovno odlučivanje;
4. Ruralni turizam;
5. Metode istraživanja tržišta;
6. Destinacijski menadžment u ruralnom turizmu;
7. Ljekovito i aromatično bilje;
8. Hmeljarstvo i bobičasto voće;
9. Ukrasno bilje i oblikovanje vrtova;
10. Lovstvo i kinologija;
11. Uzgoj peradi;
12. Konzervacijska poljoprivreda.

Analizirajući poznavanje pojmova vezanih uz kvalitetu kod studenata stručnog preddiplomskog studija, poput upravljanje kvalitetom, TQM, normizacija, ISO, certifikacija i sl., došlo se do zaključka da većina studenata (preko 70%) uopće ne poznaje te pojmove ili su samo čuli za njih i ne znaju im značenje. Također, deskriptivna analiza je pokazala da je većina studenata specijalističkog diplomskog stručnog studija čula za navedene pojmove, ali im ne znaju značenje i primjenu. Osim toga većina anketiranih studenata se izjasnilo da tokom prethodnih godina studiranja nisu imali priliku slušati teme iz područja kvalitete i sustava upravljanja kvalitetom. U provedenom anketiranju 94% studenata se izjasnilo da bi željelo slušati modul „Upravljanje kvalitetom“, a preko 75% anketirana studenta smatrali su modul „Upravljanje kvalitetom“ važnim za svoje obrazovanje i korisnim za primjenu u praksi.

¹² Dušanka Gajdić i sur., „Unapređenje kvalitete na Visokom gospodarskom učilištu u Križevcima kroz inovacije programa,“ 11. hrvatska konferencija o kvaliteti, HDK, Vodice, 2011.

Do tada se iz područja kvalitete od ak. god. 2008/2009. na VGUK izvodio svega jedan modul, „Skladištenje poljoprivrednih proizvoda i upravljanje kvalitetom” i to samo na 3. godini stručnog studija smjera Bilinogojstvo.

S obzirom da je studentska procjena putem anketa temeljni način utvrđivanja studentskog iskustva i zadovoljstva ponuđenim modulima i postojećim programima, na VGUK su provedene inovacije studijskih programa sukladno željama studenata i potrebama globalnog tržišta rada. Shodno dobivenim rezultatima i zahtjevima SOK-e koji podrazumijeva kontinuirano poboljšanje, na VGUK se dvije godine nakon provedenog anketiranja uveo izborni modul „Upravljanje kvalitetom u poljoprivrednoj proizvodnji“ koji se na stručnom studiju Poljoprivreda izvodi od ak. god. 2013/2014., a na specijalističkom diplomskom stručnom studiju Menadžment u poljoprivredi izvodi se od ak. god. 2014./2015.

Analizirajući tri akademske godine od kada je uveden, može se uočiti da interes studenata za navedenim modulom iz godine u godinu znatno raste što potvrđuje sve veći broj studenata koji ovaj modul biraju kao izborni. Bazni indeksi ukazuju na visok postotak rasta broja studenata Tablica 1.)

Tablica 1. Broj studenata koji su pohađali modul
„Upravljanje kvalitetom u poljoprivrednoj proizvodnji“
u razdoblju od ak. g. 2013/2014.- 2015/2016.

Akademska godina	Stručni studij Poljoprivreda	SDSS Menadžment u poljoprivredi	Ukupno	Indeks 2013/2014. = 100
2013/2014	6	0	6	100
2014/2015	7	4	11	183
2015/2016	20	8	28	467
Ukupno	33	12	45	

Izvor: Izvorno autorsko.

Od 2012. do 2015. godine na problematici upravljanja kvalitetom u poljoprivredno-prehrambenom i distribucijskom lancu i sigurnosti hrane na VGUK je diplomiralo ukupno devet studenata, a jedan rad je trenutno u izradi.

Tablica 2. Popis studenata i teme završnih radova iz područja kvalitete u razdoblju od 2012.–2015. godine.

RB.	Tema	Ime studenta/ice	God. obrane
1.	Determiniranje kritičnih kontrolnih točaka u proizvodnom lancu proizvodnje stočne hrane u tehnološkom procesu MSH Cepidlak d.o.o.	Gordana Jelušić	2012.
2.	Lanac kvalitete merkantilne krušne pšenice u tehnološki aspekti upravljanja kvalitetom u poduzeću Vlado d.o.o.,	David Pintar	2014.
3.	Izrada Priručnika kvalitete laboratorija za ispitivanja kakvoće poljoprivrednog sjemena Visokog gospodarskog učilišta u Križevcima	Jasmina Volf	2014.
4.	Implementacija HACCP sustava u poljoprivredne ljekarne tvrtke Vrt d.o.o.	Marko Vuković	2015.
5.	Implementacija GlobalG.A.P. sustava na OPG Dario Sršen	Ante Šimundić-Mrgan	2015.
6.	Kritične i kritične kontrolne točke i poboljšanje tehnološkog procesa u mlinarsko-pekarskom poduzeću Oškera d.o.o	Antonio Oškera	2015.
7.	Važnost upravljanja dokumentacijom u središnjem laboratoriju za kontrolu mlijeka	Tea Ščetarić-Jasek	2015.
8.	Učinkovitost implementacije HACCP-a u poljoapotekama Graminea A.B.M., d.o.o.	Valerija Orlić	2015.
9.	Primjena HACCP-a u maloprodaji mesa i mesnih proizvoda	Sanja Varadin	2015.
10.	Implementacija GlobalGAP sustava na Visokom gospodarskom učilištu u Križevcima”,	Marka Erakovića	u izradi

Izvor: Izvorno autorsko.

Kao što se može uočiti iz navedenih tema, prilikom izrade završnih radova studenti se susreću s problematikom koja se pojavljuje u praksi upravljanja kvalitetom u poljoprivredno prehrambenom, proizvodnom i distributivnom lancu. Neki radovi i provedena istraživanja prilikom izrade završnih radova primjenjivi su u praksi, a ponekad studenti osobno sudjeluju u određenim aktivnostima sustava upravljanja kvalitetom, implementacije normi sustava upravljanja, izradi Priručnika kvalitete i sl.

Izuzetno je važno da studenti već tijekom studija imaju priliku na praktičnim primjerima iz prakse, odnosno vlastitim sudjelovanjem u implementaciji nekog od sustava upravljanja kvalitetom steći osnovne kompetencije u području upravljanja kvalitetom u poljoprivredno-prehrambenom i distribucijskom lancu. Stečene osnovne kompetencije izuzetno su važne za studen-

te kako bi mogli razumjeti auditore kvalitete prilikom audita i implementacije nekog od sustava kvalitete u organizacije u kojima će raditi. Osnivanje kolegija iz područja sigurnosti hrane i upravljanja kvalitetom te izrada završnih radova na primjerima konkretnih poduzeća to im i omogućuje. Studenti tako stečena znanja i kompetencije iz područja upravljanja kvalitetom proizvodnje, prerade, transporta i distribucije poljoprivrednih i prehrambenih proizvoda pretaču u obvezatne norme kojih se svi subjekti u poslovanju s hranom moraju pridržavati. U konačnici o tome ovisi i njihova konkurentnost na međunarodnom tržištu.

4. ZAKLJUČAK

Usvajanje novih kompetencija je glavni cilj procesa obrazovanja. Uvođenje nastavnih sadržaja u postojeće i osnivanje kolegija iz područja sigurnosti hrane i upravljanja kvalitetom u poljoprivredno-prehrambenom i distribucijskom lancu nužno je za stjecanje osnovnih kompetencija studenata koji se obrazuju za rad u poljoprivredi i prehrambenoj industriji.

Javlja se problemi neusklađenosti obrazovnih ishoda učenja za određena zanimanja u poljoprivredno-prehrambenoj proizvodnji s potrebama tržišta odnosno poslodavaca. Osim toga vrlo često sam proces izmjene i period akreditacije novih studijskih programa je veoma dug što znatno utječe i na prilagodbu programa brzim promjenama na tržištu rada i trendovima u poljoprivrednoj proizvodnji.

Kako bi se osiguralo da se odobreni programi tijekom vremena prilagođavaju razvoju određenog znanstvenog područja i razvoju prakse u poljoprivredi, na VGUK se redovito provodi institucijsko vrednovanje i nadziranje studijskih programa. Kontinuirano se provode inovacije i poboljšanja studijskih program sukladno željama studenata i potrebama globalnog tržišta rada. Tako je na temelju rezultata anketiranja provedenog 2011. godine do danas na VGUK uvedeno dvanaest novih modula. Shodno dobivenim rezultatima i zahtjevima studenata na VGUK se dvije godine nakon provedenog anketiranja uveo izborni modul „Upravljanje kvalitetom u poljoprivrednoj proizvodnji“. Analizirajući tri akademske godine od kada je modul uveden, uočen je znatan porast interesa studenata za navedenim modulom. Osim toga studenti za svoje završne radove sve češće biraju teme iz područja upravljanja kvalitetom u poljoprivredno-proizvodnom i distribucijskom lancu. Radovi se vrlo često pišu na temelju iskustava iz prakse. Tako se na direktan način povezuju teorija i praksa odnosno studenti, budući stručnjaci i menadžeri poljoprivrede, se mogu upoznati s problematikom i važnošću upravljanja kvalitetom u poljoprivredi.

Područje sigurnosti hrane i upravljanje kvalitetom u poljoprivredno-prehrambenom i distribucijskom lancu ne smije biti samo teoretska osnova i administrativni zapis, kao što je na žalost to još uvijek prisutno u praksi, već je potrebno da studijski programi omogućе stjecanje znanja i vještina za obavljanje specifičnih poslova, nužno potrebnih i traženih na tržištu rada. Potrebno je obrazovati inženjere praktičare koji će svojim znanjem, kompetencijama i vještinama moći udovoljiti zahtjevima procesa rada.

Abstract:

NEEDS AND CHALLENGES OF ADAPTATION OF
AGRICULTURAL STUDY PROGRAMMES IN HIGHER EDUCATION
ACCORDING TO MARKET REQUIREMENTS

Different sectors of the economy have developed various standards of quality assurance. According to that, higher education study programmes in the field of quality management have to be adapted continuously in accordance with the market needs. This paper analyses the innovations in study programmes conducted on College of Agriculture in Križevci in the period of 5 years. The paper shows the increase in the number of optional courses with special emphasis on the increase in students' interest for the acquisition of knowledge in the field of quality management, measured by the number of students and the number of final papers. On the one hand, the research underlines the necessity, and on the other hand, the options for adaptation of higher education study programs to market needs and standards in agri-food production and agricultural legislation of the EU and Croatia.

Key words: higher education in agriculture, adaptation of study programmes, quality management.

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UTJECAJ MARKE ZRAČNOG PRIJEVOZNIKA NA LOJALNOST POSLOVNIH PUTNIKA

THE INFLUENCE OF AIRLINE BRANDS ON
BUSINESS PASSENGER LOYALTY

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SAŽETAK

Poslovni putnici predstavljaju dragocjen tržišni segment kako tradicionalnim tako i niskobudžetnim zračnim prijevoznicima. Ovaj rad analizira značaj marke pri njihovom odabiru zračnog prijevoznika i identificira ključne čimbenike u maksimiziranju lojalnosti. Primarni podaci prikupljeni su metodom samopopunjavanja anketnog upitnika pomoću Lime Survey software. Kvotni uzorak čini 249 aktivnih sudionika poslovnih putovanja. Nalazi istraživanja preporučuju korištenje programa lojalnosti za jačanje privrženosti te primjenu adekvatnog pristupa poslovnim putnicima za jačanje vezanosti.

Ključne riječi: marka zračnog prijevoznika, poslovni putnici, lojalnost korisnika.

1. UVOD

Cilj ovog rada je ispitati valjanost odnosa između marke zračnog prijevoznika i lojalnosti putnika. Pritom je fokus na poslovnim putnicima, koji predstavljaju segment korisnika usluga zračnog prijevoza koji je u dosadašnjim znanstvenim radovima bio zanemarivan.

Prije opisa metodologije istraživanja i samih rezultata, u nastavku slijedi kratak prikaz triju referentnih znanstvenih radova koji su empirijski istraživali utjecaje marke zračnog prijevoznika.

2. PREGLED LITERATURE

Prvo referentno istraživanje proveli su autori Wong i Musa¹ u Kuala Lumpuru. Autori su ispitivali zadovoljstvo markom, te su uspoređivali zadovoljstvo dva posve različita tržišna segmenta, tj. putnike niskobudžetnog *Air Asia* te tradicionalnog *Malaysian Airlines*-a. Oba prijevoznika prema ocjeni Skytraxa spadaju među najbolje prijevoznike svijeta. Prometuju na domaćim i međunarodnim linijama, opslužuju različite tržišne kategorije putnika, te nude različite doživljaje putnicima. Jedan od nalaza istraživanja jest da se razina usluge koju putnici očekuju od niskobudžetnih i tradicionalnih prijevoznika razlikuje. Nadalje, konkurencija ovih dvaju prijevoznika ih prisiljava da posebnu pozornost posvete strategiji diferencijacije. Pritom je eksplorativnom faktorskom analizom otkriveno sedam dimenzija zadovoljstva markom: (i) opipljivi elementi, (ii) cijena, (iii) srž usluge, (iv) reputacija prijevoznika, (v) publicitet, (vi) promocija od usta do usta, te (vii) zaposlenici. Općenito se može reći da ispitanici oba tržišna segmenta nisu bili zadovoljni svim navedenim dimenzijama, te da su imali najveća očekivanja od dimenzija cijene, srži usluge i zaposlenika. Rezultati također pokazuju da je razina nezadovoljstva markom veća kod putnika tradicionalnog prijevoznika *Malaysian Airlinesa*. Tako je *Air Asia* percipiran pozitivnije u odnosu na *Malaysian Airlines* u dimenzijama cijene, publiciteta te promocije od usta do usta. S druge strane, *Malaysian Airlines* je bolje percipiran u dimenzijama opipljivih elemenata, srži usluge, reputacije i zaposlenika. Zanimljivo je da su ispitanici niskobudžetnog prijevoznika nezadovoljni cijenom, što potkrepljuje rezultate ranijih istraživanja koja su pokazala da niže cijene nužno ne rezultiraju i većim zadovoljstvom.

¹ Wong Kee Mun, and Ghazali Musa, "Branding satisfaction in the airline industry: a comparative study of Malaysia Airlines and Air Asia, *African Journal of Business Management*, Vol. 5, No. 8, 2011, p. 3410-3423.

Drugo referentno istraživanje provela je autorica J. Benner (2009.) u Copenhagenu. Cilj predmetnog istraživanja bio je istražiti i definirati faktore lojalnosti te izgraditi model lojalnosti u industriji zračnog prijevoza. Istraživanjem su bili obuhvaćeni putnici ekonomske i poslovne klase na ekonomski visokorazvijenom skandinavskom tržištu. Rezultati istraživanja identificirali su tri vrste srodnih pogodnosti kao relevantne za nastanak lojalnosti putnika. To su društvene, psihološke i funkcionalne pogodnosti, odnosno korisnosti koje putnici imaju kao rezultat uspostavljenog odnosa s određenom markom prijevoznika. Svaka od navedenih korisnosti proizlazi iz različitih osobina marke prijevoznika te potiče lojalnost putnika. Za upravljanje lojalnošću, posebno su važni društveno-psihološki aspekti odnosa koje putnici uspostavljaju s markom. Kao glavni pokretači lojalnosti identificirani su (i) podudarnost između predodžbe o sebi i predodžbe o marki prijevoznika, tj. poistovjećenost osobnog imidža putnika s imidžem marke prijevoznika, (ii) pouzdanost usluge, te (iii) sudjelovanje u kreiranju vrijednosti. Društveno-psihološke pogodnosti imaju naglašenu ulogu u izgradnji snažnog povjerenja u odnosima između putnika i marke prijevoznika. U skladu s tim, menadžment mora osigurati pružanje besprijekorne usluge po razumnim cijenama, te stvoriti uvjete za pružanje usluga koji će društveno i psihološki obogaćivati iskustva kupaca. Koordinacijom različitih komponenti usluga, i inkorporiranjem istih u jasnu i integriranu komunikacijsku strategiju, podržava se izgradnja harmoničnog imidža u svijesti korisnika, a što je preduvjet za razvoj istinske lojalnosti prema marki prijevoznika.

Što vodi lojalnosti putnika tradicionalnim i niskobudžetnim prijevoznicima u Hrvatskoj, istraživali su autori Mikulić i Prebežac² s Ekonomskog fakulteta u Zagrebu. Rezultati njihovih istraživanja otkrivaju da imidž prijevoznika snažno utječe na lojalnost kod oba tržišna segmenta, iako među njima postoje razlike u pogledima na imidž. Za putnike koji putuju tradicionalnim prijevoznicima, percepcija o kvaliteti usluge znatno više i snažnije utječe na imidž prijevoznika nego percepcija o cijeni, dok je kod putnika niskobudžetnih prijevoznika utjecaj oba elementa na imidž prijevoznika približno podjednak. Iskustvo kupnje avionske karte ima najjači utjecaj na percepciju kvalitete usluge, ukazujući na značaj prikupljanja informacija o redu letenja, jednostavnosti rezervacija i procesu rezervacija. Segmenti putnika niskobudžetnih i tradicionalnih prijevoznika pokazuju još i druge značajne razlike. Tako su tjedne frekvencije letova izrazito važne putnicima tradicionalnih prijevoznika, dok su putnicima niskobudžetnih jedva važne i to tijekom vikenda. Na-

² Josip Mikulić i Darko Prebežac, "What drives passenger loyalty to traditional and low-cost airlines? A formative partial least squares approach", *Journal of Air Transport Management*, Vol. 17, No. 4, 2011, str. 237-240.

dalje, ponuda hrane i pića jako utječe na putnike tradicionalnih prijevoznika, dok ovaj element ponude uopće ne utječe na putnike niskobudžetnih prijevoznika, budući da se ove usluge kod niskotarifnih prijevoznika naplaćuju.

S obzirom na dimenziju pouzdanosti, kao komponente usluge, putnici niskobudžetnih prijevoznika pokazuju veću osjetljivost na sigurnost nego točnost prijevoznika, dok je situacija kod putnika tradicionalnih prijevoznika obrnuta. Pouzdanost usluge inače je identificirana kao druga najutjecajnija komponenta u stvaranju percepcije o kvaliteti usluge te se nameće kao relevantna u planiranju i oblikovanju marketinških strategija i strategija komunikacija s javnošću. Nadalje, dok su među putnicima niskobudžetnih prijevoznika cijene avionskih karata najutjecajniji indikator unutar dimenzije cijene usluga, među putnicima tradicionalnih prijevoznika to su popusti i nagrade u okviru programa lojalnosti. U tom smislu, nedavni porast nagradnih programa u sektoru niskobudžetnih prijevoznika može se promatrati kao dobra strategija za privlačenje i vezivanje onih putnika koji su u prošlosti pretežito koristili tradicionalne prijevoznike.

3. METODOLOGIJA

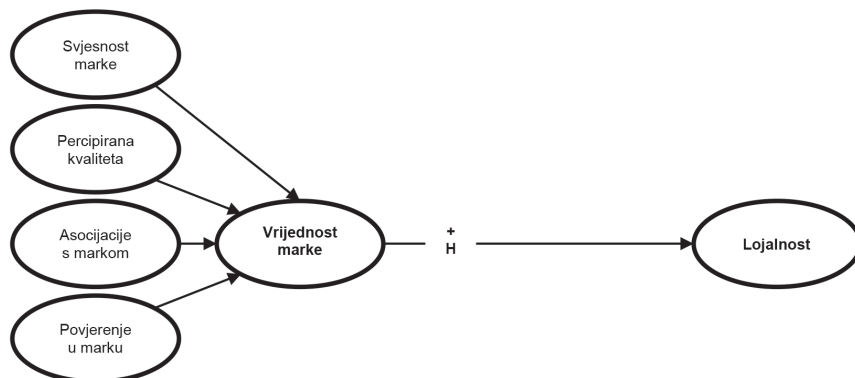
Glavni ciljevi predmetnog istraživanja su analizirati značaj marke zračnog prijevoznika pri odabiru zračnog prijevoznika u segmentu poslovnih putovanja. Nadalje, cilj je i analizirati i usporediti percepcije poslovnih putnika o tradicionalnim i niskobudžetnim zračnim prijevoznicima te utvrditi eventualne razlike u potrebama i preferencijama među korisnicima ovih dviju vrsta prijevoznika.

3.1. Ciljevi i hipoteze istraživanja

U svrhu istraživanja utjecaja marke zračnog prijevoznika na lojalnost korisnika u segmentu poslovnih putovanja, formulirane su dvije hipoteze istraživanja:

- H1: Vrijednost marke (engl. *brand equity*) zračnog prijevoznika ima značajan pozitivan utjecaj na razinu lojalnosti poslovnih putnika (Slika 1).

Slika 1. Prikaz hipoteze H1 u strukturnom modelu pretpostavljenih odnosa i utjecaja



- H2: Poslovni putnici koji koriste tradicionalne prijevoznike i poslovni putnici koji koriste niskobudžetne prijevoznike pridaju različite stupnjeve važnosti pojedinim elementima usluge prijevoznika.

3.2. Uzorak istraživanja i metode obrade podataka

Osnovni skup primarnog istraživanja čine visoko ili srednje pozicionirani menadžeri poduzeća u Hrvatskoj. Uzorak je po svojim značajkama namjerni, kvotni, pri čemu je kontrolna varijabla bila vrsta zadnje korištenog zračnog prijevoznika (niskobudžetni *versus* tradicionalni zračni prijevoznik). Podaci su prikupljeni pomoću visokostrukturiranog anketnog upitnika postavljenog na Internetu, metodom samopopunjavanja u periodu od 19.6.2012. do 10.7.2012. godine. Obuhvaćaju demografska, socioekonomska i psihološka obilježja ispitanika, njihove stavove i percepciju o zadnje korištenom zračnom prijevozniku, percipirane važnosti pojedinih obilježja zračnih prijevoznika te stavove poslovnih putnika o niskobudžetnim prijevoznicima.

U prikupljanju podataka je korišten softver slobodnog izvora *LimeSurvey* (engl. *open-source software*). Pozivno pismo poslano je na ukupno 377 adresa elektroničke pošte. Ukupno se 263 ispitanika odazvalo na istraživanje (70%), od čega je 249 upitnika bilo kompletno popunjeno te iskoristivo za obradu podataka (95%).

U mjerenju ključnih varijabli gore navedenog strukturnog modela, koje su latentne po prirodi, korištene su mjerne ljestvice sa višestrukim indikativima (Likertove ljestvice i ljestvice za direktno ocjenjivanje). Pritom se operacionalizacija zavisne i nezavisne varijable (vrijednost marke; lojalnost put-

nika) te moderatorskih varijabli (cijena; kalkulatívna privrženost; afektivna privrženost), uvelike oslanjala na konceptualizacijama varijabli koje su korištene u radovima autora³, Gustafsson *et al.*⁴ te Stahl *et al.*⁵.

U osnovnoj obradi podataka korištene su metode deskriptivne statistike (računanje mjera centralne tendencije i varijabilnosti podataka). Za potrebe testiranja formuliranih hipoteza korišteno je *structural equation modeling* (H1; Prikaz 1.), te testovi statističke značajnosti (H2). Valjanost i pouzdanost predloženog modela i njegovih varijabli ocijenjeni su primjenom Cronbach-ovog koeficijenta alfa, te pomoću eksplorativne i konfirmativne faktorske analize. Za testiranje pretpostavljenih odnosa u predloženom modelu strukturnih jednadžbi korišten je softver *SmartPLS*.⁶ Smjer i jakost veza testira se pomoću vrijednosti koeficijenata veza te statističke značajnosti koeficijenata.

4. REZULTATI ISTRAŽIVANJA

Mjerni model pokazuje visoku razinu valjanosti i pouzdanosti (Tablica 1.). Pokazatelji kompozitne pouzdanosti za sve latentne varijable su iznad kritične vrijednosti od 0,8, što upućuje na visok stupanj interne konzistentnosti.⁷

4.1. Analiza utjecaja vrijednosti marke (engl. brand equity) zračnog prijevoznika na razinu lojalnosti poslovnih putnika (Hipoteza 1)

Isto tako, visoke vrijednosti indikatora Cronbach alfa uz to upućuju na visoku razinu pouzdanosti mjerenja latentnih varijabli. Nadalje, prosječna ekstrahirana varijanca (engl. *Average Variance Extracted*, *AVE*) je iznad vrijednosti od 0,5 što upućuje na zadovoljavajuću razinu konvergentne valjanosti (Fornell i Larcker, 1981.).

³ David A. Aaker, "Measuring brand equity across products and markets", *California management review*, Vol. 38, No. 3, 1996, p. 103.

⁴ Anders Gustafsson, Michael D. Johnson and Inger Roos, "The effects of customer satisfaction, relationship commitment dimensions, and triggers on customer retention" *Journal of marketing*, Vol. 69, No. 4, 2005, p. 210-218.

⁵ Florian Stahl, Mark Heitmann, Donald R. Lehmann and Scott A. Neslin, "The impact of brand equity on customer acquisition, retention, and profit margin", *Journal of Marketing*, Vol. 76, No. 4, 2012, p. 44-63.

⁶ Christian Ringle, Sven Wende and Alexander Will, *Smart-PLS Version 2.0 M3*, *University of Hamburg*, 2005.

⁷ Josip Mikulić i Darko Prebežac, "What drives passenger loyalty to traditional and low-cost airlines? A formative partial least squares approach", *Journal of Air Transport Management*, Vol. 17, No. 4, 2011, str. 237-240.

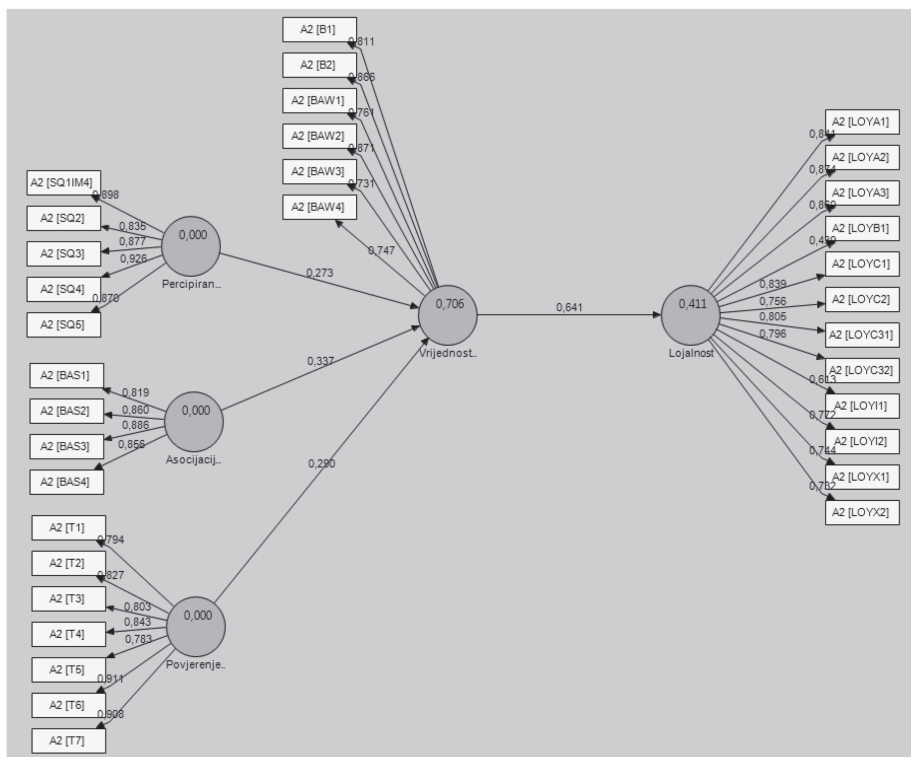
Tablica 1. Pokazatelji kvalitete modela (osnovni model)

	Kompozitna pouzdanost	Cronbachov alfa	AVE	R ²	Q ²
Asocijacije s markom	0,916173	0,877908	0,732225		
Lojalnost	0,942959	0,933352	0,585188	0,410628	0,229182
Percipirana kvaliteta	0,945759	0,928346	0,777352		
Povjerenje u marku	0,943591	0,930089	0,705686		
Vrijednost marke	0,913769	0,887165	0,639608	0,705963	0,262467

Izvor: Autori.

Što se tiče strukturnog modela (Prikaz 2), koeficijenti determinacije (R^2) latentnih varijabli unutarnjeg modela (tj. *Vrijednost marke* i *Lojalnost*) upućuju na značajnost veze među istim varijablama.⁸

Slika 2. Prikaz strukturnog modela s koeficijentima veza



⁸ W. W. Chin, "Commentary: Issues and opinion on structural equation modeling, 1998.

Nadalje, pokazatelj suvišnosti (Q_2) iznad nule je za obje varijable, što upućuje na relevantnost predviđanja od strane varijabli koji djeluju na ove latentne varijable.⁹ Isto tako t -vrijednosti upućuju na to da su koeficijenti svih veza u modelu statistički značajni

Tablica 2. T-vrijednosti koeficijenata veza u unutarnjem modelu (osnovni model)

VEZA	t-vrijednost
Asocijacije s markom -> Lojalnost	3,023408
Asocijacije s markom -> Vrijednost marke	3,112983
Percipirana kvaliteta -> Lojalnost	2,253224
Percipirana kvaliteta -> Vrijednost marke	2,361814
Povjerenje u marku -> Lojalnost	2,689913
Povjerenje u marku -> Vrijednost marke	2,799460
Vrijednost marke -> Lojalnost	12,568617

(Tablica 2.). Shodno tomu, moguće je prihvatiti hipotezu H1, tj. hipotezu da vrijednost marke (engl. *brand equity*) zračnog prijevoznika ima značajan pozitivan utjecaj na razinu lojalnosti poslovnih putnika.

4.2. Analiza razlika u važnosti elemenata usluge prijevoznika (Hipoteza 2)

Kako bi se ustanovile eventualne razlike u potrebama i preferencijama putnika niskobudžetnih i tradicionalnih prijevoznika, u Tablici 3. su prikazane aritmetičke sredine ocjena važnosti elemenata usluge prijevoznika posebno za putnike niskotarifnih prijevoznika (N=13) te tradicionalnih prijevoznika (N=236). Uz to Tablica 3. sadrži i standardne devijacije ocjena važnosti elemenata usluge prijevoznika.

⁹ Jörg Henseler, Christian M., Ringle and Rudolf R. Sinkovics, “The use of partial least squares path modeling in international marketing”, *Advances in International Marketing (AIM)*, Vol. 20, 2009, 277-320.

Tablica 3. Ocjena važnosti elemenata usluge prijevoznika

Kod	Elementi usluge prijevoznika	Vrsta prijevoznika	N	Aritm. sredina	Std. devijacija
VA1	Prijevoznik leti u mnoga odredišta i ima dobar vremenski raspored letenja.	LCC	13	4,15	1,144
		FSC	236	4,11	1,052
VA2	Prijevoznik nudi mogućnost jednostavne i brze rezervacije i kupnje karte.	LCC	13	4,38	0,768
		FSC	236	4,26	0,884
VA3	Prijevoznik nastoji da boravak putnika u zračnoj luci bude što kraći i ugodniji.	LCC	13	3,54	1,330
		FSC	236	3,70	1,090
VA4	Prijevoznik ima komforne zrakoplove, te nudi sadržaje za vrijeme leta koji skraćuju vrijeme putovanja i let pretvaraju u doživljaj.	LCC	13	3,62	1,609
		FSC	236	3,75	1,057
VA5	Prijevoznik ima dobar sustav nagrađivanja vjernosti svojih putnika kroz nagrade i bonus programe za česte putnike (FFP).	LCC	13	3,38	1,325
		FSC	236	3,53	1,045
VA6	Prijevoznik svakom putniku posvećuje posebnu pažnju, i stalo mu je do toga da razvije dobar odnos sa svakim putnikom.	LCC	13	3,15	1,405
		FSC	236	3,45	1,024
VA7	Prijevoznik nudi usluge po povoljnijim cijenama.	LCC	13	4,38	0,768
		FSC	236	3,82	0,999
VA8	Prijevoznik ima reputaciju sigurnog prijevoznika.	LCC	13	4,31	0,855
		FSC	236	4,43	0,825
VA9	Prijevoznik ima reputaciju točnog prijevoznika.	LCC	13	4,38	0,870
		FSC	236	4,20	0,976
VA10	Prijevoznik ima reputaciju da pruža vrhunske usluge.	LCC	13	4,08	0,954
		FSC	236	3,92	0,986
VA11	Prijevoznik uvijek ima slobodno mjesto.	LCC	13	3,69	1,316
		FSC	236	3,39	1,134

Napomena: LCC = Putnici niskobudžetnih prijevoznika (kratica od engl. *Low-Cost Carrier*);
 FSC = Putnici tradicionalnih prijevoznika (kratica od engl. *Full Service Carrier*).

Kao što je vidljivo iz sljedeće tablice (Tablica 4.), jedina statistički značajna razlika između putnika niskobudžetnih i tradicionalnih prijevoznika je u važnosti elementa *cijena letenja* (VA7; značajnost razlike na razini 5%). To vrijedi i pri pretpostavki jednake i nejednake varijance između ova dva segmenta korisnika. Pritom su niže cijene usluga znatno važnije putnicima niskobudžetnih prijevoznika što je zapravo očekivan nalaz (4,38 naspram 3,82; Tablica 3.). Hipoteza H2 se djelomično prihvaća samo zbog razlike u važnosti cijena između putnika niskobudžetnih i tradicionalnih prijevoznika.

Tablica 4. T-test za jednakost aritmetičkih sredina

Element usluge	t-vrijednost	Stupnjevi slobode	Signifikant-nost	Razlika u aritmetičkoj sredini	Standardna pogreška razlike
VA1	,122	13,143	,905	,039	,324
VA2	,553	13,813	,589	,122	,221
VA3	-,439	12,903	,668	-,165	,376
VA4	-,289	12,577	,778	-,130	,452
VA5	-,399	12,836	,696	-,149	,374
VA6	-,747	12,712	,469	-,295	,395
VA7	2,526	14,335	,024	,563	,223
VA8	-,512	13,261	,617	-,125	,243
VA9	,744	13,718	,470	,185	,249
VA10	,594	13,450	,563	,162	,272
VA11	,813	13,001	,431	,302	,372

Izvor: Autori.

U slučaju da se ovaj element ne promatra kao element usluge zračnog prijevoznika, hipotezu H2 bi na osnovu rezultata primarnog istraživanja ovog znanstvenog rada trebalo odbaciti, s obzirom da je jedino kod ovog elementa bila prisutna statistički značajna razlika u stupnju važnosti.

5. ZAKLJUČAK

Rezultati istraživanja korisni su menadžmentu svih zračnih prijevoznika koji posluju u Hrvatskoj. Mogu poslužiti za usporedbe i analize vlastitih rezultata, za planiranje budućih marketinških i prodajnih aktivnosti te posebno poboljšanje lojalnosti poslovnih putnika. Poglavitito su korisni nacionalnom prijevozniku Croatia Airlines budući je najveći postotak ispitanika ocjenjivao njihove usluge, a zatim i prijevozniku Lufthansa.

Empirijska potvrda snažnog i statistički značajnog pozitivnog utjecaja vrijednosti marke zračnog prijevoznika na lojalnost korisnika usluga u segmentu poslovnih putovanja, može služiti menadžmentu kao orijentir u planiranju i provođenju marketinških aktivnosti koje će voditi ka boljim prodajnim i poslovnim rezultatima.

Napomena: Rad se zasniva na istraživanju koje je za svoj znanstveni magistarski rad provela Ljilja Matas Milković.

Abstract:

THE INFLUENCE OF AIRLINE BRANDS
ON BUSINESS PASSENGER LOYALTY

Business passengers represent a valuable market segment for both traditional full service carriers as well as for low cost carriers. This study aims to shed some light on the significance of airline brands in carrier choice and to identify key variables that help to maximize customer loyalty within this segment.

The primary data used in this study were collected via self-completion questionnaires using the Lime Survey open-source surveying software. The results of this study suggest using loyalty programs to develop customer commitment paired with suited approaches towards business passengers in order to strengthen their loyalty.

Key words: airline brand, business passengers, customer loyalty.

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TOTALNI SISTEM UPRAVLJANJA AERODROMIMA – PUT U BUDUĆNOST

TOTAL AIRPORT MANAGEMENT SYSTEM – THE WAY FORWARD

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SAŽETAK

Aerodromi se vide kao prepreke za rast sistema zračnog transporta u budućnosti. Kako bi se dosegao planirani porast prometa u slijedećih 15 godina (dvostruko u odnosu na referentnu 2014. godinu ICAO - Global Market Forecast 2015-2034), moraće se povećati investicije, razvoj i istraživanje. Sve ovo je u svrhu poboljšanja u propusnosti aerodroma, efikasnosti i tačnosti uz kontinuitet u postizanju sigurnosti. Procesi na aerodromima moraju biti u potpunosti integrirani unutar sistema upravljanja zračnim prostorom (Air Traffic Management-ATM) i biti sposobni za interakciju s drugim komponentama sistema na način da razumiju prioritete operatora zrakoplova i ograničenja zračne transportne mreže, a sve u cilju optimalnog ispunjenja potreba korisnika zračnog prostora. Aerodromsko kolaborativno donošenje odluka (Collaborative Decision Making-CDM) je koncept koji ima za cilj poboljšanje Upravljanja zračnim protokom i kapacitetom (Air Traffic Flow and Capacity Management-ATFCM) na aerodromima čime se postiže smanjenje kašnjenja, poboljšanje predvidljivosti do-

gađaja i optimizacija korištenje resursa. Total Airport Management System-TAMS pristup integriše postojeće sisteme optimizacije podrške. Sistemi podrške su razvijeni u prošlosti kako bi se pomoglo ljudskim operaterima u njihovim individualnim radnim procesima. Na primjer: alati za slijetanje, polijetanje i upravljanje površinama su već pokazali da mogu dovesti do poboljšanja sigurnosti i efikasnosti.

Ključne riječi: kolaborativno odlučivanje, upravljanje aerodromom, kvalitet podataka.

1. UVOD

Aerodromi su primjeri vrlo velikih, dinamičnih i složenih sistema sa mnogim međuzavisnostima između različitih saobraćajnih grana:¹ (zračni transport, cestovni transport, željeznički transport i javni prevoz).

Uobičajeno se aktivnosti na aerodromima dijele na one koje se obavljaju na **zračnoj strani** (airside) - svi procesi direktno vezani za zrakoplov i neophodne podprocese vezane za opslugu zrakoplova i aktivnosti na **zemaljskoj strani** (landside) - svi procesi koji su podrška procesima na zračnoj strani, a odvijaju se najčešće u zoni slobodnog pristupa.

Usluge na zračnoj strani mogu biti: usluge zračne kontrole, usluge zemaljske kontrole, usluge aerodromske zemaljske opsluge, usluge zemaljske opsluge zračnog prevozioca.

Usluga na zemaljskoj strani mogu biti: terminalne usluge (usluge unutar putničkog ili kargo terminala), usluga salona (poslovnih salona), usluge za prtljag, posebne usluge (VIP, osobe sa invaliditetom).

Međuzavisnosti između službi i stepen složenosti sistema je rezultat sljedeće činjenice:

- službe dijelom dijele iste resurse (npr. gledano sa zračne strane aerodroma: stajanku, rulne staze, piste, zračni prostor);
- sve službe moraju da sarađuju da doprinesu zajedničkom transportnom cilju.

Usluge su u nadležnosti različitih operatora. Aerodrom se može posmatrati kao heterogeni sistem-sistema sa različitim interesnim grupama, svaka grupa posluje u različitim područjima s različitim ciljevima, ali sve uglavnom u cilju maksimiziranja: sigurnosti, propusnosti, dobiti, minimiziranje utjecaja na okoliš.

¹ Institute of Flight Guidance, Final Report of Preliminary Study Total Airport Management, DLR, Institut für Flugführung, Braunschweig, Germany, 2001.

2. SUBJEKTI ILI UČESNICI NA AERODROMIMA I NJIHOVA PERCEPCIJA ZAHTJEVA

Ako posmatramo suštinu zračnog prometa, onda možemo reći da su ključni korisnici ukupne usluge zračnog prometa - putnici. Naravno, ovdje na određen način ciljano pravimo grešku jer u segmentu kargo usluga, što može da bude u određenim slučajevima specijalizovanih aerodroma osnovni proces, nemamo putnika.

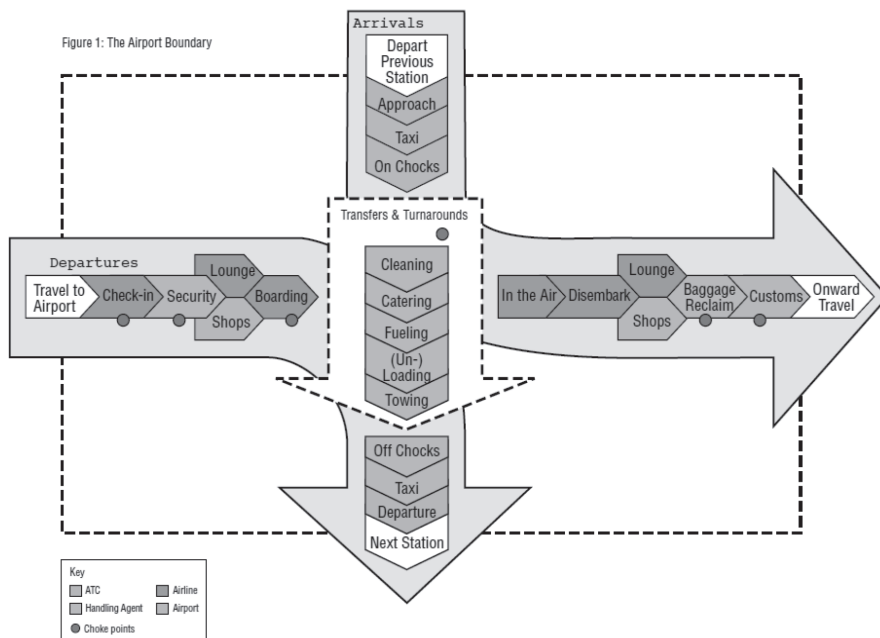
Većina putnika integralno posmatra i ocjenjuje ukupnu uslugu zračnog prevoza. Ovo praktično znači proces od rezervacije karte do ukrcavanja u zrakoplov. Može se reći i da je ukupni cilj zadovoljstvo korisnika usluge za sve vrste pruženih usluga.

Ono što se praktično ne vidi iz ugla korisnika usluge ili neupućenih u sve detalje jeste da različite organizacije i pružatelji usluga, svako od njih s puno odgovornosti, moraju biti koordinirani pod različitim uvjetima. Možemo izdvojiti dva glavna aktera rada na aerodromu: 1) operatori aerodroma i 2) operateri zrakoplova (zrakoplovne kompanije).

Za operatore aerodroma karakteristično je da imaju pridružene organizacije ili su odgovorni za organizaciju ovih funkcija. U ove funkcije ili organizacije možemo navesti:

- lokalne vlasti, vlada (institucije koje predstavljaju vlast, npr. kontrola putnih dokumenata);
- koncesionari (zakupci);
- održavanje i snabdijevanje infrastrukturom (struja, voda, plin, itd.);
- policija;
- protivpožarna zaštita;
- medicinska služba, hitna pomoć;
- meteo služba i sl.

Slika 1. Procesi i sudionici rada na aerodromu



I operatori zrakoplova imaju pridružene organizacije ili su odgovorni za organizaciju ovih funkcija. U ove funkcije ili organizacije možemo navesti: snabdijevanje gorivom, inženjering, snabdijevanje hranom i pićem u toku leta (catering) i usluge sanitarne službe).

Detaljno se fokusiramo na usluge zračnog prevozioca (1), usluga aerodroma (1-3) i usluge kontrole letenja (3-5):

1. komponenta izlazna pozicija/parking pozicija (Gate/Stand),
2. Komponenta platforme (apron),
3. Komponenta rulnih staza (taxiway),
4. Komponenta pisti (runway),
5. Komponente zračnog prostora (ATM, ASM, ATFM, ATS).

Ove komponente su u nadležnosti: operatora zrakoplova (koji u većini slučajeva nije odgovoran za funkcije aerodroma, peratora aerodroma i kontrole zračnog prostora).

Ove usluge, a posebno njihovi planovi, međusobno su povezani i uslovljeni. Također, zajednički oblik organizacije rada ovih službi je putem operativnih centara, u nekim slučajevima se ovi centri nalaze veoma blizu jedan drugom.

3. PROBLEMI SA KOJIM SE SUOČAVAJU AERODROMI U SAVREMENOM POSLOVANJU

Aerodromi se vide kao prepreke za rast u budućnosti sistema zračnog transporta. Kako bi se dosega planirani porast prometa u slijedećih 15 godina (dvostruko u odnosu na referentnu 2014. godinu ICAO - Global Market Forecast 2015-2034), moraće se povećati investicije, razvoj i istraživanje. Sve ovo je u svrhu poboljšanja u propusnosti aerodromu, efikasnosti i tačnosti uz kontinuitet u postizanju sigurnosti. Procesi na aerodromima moraju biti u potpunosti integrirani unutar sistema upravljanja zračnim prostorom (ATM) i biti sposobni za interakciju s drugim komponentama sistema na način da razumiju prioritete operatora zrakoplova i ograničenja zračne transportne mreže, a sve u cilju optimalnog ispunjenja potreba korisnika zračnog prostora.

Kao prvi korak u ovom procesu evolucije, sve bitne procese iz zračne luke počevši od registracije putnika do opsluge zrakoplova, potrebno je projektovati u svrhu postizanja zajedničkog cilja, a to je osiguranje da svaki odlazak zrakoplova ispunjava dogovorenu 4D trajektoriju.

Sporazum za 4D-putanje, baziran je na preciznom vremenu polijetanja i projektovanom vremenu slijetanja i povećaće, ne samo efikasnost ATM sistema, već i samih aerodroma.

Aerodromi su čvorovi sistema zračnog saobraćaja. Aerodrom zasnovan na učinku (performance-based) je potreban preduvjet za budući ATM sistem zasnovan na učinku. Stoga koncepti budućnosti imaju za cilj integrirano upravljanje zračnom lukom, gdje su svi procesi: svih glavnih operatora zrakoplova, zračne luke, aerodrom, aerodromska Air Traffic Control – ATC i pružatelji usluga opsluge provode koristeći jedan set podataka.

Za sve sudionike procesa na aerodromima vrijedi:²

- nedostatak zajedničkog planiranja i to od strateškog planiranja do taktičkog i operativnog planiranja između kontrole letenja, planera zračnih luka, agencija za opslugu, operatora zrakoplova i nacionalnih koordinatora zračne luke, što je rezultiralo neoptimalnim korištenjem već oskudnih kapaciteta zračnih luka³;

² EUROCONTROL, Total Airport Management (Operational Concept + Logical Architecture), Edition Number: 3.0, 2006.

³ Teoretski, postoji dovoljno zračnih luka i pista u Europi da mogu zadovoljiti zahtjeve u budućnosti. Međutim, tržište i dalje zahtjeva upotrebu glavnih aerodroma, pa time će isti i dalje biti uska grla u sistemu zračnog saobraćaja. Prognoza rasta saobraćaja će pogoršati problem zagušenja na najprometnijim aerodromima što će vjerojatno utjecati na kontrolu i distribuciju saobraćaja. Regionalni aerodromi postaju sve važniji u ovom procesu. Dakle, zagušenja se mogu prenijeti na aerodrome u kojima ovaj problem još ne postoji. Ovaj problem, ako se ne artikulira u pravo vrijeme, dodatno će poremetiti redove letenja, degradirati javnu uslugu i imati dodatni (negativni) uticaj na životnu sredinu.

- ograničena i nedovoljna infrastruktura za real-time razmjenu podataka između kontrole letenja, meteo službi, operatora aerodroma i zrakoplova (uključujući i službe za opslugu), što rezultirala nefleksibilnim odgovorima na događaje u realnom vremenu i promjene u operativnim zahtjevima korisnika;
 - nemogućnost da se u potpunosti iskoriste potencijali modernih dostignuća u oblasti avionike zrakoplova;
 - ograničenja u oblasti okoliša i zahtjevi koji mogu značajno uticati na kapacitet⁴;
 - dugo vrijeme implementacije za uvođenje poboljšanja i/ili novih sistema u zrakoplov i kontrolu letenja.
- Nadalje mogu se izdvojiti i slijedeći problemi:
- različite komercijalne i vladine zainteresirane strane;
 - djelomično suprotstavljeni interesi između zainteresiranih strana;
 - historijski razvoj struktura (težak prelazak na novi način upravljanja);
 - lokalno odlučivanje bez uvida na globalnu situaciju i
 - vrlo konvencionalne tehnike za koordinaciju.

4. PRINCIPI TOTALNOG UPRAVLJANJA AERODROMIMA

(European Civil Aviation Conference - ECAC) strategija iz 1990., koja sadrži sveukupni cilj “hitno pružanje povećanog zračnog prostora i kontrolu kapaciteta... zadržavajući visok nivo sigurnosti”, usvojena je od strane ministara transporta zemalja ECAC u 1990.

4.1. Historijski počeci

To je dovelo do uvođenja Programa integracije i harmonizacije europske kontrole zračnog prometa (European Air Traffic Control Harmonisation and Integration Programme - EATCHIP) i Sistema sučelja Aerodrom/Kontrola zračnog prometa (Airport/Air Traffic System Interface - APATSI). Ova unaprijeđenja, kao i implementacija Centralne upravljačke jedinice za protok (Central Flow Management Unit-CFMU), pomogao je da se poboljša kapa-

⁴ Zaštita okoline postaju sve važnija u aerodromskim operacijama i upravljanjem zračnim prostorom (ATM). Napredak je postignut u standardima ICAO što je dovelo do smanjenja nivoa buke i emisija kod novih aviona. Međutim, naprednije ATC procedure, operativne tehnike letenja i nove infrastrukture i tehnologije su potrebne kako bi se smanjila buka i emisija. Međutim, čak i to neće pružiti rješenje kada nisu u kombinaciji sa efikasnim planiranjem korištenja zemljišta oko aerodroma i dugoročne nacionalne i regionalne/komunalne strategije za zaštitu i ekonomskih i ekoloških interesa društva.

citeta i efikasnosti, ali ta poboljšanja su već prevaziđena zbog kontinuiranog rasta potražnje⁵.

4.2. Veza sa ATM strategijom 2000+

Na petom sastanku ECAC ministara transporta (MATSE/5) u Kopenhagenu 14. februara 1997. godine, ministri su usvojili Institucionalnu strategiju za zračni promet (ATM) u Europi i odlučili da EUROCONTROL revidira konvenciju, koja je kasnije potpisana 1997. godine, i ova konvencija treba biti pravni instrument za provedbu ECAC ATM institucionalne strategije.

Osim toga, ministri su tražili za razmatranje na sljedećem sastanku prijedlog za sveobuhvatnu, Gate-to-Gate orijentisanu ATM Strategiju za godine 2000+ kao nastavak za Strategije na ruti i aerodrom za 1990.

To je dovelo do razvoja Europske strategije upravljanja zračnog prometa za godine 2000+ (European Air Traffic Management Strategy - "The ATM Strategy 2000+").⁶

ATM strategija 2000+ zamenjuje ECAC Strategije iz 1990. Ova strategija se gradi na rezultatima Programa integracije i harmonizacije europske kontrole zračnog prometa (European Air Traffic Control Harmonisation and Integration Programme - EATCHIP) i Sistema sučelja Aerodrom/Kontrola zračnog prometa (Airport / Air Traffic System Interface - APATSI). Prema ATM Strategy 2000+, dio I (2003 edicija), glavne karakteristike novog koncepta su:

- strateški organizacija i poboljšanu predvidivost;
- upravljanja letom od polazne do dolazne stanice (Gate-to-Gate);
- poboljšana fleksibilnost i efikasnost;
- zajedničko (kolaborativno) donošenje odluka;
- odgovarajuće upravljanje kapacitetima da se zadovolji potražnja;
- zajedničko (kolaborativno) upravljanje zračnim prostorom.

Projekat Aerodrom CDM i koncept Aerodrom CDM podržavaju ove karakteristike direktno ili indirektno kroz bolje odlučivanje i poboljšanje predvidljivosti.⁷

Razvojem Naprednog vođenja površinama kretanja i kontrole (Advanced Surface Movement Guidance and Control - A-SMGCS), čiji se početak razvoja

⁵ EUROCONTROL, Airport CDM Operational Concept Document, Edition Number: 3.0, 2006.

⁶ EUROCONTROL, European Air Traffic Management Strategy for the years 2000+, 2003 Edition.

⁷ EUROCONTROL, Airport CDM Operational Concept Document, Edition Number: 3.0, 2006.

veže za kraj 1980-ih, omogućava se upravljanja procesima na aerodromu na integrirani način. Tu se prije svega misli da se ne razvijaju alati za podršku pilotima, kontrolorima na tornju ili kontrolorima opsluge na zemlji odvojeno, već da se definišu A-SMGCS kao jedan integrirani sistem podrške za aerodrome sa specifičnim - sučeljima za različite operatore.

Najnovija dostignuća kao Kolaborativno donošenje odluka (CDM) nastavlja sa ovim trendom integracije, pružajući poboljšanu razmjenu informacija između različitih radnih mjesta novim elektronskim putem, dodavanje novih pristupa na postojeću IT-infrastrukturu. Ovakav pristup će vjerojatno dovesti do značajnih poboljšanja u srednjoročnom periodu.⁸

4.2.1. CDM

Prema definicijama je:⁹ Aerodromsko kolaborativno donošenje odluka (CDM) je koncept koji ima za cilj poboljšanje Upravljanja zračnim protokom i kapacitetom (Air Traffic Flow and Capacity Management-ATFCM) na aerodromima čime se postiže smanjenje kašnjenja, poboljšanje predvidljivosti događaja i optimizacija korištenje resursa. Implementacija Aerodrom CDM omogućava svakom partneru Aerodrom CDM optimizirati svoje odluke u suradnji s drugim partnerom Aerodrom CDM, znajući njihove preferencije i ograničenja kao i stvarne situacije i situacije koje se predviđaju. Donošenje odluka od strane partnera Aerodroma CDM je olakšavajuća jer se vrši razmjena tačne i pravovremene informacije kroz prilagođene postupke, mehanizme i alate. Koncept Aerodrom CDM je podijeljen u sljedeće elemente:

- aerodrom CDM dijeljenje informacija;
- CDM proces prihvata i otpreme – pristup ključnih tačaka (Milestones Approach);
- proračun varijabilnog vremena taksiranja;
- kolaborativno upravljanje ažuriranja leta;
- kolaborativna predpoletna sekvenca;
- CDM u nepovoljnim uslovima;
- napredni CDM,
- aerodrom CDM Partner.

Aerodrom CDM Partner je jedna od zainteresiranih strana CDM-A, koji sudjeluje u procesu CDM. Glavni partneri Aerodrom CDM su:

⁸ Institute of Flight Guidance, Final Report of Preliminary Study Total Airport Management, DLR, Institut für Flugführung, Braunschweig, Germany, 2001.

⁹ EUROCONTROL, Airport CDM Operational Concept Document, Edition Number: 3.0, 2006.

- operateri aerodroma;
- operatori zrakoplova;
- organizacije za opslugu na zemlji;
- organizacije koje se bave odleđivanjem;
- pružatelj navigacionih usluga (Air Navigation Service Provider - ATC);
- centralne upravljačke jedinice za protok (CFMU);
- usluge podrške (policija, carina i imigracije, itd).

4.2.2. CDM elementi¹⁰

Aerodrom CDM dijeljenje informacija

CDM razmjena informacija je od suštinske važnosti za postizanje zajedničke situacijske svijesti (Common Situational Awareness - CSA) kroz razmjenu i dijeljenje svih relevantnih informacija, uključujući i snimanje podataka i post-operativne analize. Također predstavlja temelj na kojem svi ostali elementi rade i kao takav mora biti prvo implementiran.

CDM proces prihvata i otpreme - pristup ključnih tačaka (Milestones Approach)

Fokusirajući se na proces prihvata i otpreme i unutrašnje povezivanje segmenata leta i na Centralnu upravljačku jedinicu za protok - CFMU, ovaj element poboljšava predvidljivost ulaznog i izlaznog prometa. Zajedno sa Aerodrom CDM dijeljenje informacija, pruža temelj saobraćajne mreže, od suštinskog značaja za šire planiranje poboljšanja sistema. Ovaj element je bitan ako se očekuje ostvarenje punog potencijala CDM dijeljenja informacija.

Proračun varijabilnog vremena taksiranja

Proračun varijabilnog vremena taksiranja ima za cilj poboljšanje tačnosti proračuna u vezi sa kretanjem zrakoplova na tlu, kao što je očekivano vrijeme polijetanja. Ovaj element je preduvjet za implementaciju Kolaborativno upravljanje ažuriranja leta.

Kolaborativno upravljanje ažuriranja leta

Ovaj element osigurava potrebne operativne fleksibilnosti ATFM da se nose s izmjenama u vremenima polijetanja, zbog promjena u saobraćaju i preferencije operatora. Ovo upravljanje zahtijeva precizno vrijeme taksiranja koje osigurava element Proračun varijabilnog vremena taksiranja i element CDM proces prihvata i otpreme – pristup ključnih tačaka (Milestones Approach).

¹⁰ Ibid.

Kolaborativna predpoletna sekvenca

Ovaj element povećava fleksibilnost i pomaže u optimizaciji resursa aerodroma.

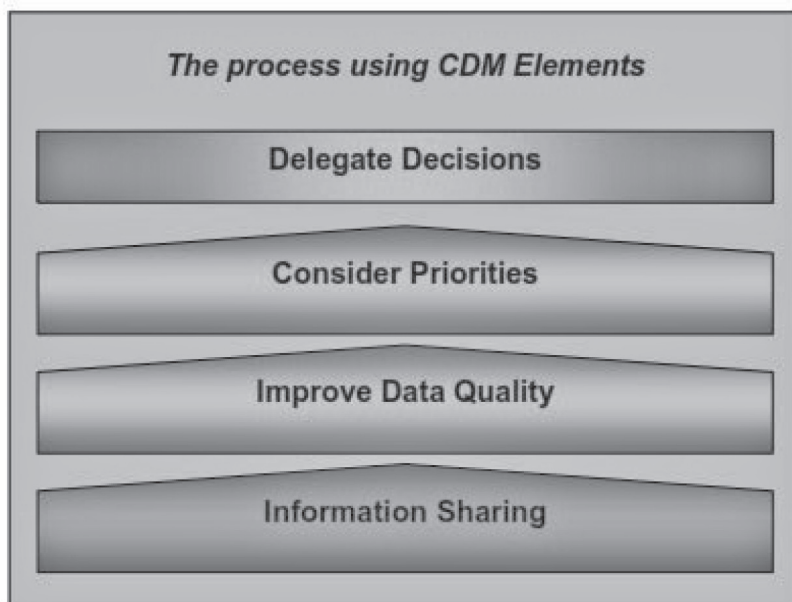
CDM u nepovoljnim uslovima

Ovaj element olakšava distribuciju promjena kapaciteta i oporavak od prekida, osiguravajući fleksibilnost i optimalno korištenje raspoloživih resursa.

Napredni CDM

Iako još uvijek nedefinisani u potpunosti, ovaj element će povećati i proširiti zajedničke situacijske svijesti i povećanje saradnje između partnera aerodroma koristeći napredne tehnologije i povezivanje s naprednim alatima, odnosno A-SMGCS, AMAN/DMAN.

Slika 2. Procesi sa korištenjem CDM elemenata



Benefiti primjene CDM za partnere su:¹¹

Operatori zrakoplova ⇒	Program letnih operacija se odvija prema rasporedu
Organizacije za opslugu na zemlji ⇒	Tačnost vremena polijetanja i prihvata i otpreme, Povećano korištenje resursa
Organizacije koje se bave odleđivanjem ⇒	Precizno poznavanje zahtjeva Povećano korištenje resursa
Operateri aerodroma ⇒	Tačnost polijetanja i slijetanja, Povećano korištenje parking mjesta, izlaza i terminala
Pružatelj navigacionih usluga (ATC) ⇒	Optimizirano korištenje aerodromske infrastrukture, Smanjenje zagušenja
Centralne upravljačke jedinice za protok (CFMU) ⇒	Optimizirano korištenje ATFM slotova, Povećano korištenje rutnih i aerodromskih kapaciteta

A-CDM je u potpunosti implementiran na slijedećim aerodromima:¹² Berlin Schönefeld, Brussels, Düsseldorf, Frankfurt, Helsinki, London Gatwick, London Heathrow, Madrid, Milan Malpensa Munich, Paris CDG, Oslo, Rome Fiumicino, Stuttgart, Venice, Zurich.

4.2.3. TAM

Aerodromi su čvorovi sistema zračnog saobraćaja. Aerodrom zasnovan na učinku (performance-based) je potreban preduvjet za budući ATM sistem zasnovan na učinku. Stoga koncepti budućnosti imaju za cilj integrirano upravljanje aerodromom, gdje su svi procesi: svih glavnih operatora zrakoplo-

¹¹ Ibid.

¹² Damir Vuk, Enes Ciriković i Dominik Suk, „Kvaliteta podataka i njen značaj danas“, Praktični menadžment, Vol. VI, No. 1, 2015, str. 54-58.

va, zračne luke, aerodrom, aerodromska ATC i pružatelji usluga opsluge provode koristeći jedan set podataka.

Ovo je utemeljeno u Operativnom centru aerodroma (Airport Operations Centre - APOC) gdje operateri stalno komuniciraju i koordiniraju, razvijaju i dinamički održavaju zajedničke planove i izvršavaju one koji su u njihovoj zoni odgovornosti. Različite moguće APOC implementacije se očekuje, u rasponu od distribuirane virtualne APOC pa sve do high-tech fizičkih APOC, čak i sa novim ulogama operatera.

Jezgra informacijske osnove u Totalnom upravljanju aerodromom je Operativni plan aerodroma (Airport Operations Plan - AOP). Za AOP možemo reći da predstavlja projekciju Plana mrežnih operacija (Network Operations Plan - NOP), obogaćen sa specifičnim podacima aerodroma. Sadrži performanse aerodroma, tvrda i meka ograničenja različitih zainteresiranih strana, pa sve do detaljnog opisa resursa. Postoje različite opcije implementacije AOP, osiguravajući različite komercijalne interese zainteresiranih strana.

TAM pristup integriše postojeće sisteme optimizacije podrške. Sistemi podrške su razvijeni u prošlosti kako bi se pomoglo ljudskim operaterima u njihovim individualnim radnim procesima. Na primjer: alati za slijetanje, polijetanje i upravljanje površinama su već pokazali da mogu dovesti do poboljšanja sigurnosti i efikasnosti. Ali to je samo kada evoluiraju iz današnje situacije u kojoj oni djeluju kao pojedinačni alat za podršku i postaju komponente integrirane arhitekture informacija aerodroma koja mogu djelovati kao holistički alata za podršku u odlučivanju za sve partnere na aerodromu.¹³

4.2.3.1. Pristup TAM¹⁴

Totalno upravljanje aerodromom (TAM) posmatra aerodrom holistički kao jedan čvor ukupne zračne transportne mreže. Kako bi se osigurao ukupni Kvalitet usluge (Quality of Service - QoS) aerodroma i to prema korisnicima usluga i prema zračnoj transportnoj mreži, TAM se koncentrira na početnim fazama strateškog i predtaktičkog planiranja pomoću najpreciznijih dostupnih informacija, zatim praćenje (i kada je to potrebno, reaktivno planiranje) taktičkog radnog procesa. Koristi:

- Zbog poboljšane predvidljivosti raspoloživih sredstava može se koristiti na optimiziran način i višak kapaciteta se može smanjiti ili spriječiti.

¹³ EUROCONTROL, Total Airport Management (Operational Concept + Logical Architecture), Edition Number: 3.0, 2006.

¹⁴ Ibid.

- Situaciona svijest predviđenih događaja će povećati zadovoljstvo kupaca (operatora zrakoplova i putnika).
- Može se očekivati bolje razumijevanje i veću transparentnost kooperativnih pregovaranja i donošenje odluka za sve aktere.
- Rješenja sukoba sa boljim prihvatanjem od strane različitih interesnih grupa su mogući.

Važno je napomenuti da ovaj QoS ugovor ne podrazumijeva određeni, unaprijed zadati oblik, način realizacije, organizacijske strukture ili sistema tehničke podrške za svaki pojedinačni aerodrom. To je u potpunosti do aerodroma kako će definisati QoS ugovor s zainteresiranim stranama, tako da će veliki izbor implementacije TAM biti moguć - u rasponu od rada sa olovkom i papirom na vrlo malom aerodromu, pa sve do uspostavljanja komandnih i kontrolnih centara sa ogromnom računarskom podrškom za velike aerodrome.

4.2.3.2. Područje primjene

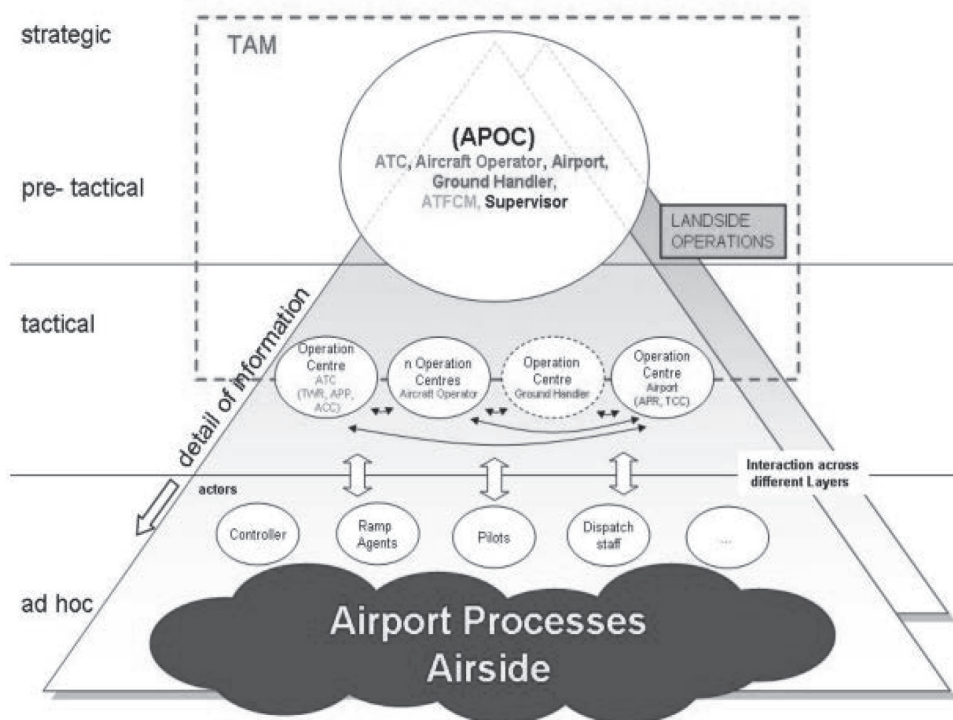
Izvršenje aktivnosti u redovnom radu nije dio TAM. Kako bi se postigla vremenska efikasnosti kao i kompetentnost izvršenja pojedinih aktivnosti redovni rad će biti i ostati unutar Operativnih centara, ali ishodi ovih aktivnosti moraju se uzeti u obzir u TAM. Područje primjene TAM je ograničena na jedan aerodrom, ali uz uticaj na druge TAM, druge aerodrome, i cijeli zračni promet.

TAM također daje priliku da se ostvari novi način komunikacije. Zainteresovane strane će dobiti uvid o procesima i probleme drugih aktera i biti svjesni predstojećih problema u vezi različitih vanjskih okolnosti (npr. vremenski uvjeti). U CDM procesu oni će raditi i odlučivati zajedno o rješenjima i zavise od aerodroma, odluka će ili mogu biti donešene u nekoj vrsti centralnog "sjedišta" ili putem decentraliziranog sistema. Budući koncept TAM će omogućiti razvoj automatiziranih alata za planiranje koji će omogućiti zainteresiranim stranama postizanje boljeg nivoa performansi. Obim TAM može se opisati na različite načine, u vremenskom i prostornom obliku.

U vremenskom okviru TAM se proteže od strateškog faze sve do predtaktičke i taktičke faze. Crvena isprekidana linija (Slika 3) izražava vremenski raspon TAM, dok APOC (Airport Operation Centre) prikazuje fizičku realizaciju u strateškoj, predtaktičkoj i dijelom taktičkoj fazi.

Većina Operativnih centara koji egzistiraju u sadašnjosti, a potiču od različitih zainteresiranih strana (ATC, zrakoplovni operatori itd) posao uglavnom obavljaju samo u taktičkom vremenskom horizontu.

Slika 3. Vremenski okvir TAM



Definicija strateške faze

Strateška faza obuhvata vremenski horizont planiranja koji obuhvata samo rad na performansama i nivou protoka i imaju samo pretpostavke (obično na osnovu iskustva) na raspolaganju za planiranje zračnog prometa (raspored). Danas strateška faza obično počinje nakon početka konferencije za SLOT¹⁵ i završava se sedam dana prije događaja.

Definicija predtaktičke faze

Predtaktičke faze obuhvata vremenski horizont planiranja koji obuhvata samo rad na performansama, nivou protoka i nivou slučaja. Ovim se postiže rana procjena parametara, kao što su meteorološki i potencijalni manjak kapaciteta uzimajući u obzir predviđeno stanje zračnog prometa (raspored i pro-

¹⁵ SLOT Konferencija je radna konferencija. Kao dio procesa SLOT odobravanja, svrha ove konferencije je da IATA i ne-IATA članicama širom svijeta omogući forum za dodjelu slotova u potpunosti koordiniranih aerodromima (Level 3), a za postizanje konsenzusa o prilagodbi rasporeda reda letenja ograničenjima kapaciteta aerodroma (Level 2). Polugodišnja (juni i novembar) Slot konferencije je najveći događaj IATA.

cjene). Danas predtaktička faza obično obuhvata vrijeme od sedam dana prije događaja do početka taktičke faze.

Definicija taktičke faze

Taktički faza obuhvata dan operacije do nivoa trenutnog stanja. Ova faza koristi detaljne vremenske i druge relevantne operativne informacije, uzimajući u obzir najnovije podatke koji se odnose na stanje zračnog prometa (raspored, procjene i stvarna vremena). TAM ne obuhvata vremenski horizont planiranja koji rade isključivo na nivou događaja (npr. AMAN, DMAN, ...)¹⁶ i kreira upravljana (automatski planirano) vremena za događaje. Ova vremena se koriste kao fiksni događaj za dalje izračunavanje procesa upravljanja.

U strateškoj fazi detalji informacija za planiranje su niži (u usporedbi s predtaktičkom i taktičkom fazom) i rezultati grubog planiranja budućeg toka prema vremenu rasporeda letova i poznatog kapaciteta pod “normalnim” okolnostima (dva puta godišnje, prema IATA konferenciji prosjek kapaciteta piste će se koristiti za koordinaciju dolaska i odlaska puta). U ovoj fazi nekoliko scenarija može se razviti u zavisnosti od ograničenja, kao što su smjer vjetera, loše vrijeme, rani dolazak interkontinentalnog leta itd.

Zbog naknadnih informacija u predtaktičkoj fazi npr. izmjene u vremenu (meteorološki) mogu uticati na razvoj strategija i predefinisane ciljeva performansi i protoka. Ove aktivnosti će ovisiti o kvaliteti podataka, predvidljivosti i vjerojatnosti nastanka događaja.

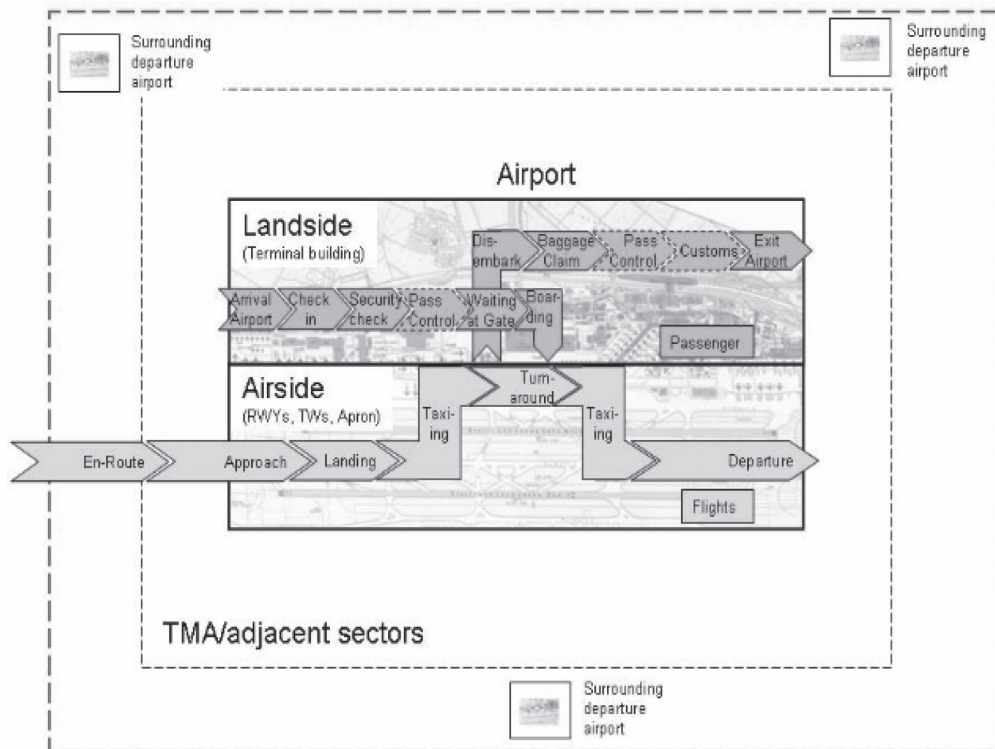
S približavanjem datuma leta (taktička faza) planiranje aktivnosti mogu se intenzivirati i postati preciznije u skladu sa povećanjem kvalitete informacija. U ovoj fazi Operativni centri su uglavnom uključeni: centar ATC, operatora zrakoplova, zračne luke i centri pružatelja usluga.

Ovisno o kvaliteti podataka, predvidivosti i vjerojatnosti nastanka događaja, TAM može biti proširen na oblasna područja (enrote) i ako se uzmu kratki letovi u obzir i na okolne aerodrome odlaska. Stoga veze i potencijalno preklapanja nadležnosti između TAM i ATM treba utvrditi.

Zemaljske operacije kao što je registracija (check-in), sigurnosne provjere itd imaju direktan utjecaj na zračne operacije. Kašnjenje putnika zbog operativnih kašnjenja može dovesti do odstupanja vremena ukrcavanje, koji može prouzrokovati daljnje negativne događaje kao što je zatvaranje izlaza (gate) ili dijelova terminala (npr. zbog prtljaga bez nadzora), što u konačnici utiče na operacije u cjelosti.

¹⁶ Upravljanje dolascima (AMAN) funkcionira na osnovu stanja zračnog prostora, postojanja zračnih turbulencije, sposobnosti zrakoplova i prioriteta korisnika u slijetanju. Uvakav način upravljanja slijetanjem omogućava povećanje aerodromske propusnosti. Upravljanje odlascima (DMAN) služi za optimizaciju odlazaka kako bi se osiguralo najefikasnije korištenje resursa aerodroma.

Slika 4. Prostorni obuhvat TAM



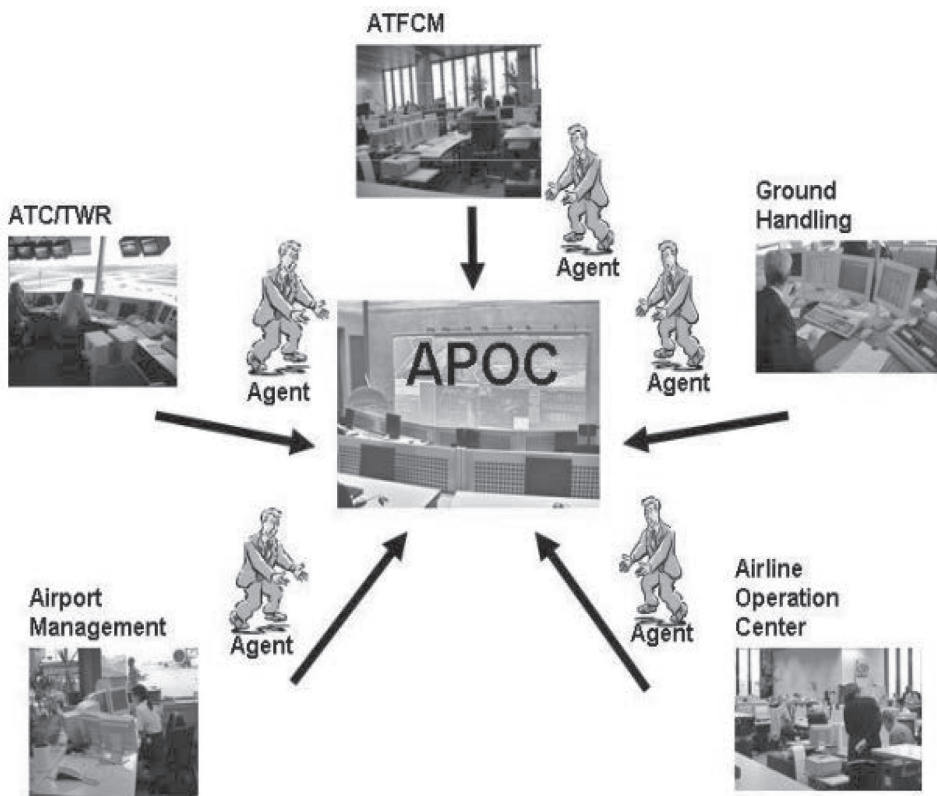
Zemaljske operacije su dio TAM, samim time što ako se ne uzmu u obzir ne bi se moglo u cjelosti nositi sa dešavanjima na zračnoj strani.

4.2.4. APOC¹⁷

TAM bi trebao biti skalabilan i prilagodljiv za različite veličine aerodroma, jer ne treba svaki aerodrom kompletnu tehničku složenost TAM. Na nekim aerodromima dijelovi TAM su već na raspolaganju i trebaju samo da bude povezani sa globalnim sistemom upravljanja. S druge strane, manji aerodromi u nekim dijelovima kao što su operacioni centri moraju biti završeni ili dodate funkcije kako bi se ukupna funkcionalnost TAM mogla implementirati.

¹⁷ EUROCONTROL, Total Airport Management (Operational Concept + Logical Architecture), Edition Number: 3.0, 2006.

Slika 5. APOC učesnici



Centralni alat TAM je Aerodromski operativni centar APOC gdje su predstavnici svih zainteresiranih strana uključeni u radu. Ovakav APOC ima dvije glavne funkcije: Prva, sve relevantne informacije aerodroma, promet na zračnoj i zemaljskoj strani, operacije na zemlji, vremenske uvjete i tako dalje, prikupljaju, prate i analiziraju u centru. Ova informacije su na odgovarajući način pripremljene za prikazivanje rukovodnom osoblju i služe kao pomagala za operativne i taktičke odluke vezane za rad aerodroma i zračnog prometa na optimalan način.

Druga je da APOC treba opremiti alatima za planiranje i alatima za simulaciju za predtaktička, i u nekim slučajevima strateška planiranja. Pri tome količinu tehničkih sistema i alata treba prilagoditi u funkciji složenosti aerodromske infrastrukture i obima dnevnih operacija. Povezivanje postojećih tehničkih sredstava i njihova integracija u globalni koncept, TAM će omogućiti razvoj i implementaciju automatskih alata za planiranje što će pomoći zainteresiranim stranama postizanje boljeg nivo performansi. TAM će dati i kon-

cept za komunikacije i platformu za informacije za sve zainteresirane strane uključene u rad aerodroma, i time omogućiti svakom učesniku da donose odluke u najboljem okruženju u skladu s ciljevima CDM.

U suštini aerodromski operativni centar može biti “centralizovani” ili “decentralizovani”, kao i varijantna rješenja ova prethodna dva.

Centralizovani APOC zahtijeva jednu prostoriju u kojoj sve relevantne informacije će se spojiti i prikazati. Svaki član zainteresirane strane ili njegov zastupnik posjeduje radno mjesto s online pristupom svom operativnom centru za razmjenu informacija i kako bi se omogućilo donošenje odluka.

Centralno rješenje sadrži kompletan APOC sa znatnom tehničkom opremom za analizu u realnom vremenu, planiranje i simulaciju i to pretežno za velike međunarodne aerodrome. Na ovaj način sve zainteresirane strane dijele iste informacije istovremeno i imaju mogućnost donošenja harmoniziranih odluka. Oni će biti svjesni potencijalnih problema i putem procesa CDM mogu razviti i koordinirati najbolja rješenja u ranoj fazi.

Decentralizovani APOC ne zahtijeva samostalan i izdvojeni operativni centar. Umjesto ovog, zainteresirane strane su povezane s online pristupom raspoloživim bazama podataka sa alatima za praćenje, planiranje i simulacije. Samo za hitne odluke sa dalekosežnim efektima će predstavnici zainteresiranih strana organizirati sastanak i biti zajedno. Finansijski i tehnički troškovi za decentralizirana rješenja bi mogla biti manja od centraliziranih rješenja, ali na račun komplikovane komunikacije i nedostataka direktnog rada.

Još jedna varijacija može biti **virtualni APOC**: Tehnička oprema dijeli se u već postojećim operativnim centrima ATC, operatora zrakoplova ili aerodroma. Uz pomoć mreže, sve relevantne informacije, kao što su stvarno stanje prometa, planiranje, i trenutne odluke se razmjenjuju između povezanih partnera. Na ovaj način tehnička pomoć za sve zainteresirane strane je dostupna bez fizičke izgradnje operativnog centra aerodrom.

Teoretski, virtualnu stvarnost ovakvog APOC sa direktnim vezama između agenata zainteresiranih strana bi mogla biti ostvarljiva. Granični uvjeti bi bili vjerojatno isti kao u pravom APOC, ali svaki povezani agent fizički sjedi u svom lokalnom operativnom centru i ima pristup relevantnim podacima, planiranju i instrumentima za praćenje kao u centralizovanom APOC. U virtualnom APOC agent ima mogućnost da raspravlja i razmjenjuje informacije sa povezanim partnerima vizualno. U takvom okruženju on će biti u stanju demonstrirati uticaj promjene parametara na stvarne ili očekivane protoke u dolasku i odlasku i podešavanje u kasnijem postupku.

Priručni APOC je najmanji sistem i koristi se za regionalni aerodrom. Jedan postojeći operativni centar se oprema sa dodatnim tehničkim alatima

za praćenje i planiranje. Normalno smanjenje kapaciteta i kašnjenja su zanemarivi problemi na ovim aerodromima (osim manjih aerodroma na tipičnim turističkim odredištima poput otoka koji su vrlo često pretrpani tokom ljetne sezone), tako da operateri aerodroma trebaju podršku za svoje svakodnevne poslove, a ne za predtaktičko i strateško planiranje.

Daljinski upravljani (izdvojeni) APOC predstavlja još jedno rješenje za vrlo male aerodrome. Ovi operativni centri mogu biti iznajmljeni (outsourcing) od strane većih aerodroma (mrežni ili HUB aerodromi). Međutim, ovo rješenje zahtijeva pouzdane digitalne mreže i nerestriktivnu obradu podataka između partnera i zainteresiranih strana.

4.2.5. CDM i TAM u Bosni i Hercegovini

Prema dostupnim podacima, a čine ga direktna komunikacija i korespondencija Email-om, implementacija CDM i TAM u Bosni i Hercegovini je veoma slaba. Ovo posebno ako se posmatra puna uloga i kapacitet CDM i TAM. Praktično bi ova saradnja morala da bude u potpunosti implementirana, sa svim sudionicima zračnog transporta. Jedan od stvarnih dokaza implementacije jesu potpisani ugovori, MoU ili LoA ili SLA itd.

Za neke aerodrome, prije svega Aerodrom Sarajevo, mogu se naći elementi razmjene podataka. To su:

1. Unos određenih podataka od strana ATC u aplikaciju Aerodroma (FPT, CTOT i sl.).
2. Prikaz ekrana Meteo službe, sa trenutnim vrijednostima RVR, METAR, jačina i pravac vjetra i sl.
3. Aerodrom Sarajevo daje podatke o odobrenim letovima (SLOT) za slijedeći dan.

Međutim, karakteristika ovakvog oblika razmjene podataka je da nema dinamike i povratne veze. Unijeti podaci i prikazane informacije mogu biti od koristi samo primatelju informacija ali se ne ostvaruje srž kolaboracije ili totalnog upravljanja, a to je donošenje odluka vodeći računa o svim akterima i posljedicama takvih odluka. Ako se posmatra obim i veličina prometa na Aerodromu Sarajevo, može se konstatovati da je adekvatan model primjene APOC: virtulani APOC, ili priručni APOC.

5. POBOLJŠANJE KVALITETA USLUGE PRIMJENOM SISTEMA TOTALNOG UPRAVLJANJA AERODROMIMA

Kako bi se osiguralo dosljedno i ispravno zajedničko viđenje situacije ATM, svi partneri su dužni da pružaju i koriste podatke u skladu s propisanim pravilima u pogledu formata, tačnosti, dostupnosti i pravovremenosti.

5.1. Kvaliteta i dostupnost podataka

Pisma sporazuma (LoA) i/ili Memorandumi o razumijevanju (MoU) između partnera koji sudjeluje trebaju biti potpisani čime se pokrivaju format, tačnost, dostupnost, pravovremenost i vlasništvo nad podacima i odgovornosti za razmjenu podataka. LoA treba da sadrži opis poslovnih procesa i politike koje će biti na snazi kod kreiranja i daljnje distribucije traženih podataka. Kako bi se mjerila kvaliteta razmjene podataka između partnera, skup postupaka će se uspostaviti za rutinsku analizu podataka u odnosu na skup dogovorenih kriterija.¹⁸

5.2. Zahtjevi za kvalitetom podataka

U praksi ne bi trebalo problem kvalitete podataka svesti na jednostavne tehničke karakteristike kao što je tačnost i ispravnost. Kvaliteta je više od toga - ona je višedimenzionalna. Dimenzije kvalitete proizlaze iz potreba korisnika - konzumenta podataka. Kvaliteti podataka odnosno kvaliteti informacija, treba pristupiti kroz koncept informacijskog proizvoda, jer tako dolazi u fokus njena multidimenzionalnost.¹⁹

Da bismo od „sirovih“ podataka dobili informacije, potrebni su i dodatni podaci o podacima - tzv. metapodaci. Podaci su uvijek predstavljeni u formi nekog modela podataka. Taj model podataka može biti sasvim jednostavan ili kompleksan, ali u svakom slučaju on određuje kako će biti interpretirano značenje podataka (tj. semantika podataka) koji su njime predstavljeni. Metapodaci su podaci koji semantički opisuju podatke u nekoj reprezentaciji. Jedino podaci uz odgovarajuću semantiku mogu biti interpretirani, odnosno iz takvih podataka je moguće ekstrahirati informacije ili čak novo znanje odnosno spoznaje. Podaci s neodgovarajućom ili nedostatnom semantikom ne mogu se dobro interpretirati - njihova kvaliteta je loša s obzirom na dimenziju „pogod-

¹⁸ EUROCONTROL, Airport CDM Operational Concept Document, Edition Number: 3.0, 2006.

¹⁹ Damir Vuk, Enes Ciriković i Dominik Suk, „Kvaliteta podataka i njen značaj danas“, Praktični menadžment, Vol. VI, No. 1, 2015, str. 54-58.

nost upotrebe“. Unatoč tome, i takvi podaci mogu biti upotrebljivi, ali ograničeno. Dakle, semantička izražajnost, odnosno potpunost modela podataka, (reprezentacije podataka) direktno utječe na kvalitetu podataka.

Kvaliteta podataka je rezultat odgovarajućih napora u organizaciji, a to razumljivo ima svoju cijenu. Ako trošak postizanja odgovarajućeg stepena kvalitete podataka ne opravdava korist, onda je takav trošak nepoželjan. Sintagma „prikladnost za upotrebu“ („Fitness for use“), označava upravo to - onu razinu i vrstu kvalitete podataka koja je prikladna odnosno potrebna za odgovarajuću upotrebu, onako kako ju definiraju konzumenti podataka.

U općoj teoriji podataka i informacija, Strong, Lee i Wang koji zastupaju empirijski pristup, smatraju da se problem kvalitete podataka mora promatrati u širem kontekstu gdje se podaci nalaze odnosno upotrebljavaju, a to je kontekst informacijskog sistema. Ovi autori definiraju konceptualni okvir (framework) za koji iznose da je provjeren kako u industriji tako i u državnoj upravi. Okvir sadrži petnaest dimenzija, grupiranih u četiri kategorije kvalitete podataka:

- unutrašnja kvaliteta (intrinsic);
- kvaliteta dostupnosti (accessibility);
- kontekstualna kvaliteta (contextual) i
- reprezentacijska kvaliteta podataka (representational).

U zrakoplovstvu, zahtjevi za kvalitetom podataka su definirani sa ICAO, EC i lokalnim zakonskim zahtjevima.

Prema EUROCONTROLU: „Zahtjevi za kvalitetom podataka bit će definirani za svaki pojedinačni podatak u okviru zrakoplovnih podataka i zrakoplovnih informacija iz članka 2. stavak (2) ovog pravilnika, tako da obuhvataju sljedeće:

- točnost i rezoluciju podataka;
- razinu integriteta podataka;
- mogućnost da se utvrdi podrijetlo podatka;
- razinu sigurnosti da je podatak stavljen na raspolaganje sljedećem predviđenom korisniku prije datuma/vremena stupanja na snagu i da se ne brišu prije datuma/vremena kada prestaju da budu na snazi.“

5.3. Ukupno poboljšanje kvaliteta usluge

Ukupno poboljšanje usluge možemo posmatrati iz dva ugla: interno poboljšanje usluge i eksterno poboljšanje usluge. Interno poboljšanje kvalitete usluge ogleđa se u međusobnoj interakciji svih učesnika, odnosno partnera u procesu zrakoplovnog transporta. Ovo je neprekidan proces, traje u svim

fazama (strateška, predtaktička, taktička). Direktne koristi su: povećanje kapaciteta na osnovu boljeg iskorištenja unutarnjih resursa, smanjenje grešaka zajedničkim donošenjem odluka, smanjenje grešaka zbog pogrešno interpretiranih informacija, smanjenje ili u potpunosti eliminacija sigurnosnih prijetnji (safety incidenti i nesreće).

Eksterno poboljšanje kvaliteta usluga ogleđa se u razumijevanju i prihvatanju kvalitete od strane krajnjih korisnika procesa zrakoplovnog transporta: putnici, posjetioci, javnost, vlasnici.

Zajednički imenitelj koristi za eksterne korisnike usluga je poboljšanje efektivnosti i efikasnosti procesa zrakoplovnog transporta, dostupnost pravih informacija u pravo vrijeme, smanjenje kašnjenja - smanjenje ili nestanak nepotrebnih troškova, povećanje produktivnosti prema jedinici angažovane radne snage, povećanje kapaciteta kroz bolje korištenje resursa - uštede u povećanju kapaciteta aerodroma (npr. nije potrebna dodatna izgradnja pisti, parking pozicija, terminalnih zgrada i sl.).

6. ZAKLJUČAK

Povezivanje postojećih tehničkih sredstava i njihova integracija u globalni koncept- TAM, će omogućiti razvoj i implementaciju automatskih alata za planiranje što će pomoći zainteresiranim stranama postizanje boljeg nivo performansi. TAM će dati i koncept za komunikacije i platformu za informacije za sve zainteresirane strane uključene u rad aerodroma, i time omogućiti svakom učesniku da donose odluke u najboljem okruženju u skladu s ciljevima CDM.

Prema dostupnim podacima, a čine ga direktna komunikacija i korespondencija E-mail-om, implementacija CDM i TAM u Bosni i Hercegovini je veoma slaba. Ovo posebno ako se posmatra puna uloga i kapacitet CDM i TAM. Praktično bi ova saradnja morala da bude u potpunosti implementirana, sa svim sudionicima zračnog transporta. Jedan od stvarnih dokaza implementacije jesu potpisani ugovori, MoU ili LoA ili SLA itd.

Trenutna praksa razmjene podataka kod sudionika zračnog transporta u BiH ima koristi samo primatelju informacija ali se ne ostvaruje srž kolaboracije ili totalnog upravljanja, a to je donošenje odluka vodeći računa o svim akterima i posljedicama takvih odluka.

Interno poboljšanje kvalitete usluge ogleđa se u međusobnoj interakciji svih učesnika, odnosno partnera u procesu zrakoplovnog transporta. Ovo je neprekidan proces, traje u svim fazama (strateška, predtaktička, taktička). Direktne koristi su: povećanje kapaciteta na osnovu boljeg iskorištenja unutar-

njih resursa, smanjenje grešaka zajedničkim donošenjem odluka, smanjenje grešaka zbog pogrešno interpretiranih informacija, smanjenje ili u potpunosti eliminacija sigurnosnih prijetnji (safety incidenti i nesreće).

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Summary:

TOTAL AIRPORT MANAGEMENT SYSTEM – THE WAY FORWARD

Linking existing technical resources and their integration into the global concept-TAM, will enable the development and deployment of automated planning tools which will help interested parties achieve a better level of performance. TAM will give the concept of communication and information platform for all stakeholders involved in the operation of the airport, thus allowing each participant to make decisions in the best environment in line with the objectives of the CDM. According to available data, and make it direct communication and correspondence over email, implementation of CDM and TAM in Bosnia and Herzegovina is very weak. This particularly if viewed full role and capacity of CDM and TAM. Practically this cooperation had to be fully implemented, with all participants in air transport. One of the real evidence of implementation are signed contracts, MOU or LoA or SLA etc. The current practice of exchange of data by participants of air transport in Bosnia and Herzegovina has benefited only the receiver of information but does not realize the essence of collaboration and total management, and that is the decision taking into account all the actors, and the consequences of such decisions. Internal service quality improvement is reflected in the mutual interaction of all participants, and partners in the process of air transport. This is an ongoing process, takes in all phases (strategic, pre-tactical, tactical). Direct benefits include: increased capacity based on better use of internal resources, reduce errors joint decision-making, reduced errors due to wrongly interpreted information, reducing or completely eliminating safety threats (safety incidents and accidents). External improving the quality of service is reflected in the understanding and acceptance of the quality of the end-users of the process air transport: passengers, visitors, public, owners. The common denominator is used for

external users service is to improve the effectiveness and efficiency of the air transport, the availability of the right information at the right time, reducing delays - the reduction or disappearance of unnecessary costs, increasing productivity per unit of engaged labour force, increase capacity through better use of resources - savings increase airport capacity (i.e. no additional construction racetrack, parking positions, terminal buildings and the like.).

Key words: collaborative decision-making, customer satisfaction, data quality.

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Tematska cjelina/*Thematic unit*
KVALITETA U ZDRAVSTVU I TURIZMU
QUALITY IN HEALTHCARE AND TOURISM

Zadar, Hrvatska/*Croatia*
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**THE IMPACTS AND EFFECTS THAT CURRENCY
EXCHANGE RATES HAVE ON FOREIGN TOURISTS'
PERCEPTION OF THE QUALITY IN HOSPITALITY
INDUSTRY: CASE CROATIA**

UTJECAJI I UČINCI VALUTNOG TEČAJA NA PERCEPCIJU
KVALITETE U TURISTIČKOJ INDUSTRIJI SAGLEDANI S ASPEKTA
STRANIH TURISTA: SLUČAJ HRVATSKA

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ABSTARCT:

This research paper explores the impacts and effects that currency exchange rates have on tourists' perception of quality in tourism industry. By realizing the importance of tourism in Croatia, this study discovers the habits and behaviours of foreign tourists when exchanging currency. A survey was conducted on foreign tourists focusing on discovering their habits when visiting Croatia. The conducted research results shown trend: travellers are slightly underestimating the advantage of exchanging the currency before the vacation in their domestic country although the advantages of this approach includes saving money through obtaining more favourable exchange rate. The outcome suggests that international travellers have quite basic or even low knowledge of financial literacy and benefits of using it in daily life no matter if they travel for leisure or business purpose, but the quality of exchange rate service influences overall satisfaction level of foreign tourist.

Keywords: currency exchange rates, quality in tourism industry, foreign tourists, financial literacy, purchasing power.

1. INTRODUCTION – TOURISM IN CROATIA

This paper analyses the impact of money exchange rates on tourists' purchasing power and overall quality of tourist service in Croatia as well as the influence of foreign currency brought by the inflows of foreign travellers into the Croatian tourism market on exchange rate. Saayman in his research investigates the effects between currency and tourism.¹ The same author explains the exchange rates and how they promotes tourism flows since good currency rate influences not only the purchasing power of the tourists but also the overall impression of the stay in the country.² The tourism market is interconnected with the currency exchange rates.³ Moreover the same authors are explaining that the effect of currencies has been in longline researched but the relationship between tourism and exchange rates are less studied.⁴

Croatia has been recognized internationally due to its exclusive factors such as natural resources, national culture and unique environment. Those factors exist due to the variety of coastline, rural areas and rich inland. According to the supply of tourist services the European Union is saturated, it's urgent to find new possible ways to attract and retain tourists.⁵ The main focus in Croatia is to improve the seasonality, upgrade the present technologies and boost further the infrastructure. Moreover, country has to control the budgets designated for the overall future progress and to use better the advantages of the indented coastline.⁶ Additional issues are presented by the elevated cost of labour in the market, not competitive exports and instable government.⁷ The tourism industry in Croatia demands the implementation of facilities and accommodations for tourists, indirectly involving the further development of the quality of infrastructure. A consequential improvement would be the extension of seasonality, during which locals can improve the experience of the tourists by providing another unique and personalized experience although festival and event tourism continue to be an ongoing positive trend for the industry. Various festivals are attracting hundreds of thousands of new visitors and completely reshaping some destinations, as well as stimulating other categories, such as the performance of

¹ Andrea Saayman & Melville Saayman, "Exchange rate volatility and tourism - revisiting the nature of the relationship", *European Journal of Tourism Research*, Vol. 6, No. 2, 2013, p. 104-121.

² Ibid.

³ Maria Santana-Gallego, Francisco J. Ledesma-Rodríguez & Jorge V. Pérez-Rodríguez, "On the impact of exchange rate regimes on tourism", No. 07-07, 2007.

⁴ Ibid.

⁵ Dani Bunja, "Modernizing the Croatian tourism industry", *International Journal of Contemporary Hospitality Management*, Vol. 15, No. 2, 2003, p. 126-128.

⁶ Ibid.

⁷ Croatia Retail Report Q2, 2015.

airlines. According to, the Euromonitor country report there are around 20 noticeable music festivals in Croatia that last during the whole summer from June to the beginning of September. Online travel proved to be a strong driver for the category in 2014. Online travel agencies are strongly positioning themselves in all major destinations with peer-to-peer type websites representing strong competition within the large but specific and highly fragmented private accommodation market. Hotel industry sees positive investment trends in 2014. Future consolidation of private accommodation could provide an additional boost for hotels in the country. Various social media campaigns in 2014, especially through event sponsorship, such as Maistra's sponsorship of the 2014 Red Bull Air Race, helped in pushing online sales higher. Adapting to trends in online sales, through the further development of mobile websites and applications, should bring even more positive results. Embracing trends is the key to success as well the further strengthening of the country's hotel industry Euromonitor, 2015.

The tourism sector in Croatia gives a great contribution to the overall economy.⁸ Croatia is an emerging economy and the key to a possible success is to plan well an additional expansion in the tourism sector. As a host, Croatia would benefit from the improved employment, income and foreign exchange profit.⁹ The unemployment rate in Croatia is very high so there is a limited amount of foreign exchange resources. According to the same source, a further increase in tourism would expand the demand for the goods and services, the boosted demand will moreover upgrade the attributable industries rather than importing goods that can be produced within the country".¹⁰

According to the report from 2014 the World Travel and Tourism Council (WTTC), for the year 2013 the total contribution of travel and tourism was 27,8% of the overall Croatian GDP. Additionally, the direct contribution in 2013 was 12,1% of total GDP.¹¹ The labour force in the Croatian tourism market plays continually an important role. More than a total of 311,500 jobs were created in the tourism sector in 2013. The direct amount of it was 13,3% or 138,000 jobs.¹² Those numbers indicate that, as tool, tourism has a significant influence on our economy. The growth in domestic economy is also associated with the currency exchange. According to Svilokos and Tolić, if the domestic currency depreci-

⁸ Alen Belullo i Tanja Broz, "Do Fundamentals Explain the Behaviour of the Real Effective Exchange Rate in Croatia?" In Conference Proceedings of the 28th International Conference on Organisational Science Development: New technologies, new challenges, 2009, p. 25-27.

⁹ Tonći Svilokos, Meri Šuman Tolić i Ivana Pavlić, *Economic Growth and Tourism Demand in Croatia: the Cyclical Component Analysis*, Zagreb International Review of Economics and Business, 17 (SCI), 2014, p. 65-80.

¹⁰ Ibid.

¹¹ WTTC, 2014.

¹² Ibid.

ates, it will increase the prices of foreign goods and services in terms of domestic currency, and reduce the price of domestic goods and services denominated in foreign currencies".¹³ If that happens, "the imports would decrease and have the lower value" while this would be the opposite for the exports. According to the same source, that would lead to a better economic situation in the country and the growth of GDP. The profit that tourism presents is well connected with the customer itself: customers or foreign tourists who observe our currency and process the price information and buying power.¹⁴

According to the Financial Glossary the definition of currency exchange is: „the exchange rate is the price at which the currency of one country can be converted to the currency of another. Although some exchange rates are fixed by agreement, most fluctuates or float from day to day. Daily exchange rates are listed in the financial sections of newspapers and can also be found on financial websites".¹⁵

The currency in Croatia is the Croatian Kuna. The Croatian Kuna is controlled by the Hrvatska Narodna Banka (HNB). This currency is not influenced by other foreign currencies, it has the independence to be formed freely on the market of currencies. The national currency fluctuates, it depends on the supply and demand on the local market; the Croatian Kuna is part of the currency market so there cannot exist big oscillations which permit to the currency to be quite stable. In March of 2015, the value for one US dollar to Kuna was 7,18 kn while the value for one Euro was 7,62 kn. Those exchange rates can attract foreign tourists to spend their money but can also induce investors to invest in the country. The government in consequence can prospect the possibility of development. The currency is not elevated when compared to the Euro, US dollar and the British Pound. Taking into consideration those currencies, it may be concluded that Croatia will attract tourists from those regions since their country is much more expensive. When on their vacation, tourists perceive the prices differently since the expression of some goods and services is given in a different currency.¹⁶ Foreign tourists can see prices in more than one currency like, for example, in border countries and duty free shops. The impression of two currencies can put travellers in an undecided situation, whether or not to acquire the

¹³ Tonći Svilokos i Meri Šuman Tolić, *Does Misaligned Currency Affect Economic Growth?—Evidence from Croatia*. Croatian Economic Survey, Vol. 16, No. 2, 2014, p. 29-58.

¹⁴ Priya Raghbir, Vicki G. Morwitz, and Shelle Santana, "Europolymoney: How Do Tourists Convert Foreign Currencies to Make Spending Decisions?", *Journal of Retailing*, Vol. 88, No. 1, 2012, p. 7-19.

¹⁵ Financial Glossary, 2011.

¹⁶ Priya Raghbir, Vicki G. Morwitz, and Shelle Santana, "Europolymoney: How Do Tourists Convert Foreign Currencies to Make Spending Decisions?", *Journal of Retailing*, Vol. 88, No. 1, 2012, p. 7-19.

good or service. On the other hand, different issues arise if tourists travel through countries such as Bosnia and Herzegovina, Serbia and Montenegro. Those issues derive from their currency values since those currencies are less valued than the Croatian Kuna; in consequence, it provokes immediate competitiveness. When tourists visit a certain country, they spend less if the currency is worth more than in their home country.¹⁷ The opposite effect is when the value is valued less, that refers to a good or service that is worth less in the visiting country than in the home country. Another important concept that is relevant to this topic is the term money illusion:¹⁸ “This is provoked by the effect of the ‘money illusion’ where people over weight nominal price to the real price. It is because of the “money illusion”; that is, the failure to perceive that the dollar, or any other unit of money expands or shrinks in value.¹⁹ Almost everyone is subject to the ‘money illusion’ in respect to his own country’s currency.²⁰ Fisher also affirms that people tend to see the rise and fall of foreign currency better than the domestic one”.²¹

The foreign exchange market: “The market in which participants are able to buy, sell, exchange and speculate on currencies. Foreign exchange markets are made up of banks, commercial companies, central banks, investment management firms, hedge funds, and retail forex brokers and investors. The forex market is considered to be the largest financial market in the world”.²²

Another important factor to connect is the price factor. Price factors in tourism are numerous. Some of them are costs of transportation, cost of living and specific services in the destination that wants to be visited by a certain tourist. Additional price factor to be considered is also the change in exchange rates.²³ As mentioned earlier, another challenge for any destination management, apart from price factors, is to determine what drives tourists and what their motivational factors are.²⁴ Due to many factors, like changing behaviours of travellers for exchanging rates, it becomes difficult to establish this.²⁵ Additional factors to connect are the motivational factors: Tourist demand and expectations are each year increasing thus provoking a tourist destinations to develop and expand their range of offerings. Tourists have more expectations from the country they visit,

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Irving Fisher, *The money Illusion*, Public domain, 1929.

²⁰ Ibid.

²¹ Ibid.

²² Investopedia, 2015.

²³ Goeffrey I. Crouch, “Currency exchange rates and the demand for international tourism”, *Journal of Tourism Studies*, Vol. 4, No. 2, 1993, p. 45-53.

²⁴ Angela Santos, *Iceland’s Currency Devaluation and Exchange Rate, the Effects on Traveler’s Perception towards Iceland as a Touristic Destination*, University Centre „Cesar Ritz“, Switzerland, 2008.

²⁵ Ibid.

from infrastructure, such as roads and airports, as well as the goods and services they might need. Their vacation has to be perfect to them, but also the hosting country should benefit from it as well from the choice of a destination. An important fact about tourists is that they always search for the service which will fulfil their demands, wishes and expectations.²⁶ Knowing the fact that they are in the foreign country, they will most probably find themselves in specific situations where they will need help and assistance.²⁷

In order to get familiar with the market and demands of the customers/tourists, a destination management has to know the reasons (motivational factors) why tourists choose to go to a specific destination instead of some other.²⁸ The structured economic approach represents the idea that the choices that the tourists make depend hugely on prices and exchange rates of the certain destination in their decision if they will visit that destination.²⁹

Another issue that needs to be confronted is the choice of the place of exchange, whether is a bank or an exchange office where tourists tend to exchange their currencies. Banks are more trustworthy and secure since the exchange offices can easily change the rates in their favour. Those tourists that feel that they did not get what they expected will not return, or even more, they will look with suspicion on any other future exchange.

2. METHODS PART

The conducted research is a descriptive type of research. Research question: What are the currency exchange habits of foreign tourists, and are they aware of the financial currency rates impacts? Theoretical population are foreign tourists that visit Croatia, and study population are foreign tourists that visit Dubrovnik. The sample consists of 42 male foreign tourists and 58 female foreign tourists that visit Dubrovnik. Variables used in research are: Age, operational definition (19-30, 31-40, 41-50, 51-60, 60+), Gender (Male, Female), Purpose of travel (Business, Leisure), Daily basis spending (10-50\$/€, 50-100\$/€, 100-200\$€, more than 200\$/€) and Citizenship (USA, United Kingdom, Canada, France, Italy, Macedonia, Norway, Germany, Russia, China, Sweden, Austria, Ireland, Spain).

²⁶ Soile Kuusela, *What holiday tourists expect from currency exchange service in Finland?: Case FOREX Bank Tampere*, Tampere University of Applied Sciences, Finland, 2014.

²⁷ Ibid.

²⁸ Angela Santos, *Iceland's Currency Devaluation and Exchange Rate, the Effects on Traveler's Perception towards Iceland as a Touristic Destination*, University Centre „Cesar Ritz“, Switzerland, 2008.

²⁹ Geoffrey I. Crouch, “Currency exchange rates and the demand for international tourism”, *Journal of Tourism Studies*, Vol. 4, No. 2, 1993, p. 45-53.

A research was constructed and conducted for the goal of measuring the impact of currency exchange rates on foreign tourists in Croatia. The survey target population were foreign tourists visiting Dubrovnik in order to acquire as wide and precise data as possible.

The paper and pencil survey was distributed on Stradun at the Pile gate, Dubrovnik during three days from April 21-24, 2015. The foreign tourists were the only interested focus group of this research since their perception of currency exchange rates differ and locals were excluded from the survey. After a complete examination the survey method was the perfect method to gather the required information to fulfil the research 100 people participated (48 men and 52 women).

Based on surveys³⁰, a new survey was made. It consists of 17 different questions among which 13 were multiple choice, two were fill in the blank such as “citizenship” and “please add any comments” one question was to rank from one (most important) to six (less important) and the last question was a set of statements were the participants had to circle in the Likert scale from “strongly disagree”, “disagree”, “neither agree or disagree”, “agree” and “strongly agree” in order to get accurate data as much as possible.

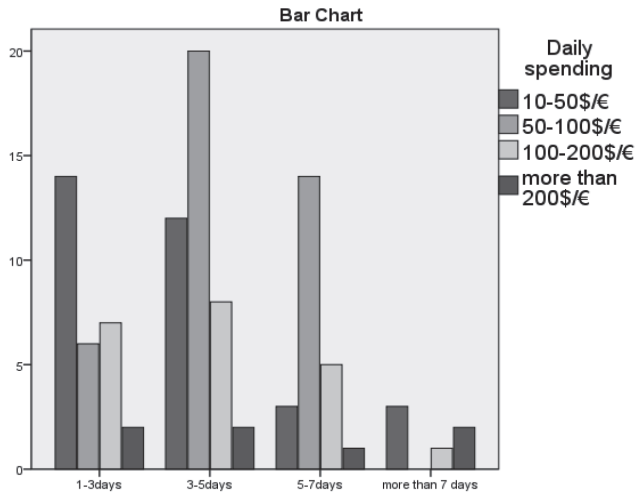
The purpose of this survey is to receive back the information from the participants about their behaviour and knowledge in travelling, habits regarding the exchange rates, preferred location of money exchange and an overall understanding of the financial literacy regarding the exchange rates. Furthermore, the survey was conducted in English and all the money values inside the survey are expressed in “\$/€” since the US Dollar and the Euro exchange rates are similar.

3. RESULTS

The results are shown in the research and furthermore discussed. Question “What is your preferred method of payment when you are on vacation?” Most of the participants (57%) stated that Credit/Debit card was their preferred method of payment. There was no significant difference between people who travelled for business and those who travelled for leisure when it comes to the preferred method of payment. There was no significant difference between different genders regarding this either. Question “What is the planned duration of your stay?” Most of the participants (42%) stated that the planned duration of stay is 3-5 days (Figure 1).

³⁰ Angela Santos, *Iceland's Currency Devaluation and Exchange Rate, the Effects on Traveller's Perception towards Iceland as a Touristic Destination*, University Centre „Cesar Ritz“, Switzerland, 2008, and Soile Kuusela, *What holiday tourists expect from currency exchange service in Finland?: Case FOREX Bank Tampere*, Tampere University of Applied Sciences, Finland, 2014.

Figure 1. Cross tabulation of planned duration of stay with daily basis spending



Source: Conducted survey.

There was a significant difference between business travellers and leisure travellers, $\chi^2(9, N=100) = 20.71, p = .01$. Most of the people (48.3%) who were visiting 1-3 days stated that they spend 10-50\$/€ daily, while those visiting for 3-5 days (47.6%) and those visiting for 5-7 days (60.9%) stated that they spend 50-100\$/€ daily. Most of people (50%) who were visiting for more than 7 days reported spending 50\$/€ a day. Question “Have you exchanged any currency before your trip?” Most of the participants (59%) stated that they do not exchange money prior their trip (Table 1).

Table 1. Exchanging the money before the trip

		Exchange before the trip			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	41	41,0	41,0	41,0
	No	59	59,0	59,0	100,0
	Total	100	100,0	100,0	

Source: Conducted survey.

There was no significant difference between people who travelled for business and those who travelled for leisure when it comes to the exchanging of currency before their trip. There was no significant difference between

genders regarding this either. Question “What is your preferred place for money exchange?” Most of the participants (31%) stated that any bank is the preferred place for exchange money (Table 2).

Table 2. Cross tabulation of the preferred place of exchange and purpose of visit

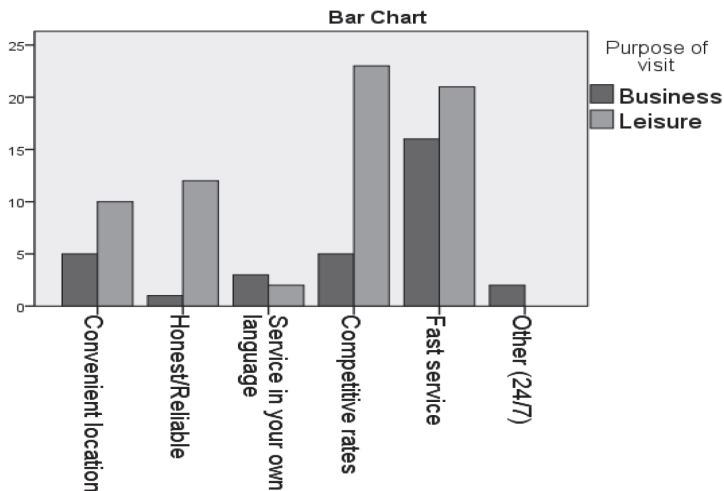
Preferred place of exchange * Purpose of visit Crosstabulation						
			Purpose of visit		Total	
			Business	Leisure		
Preferred place of exchange	Personal bank	Count	11	17	28	
		% within Preferred place of exchange	39,3%	60,7%	100,0%	
	Any bank	Count	7	24	31	
		% within Preferred place of exchange	22,6%	77,4%	100,0%	
	Exchange office	Count	4	18	22	
		% within Preferred place of exchange	18,2%	81,8%	100,0%	
	Other	Count	0	3	3	
		% within Preferred place of exchange	0,0%	100,0%	100,0%	
	Withdraw money from ATM	Count	9	6	15	
		% within Preferred place of exchange	60,0%	40,0%	100,0%	
	No preference	Count	1	0	1	
		% within Preferred place of exchange	100,0%	0,0%	100,0%	
	Total		Count	32	68	100
	% within Preferred place of exchange		32,0%	68,0%	100,0%	

Source: Conducted survey.

There was a significant difference between business travellers and leisure travellers, $\chi^2(5, N=100) = 12.81, p = .02$. Most of the leisure travellers (60.7%) were exchanging money in a personal bank, while leisure travellers (77.4%) exchanged money in any bank. Those who exchanged money in an exchange office (81.8%) were also visiting for the purpose of leisure. Most of the people (60%) that come for business stated that the preferred place of ex-

change is the ATM machine. There was no significant difference between the genders and ages regarding the preferred place of exchange. Question “What is the most important for you when exchanging currency in exchange office?” Most of the participants (37%) stated that fast service is the most important asset for an exchange place (Figure 2).

Figure 2. Cross tabulation of the most important asset and the purpose of visit

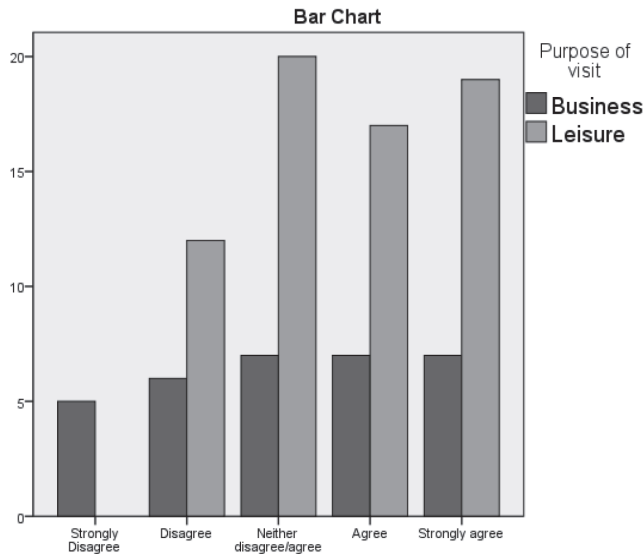


Source: Conducted survey.

There was a significant difference between business travellers and leisure travellers, $\chi^2 (5, N=100) = 14, 31, p=, 01$. Most of the leisure travellers (66.7%) value an exchange office and the convenient location as the most important asset. Travelers that chosen honest/reliable (92.3%), those who valued competitive rates (82.1%) and those who valued the fast service (56.8%) were also coming for the purpose of leisure. Most of the people (60%) that came for business stated that the most important asset was the service in their own language. There has no significant difference between citizenship regarding this either. Question “When travelling I pay attention to the level of exchange rates?” Most of the participants (42%) stated that they agree with the statement: “when travelling I pay attention to exchange rates” (Table 2, Figure 2). There was a significant difference between business travellers and leisure travellers, $\chi^2 (4, N=100) = 11, 47, p=, 02$. Most of the leisure travellers (81.8%) disagree with the statement, while those that neither agree/disagree (61.1%) and those

who agreed (78.6%) are also coming for the purpose of leisure. The business people (100%) stated that they strongly disagreed with the statement. There is no significant difference between the genders regarding this either. Question “If destinations exchange rates are low I see this as a good reason to visit the country?” Most of the participants (27%) stated that they neither agreed/disagreed with the statement: “If destination’s exchange rates are low I see this as a good reason to visit the country” (Figure 3).

Figure 3. Crosstabulation of destination’s exchange rates



Source: Conducted survey.

There was a significant difference between business travellers and leisure travellers, $\chi^2 (4, N=100) = 11.49, p = .02$. Most of the leisure travellers (66.7%) disagreed with the statement, while those that neither agreed/disagreed (74.1%) those who agreed (70.8%) and those who strongly agreed (73.1%) were also coming for the purpose of leisure. The business people (100%) stated that they strongly disagreed with the statement. There is no significant difference between genders regarding this either. Question “Level of exchange rate affects my holiday decisions?” Most of the participants (37%) stated that they neither agreed/disagreed with the statement: “Exchange rate changes affect my holiday decisions” (Table 3).

Table 3. Crosstabulation of exchange rate changes affect my holiday decisions and purpose of visit

Exchange rate changes affect my holiday decisions * Purpose of visit Crosstabulation						
			Purpose of visit		Total	
			Business	Leisure		
Exchange rate changes affect my holiday decisions	Strongly disagree	Count	10	3	13	
		% within Exchange rate changes affect my holiday decisions	76,9%	23,1%	100,0%	
	Disagree	Count	6	18	24	
		% within Exchange rate changes affect my holiday decisions	25,0%	75,0%	100,0%	
	Neither disagree/ agree	Count	12	25	37	
		% within Exchange rate changes affect my holiday decisions	32,4%	67,6%	100,0%	
	Agree	Count	3	17	20	
		% within Exchange rate changes affect my holiday decisions	15,0%	85,0%	100,0%	
	Strongly agree	Count	1	5	6	
		% within Exchange rate changes affect my holiday decisions	16,7%	83,3%	100,0%	
	Total		Count	32	68	100
	% within Exchange rate changes affect my holiday decisions		32,0%	68,0%	100,0%	

Source: Conducted survey.

There was a significant difference between business travellers and leisure travellers, $\chi^2(4, N=100) = 15,90, p = 0,03$. Most of the leisure travellers (75%) disagree with the statement, while those that neither agree/disagree (67.6%) those who agreed (85.0%) and those who strongly agree (83.3%) are also coming for the purpose of leisure. The business people (76.9%) stated that they strongly disagreed with the statement. There had no significant difference between different genders regarding this either.

4. DISCUSSION

The overall results of the survey conducted show that a slight but important difference between the preferred methods of payment exists: where credit/debit card payment prevails in front of the old fashioned cash. Additionally, payment with cash is the cheapest way of payment: those that are preferring cash are experiencing larger discounts than those that are paying with credit/debit cards. Furthermore, the travellers expressed the opinion that credit/debit cards were less risky. People are perceiving this method as the safest one and are willing to pay more for the goods and services offered in the visited country. Since Croatia as destination offers a wide range of authentic goods and services most of the participants are staying for an average of 3 to 5 days. Comparing to business travellers who are staying in the country on an average of 1 to 3 days due to the restricted freedom and obligations. Leisure travelers stay the most an average of 3 to 5 days since they have an unlimited variety of offerings. Travelers are spending an average of 50-100\$/€ on a daily basis. These expenses derive from the goods and services that they are consuming (food and beverages, attraction fees). The survey excluded the lodging expenses since the daily spending would largely increase and would compromise the goals of the research. The conducted research results shown trend which is that travellers are slightly underestimating the advantage of exchanging the currency before the vacation in their domestic country although the advantages of this approach include saving money and obtaining more favourable exchange rate. The outcome suggests that international travellers have quite basic or even low knowledge of financial literacy and benefits of using it in daily life. Another trend noticed was that travellers are not aware that by exchanging money in their home country they can save time but also money. By doing so, they can completely avoid exchange offices in their travel destinations which often have much higher exchange rates compared to those at home. The results show a trend that the preferred place for travellers to exchange money is the bank, as they perceive them as the most safe and trustworthy place to exchange the currency in contrast to the exchange offices. When examining the habits of the business travellers, they tend to prefer the usage of ATM machines or cashpoint, which can be explained through their busy schedules as the ATM machine is considered the most convenient method of retaining money. The participants also had to answer what they consider of the most important asset an exchange office has to offer. The outcome reveals that travellers, for the purpose, of leisure value the convenient location as the most important asset. Travelers are expecting that accessibility towards exchanging their currencies, not locating them with ease, will lead to

negative feedback from the overall vacation. Dubrovnik, fortunately, has exchange offices all around the city granting an easy access. It was surprising that the competitive rates are not the most important asset, but they follow with a slight difference after the convenient location. Competitive rates indicate the financial literacy of the travellers.

The survey also included 3 general questions about the overall knowledge of currencies. Through the results, it is found that travellers pay attention to the currencies. Travelers visiting a country are perceiving the currency of visited country more favourable if the rates are lower and therefore they buy more. Travelers are choosing the destination due to their personal preferences. A low rate on currency can also be interpreted as a country that is economically in recession or the traveller can perceive it as unsafe country to visit. Moreover, there exists the possibility that the country has no developed strategic plan to attract tourists. The final statement regarding exchange rates that affect decisions of travellers' vacation also resulted uncertain. Therefore, the conclusion is that travellers are more aware of their budget and money, but still they are lacking the financial literacy making their decisions on their own free will and preference. The results positively answered the hypothesis statement considering the level of travellers awareness of the currency exchange rates. Foreign tourists are more aware of currencies rates. Additionally, it does influence the purchasing power. As previously stated, it's uncertain that low exchange rates are perceived as a good reason to visit a country, but travellers are individuals who get motivated individually also they will safely spend more money if they know the rates and prices in the foreign country. There is still an open gap that travellers are still not conscious of the importance of the financial literacy. The financial literacy affects the travellers who know exactly how much goods and services are priced and valued; they will spend daily exact amounts of money. Croatia with a relatively stable and affordable exchange rate can attract an increased number of foreign travellers. When discussing the appreciation and depreciation of a currency, no significant differences were shown in research results. Neither confirming that the tourists coming to Dubrovnik are consuming more when there is a depreciation of a currency neither they do consider this component as important one when choosing their destination and in general when travelling. To conclude with, a surplus in the inflow of tourists will result in a positive impact in the national GDP.

Multiple entities will benefit from this research. The first one is definitely the national tourist board since it can promote the uniqueness of the natural environment by constructing a marketing plan that will attract an increased number of travellers. The second entity that can benefit from this research is

the local financial services that can analyse the research and draw out their own conclusions in order to attract the travellers to exchange and retain more money in the country. The local entrepreneurs and the local government can focus on the offering of the exchange places and raise the awareness of foreign tourists prior to the season by a strong and intensive marketing.

The recommendations for the future researches are those to construct a larger scale of participants in order to get more significant and precise data, add more open ended questions to receive more worthy personal and individual data, and finally, do the research during the middle of the high season since during the high season there is a major turnover of tourists. The limitation of this research was that the data was collected only in Dubrovnik area before the high tourist season.

Sažetak:

UTJECAJI I UČINCI VALUTNOG TEČAJA NA PERCEPCIJU KVALITETE U TURISTIČKOJ INDUSTRIJI SAGLEDANI S ASPEKTA STRANIH TURISTA: SLUČAJ HRVATSKA

Rad se bavi istraživanjem utjecaja i efekata koje valutni tečaj ima na percepciju kvalitete u turističkoj industriji sagledanu s aspekta stranih turista. Nakon spoznaje o važnosti turizma u Hrvatskoj u ovom istraživanju otkrivamo navike i ponašanja stranih turista prilikom razmjene valuta. Istraživanje je provedeno na stranim turistima, a fokus je na otkivanju njihovih navika prilikom posjete Hrvatskoj. Rezultati provedenog istraživanja pokazuju trend po kojem putnici pomalo podcjenjuju prednosti razmjene valuta prije samog puta u svojoj domicilnoj zemlji, a taj pristup uključuju uštedu novca koja proizlazi iz povoljnijeg tečaja. Zaključak istraživanja ukazuje na tendenciju bazičnog ili čak niskog stupnja financijske pismenosti stranih putnika neovisno o tome putuju li zbog poslovnih obveza ili privatnog odmor, ali kvaliteta usluge razmjene valuta utječe na cjelokupan stupanj zadovoljstva stranog turist.

Ključne riječi: valutni tečaj, kvaliteta u turističkoj industriji, strani turisti, financijska pismenost, kupovna moć.

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PROMOCIJA FIZIČKIH AKTIVNOSTI KAO JEDAN OD PREDUVJETA ZDRAVOG DRUŠTVA

PROMOTING PHYSICAL ACITIVITY AS
ONE OF THE PRECONDITIONS OF A HEALTHY SOCIETY

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SAŽETAK

Za očuvanje zdravlja na razini društva bitno je promicanje tjelesnih aktivnosti, koja ima pozitivan utjecaj na čovjeka smanjujući bolesti srca, šećerne bolesti tipa 2, osteoporoze, visokog krvnog tlaka, kolesterola i dr. Tjelesna neaktivnost je prepoznata kao četvrti rizični faktor globalnog mortaliteta. Nacionalni i lokalni pristupi i strategije trebaju se razvijati tako da podižu svijest o riziku tjelesne neaktivnosti usmjerene različitim skupinama – djeci, mladima, ženama, radnoj populaciji, starijima, osobama s invaliditetom. Koriste se različite metode za podizanje motivacije putem usmjerenih kampanja, sredstvima javnog priopćavanja, mijenjanjem nastavnih programa, stvaranjem i unapređivanjem pristupa mjestima i ustanovama za tjelesnu aktivnost. Također, promocija zdravlja na radnom mjestu izuzetno je bitna uz aktivnost specijaliste medicine rada, stručnjaka zaštite na radu te uz jaku podršku menadžmenta. Osim same tjelesne aktivnosti bitno je voditi računa o zdravim prehrambenim navikama, ciljanom unosu tekućine, upravljanju psihosocijalnim rizicima, medicinski programiranim aktivnim odmorima, zdravstvenim pregledima uz pozitivne promjene vezane za kulturu življenja.

Ključne riječi: tjelesna aktivnost, zdravlje, promocija zdravih aktivnosti, kvaliteta života.

1. UVOD

Istraživanja su pokazala da je tjelesna aktivnost i redovito tjelesno vježbanje neophodno u suvremenom načinu života te da predstavlja sastavni dio stvaranja kompletne osobe.

Današnja saznanja nedvojbeno nam pokazuju da je stupanj zdravlja ljudi, osim nasljednih faktora i utjecaja okoline, značajnim dijelom odraz različitih aspekata načina života povezanih s obiteljskom tradicijom, kulturološkim i socioekonomskim okruženjem. Niz spoznaja i istraživanja povezuje kvalitetan način življenja sa stilom života koji podrazumijeva pored nepušenja, neovisnosti o alkoholu i drogama, zdravog načina prehrane, otpornosti prema stresu i infekcijama, tjelesno vježbanje kao važan udio u stvaranju zdravog ljudsko organizma. Stoga se podrazumijeva da su navedeni faktori u današnjim uvjetima sastavni dio kulture življenja svakog pojedinca.¹

2. ŠTO JE TJELESNA AKTIVNOST

Pod tjelesnom aktivnosti podrazumijeva se svako tjelesno kretanje koje proizvode skeletni mišići, a koje rezultira troškovima energije iznad razine mirovanja.

Današnji život nezamisliv je bez suvremenih tehničkih sredstava, čija upotreba je zamijenila fizički rad iz prošlosti koji je služio za preživljavanje, a što je dovelo do situacije nedostatne tjelesne aktivnosti. Taj nedostatak moguće je u suvremenom društvu kompenzirati organiziranim grupnim ili samostalnim tjelesnim vježbanjem, koje je postalo neizostavna potreba i sastavni dio kvalitetnog i zdravog načina življenja svakog suvremenog čovjeka.

3. POSLJEDICE FIZIČKE NEAKTIVNOSTI

Prema podacima Svjetske zdravstvene organizacija WHO, šezdeset posto ljudi u svijetu nije dovoljno tjelesno aktivno. Od nekretanja, kao čimbenika smrti, svake godine umire više od 2 milijuna ljudi.²

¹ Boran Berčić i Venio Đonlić, *Tjelesno vježbanje u suvremenim uvjetima života*, Filozofski fakultet u Rijeci, Rijeka, 2009.

² [http://www.who.int/whosis/data/Search.jsp?indicators=\[Indicator\].\[SDEC\], Members](http://www.who.int/whosis/data/Search.jsp?indicators=[Indicator].[SDEC], Members).

Učinak tjelesnog vježbanja na ljudski organizam izuzetno je povoljan. Tjelesno vježbanje povećava opskrbu stanica kisikom te tako dovodi do raspada slobodnih radikala. Također podiže razinu psihofizičkih i funkcionalnih sposobnosti, koje su osnovni pokazatelj stupnja zdravlja. Redovita tjelesna aktivnost povećava kvalitetu života na fiziološkom i psihološkom planu.³ Stupanj zdravlja jedna je od osnovnih odrednica razine kvalitete života. Ljudski je organizam evolucijom formiran za lokomociju, što podrazumijeva da mu je tjelesna aktivnost potrebna kako bi pravilno funkcionirao. Visoki kapaciteti tjelesne sposobnosti predstavljaju pozitivan kriterij zdravlja. Redovito tjelesno vježbanje povezano je s tri aspekta zdravlja: somatskim, mentalnim i socijalnim.

Rezultati dosadašnjih istraživanja pokazuju da redovito, ispravno planirano i programirano tjelesno vježbanje ima pozitivan utjecaj i na povišeni krvni tlak, masnoću u krvi te na povišeni indeks tjelesne mase. Također smo svjedoci da tjelesna aktivnost promovira nepušački stil života i pravilnu ishranu te djeluje na povišenje razine pozitivnih psihosocijalnih karakteristika smanjenjem pojave ovisnosti kao i intenzitet neuroza i depresija.⁴

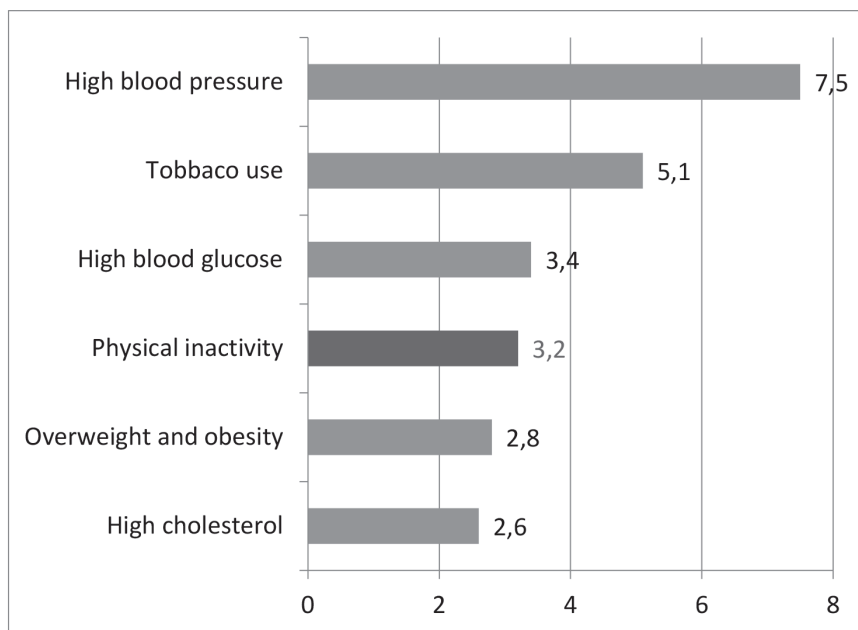
Pet vodećih rizičnih faktora globalne smrtnosti su visok krvni tlak, pušenje, visok šećer u krvi, fizička neaktivnost, debljina i visok kolesterol (Slika 1).⁵

³ Richard H. Cox, *Psihologija sporta: koncepti primjene*, Naklada Slap, Jastrebarsko, 2005.

⁴ Stjepan Heimer, „Promicanje zdravstveno-preventivne tjelesne aktivnosti u Republici Hrvatskoj“, *Sport za sve*, Glasnik Hrvatskog saveza sportske rekreacije, No. 35, 2003, str. 3-4.

⁵ D. Bislimovska, S. Petrovska, L. Todorovska, S. Manchevska, „Promoting physical activity in the community“, *Zbornik 6. Hrvatskog kongresa medicine rada s međunarodnim sudjelovanjem*, Šibenik, 2015.

Slika 1. Vodeći rizični faktori za globalnu smrtnost (milijuni smrtnih slučajeva)



Izvor: D. Bislimovska, S. Petrovska, L. Todorovska, S. Manchevska, „Promoting physical activity in the community“, Zbornik 6. Hrvatskog kongresa medicine rada s međunarodnim sudjelovanjem, Šibenik, 2015.

Rizični faktori najviše pridonose bolestima srca i krvnih žila koje su glavni uzrok smrti u svijetu.

Oko 5,3 milijuna smrti prema podacima WHO otpada na fizičku neaktivnost. Oko 10,4% karcinoma debelog crijeva smatra se da je uzrokovano tjelesnom neaktivnošću. Fizička neaktivnost uzrok je 27% šećerne bolesti kao i 30% ishemične bolesti srca. Tjelesna aktivnost također pozitivno utječe na zdravstvene probleme uzrokovane osteoporozom, kao i na mentalno zdravlje.⁶

⁶ [http://www.who.int/whosis/data/Search.jsp?indicators=\[Indicator\].\[SDEC\], Members](http://www.who.int/whosis/data/Search.jsp?indicators=[Indicator].[SDEC], Members).

4. PROMOVIRANJE FIZIČKE AKTIVNOSTI

Promocija tjelesnih aktivnosti treba obuhvatiti, ovisno o sociološkim i kulturološkim uvjetima, interesu i kondiciji pojedinca tijekom života sve interesne skupine.⁷

Slika 2. Interesne skupine društva



Izvor: D. Bislimovska, S. Petrovska, L. Todorovska, S. Manchevska, „Promoting physical activity in the community“, Zbornik 6. Hrvatskog kongresa medicine rada s međunarodnim sudjelovanjem, Šibenik, 2015.

Akcije promoviranja tjelesnih aktivnosti potrebno je provoditi na svim razinama društva:

- na razini pojedinca;
- interpersonalno;
- organizacijski;
- u zajednici;
- putem javnih politika.

⁷ D. Bislimovska, S. Petrovska, L. Todorovska, S. Manchevska, „Promoting physical activity in the community“, Zbornik 6. Hrvatskog kongresa medicine rada s međunarodnim sudjelovanjem, Šibenik, 2015.

4.1. Faze djelovanja

Na temelju globalne strategije, potrebno je razvijati i provoditi nacionalnu politiku, donositi strategije i planove, organizirati kampanje. U promociji aktivnosti trebaju sudjelovati:

- kreatori politike;
- lokalna samouprava;
- zdravstveni radnici;
- poslodavci privatnih organizacija;
- profesionalni djelatnici u sportu i rekreaciji;
- obrazovne institucije;
- urbanisti i arhitekti;
- prometni stručnjaci

4.2. Metode promoviranja

Informativni pristup utječe na povećanje svijesti o potrebi za fizičkom aktivnosti, kroz različite kampanje na razini zajednice (radne akcije, razvoj pješačkih i biciklističkih staza, savjetovanje o određenom obliku tjelesne aktivnosti, itd.).

4.2.1. Informativni pristup

Korisne su i medijske kampanje (TV, radio najave, novine, bilteni, plakati, ...). Oznake na mjestima promjene odluka (znakovi na dizalima i pokretnih stepenica koji bi trebali potaknuti ljude da koriste stepenice)

4.2.2. Socijalni i bihevioralni pristup

Potrebno je mijenjati kurikulume tjelesnog odgoja u školama i postavljanje ciljeva za nastavnike i učenike

Korisne su i individualne prilagođene intervencije zdravstvenog ponašanja (samoprocjena i nagrade uz socijalnu podršku, pješačke skupine).

4.2.3 Okolišni pristup

Okolišni pristup podrazumijeva stvaranje ili jačanje pristupa mjestima i objektima za tjelesnu aktivnost, kao i programi animacije u poslovnim organizacijama.⁸

⁸ Ibid.

5. ISKUSTVA DRUGIH

U razvijenim srednjoeuropskim i skandinavskim zemljama stanovništvo je daleko aktivnije po pitanju tjelesnog vježbanja nego u Hrvatskoj.

U Hrvatskoj je situacija daleko složenija jer oko 83% ljudi nije dovoljno tjelesno aktivno. Samo 17% stanovništva organizirano je uključeno u sportske i rekreativne aktivnosti.⁹

Tablica 1. Uključenost stanovništva u Republici Hrvatskoj u sportske i rekreativne aktivnosti u 2006. godini

Područje	Broj sudionika	Postotak u odnosu na ukupan broj stanovnika
Natjecateljski sport	280 000	6%
Rekreacija	520 000	11%
Ukupno aktivnih:	800 000	17%

Zadnjih godina stanje se nastoji poboljšati različitim javno zdravstvenim akcijama. Primjerice akcija “Izađi i hodaj” i slično.

Također u većim hrvatskom kompanijama organizirane su sportske i rekreativne grupe za zaposlene čak i mogućnost tjelesnog razgibavanja i tijekom radnog dana. Primjerice u kompaniji Ericsson Nikola Tesla d.d., gdje osim sportskih aktivnih grupa izvan kompanije organizirana je i dvorana za vježbanje, tako da se zaposlenici prema potrebi mogu razgibati na švedskim ljestvama, strunjačama, ... Koncept integriranog upravljanja zdravljem i produktivnošću radnika u INI d.d. unaprijeđen je Projektom HEALTH-INA koji se provodi već dvije godine. Promocija zdravlja na radnom mjestu, zaštita na radu i stručna podrška liječnika spec. med. rada rezultirale su poboljšanjem kvalitete života radnika te unapređenjem socijalne i gospodarske dobrobiti kompanije.¹⁰

Unatrag nekoliko godina u Makedoniji su prema strateškim dokumentima u praksi načinjeni konkretni koraci u promicanju tjelesne aktivnosti u različitim područjima. Taj je proces naglasio da suradnja među glavnim nositeljima treba pružati informacije, implementaciju programa i omogućiti siguran okoliš za tjelesnu aktivnost, vodeći do značajnih promjena u javnom zdravstvu zajednice.

⁹ Boran Berčić i Veno Đonlić, *Tjelesno vježbanje u suvremenim uvjetima života*, Filozofski fakultet u Rijeci, Rijeka, 2009.

¹⁰ I. Brkanović, „Projekt zaštite i promocije zdravlja Health – INA“, Zbornik 6. Hrvatskog kongresa medicine rada s međunarodnim sudjelovanjem, Šibenik, 2015.

Konkretni procesi obuhvatili su implementaciju strategije za organiziranje tjelesne aktivnosti za predškolsku djecu, organizaciju liječničkih preventivnih pregleda za sve koji se bave rekreativnim sportovima, tiskanje besplatnih brošura o promociji tjelesnih aktivnosti, te organiziranje aktivnosti za Europski tjedan sporta u 2015. godini. U izradi strateških dokumenata sudjelovali su Vlada Republike Makedonije, ministarstvo zdravstva, ministarstvo rada, ministarstvo obrazovanja i znanosti, javne zdravstvene institucije, liječnici primarne zdravstvene zaštite i dr.¹¹

6. ZAKLJUČAK

Nedostatak ljudskog kretanja u suvremenim uvjetima življenja je današnja stvarnost i nepobitna činjenica. Budući da je tjelesna aktivnost potreba čovjeka, potreban je veći angažman društva u cjelini isto kao i svakog pojedinca koji je dužan voditi brigu o svom tjelesno zdravstvenom statusu.

Zdrava nacija temelji se na zdravoj djeci, zdravoj mladoj populaciji, zdravim radnicima, zdravom umirovljeničkom populacijom te što je moguće zdravijom populacijom onih s posebnim potrebama. Za to postići potrebno je postaviti ciljeve, odrediti strategije, osmisliti planove i konačno implementirati aktivnosti na postizanju što zdravijih građana. Sustavni pristup upravljanju zdravljem kako općenito u zajednici tako i u različitim organizacijama omogućuje efikasan način ostvarivanja tih ciljeva. Između ostalog i planiranjem i implementacijom različitih oblika fizičkih aktivnosti za sve dobne skupine. Tjelesna aktivnost ima nezamjenjivu vrijednost jer predstavlja najbolje sredstvo za postizanje i održanje zdravlja.

Abstract:

PROMOTING PHYSICAL ACITIVITY AS ONE OF THE PRECONDITIONS OF A HEALTHY SOCIETY

To preserve the health of the society it is important to level the promotion of physical activity, which has a positive effect on reducing the man hooked heart disease, type 2 diabetes, osteoporosis, high blood pressure, cholesterol, etc. Physical inactivity is recognized as a risk factor the fourth global mortality. National and local approaches and strategies should be developed to raise awareness about the risk of physical in-

¹¹ D. Bislimovska, S. Petrovska, L. Todorovska, S. Manchevska, „Promoting physical activity in the community“, Zbornik 6. Hrvatskog kongresa medicine rada s međunarodnim sudjelovanjem, Šibenik, 2015.

activity target different groups - children, youth, women, the working population, the elderly, and people with disabilities. Different methods are used to boost motivation through targeted campaigns, the media, changing the curricula, creating and improving access to places and facilities for physical activity. Also, health promotion in the workplace is extremely important to the activity of specialists in occupational medicine, occupational safety and health, and with the strong support of management. Besides the physical activity is essential to take account of healthy eating habits, the target intake of fluids, the management of psychosocial risks, Wellness program, and health checks by the positive changes related to the culture of life.

Key words: physical activity, health, promotion of healthy activities, quality of life.

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Tematska cjelina/*Thematic unit*
KVALITETA U JAVNOM SEKTORU
QUALITY IN PUBLIC SECTOR

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**QUALITY MANAGEMENT
AS PART SMART POLICIES OF THE REGION -
THE NEW MINDSET IN PUBLIC ADMINISTRATION**

UPRAVLJANJE KVALITETOM KAO DIO PAMETNE POLITIKE
REGIJE – NOVO RAZMIŠLJANJE O JAVNOM SEKTORU

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ABSTRACT

The term mindset we will introduce awareness of relationships and contexts that are characterized by dynamism and regulation. This change in thinking must to occur in the implementation quality management in public administration. The aim of this paper is to present own experience and proposals in the implementation Smart policy on level of public administration in the context of the use of the principles of quality management and in the context of new trends in this area.

Key words: quality management, smart policy, region, relationships

1. INTRODUCTION

The European Commission meeting in December 2013 approved the Cohesion Policy for 2014 -2020. It includes strategies for smart specialization. These should be integrated at national and regional levels in the Member States called smart policy region. Although there is a National Strategy of Regional Development as a strategic document to support regional development in the long term, there are still large differences between regions. The reason is that they are so inconsistently implemented of smart policies at the regional level. Another reason is the lack of aggregate methodology to coordinate all aspects of sustainable development in the region and, consequently, to ensure its economic development. It is understood that part of the economic development are small and medium-sized enterprises.

The term smart is not unknown in the literature. Most often associated with the methodology for setting targets. The term smart as we perceive it is rather translated as intelligent or sensible, wise, clever. This term has appeared in national and regional innovation strategies RIS 3, which are part of Cohesion Policy 2014 - 2020 National and regional authorities across Europe must design strategies called smart specialization in the business environment so that they can be used as structural funds effectively and ensure synergy between the various national and regional policy. It must be said that even these activities are not completely new. Have previously been developed at different levels methodology, which included recommendations in all areas ensuring sustainable regional development. In Slovakia, the National Regional Development Strategy, which is the starting point for eligibility for access to state support of regional development in the long term. Extensive analyzes in this field, unfortunately, confirmed that these approaches are not sufficiently and effectively applied. The reason is the lack of coordination of activities related to the implementation of smart regional policy at the local government, leading to a lack of integration of economic transformation programs, regional innovation and overall economic system are often isolated, are not sufficiently harmonized industrial and economic structure of the region, research and development is not a business focus. Provisions are also at the international and trans-regional perspectives.

Fundamental weaknesses of all the methodologies to be applied so far is the fact that it contains only recommendations which should be the development of the regions do, but nothing is written in such a way. Although the government has engaged in sustainable development and the system announces measures for the use of the existing allocation of EU structural funds, or is meant to deal with the so-called Local strategies are not known real solutions,

they should first eliminate regional differences and stimulate investment in the business sector and thus support small and medium-sized enterprises in the regions generate concrete added value. Abroad, the term smart policy largely associated with cities. While it is the policy of the city administration, which should ensure its sustainable development. The drawback, however, happen to be on a larger scale somewhat forgotten the essence of the concept of “sustainable”. The essence of this concept is based on unity of purpose of addressing the social, economic and environmental. If we want this concept even further identified, we could say that sustainable development is a tool to ensure a higher standard of living and the main aim is to reconcile economic development with environmental protection. Creating a certain symbiosis goals of sustainable development has its logical justification. The social aspect of creating conditions for maintaining and increasing employment in the region, the economic aspect is designed to ensure economic performance and thus the conditions for economic development of the region and the environmental aspect should be provided innovative use of new knowledge at the level of science and technology, to ensure that they are implemented as well approaches that are environmentally friendly and for example production of products which do not impair the environment, respectively are not harmful. Smart regional policy should primarily focus on the above-mentioned objectives of sustainable development.

That there is no unnecessary discussions on the concept of smart politics of the region as a region we consider spatially created space for the creation and implementation of regional and structural policy at the second or third degree, according to the classification of territorial units for statistics. In this way, it is part of the definition set out in the Act. 503/2001. Due to this fact we mean by intelligent (smart) policy of region to understand the politics of the region at the level of the public authority, in this case the higher territorial unit, but it is equally usable and city level.

For better identification must be emphasized that the higher territorial units are legal entities and their ownership of the property. They have own budget, personal and financial independence, they may do business and collect administrative fees. They may participate at international, national and cross-border cooperation. HTUs be competent to issue generally binding regulations, are founders of budgetary, contributory and non-profit organizations and companies. Under the Constitution, the higher its territorial units mainly from their own income, but also from state subsidies. Checking higher territorial units is ensured by internal and external control. Internal Control Department provides the main supervisor, who is elected council. Its operation

is focused on the implementation of the self-administration functions, compliance with regulations, directives, orders, decisions, compliance with laws, budgetary economy, position of receivables, payables, procurement, processing of petitions and complaints. It prepares opinions on the draft budget and the final account. External control comply with the following institutions: the Supreme Audit Office of the transferred execution of state administration, the Office of the Government in matters transferred state administration, the Ministry of Finance, the administrative courts, prosecutors concerning compliance with the legality of acts, audit, financial control and asset situation, the Ombudsman Cases of human rights and freedoms.

2. ENSURING COMPETITIVENESS OF SMES THROUGH THE PROMOTION OF REGIONAL ADMINISTRATION

EU in a number of documents emphasize that the holder of the economic prosperity of regions are mainly small and medium-sized enterprises. EU Member States are bound to apply the so-called Small Business Act for Europe (SBA), a document which is a framework program for friendlier business environment in Europe. Regional authorities should be based on the contents of this document and ensure its implementation at the regional level. This document is aimed at removing barriers that prevent SMEs to exploit their potential to grow the economy and create jobs (no information about the use of this document at the state level, let alone at regional level and the results achieved). In addition to this document, the EU has created tools to support:

- Entrepreneurship and enterprise development;
- Promoting innovation in existing small and medium-sized enterprises;
- Building the capacity of innovation agencies, which should extend information of new tools aimed at promoting innovation for SMEs;
- Support research and development activities in small and medium-sized enterprises;
- Simplified access to risk capital;
- Erasmus program for young entrepreneurs.

Regional authorities should encourage the involvement of SMEs in projects through Horizon 2020:

- Dissemination of information on EU framework programs;
- Developing sectoral and cross-sectoral interest groups;
- Job search for foreign partners;
- Preparing potential project managers;

- Seek and support tools commercialization of research and innovation activities of the EU.

We believe that the large majority of small and medium-sized enterprises have no idea about these options and the more it shows the necessity of building a smart policy regions.

Seen in this smart policy is a broad range of activities. If the public authority concerned to fulfill this role, the particular help ensure sustainable competitiveness of enterprises in the region, the target group of this aid are small and medium-sized businesses in the region, which are practically the bearer of the mission development of the region and do not have the funds for it to ensure the acquisition and implementation of advanced knowledge in the field of innovation and quality management through consulting firms. To address these issues we present comprehensive programs and institutions whose role is to support small and medium-sized enterprises in Slovakia:

- Government support programs of Ministry of National economic;
- The National Agency for Development of Small and Medium Enterprises;
- The Slovak Investment and Trade Development;
- Slovak Innovation and Energy Agency;
- Slovak Association of Small Enterprises (SAMP);
- Europe 2020 (A European strategy for smart sustainable and inclusive growth);
- Small Business Act (SBA) - Law on small and medium-sized enterprises;
- The Entrepreneurship Action Plan 2020 (2020 Entrepreneurship Action Plan);
- The European Charter for Small Enterprises - in 2000 for the first time define a policy of support for SMEs in the EU etc.

Statistical data concerning some important information solutions focused on small and medium enterprises in Slovakia. On the territory of the Slovak Republic undertook at the end of 2012:

- 97% of micro-enterprises,
 - 2.4% of small businesses,
 - 0.5% medium-sized enterprises,
- (compared with year 2008 was a decrease).

The results of selected financial indicators show a significant impact of changes in the Slovak economy to the sector of small and medium-sized enterprises:

- **Mean values of return on sales - 2.0%** - (lower value than in 2008);
- **Mean values of return on assets - 0.03%** - (lower value than in 2008);
- **Medium level of debt assets SMEs developed near the upper limit of the recommended level of adequacy - 66.8%** - high debt ratio;
- Liquidity of II. instance is close to the border ability to pay short-term obligations;
- Medium maturity of short-term trade receivables of SMEs has been extended - microenterprises 28% - 4.4 on small businesses by 21% - 8.7 days)

Table 1. Strengths, weaknesses, opportunities and threats in relation to factors of competitiveness (source study NBS 3/2008)

Strengths	Weaknesses
The use of IS and ICT Professionalism and efficiency management Customer Orientation The share of export sales The emphasis on modernization of production	Control of international distribution Horizontal and vertical integration Use of marketing The strategy to differentiate themselves from the competition Human resource Management
Opportunities	Threats
Demanding customers The depth of supply and related downstream industries EU membership Availability and quality of telecommunications infrastructure Access to finance and various credit facilities	Availability of workforce with international experience and adequate education The quality and availability of specialized educational and research services The high cost of energy The lack of functioning legal system Allocation of investment incentives The quality of transport infrastructure

Source: Made by authors.

The National Bank of Slovakia conducted in 2008 research study, which could be a prerequisite for setting objectives of smart policy region in terms of ensuring the competitiveness of small and medium-sized enterprises. Competitiveness factors were divided according to Porter's approach to assessing the competitiveness of the country namely on the basis of in 31 intercompany, 17 sectoral and 25 macro-level effects. The outcome was the table describing the strengths, weaknesses, opportunities and threats and its specific content was as follows:

3. THE OBJECTIVES OF SMART POLICY REGION IN SUPPORT OF SUSTAINABILITY COMPETITIVENESS OF SMES BASED ON QUALITY MANAGEMENT

The objectives of smart policy region in support of sustainability competitiveness of small and medium-sized enterprises could be defined as follows:

- Promotion of innovation and on the development of quality products in small and medium-sized enterprises of the region;
- Support for increasing the competitiveness of these enterprises;
- Via these activities work to increase employment in the region;
- Increasing the competitiveness of small and medium-sized enterprises of the region to act indirectly to increase the income of the relevant regional body of public administration through the existing fund contributions.

Thus defined, part of the smart policy region should be addressed through the following processes:

1. The process of operative creation and recording, addressing the following tasks:
 - Development of the region's smart policy aimed at promoting the competitiveness of small and medium-sized enterprises of the region;
 - Determination of liability and temporal determinants for different tasks under this section smart policy;
 - Developing a complete database of small and medium-sized enterprises of the region;
 - Development of a system for monitoring the results of SMEs in innovation activities and the development of quality;
 - Drafting of indicators with the necessary ability to express the results of SMEs in innovation and quality development.
2. The process of helping small and medium-sized enterprises of the region in driving innovation, quality development and environmental protection in the manufacture of products aimed at meeting the following tasks:
 - To assist SMEs in the transfer of knowledge of modern science and technology in the production process;
 - To support small and medium-sized enterprises familiarity with modern innovative approaches;
 - Helping SMEs to build an effective quality management systems;
 - Work towards the expansion of modern methods of quality assurance of products;

- Help provide counseling assistance to small and medium projects at innovation in products and production technologies and projects in improving the quality of products;
 - Monitor the satisfaction of the region's population with quality products and services in the region;
 - Effectively assist in the preparation, motivation and development of human resources in the field of innovation and development of quality products.
3. The process of ensuring coherence between regional smart policy and the development of innovation and product quality in the region through the following tasks:
- To integrate the issue of innovation and development of quality products in the elaboration of normative documents region;
 - Ensure the participation of regional authorities in the development and protection of intellectual property;
 - Ensure the promotion of innovative approaches and quality development in the region;
 - Provide assistance in improving regional authority partnership between customers and suppliers;
 - Work towards the integration of environmental aspects in the life cycle of products produced in the region;
 - Encourage the transfer of modern technology and knowledge of research and development in small and medium-sized enterprises.

4. CONCLUSION

Several experts agreed that it is the regional level offers favorable prospects for the design of such a control structure that allows to reinforce the transition to a knowledge-based economy. Regions need to focus on continuous improvement, new ideas, knowledge creation and organizational learning and applying the principles for quality management at all levels, which are prerequisites for sustainable competitiveness of the main sources of development. These sources are mainly small and medium-sized enterprises in their territory, which are establishing the basic values.

Sažetak:

UPRAVLJANJE KVALITETOM KAO DIO PAMETNE POLITIKE REGIJE – NOVO RAZMIŠLJANJE O JAVNOM SEKTORU

Pojmom razmišljene želimo promovirati svijest o odnosima i kontekstu koji karakterizira dinamizam i regulativu. Ova promjena u razmišljanju mora biti prisutna kod implementacije upravljanja kvalitetom u javnom sektoru. Cilj ovog rada je prezentirati vlastito iskustvo i predložiti implementaciju pametne politike javnog sektora u kontekstu primjene načela upravljanja kvalitetom i u kontekstu novih trendova u ovom području.

Ključne riječi: upravljanje kvalitetom, pametna politika, područje, odnosi.

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IZMJENE SUSTAVA UPRAVLJANJA KVALITETOM KOJE DONOSI ISO 9001:2015 U JEDINICAMA LOKALNE I REGIONALNE SAMOUPRAVE

MODIFICATION OF QUALITY MANAGEMENT SYSTEM
BY THE ISO 9001:2015 IN LOCAL AND REGIONAL GOVERNMENT

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SAŽETAK:

ISO 9001:2015 nadogradnja je ISO 9001:2008. U jedinicama lokalne i regionalne samouprave (JLRS) koje imaju implementiran sustav kvalitete prema nekoj od ranijih verzija, promjene sustava, prije svega, odnose se na reviziju postojećih operacija i usklađivanja sa zahtjevima nove norme. Provedba internog audita, ocjena uprave kao i postupci eksternog audita pripremili su JLRS za nove zahtjeve norme. Neki od ISO zahtjeva već su definirani zakonom. Pojednostavljeno, postojeći sustav djeluje i prilagodba će zahtijevati manje posla. Priručnik kvalitete nije potreban dokument, sloboda u kreiranju i utvrđivanju dokumentiranih informacija daje mogućnost njho-

va održavanja. To pojednostavljuje i čini lakše razumljivim i jednostavnijim implementaciju zahtjeva norme u JLRS, kako za zaposlene, interne i eksterne auditore, što treba uzeti u obzir. Sadržaj Priručnik kvalitete je poboljšana osobito u području razumijevanja zainteresiranih strana i njihovih očekivanja, korištenjem važnih informacija iz postojeće dokumentacije sustava upravljanja kvalitetom (SUK) i predviđa tablicu povezivanja zahtjeva ISO normi kao i prihvatljivu dokumentiranost. Provođenje i analiza kontrole upravljanja kvalitetom je zadovoljavajuće sistematizirano što će omogućiti potpunu upotrebu relevantnih informacija, kao i prihvaćanje rješenja koja se i sada djelomično koriste.

Ključne riječi: sustav upravljanja kvalitetom, regionalna samouprava, ISO 9001:2015.

1. UVOD

Usvajanje sustava upravljanja kvalitetom (u daljnjem tekstu: SUK) je strateška odluka organizacije koja uz pretpostavku predanosti uprave ima za cilj poboljšanje sveukupne performanse. U svojoj osnovi organizacija kritički razmatra vlastitu djelotvornost, te tražeći bolja, povoljnija i/ili brža rješenja, teži unaprjeđenju.

Gospodarski sektor je izravno na tržištu, pa je ocjena uspješnosti prepoznavanja potreba korisnika usluga te stvaranja proizvoda i usluga kojima će to ostvariti, jasno mjerljiv uspjehom ili neuspjehom na tržištu.

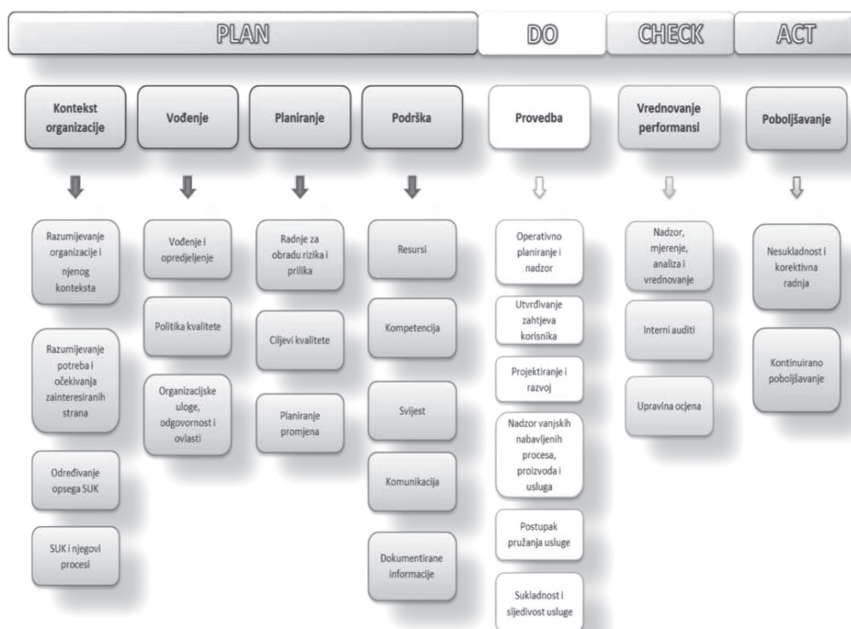
Javni sektor, odnosno jedinice lokalne i regionalne samouprave s područja Republike Hrvatske (u daljnjem tekstu: JLRS) u tom su pogledu specifične. Specifičnost proizlazi iz Zakona o lokalnoj i regionalnoj (područnoj) samoupravi (NN 129/05, 109/07, 125/08, 61/11, 150/11, 137/15) kojim je uređen djelokrug i ustrojstvo, način rada, nadzor, ali i sva druga pitanja od važnosti za njihov rad. Ovaj Zakon daje JLRS-ovima prava, obveze i ovlasti, za koje nemaju konkurencije. Značajne odrednice JLRS-ova je multifunkcionalnost djelovanja, identitet i specifičnosti definirane područjem na kojem djeluju, ali i izbori. Izbori su svojevrsan ekvivalent tržištu, na kojem uprava može provjeriti svoju uspješnost, odnosno mišljenje korisnika usluga o kvaliteti (u najširem smislu) pruženih usluga. Globalizacija tržišta i internet učinili su informacije dostupnim svima te time otvorila mogućnost praćenja i usporedbe, ali i podigla razinu očekivanja pa i kritičkog promišljanja uspješnosti fizičkih u odnosu na pravne osobe. U JLRS to konkretno znači značajno veća očekivanja korisnika usluga u pogledu sigurnosti, pravodobnosti, pouzdanosti, cjelovitosti i potpunosti pružene usluge. JLRS koje su implementirale SUK iskazale su svoju spremnost da vlastitu uspješnost mjere i ocjenjuju prema međunarodnim kriterijima. Postavlja se pitanje koje promjene

je potrebno provesti u postojećim sustavima kako bi ih prilagodili zahtjevima nove međunarodne norme.

Svjesni promjena u dinamičnom okruženju ISO (Međunarodna organizacija za normizaciju) je kroz svoje tehničke odbore još 2013. godine potaknula reviziju međunarodne norme ISO 9001:2008, te je u rujnu 2015. godine i službeno usvojena nova norma ISO 9001:2015. Značajne promjene norme vidljive su već u samoj strukturi, s osam grupa zahtjeva iz norme ISO 9001:2008, na 10 grupa zahtjeva u normi ISO 9001:2015. U nastavku je dan pregled zahtjeva norme. Analizom strukturnih razlika te proučavanjem norme uočavaju se sljedeće značajne promjene:

- Promjene u strukturi (Vidi grafički prikaz br. 1);
- Načela upravljanja;
- Terminologija;
- Razumijevanje organizacije i njenog konteksta;
- Potpune procesne orijentacije u upravljanju organizacijom;
- Uvođenje zahtjeva za upravljanja rizicima;
- Upravljanje dokumentacijom;
- Ukidanje nerazumljivih „preventivnih mjera“.

Slika 1. Prikaz PDCA ciklusa u normi ISO 9001:2015



Izvor: Izvorni rad autora.

Postavlja se pitanje što konkretno navedene izmjene znače za JLRS, odnosno koje je radnje potrebno provesti u ranije uspostavljenim sustavima upravljanja da bi sustav uspješno djelovao i prema novoj normi.

2. PROMJENE U STRUKTURI

JLRS-ovi koji su SUK implementirali prema normi ISO 9001:2000, nisu imali značajnijih problema prilikom prilagodbe sustava na tada novu normu ISO 9001:2008. Razlozi tome su u ne toliko značajnim promjenama, odnosno vrlo često čisto „kozmetičkim promjenama“ u tekstu. Revizija norme u 2015. godini je bitno drugačija. Već sama usporedba norme ISO 9001:2008 i ISO 9001:2015 pokazuje promjenu broja zahtjeva norme, dio novih zahtjeva, ali i novu, značajno drugačiju strukturu unutar postojećih zahtjeva. Naglasak nove norme je na razumijevanju konteksta organizacije odnosno uloge koju organizacija ima u sredini u kojoj se nalazi, uz uvažavanje korisnika usluge akceptirajući njegova očekivanja. Novi zahtjev u normi predstavlja i Vođenje, ali i definiranje rizika i prilika koje dovode u pitanje kontekst organizacije. Također, postiže se veća fleksibilnost u pogledu definiranja dokumentacije SUK (izuzima se dokumentiranje 6 obveznih procesa) te se pogoduje daljnjem optimiziranju tj. sistematiziranju dokumentacije koja je kod većine JLRS prenaplašena.

3. NAČELA UPRAVLJANJA

Uvrštavanjem upravljačkih načela u samu normu, dodatno je naglašen njihov značaj. Što konkretno znače upravljačka načela za JLRS -ove? Usmjerenost na korisnike usluga je temeljni razlog postojanja JLRS-ova. Zakonom definirana obveza pružanja usluga prema korisnicima usluga, ali i izvori financiranja primarno iz poreza, predstavlja pred JLRS-ove zahtjev da svoje usluge ne odrađuje više samo formalno po sili zakona, nego aktivno propitujući modele kako uslugu učiniti dostupnijom, bržom, boljom odnosno u širem smislu prema zahtjevima korisnika „kvalitetnijom“. Slijedom navedenog sve je više primjera usluga po principu „e-građana“ koje su korisnicima usluga dostupne iz njihovog doma.

Vođenje kao temeljno načelo odnosi se primarno na utvrđivanje odgovornosti na svim razinama upravljanja.

Uključenost ljudi pretpostavlja razumijevanje uloge svih službenika i namještenika o vlastitoj ulozi u SUK. Uspješan sustav ne zadržava se samo na formalnom „odrađivanju“ poslova definiranim zakonima i internim aktima JLRS-ova, nego i proaktivnim djelovanjem na svim razinama upravljanja te

otvaranja mogućnosti da se prijedlozi za unaprjeđenje potiču i razmatraju na svim razinama upravljanja.

Iako je *procesni pristup* u svojoj osnovi kao načelo ili kao zahtjev prisutan već u najranijim inačicama SUK, u normi ISO 9001:2015 ovo se načelo/zahtjev provlači kroz cijelu normu. Procesni pristup je temelj uspješnosti u kojem se sustav sagledava kao jedan sustav, a ne kao zbir zasebnih neovisnih jedinica. U poslovnoj praksi povezivanje rada upravnih tijela unutar JLRS-ova te razumijevanje uloge svih dijelova procesa, prevenira ponavljanje opetovanih radnji i omogućuje unaprjeđenje sustava.

Poboljšavanje je pretpostavka norme, a utemeljena je na stalnom preispitivanju načina rada i pokušaju da se kroz kvalitetnija rješenja unaprijedi sustav.

Odlučivanje na temelju činjenica je pretpostavka koja čini normu pouzdanom. JLRS-ovima ona može koristiti i za mjerenje uspješnosti rada. Odnosno, jasno mjerljivi ciljevi, kroz praćenje postignutih rezultata u određenom vremenskom roku, temelj su (pro)ocjene uspješnosti, ali i poslovnog odlučivanja za operativno djelovanje u budućnosti.

Upravljanje odnosima je pomalo izmijenjeno načelo. Do sada se upravljanje odnosilo na obostrano korisne odnose s dobavljačima, koji su podrazumijevali da je uspješnost JLRS-ova djelomično uvjetovana i uslugama koje za nju obavljaju dobavljači. Drugim riječima ugovaranjem pojedinih usluga, JLRS-ovi ostvaruju strateške ciljeve, pa je njihova uspješnost izravno povezana s dobavljačima, odnosno u širem kontekstu „outsourcingom“ usluga. Nova norma je ovo načelo uopćila pa se ne govori više o upravljanju odnosima s dobavljačima, nego o upravljanju odnosima, koji obuhvaćaju zapravo sve zainteresirane strane.

4. TERMINOLOGIJA

Znanstvena istraživanja¹ koja ukazuju na razloge primjene sustava upravljanja u javnom sektoru (JRLS-ovima) upućivala su na potrebu uprave za mjerenjem vlastitih performansi prema međunarodnim standardima, ali i potrebi da se utvrdi koji su to nužni kriteriji koje uprava mora zadovoljiti kako bi ju korisnici usluga doživljavali uspješnom, pouzdanom i sigurnom. Kako su sustavi upravljanja kvalitetom kroz ISO započeli svoju primjenu u vojsci od-

¹ Carlos Gardsen, „A government you can trust“ ISO Focus, Vol. 4, No. 9, 2007, p. 50-54.; Eric W. Welch, Charles C. Hinnant and Jae M. Moon, „Linking citizen satisfaction with e-government and trust in government“ Journal of public administration research and theory, Vol. 15, No. 3, 2005, p. 371-391.

nosno industriji, rječnik koji je korišten i u normi ISO 9001:2000 je bio vrlo često „inženjerski“, odnosno teže primjenjiv na uprave. Iako je norma imala intenciju primjene u svim oblicima organizacije, bilo je upitno razumijevanje pojedinih zahtjeva u „ne-inženjerskom okruženju“. Slijedom navedenog, svaku novu reviziju norme pratila je i IWA odnosno smjernica koja je pojašnjavala što konkretno pojedini zahtjevi znače u upravi. Revizija normi sustava upravljanja, želja za optimizacijom primarno kod organizacija koje su implementirale nekoliko različitih sustava upravljanja (primjerice ISO 14001; ISO 50001, ISO 27001, ISO 9001 i dr), ali i promjena koncepta norme s proizvodno na marketinški orijentiranu, učinile su rječnik odnosno terminologiju primjene, bližom organizaciji koja ih primjenjuje. Za JLRS-ove to konkretno znači da rječnik norme mogu u cijelosti uskladiti s terminologijom zakona i podzakonskih akata po kojima postupaju.

5. RAZUMIJEVANJE ORGANIZACIJE I NJENOG KONTEKSTA

Osnova uspješnog djelovanja je razumijevanje svrhe postojanja organizacije. U gospodarskom sektoru ona se uobičajeno definira kroz potrebu korisnika usluga, koju kroz svoje proizvode/usluge organizacija ispunjava. Zadovoljstvo korisnika usluga ključno je za opstanak organizacije, stoga organizacija analizira svoje operativno djelovanje te primjenom modela PDCA odlučivanja osigurava kontinuiranu težnju za učenjem na vlastitim pogreškama i unaprjeđenju.

Djelatnost JLRS-ova primarno je definirana zakonima, koji ju velikim dijelom normiraju, odnosno definiraju koje su to potrebe korisnika usluga na koje trebaju odgovoriti. ISO metodologija predstavlja niz pretpostavki (zahtjeva) koji pokazuju kako da JLRS bude (ne samo formalno) djelotvorna te u svojoj osnovi predstavlja „kvalitetu“ odnosno nadogradnju sustava upravljanja. ISO 9001:2015 u sklopu zahtjeva o kontekst organizacije pred JLRS postavlja zahtjev za definiranjem „zainteresiranih strana“ kao i njihovih očekivanja. U vrijeme značajnih smanjivanja izvornih prihoda (prihoda od poreza), ali i sve većih očekivanja zainteresiranih strana, razumijevanje organizacije i njenog konteksta za JLRS-ove postaje sve značajnija.

6. POTPUNA PROCESNA ORIJENTACIJE U UPRAVLJANJU ORGANIZACIJOM

SUK pretpostavlja definiranje glavnih i sporednih procesa, mjesta njihovih interakcija, kao osnove njihove optimizacije. Norma ISO 9001:2015

posebno naglašava procesnu orijentaciju, elaborirajući i stvarajući poveznicu od svog uvodnog dijela do zahtjeva 10. Poboljšanje. Obveza primjene procesnog pristupa u JLRS -ovima definirana je u nizu zakona o financijskim kontrolama, te predstavlja pretpostavku rada Jedinica unutarnje revizije, ali i Financijskih unutarnjih kontrola. Zakonska obveza olakšava primjenu zahtjeva za procesnim pristupom, te kroz ISO daje „dodanu“, vrijednost sustavu. Razlike u metodologiji rada Jedinica unutarnje revizije i internih auditora daju mogućnost cjelovitijeg sagledavanja sustava.

7. UKIDANJE NERAZUMLJIVIH „PREVENTIVNIH MJERA“ I UVOĐENJE ZAHTJEVA ZA UPRAVLJANJA RIZICIMA

Norma ISO 9001:2008 kao obvezni zahtjev pred organizacije postavlja „preventivne mjere“, koje su pretpostavljale analizu sustava, uočavanje situacija ili mjesta na kojima su moguće pogreške, te stvaranje pretpostavki da se neželjene pogreške ne dogode. Preventivne mjere iz ISO 9001:2008 su u svojoj osnovi preteča upravljanja rizicima u normi ISO 9001:2015.

Upravljanje rizicima sukladno zahtjevu 6.1.1 norme odnosi se na planiranje i utvrđivanje rizika i prilika s ciljem:

1. Osiguravanja ostvarenja namjeravanih rezultata SUK;
2. Povećavanja poželjnih učinaka;
3. Sprečavanja ili smanjivanje neželjenih učinaka i
4. Postizanja poboljšanja.

Nadalje, u zahtjevu 6.1.2. traži se da „Organizacija mora planirati radnje za obradu rizika i prilika i integracije i implementacije rizika u procese SUK i vrednovanja njihove djelotvornosti“. Primjena ovog zahtjeva norme, za JLRS-ove predstavlja ispunjenje zakonskih obveza za donošenjem „Strategije upravljanja rizicima“ i uređeno je Uputama za izradu strategije upravljanja rizicima te Smjernicama za upravljanje rizicima.

8. UPRAVLJANJE DOKUMENTACIJOM

U samim počecima implementacije međunarodne norme ISO 9001:2000 ili 2008 većina JLRS-ova suočila se s problemom definiranja procesa i dokumentiranog sustava koji je trebao naglasiti kako su ovi sustavi uređeni, visoko normirani kroz zakone, ali i kako, prije svega, zbog multifunkcionalnosti usluga koje pružaju imaju jako puno procesa. Ovakvom odnosu pridonijela su i tumačenja iz certifikacijskih kuća koja su kao preporuku davala da se „opi-

še sve što se radi“. Nakon implementacije sustava i formalne certifikacije za osobe koje operativno obavljaju poslove internih auditora uz svoje redovne aktivnosti u JLRS-ova nastali su problemi zbog opsežne dokumentacije, čije održavanje je postalo zahtjevno, pri čemu se nametnulo pitanje potrebe tolike dokumentacije, a poglavito dokumentacije koja je kroz akte unutar JLRS-ova već postojala. Iskustva u primjeni norme, pridonijela su razumijevanju procesnog pristupa, ali i potrebi odbacivanja svega što predstavlja obvezu koja je sama sebi svrhom. Drugim riječima, odbacivanje svih onih dokumenta koji su već negdje uređene u sustavu. Za razliku od norme ISO 9001:2008 koja je podrazumijevala definiranje politike kvalitete, ciljeva kvalitete, priručnika kvalitete, te dokumentiranih procesa, norma ISO 9001:2015 zadržava obvezu definiranja politike kvalitete i ciljeva kvalitete, ali uvodi nove dokumentirane informacije. Sloboda u definiranju sadržaja i izgleda dokumentirane informacije za JLRS-ove znači analizu postojeće dokumentacije, ukidanje svega onoga što je regulirano zakonom, podzakonskim aktima ili aktima samog JLRS-a. Ipak, Priručnik (poslovnik) kvalitete iako nije obveza predstavlja dokument koji na jednom mjestu definira zahtjeve norme i njihovu primjenu u JLRS-u te nije nužan, ali je praktičan dokument koji i dalje opravdava svoju svrhu.

9. ZAKLJUČAK

Norma ISO 9001:2015 predstavlja nadogradnju norme ISO 9001:2008. Kao i uvijek do sada, postoji dilema da li i u kojoj mjeri nova revidirana norma predstavlja poboljšanje i što pruža korisnicima koji će u praksi raditi na prilagodbi SUK-a zahtjevima nove norme. O tome postoje različita mišljenja, od toga da je revizija norme korak unatrag, da svi zahtjevi koje norma ISO 9001:2015 sadrži nalazimo i u normi ISO 9001:2008, pa do toga da revidirana norma predstavlja veliki korak naprijed u razvoju SUK. Postoji također i mišljenje da će oko 10% organizacija koje i inače sustavno rade na poboljšavanju svojeg sustava upravljanja, pronaći elemente i izvući maksimalnu korist za svoju organizaciju iz revidirane norme.

Summary:

MODIFICATION OF QUALITY MANAGEMENT SYSTEM BY THE ISO 9001:2015 IN LOCAL AND REGIONAL GOVERNMENT

ISO 9001: 2015 is an upgrade of ISO 9001: 2008. In Local and regional governments (JLRS) that have implemented quality management system according to one of the earlier versions, changes to the system, above all, consider reviewing of the current operation and its alignment with the requirements of the new standard. The implementation of the internal audit, management reviews, and external audits procedures have prepared JLRS for the new requirements of the standard. Some ISO requirements are already defined by laws. Simplified, systems that have until now acted in accordance with the requirements of the standard will have much less work. Although Quality Manual is not a necessary document, freedom in creating and defining the documented information, provides possibility of its maintaining. Since it simplifies and makes understanding of standards implementation in JLRS easier for employees, internal and external auditors, its retention should be considered. Further recommendation is Quality Manual content upgrade in particular in the scope of the defining stakeholders and their expectations, summarizing important information from existing documents QMS and predict table of the connection requirements of ISO standards and the coverage of the applicable record / document. More efficient systematization, monitoring and analyzing quality management control, will allow full use of the relevant information / application solutions that are currently partially used.

Key words: quality management system, regional authority, ISO 9001:2015.

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Tematska cjelina/*Thematic unit*
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QUALITY IN MANUFACTURING AND CONSTRUCTION

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MEASURING QUALITY OF FINISHED SURFACES OF THE WOODEN FURNITURE

MJERENJE KVALITETE GOTOVE POVRŠINE
DRVENOG NAMJEŠTAJA

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ABSTRACT

The article is interesting in the measurement and in the comparing the physical-mechanical properties of wooden furniture finished surface. Especially this contribution investigates and compares the using method till this time for comparing the colour changes of wooden furniture finished surfaces with the colour changes of the woollen blue scale together with the grey scale and the new method colour changes, where the colour changes are expressed as ΔE . In the article there are discussed other methods determinate for the testing properties of the finished surface, especially the appearance properties of the finished surfaces.

Key words: quality of finished surfaces, colour changes, extinct.

1. INTRODUCTION

The quality appearance of wooden furniture finished surfaces is the very important properties for assessment the quality of the entire furniture. The quality appearance that means the quality of finished surfaces plays a significant role in the assessment of the quality of furniture. Sometimes it is said

the finished surfaces are the coats, which is sold the furniture. Unfortunately the great part of finished surfaces testing properties are the tests based on the comparing of the surfaces properties. The great impact on the keeping of the quality of coated surfaces has nature origin of wood and the way of assessment of the quality of finished surfaces.

The first fact the comparing assessments represent not full objective testing of finished surfaces of the furniture, but the assessment of finished surfaces quality by the measurements is from the point of quality reached results more objective, repeatable and precise. The list of assessment properties of finished surfaces is issued in the Table 1.

2. QUALITY WOODEN FINISHED SURFACE ASSESSMENT

The second fact with great impact of the quality, exactness and detachment of the quality wooden finished surfaces assessment has the nature origin of wood, which is no repeatable. Drawings and colours of the each wooden part (veneer surface or massive wood) are original. The native origin and no unrepeatability of all wooden parts is the reason why is not possible to transfer some testing methods of determinate for testing properties of cars surfaces, machine surfaces at so on into the testing of furniture finished surfaces. These surfaces for instance from metal and plastic have physical-mechanical have isotropic properties of coated surfaces instead of anisotropic properties of wooden surfaces with its special drawing and colour of each finished surfaces. The transfer the testing methods determinate for testing quality physical-mechanical, chemical and appearance properties of their finished surfaces in all kinds of metal or plastic industry, especially from the car industry is not applicate in the assessment of properties of wooden surfaces in the entire wood treatment industry.

Table 1. List of the assuming properties of finished surfaces

Testing properties	Name of examination	Number of standard	Unit of measurement	Compared property	Measured properties
Appearance properties	Appearance properties	ČSN 91072	numerical scale	Compared property	No
Hardness of finished surfaces	Determination of surface hardness of paint coating by pencils	ČSN 673075	Unit	No	No
Resistance to a lit cigarette	Determination of surface resistance to a lit cigarette	ČSN 91 0284	numerical scale	Compared property	No
Surface gloss	Assessment of the surface gloss	ČSN EN 13722, ČSN 2813	% GU	no	Measured property
Thickness of the surface	Determination of thickness of the surface finish layer		µm	no	Measured property
Adhesion of coater to surface	Test adhesion by pulling off	ČSN EN 311	MPa	no	Measured property
	Paints and varnishes. Cross –cut test	ČSN ISO 2409	numerical scale	Compared property	No
Surface lightfastness	Determination of the surfaces lightfastness	ČSN 91 0282 čl. 2, ČSN EN 15187	number code reviews	Compared property	No
Surface resistance to cold liquids	Determination of surface resistance to cold liquids	ČSN 673075	numerical scale	Compared property	No
Surface resistance to vapour	Determination of resistance of surface finish to the effects of water vapour		numerical scale	Compared property	No
Durability of finished surfaces	stresses furniture surfaces during their use		numerical scale	Compared property	No
Surface resistance to wet heat	Assessment of surface resistance to wet heat	EN 12721	numerical scale	Compared property	No
surface resistance to dry heat	Assessment of surface resistance to dry heat	EN 12722.	numerical scale	Compared property	No
Resistance of the abrasion	Determination of resistance of paint coating to abrasion by loss of weight of the paint film by coefficient and number of grinding number	ČSN 673078 ČSN 910276	g/100 turns	No	Measured property

Source: Made by author.

The quality of furniture finished surfaces some properties tested such as gloss of surfaces and the colour changes measured during the their testing are evaluated by visual inspection or visual comparing by using the etalons such as colour and gloss. These attributes are important for the customers. These properties can assess by objective measurements, too.

The results of the visual inspection are always depended on the assessor's experience as well as by his or her daily and healthy fitness and state of mind¹ and do thus show a low reproducibility to measured results. The other problem of the assessment by comparing is not possibility to express uncertainty of measurement.²

In the past projects there were investigated the correlation between high gloss surfaces by measurement³ by the gloss meter and human perception together with the assessment of rough of finished surfaces and with three-dimensional surfaces analysis.

In this contribution there is investigated the correlation between the assessments of colour changes expressed by the degree of grey scale and the measurement of colour changes.

2.1. Used test methods

Changes of colors were defined on the basis of colorimeter measurements of color coordinates (L, a, b) carried out using BYK – Gardner spectrophotometer spectro-quide 45/0 gloss. The change of color in the CIE Lab. system was calculated according to aquatic defined in ISO 7724-3: The colour change is measurement by spectrophotometer. The change of colour coordinates (a- green/red axis, b-blue/yellow axis, L achromatic colour coordinate (lightness), ΔE colour difference:

$$\Delta E = \sqrt{(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2} \quad (1)$$

Visual method N 15187 The assessment of colour changes was used a day-light cabinet. Each of tested areas was compared by the grey scale.

¹ Andrea Huxol, Adrian Riegel and Kerstin Dekomien, „Development of an algorithm for measuring the quality of high gloss surfaces correlated to human perception“, 5th International Conference on Production Engineering and Management, Hochschule Ostwest-falen-Lippe and University of Applied Sciences, Università degli studi di Trieste, 2015, p. 99-110.

² K. Herzberg, Andrea Huxol, Kerstina Dekomien and Adrian Riegel, “High gloss surfaces: valid quality evaluation”, 3rd International Conference on Production Engineering and Management for Furniture Industry, Università degli studi di Trieste, 2013, p. 207-218.

³ Ibid.

2.2. Used materials

Surface of larch, beech spruce and alder samples were finished by these lacquers:

- waterborne lacquers prepared from waterborne acryl-urethane copolymer dispersion with chemical bonded UV stabilizer on the main chain of polymers mark of sample ADPUR/477 DW ;
- waterborne lacquers prepared from waterborne acryl-urethane copolymer dispersion with chemical bonded UV stabilizer with chemical bonded UV stabilizer on the main chain of polymers mark of sample ADPUR /5151;
- waterborne lacquers prepared from waterborne acryl copolymer dispersion with chemical bonded UV stabilizer mark of sample AD/5151;
- waterborne lacquers prepared from waterborne acryl copolymer dispersion with chemical bonded UV stabilizer mark of sample AD/477 DW sample

3. RESULTS

In the first step we compared the comparing the colour changes by blue woollen scale and dark and light grey scale. These results are published in the tables 2, 3, 4, 5, 6 a 7.

Table 2. The comparing the grey scale light shades of etalon to the white etalon units with the measuring colour shades by the spectrophotometer, express as ΔE

Comparing degree of light scale	ΔE	σ	ΔL	σ	Δa	σ	Δb	σ
Compared white 5	15,99	0,15	-9,08	0,11	-1,69	0,03	13,06	0,14
5	19,00	0,65	-11,25	0,45	-1,21	0,08	15,27	0,49
Compared white 5	15,50	0,43	-9,14	0,43	-1,56	0,13	12,42	0,28
4	17,25	0,54	-12,35	0,50	-1,92	0,18	11,90	0,29
Compared white 5	16,29	0,20	-9,56	0,26	-1,33	0,06	13,13	0,11
3	19,09	0,37	-15,41	0,23	-2,76	0,04	10,93	0,34
Compared white 5	15,99	0,28	-8,87	0,16	-1,53	0,11	13,22	0,33
2	22,05	0,17	-19,94	0,16	8,77	0,06	-3,47	0,19
Compared white 5	15,73	0,15	-9,00	0,07	-1,92	0,12	12,76	0,12
1	32,22	0,26	-31,27	0,07	-3,86	0,16	6,77	0,27

Source: Made by author.

Following Table 3. presents colour differences between degrees of grey scale.

Table 3. Colour differences between degrees of grey scale

Colour differences between grey scale degrees	ΔE	ΔL	Δa	Δb
5 and 1	16,49	-22,26	-1,94	-5,99
5 and 2	6,06	-11,06	-1,95	-4,45
5 and 3	2,80	-5,85	-1,42	-2,19
5 and 4	1,76	-3,21	-0,36	-0,52
5 and 5	3,02	-2,18	0,49	2,21

Source: Made by author.

Following Table 4. presents colour differences for one degree of grey scale.

Table 4. Colour differences for one degree of grey scale

Colour differences for one degree of grey scale				
	ΔE	ΔL	Δa	Δb
5 and 1	3,30	-4,453	-0,3875	-1,1979
5 and 2	1,51	-2,7654	-0,4866	-1,1125
5 and 3	0,93	-1,9507	-0,4747	-0,7307
5 and 4	0,88	-1,6033	-0,1778	-0,2582
5 and 5	3,02	-2,1762	0,48624	2,21474

Source: Made by author.

Following Table 5. presents results of comparing the grey scale dark shades of etalon to the white etalon units with the measuring colour shades by spectrophotometer, express as ΔE .

Table 5. The comparing the grey scale dark shades of etalon to the white etalon units with the measuring colour shades by the spectrophotometer, express as ΔE

Comparing degree of light scale	ΔE	σ	ΔL	σ	Δa	σ	Δb	σ
Compared dark 5	46,42	0,11	-46,17	0,12	-3,83	0,06	2,94	0,17
5	46,97	0,14	-46,74	0,14	-4,13	0,04	2,15	0,14
Compared dark 5	46,56	0,11	-46,31	0,11	-4,10	0,05	2,48	0,11
4	45,31	0,13	-45,02	0,14	-4,61	0,03	2,36	0,06
Compared dark 5	46,07	0,09	-45,78	0,09	-4,03	0,07	3,21	0,10
3	43,24	0,09	-42,85	0,10	-4,56	0,04	3,72	0,09
Compared dark 5	46,60	0,10	-46,36	0,10	-4,08	0,05	2,49	0,09
2	39,44	0,21	-39,10	0,21	-4,18	0,02	3,20	0,05
Compared dark 5	46,41	0,11	-46,16	0,11	-4,01	0,04	2,78	0,09
1	33,39	0,19	-32,68	0,19	-4,01	0,04	5,59	0,06

Source: Made by author.

Following Table 6. presents colour differences between degrees of grey scale AND Δe .

Table 6. Colour differences between degrees of grey scale AND Δe

Colour differences between grey scale degrees	ΔE	ΔL	Δa	Δb
5 and 1	13,02	-13,48	0,00	-2,81
5 and 2	7,16	-7,26	0,09	-0,71
5 and 3	2,82	-2,94	0,52	-0,50
5 and 4	1,24	-3,22	-0,50	-0,24
5 and 5	-0,55	0,57	0,30	0,79

Source: Made by author.

Following Table 7. presents colour differences for one degree of grey scale.

Table 7. Colour differences for one degree of grey scale

Colour differences for one degree of grey scale				
	ΔE	ΔL	Δa	Δb
5 and 1	2,60	-2,6952	-0,0005	-0,5613
5 and 2	1,79	-1,8154	0,02363	-0,1785
5 and 3	0,94	-0,9787	0,17433	-0,1682
5 and 4	0,62	-1,6104	-0,2488	-0,1216
5 and 5	-0,55	0,57	0,30	0,79

Source: Made by author.

The colour changes of finished surfaces of samples from massive wood were the assessed by visual compared testing and by the measurements in the second step. The results of these tests there are in the Table 8.

Table 8. Color changes of the samples during them exposure natural light behind the window glass, the grey scale comparing of color changes

Wood	Beech		Walnut		Spruce		Alder	
Lack	ADPUR/ 5151	AD/ 5151	ADPUR/ 5151	AD/ 5151	ADPUR/ 5151	AD/ 5151	ADPUR/ 5151	AD/ 5151
Exposition time	Degree of gray scale light and dark							
0 h	5	5	5	5	5	5	5	5
168 h	4	3-4	3-4	3-4	3	2-3	2	2-3
336 h	3-4	3	3-4	3	3	2-3	2	2-3
578 h	3	3	3-4	3-4	3	2-3	2	2-3
746 h	4	2-3	3-4	2-3	3	2-3	2	2-3
916 h	2-3	2	3-4	2	3	2	2	2
1082 h	2	1-2	2-3	1-2	2-3	1.2	1-2	2
1258 h	2	1	2	1	2-3	1	1	1-2

Source: Made by author.

Following Table 9. presents colour changes of the samples during them exposure natural light behind the window glass, colour differences ΔE .

Table 9. Color changes of the samples during them exposure natural light behind the window glass, color differences ΔE

Wood	Beech		Walnut		Spruce		Adler	
Lack	ADPUR/ 5151	AD/ 5151	ADPUR/ 5151	AD/ 5151	ADPUR/ 5151	AD/ 5151	ADPUR/ 5151	AD/ 5151
Exposition time	Color differences ΔE							
168 h	1,12	1,2	0,13	0,4	0,01	2,4	0,07	1,52
336 h	4,12	4,75	2,58	0,4	1,00	1,40	0,59	0,96
578 h	4,72	5,49	3,20	3,58	1,56	0,31	0,57	0,41
746 h	6,46	6,46	3,99	3,88	0,16	0,99	0,82	1,86
916 h	7,18	7,82	4,14	5,41	0,16	3,14	2,91	1,73
1082 h	7,07	9,09	6,18	8,40	3,18	3,71	2,59	2,96
1258 h	8,27	7,52	6,59	7,60	3,17	4,35	3,24	3,86

Source: Made by author.

The correlation between the results in the Table 8. and the Table 9. there are in the tables 10 and in the Table 10.

Table 10. Correlation between dark grey scale and measured ΔE .

Degrees of dark grey scale	ΔE
Degree 5	0 – 1,16
Degree 4	1,17 – 2,12
Degree 3	2,13 – 5,75
Degree 2	5,76 – 7,97
Degree 1	7,98 a vice

Source: Made by author.

Following Table 11. presents colour changes of the samples during them exposure natural light behind the window glass, colour differences ΔE .

Table 11. Correlation between dark grey scale and measured ΔE

Degrees of dark grey scale	ΔE
Degree 5	0 – 1,29
Degree 4	1,30 – 5,46
Degree 3	5,47 – 7,52
Degree 2	7,53 – 14,98
Degree 1	14,99 and more

Source: Made by author.

The comparing the grey scale dark shades of etalon to the black etalon units with the measuring colour shades by the spectrophotometer, express as ΔE .

4. CONCLUSION

Assuming published results show that the differences between assessments by comparing according grey scale and by measuring don't reach the same results. For application the measurement method into the testing the quality of colour changes or ageing of the finished surfaces it is important to develop new method with the determination new demands. These new requests must be coming from:

- requirements of future users and costumers of furniture;
- requirements on durability of wooden surfaces and durability of wooden furniture;
- new requests must go from the limits of the manufacturing process;
- the properties of finished wood;
- the future stresses furniture surfaces during their use.

From the point of future of furniture and the future testing of quality furniture finished surface it is important to decrease the number of compared assessments of testing appearance *proper-ties of finished surfaces and to increase the number assessments by measurement.*

Sažetak:

MJERENJE KVALITETE GOTOVE POVRŠINE DRVENOG NAMJEŠTAJA

U članku se obrađuje mjerenje i usporedba fizičko-mehaničkih svojstava gotove površine drvenog namještaja. Doprinosi istraživanju i usporedbi korištenih metoda za usporedbu promjena boje gotove površine drvenog namještaja s promjenama boja drveno plave nijanse zajedno sa sivom nijansom i nove metode promjene boja, gdje se promjene boja manifestiraju kao ΔE . U članku se prezentiraju i druge metode predviđene za testiranje karatkeristika gotove površine drvenog namještaja, osobito izgled gotove površine.

Ključne riječi: kvaliteta gotove površine, promjene boja, ugašen.

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UČINCI MJERA ENERGETSKE UČINKOVITOSTINA PODRUČJU KOPRIVNIČKO - KRIŽEVAČKE ŽUPANIJE

EFFECT OF ENERGY EFFICIENCY (EE) MEASURES -
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Sažetak

Tema rada je analiza učinaka mjera energetske učinkovitosti EnU - 22 i 23 na području Koprivničko-križevačke županije. Analiza rada bit će usmjerena na energetske i ekonomske parametre te njihovu povezanost. Pored analize navedenih parametara, cilj rada je detektirati eventualne probleme u provedbi mjera te dati smjernice kako poboljšati provedbu mjera za buduće razdoblje. Drugim riječima, rezultatima istraživanja pokušat će se izmjeriti učinak mjera, istaknuti važnost takvih mjera, ali isto tako i ukazati na uočene nedostatke sa svrhom optimiziranja očekivanih rezultata te povećanja kvalitete organizacije i implementacije takvih vrlo važnih mjera povećanja energetske učinkovitosti stambenog sektora.

Ključne riječi: energetska učinkovitost, kvaliteta, stambeni sektor.

1. UVOD

Strategija implementacije mjera za poboljšanja energetske učinkovitosti na području stambenih zgrada, na razini članice Europske unije, započelo je preko javnih poziva fizičkim osobama za sufinanciranje obnove postojećih obiteljskih kuća. Predmet javnog poziva je dodjela sredstava Fonda za zaštitu okoliša i energetske učinkovitost na području Republike Hrvatske za zgrade koje odgovaraju propisanim uvjetima.

Postojeća obiteljska kuća u smislu Poziva smatra se:

1. Ako je izgrađena temeljem građevinske dozvole ili drugog odgovarajućeg akta sukladno Zakonu o gradnji (NN 153/13) i svaka druga koja je navedena ili posebnim zakonom izjednačena.
2. Ako je građevinske bruto površine do 600 m² ili s najviše tri stambene jedinice (skup prostorija namijenjenih stanovanju s prijeko potrebnim sporednim prostorijama koje čine zatvorenu građevinsku cjelinu i imaju poseban ulaz).
3. Ako je najmanje 50% bruto podne površine namijenjene stanovanju.

Mjere koje se mogu provoditi unutar objavljenog Poziva za kontinentalnu Hrvatsku su:

- Zamjena stolarije ovojnice grijanog prostora novom s definiranim koeficijentom prolaska topline $U_w \leq 1,4$ (W/m²K);
- Povećanje toplinske zaštite ovojnice grijanog prostora na koeficijent prolaska topline $U \leq 0,20$ (W/m²K) za krov, strop i pod grijanog prostora, odnosno $U \leq 0,25$ (W/m²K) za vanjski zid te isti koeficijent za pod prema tlu i ukopane dijelove grijanog prostora;
- Ugradnja novog sustava s plinskim kondenzacijskim kotlom za povećanje energetske učinkovitosti sustava grijanja;
- Ugradnja novog sustava sa sunčanim toplinskim pretvaračima za grijanje potrošne tople vode kao i za grijanje stambenog prostora;
- Ugradnja novog sustava s kotlom na drvnu sječku/pelete ili s pirolitičkim kotlom na drva za grijanje potrošne tople vode i/ili prostora;
- Ugradnja novog sustava s dizalicom topline za grijanje potrošne vode i/ili prostora ili za grijanje i hlađenje A energetske klase;
- Ugradnja novog sustava s fotonaponskim pretvaračima (modulima) za proizvodnju električne energije u samostalnom ili mrežnom radu.

1.1. Predmet i ciljevi istraživanja

Predmet istraživanja u radu su projekti podizanja energetske učinkovitosti koji u potpunosti odgovaraju definiranim uvjetima javnog Poziva. Uzorak predmetnog istraživanja su 40 nasumično odabranih i implementiranih projekata na području Koprivničko-križevačke županije. Istraživanje je usmjereno na energetske i ekonomske parametre te njihovu povezanost.

Cilj istraživanja je detektirati eventualne probleme u provedbi mjera te dati smjernice kako poboljšati provedbu mjera za buduće razdoblje. Drugim riječima, rezultatima istraživanja pokušat će se izmjeriti učinak mjera, istaknuti važnost takvih mjera, ali isto tako i ukazati na uočene nedostatke sa svrhom optimiziranja očekivanih rezultata te povećanja kvalitete organizacije i implementacije takvih vrlo važnih mjera povećanja energetske učinkovitosti stambenog sektora.

1.2. Metodologija istraživanja

Metode¹ koje su korištene u istraživanju su komparativna metoda, metoda studije slučaja te metoda prezentiranja dobivenih rezultata pomoću tablica i dijagrama. Komparativna metoda koristit će se kod analize podataka realiziranih projekata.

Metodom analize i sinteze obradit će se dosadašnji projekti podizanja energetske učinkovitosti u stambenom sektoru, kako bi dobili rezultate do sada provedenih mjera. Dobiveni rezultati uspoređuju se sa ciljevima koji se žele postići.

2. REZULTATI ISTRAŽIVANJA

Analiza rezultata istraživanja je podijeljena u potpoglavlja na način da se odvojeno prikažu rezultati vezani uz ekonomske parametre te za energetske parametre.

2.1. Analiza ekonomskih parametara u projektima energetske učinkovitosti

U radu je prikazana analiza rezultata istraživanja na 40 projekata podizanja energetske učinkovitosti kroz provedene mjere definirane u Pozivu.

¹ Miroslav Žugaj, Ksenija Dumičić i Vesna Dušak, „Temelji znanstvenoistraživačkog rada“, TUV A, Varaždin, 2006.

Tablica 1. Iznos investicija prema provedenoj mjeri energetske učinkovitosti

Projekt	Stolarija	Vanjski zid	Krov/strop	Ostalo
Broj:	Iznos investicije (kn)	Iznos investicije (kn)	Iznos investicije (kn)	Iznos investicije (kn)
1	38.113,89	44.556,25	76.680,00	11.522,94
2	23.296,90	82.262,50	76.025,00	12.500,00
3	9.078,20	106.735,00	80.500,00	35.000,00
4	26.519,29	87.613,46	76.077,50	36.000,00
5	43.748,56	79.550,00	75.110,00	-
6	25.825,31	77.140,00	114.000,00	-
7	24.481,48	99.375,00	-	-
8	42.297,60	74.950,00	-	-
9	145.877,05	76.103,12	-	-
10	19.197,99	72.450,00	-	-
11	31.495,69	76.675,00	-	-
12	49.754,50	75.500,00	-	-
13	27.058,82	71.670,00	-	-
14	16.487,99	-	-	-
15	19.208,39	-	-	-
16	23.054,26	-	-	-
17	52.811,35	-	-	-
18	23.066,63	-	-	-
19	32.650,00	-	-	-
20	24.820,00	-	-	-
Σ	698.843,90	1.024.580,33	498.392,50	95.022,94
sv	34.942,20	78.813,87	83.065,42	23.755,74

Izvor: Vlastito istraživanje.

Tablica 2. Zastupljenost pojedine mjere na projektima energetske učinkovitosti u stambenom sektoru – fizičke osobe

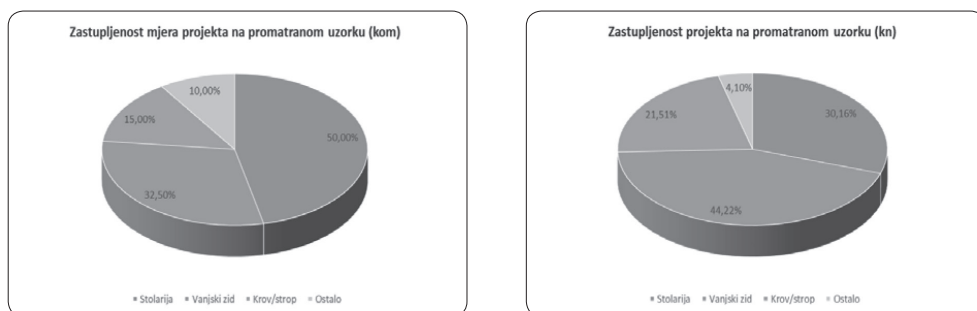
Stolarija	Vanjski zid	Krov/strop	Ostalo
50,00%	32,50%	15,00%	10,00%

Izvor: Vlastito istraživanje.

Stolarija	Vanjski zid	Krov/strop	Ostalo
Iznos investicije (kn)	Iznos investicije (kn)	Iznos investicije (kn)	Iznos investicije (kn)
30,16%	44,22%	21,51%	4,10%

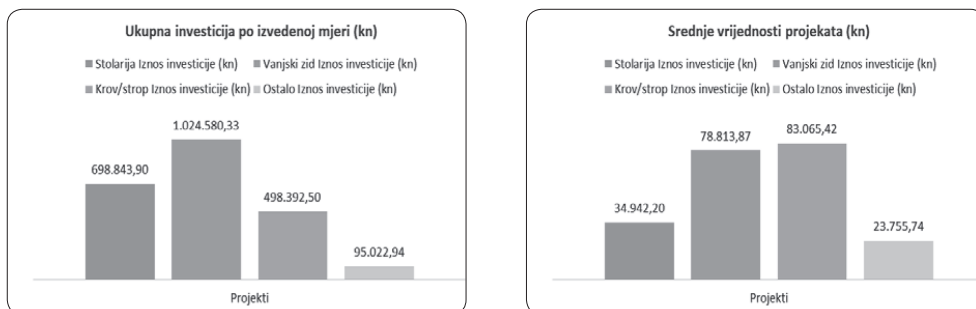
Izvor: Vlastito istraživanje.

Grafikon 1. Zastupljenost mjera projekata na promatranom uzorku



Izvor: Vlastito istraživanje.

Grafikon 2. Ukupni iznosi investicija po izvedenoj mjeri te srednje vrijednosti



Izvor: Vlastito istraživanje.

Iz analize podataka na promatranom uzorku provedenih projekata energetske učinkovitosti vidljivo je da je mjera zamjene vanjske stolarije najčešće korištena mjera. Međutim, najviše sredstava korisnika upotrijebljeno je za mjeru izolacije vanjskog zida zgrade. Pored toga, uočljivo je da je mjera izolacije krovnog dijela ovojnice zgrade najskuplja mjera u realizaciji projekata, dok su se ostale mjere pokazale nedovoljno prioritetne kod korisnika.

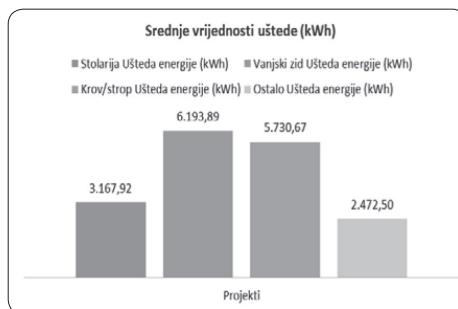
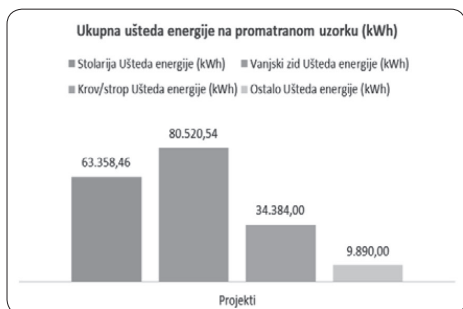
2.2. Analiza energetske parametara u projektima energetske učinkovitosti

Vidljivo je da najveća ušteda energije i po ukupnosti, a isto tako i po projektnom srednjem prosjeku, ostvarena preko mjere izolacije vanjskog zida.

Tablica 3. Ušteda energije (kWh) prema provedenoj mjeri energetske učinkovitosti

Projekt	Stolarija	Vanjski zid	Krov/strop	Ostalo
Broj:	Ušteda energije (kWh)	Ušteda energije (kWh)	Ušteda energije (kWh)	Ušteda energije (kWh)
1	2.238,00	3.714,00	1.568,00	3.040,00
2	2.510,00	7.105,00	1.380,00	1.348,00
3	225,00	9.508,44	12.786,00	2.632,00
4	800,00	9.235,10	5.800,00	2.870,00
5	4.860,00	8.303,00	8.050,00	-
6	1.139,00	5.320,00	4.800,00	-
7	1.033,00	5.605,00	-	-
8	1.711,00	6.080,00	-	-
9	4.474,56	2.220,00	-	-
10	3.957,90	6.030,00	-	-
11	3.010,00	6.550,00	-	-
12	3.050,00	5.800,00	-	-
13	18.050,00	5.050,00	-	-
14	2.050,00	-	-	-
15	2.300,00	-	-	-
16	1.900,00	-	-	-
17	2.060,00	-	-	-
18	2.560,00	-	-	-
19	2.980,00	-	-	-
20	2.450,00	-	-	-
Σ	63.358,46	80.520,54	34.384,00	9.890,00
sv	3.167,92	6.193,89	5.730,67	2.472,50

Grafikon 3. Ukupna ušteda energije po izvedenoj mjeri te srednje vrijednosti



Izvor: Vlastito istraživanje.

Zanimljivo je uočiti da je sljedeća mjera po ukupnosti uštede - zamjena vanjske stolarije, međutim ista nema istu uštedu po projektnom srednjem prosjeku već ta ušteda pripada izolaciji kosog krova. Odgovor zašto ostale mjere nisu toliko zastupljene vidljiv je i preko analize srednjih ušteda koje jasno pokazuju najmanju srednju vrijednost uštede energije na provedenim projektima.

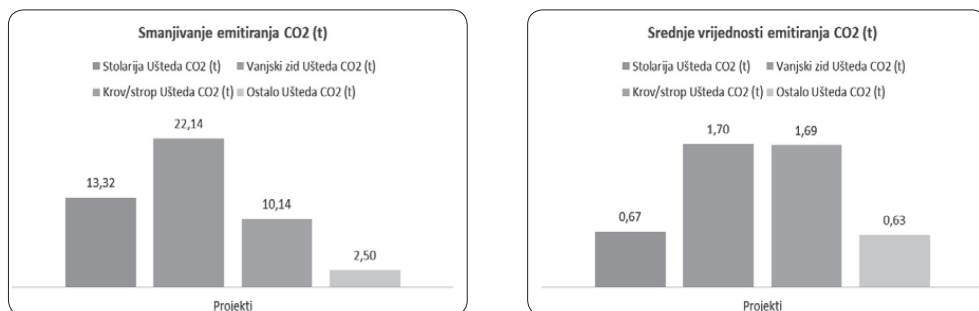
2.3. Analiza smanjivanja ugljičnog dioksida po provedenoj mjeri

Najveće smanjenje emitiranja ugljičnog dioksida po ukupnosti ostvareno je preko mjere izolacije vanjskog zida, što ukazuje kako se ta mjera pokazala boljom od mjere zamjene vanjske stolarije koju su korisnici češće koristili.

Tablica 4. Smanjenje emitiranja CO₂ prema provedenoj mjeri energetske učinkovitosti

Projekt	Stolarija	Vanjski zid	Krov/strop	Ostalo
Broj:	Ušteda CO ₂ (t)	Ušteda CO ₂ (t)	Ušteda CO ₂ (t)	Ušteda CO ₂ (t)
1	0,60	1,00	0,44	0,80
2	0,70	2,00	0,30	0,40
3	0,10	2,34	3,40	0,70
4	0,20	2,00	1,50	0,60
5	1,30	2,20	2,10	-
6	0,30	1,50	2,40	-
7	0,27	1,60	-	-
8	0,45	2,00	-	-
9	1,40	0,90	-	-
10	1,00	1,40	-	-
11	0,70	1,90	-	-
12	1,20	1,70	-	-
13	1,00	1,60	-	-
14	0,60	-	-	-
15	0,60	-	-	-
16	0,60	-	-	-
17	0,70	-	-	-
18	0,70	-	-	-
19	0,40	-	-	-
20	0,50	-	-	-
Σ	13,32	22,14	10,14	2,50
sv	0,67	1,70	1,69	0,63

Grafikon 4. Ukupna ušteda CO₂ po izvedenoj mjeri te srednje vrijednosti



Izvor: Vlastito istraživanje.

Iz analize srednjih vrijednosti smanjenja emitiranja CO₂ vidljivo je da su mjere izolacije vanjskog zida i mjere izolacije kosog krova najučinkovitije i praktički poravnate po učinku.

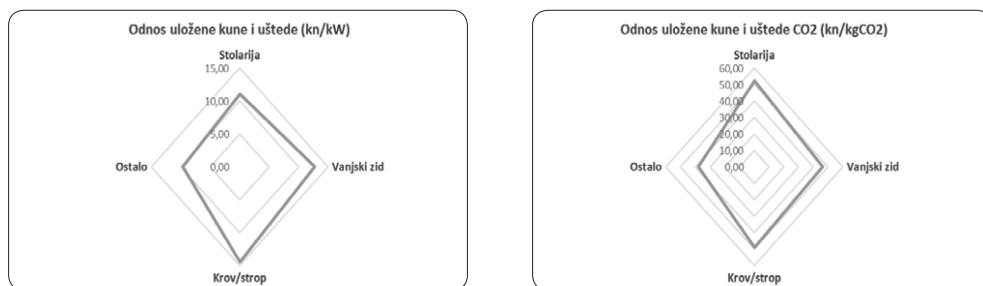
2.4. Rezultati učinaka mjera EnU - 22 i 23 energetske učinkovitosti

Rezultati mjera možda su najvidljiviji iz odnosa uložene kune i dobivene (uštedene) energije odnosno smanjenja emitiranja ugljičnog dioksida. Upravo te odnose prikazuje dolje prikazana tablica te pripadajući grafikoni.

Tablica 5. Odnos uložene kune i smanjenje CO₂ prema provedenoj mjeri energetske učinkovitosti

Stolarija	Vanjski zid	Krov/strop	Ostalo	
Ušteda CO ₂ (kg)	Ušteda CO ₂ (kg)	Ušteda CO ₂ (kg)	Ušteda CO ₂ (kg)	
34.942,20	78.813,87	83.065,42	23.755,74	sv (kn)
670,00	1.703,08	1.690,00	625,00	sv (CO ₂ /kg)
52,15	46,28	49,15	38,01	kn/kg CO₂

Grafikon 5. Odnosi uložene kune i uštede energije odnosno smanjenje emisije CO₂



Izvor: Vlastito istraživanje.

Rezultati učinaka mjera 22 i 23 vidljivi su i preko odnosa uložene kune i uštede energije odnosno smanjenja emitiranja ugljičnog dioksida. Iz provedenih istraživanja i analize relevantnih parametara vidljivo je da je najbolji odnos između uložene kune i dobivene uštede energije za grijanje i hlađenje kod mjere izolacije kosog krova, a zatim kod gotovo izjednačenih rezultata odnosa između mjera izolacije vanjskog zida i zamjene vanjske stolarije.

3. ZAKLJUČAK

Iz rezultata istraživanja jasno je vidljivo da su korisnici takvih mjera vrlo zainteresirani za takve projekte, što pokazuje iskorištavanje predviđenih sredstava u vrlo kratkom roku. Isto tako, rezultati jasno ukazuju na to da su se korisnici aplicirali najčešće na subvenciju mjera podizanja energetske učinkovitosti zamjene vanjske stolarije. Razlog tome vidljiv je u analizi ekonomskih pokazatelja koji ukazuju da ta mjera traži najmanje ulaganja. Nadalje, uočljivo je da su korisnici kao najprioritetniju mjeru odabrali mjeru izolacije vanjskog zida u što su najviše investirali vlastita sredstva, a da se je to uistinu i najbolja odluka pokazuju rezultati analize energetske parametara koji ističu najveću uštedu energije upravo preko mjere izolacije vanjskog zida.

Vrlo važno je istaknuti da mjera izolacije kosog krova nije dovoljno prepoznata iako poslije mjere izolacije vanjskog zida daje najbolje rezultate energetske uštede. Osim toga, mjera izolacije kosog krova daje najbolji odnos uložene kune prema dobivenoj uštedi energije i emisije štetnih plinova. Razlog tome je vrlo jasan, a to je visina ulaganja vlastitih sredstava korisnika. Isto tako vidljivo je i da ostale mjere podizanja energetske učinkovitosti nisu bile dovoljno privlačne ulagačima na što jasno ukazuju dobiveni parametri učinaka tih mjera.

Na kraju važno je istaknuti smjernice da takve vrlo važne mjere, ne samo za korisnike subvencija nego i za izvođače i sve one koji sudjeluju u tim projektima, daju bolje rezultate. U prvom redu se to odnosi na mogućnosti financiranja mjera koje su se pokazale kao najbolje u odnosu uloženog i dobivenog, dakle izolaciju kosog krova i ostalih ne toliko prioriternih mjera. Istraživanje je pokazalo da su za takve mjere subvencije od 40% preniske. Država bi trebala takve mjere dodatno subvencionirati i na taj način motivirati korisnike. Isto tako, trebala bi se održati edukacija korisnika u kojoj bi se naglasila važnost pojedine mjere i što se mjerama dobiva. Na žalost sredstva predviđena za edukatore, a to su u prvom redu ovlašteni certifikatori, su preniska odnosno nisu niti predviđena.

Summary:

EFFECT OF ENERGY EFFICIENCY (EE) MEASURES- IN KOPRIVNICA – KRIŽEVCI COUNTY

The paper discusses the analysis of the effects of energy efficiency (EE) measures – 22 and 23 in Koprivnica – Križevci County. The analysis is focused on energy and economic parameters and their relation. In addition to the analysis of the aforementioned parameters, the goal of the paper is to detect eventual problems in the implementation of measures and to provide guidelines on how to improve them in the future. In other words, the results of the research should show the impact of those measures, emphasize their importance, but also point out the identified deficiencies in order to optimize the expected results and improve the quality of the organisation and implementation of such important measures of improving energy efficiency in housing.

Key words: energy efficiency, quality, housing.

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CSR AS A FACTOR SHAPING THE QUALITY AND SAFETY IN THE CONSTRUCTION COMPANIES

DRUŠTVENA ODGOVORNOST ORGANIZACIJE
KAO FAKTOR OBLIKOVANJA KVALITETE I SIGURNOSTI
U GRAĐEVINSKIM KOMPANIJAMA

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ABSTRACT

The concept of social responsibility (CSR) is linked with the concept of the sustainable development which assumes that a business activity cannot be focused only on the economic results. It should integrate economic, social and environmental aspects of the enterprise activity. Factors that enable achieving success in the construction industry are connected with realization of the investment in a way that fulfills customers' requirements by maintaining a high quality of services, respect for the life and health of workers and reducing the negative impact of construction activities on the environment. The article discusses aspects of CSR with regard to ISO 26000 in the policy of a selected enterprise which is a leader of the construction industry in Poland.

Key words: corporate social responsibility, Construction Company, sustainable development.

1. INTRODUCTION

The construction industry is a specific industry in the economy sector since it is characterized by unique feature of the construction investment and its products and place related to involvement of the high number of companies from relative industries. There are other features of the construction industry that affects on its specific character that result from the high labour intensity connected with the construction contracts term, seasonal work and relations with regulations determining the entire construction process.

The construction industry has some terms related to its definition such as the building industry or the civil engineering. Some of these definitions, which are based on the nature of the construction process and features of the industry's products, are merely indications of what the construction industry includes or doesn't include.¹

In accordance to Nam and Tatum (1989)² the construction refers to all types of activities associated with the erection and repair of immobile structures and facilities. Lange and Miles (1979)³ described the construction as an aggregation of businesses engaged in closely related activities.

The building and infrastructure development sector of the construction industry is a catalyst, a rock, and the strongest base for rapid economic growth, it therefore becomes very imperative that building and infrastructure projects are project managed efficiently to succeed. The success of a building and infrastructure project is very important in a developing economy if critically is analyzed the quantum of resources wasted and its negative impact to the Gross Domestic Product (GDP) of the nation's economy.⁴

¹ Georgi Ofori, *The Construction Industry: Aspects of Its Economics and Management*, Singapore University Press. Kent Ridge, Singapore 0511, 1990, pp. 18.

² C.H. Nam and , C. B. (Bob) Tatum, „Major characteristics of constructed products and resulting limitations of construction technology”, *Construction Management and Economics*, 1988, pp. 133-148.

³ Julian E. Lange, and Quinn Mills, “An introduction to the construction sector of the economy”, [In:] Lange, J.E. and Mills, D.Q. (eds.), *The Construction Industry: Balance Wheel of the Economy*, Lexington Books. Lexington. Mass, 1979, pp. 1-10.

⁴ Chinedu Chidinma Nwachukwu and Fidelis I. Emoh, *Building construction project management success as a critical issue in real estate development and investment*, *AMERICAN JOURNAL OF SOCIAL AND MANAGEMENT SCIENCES*, 2011.

The construction industry plays a special role in the Polish economy since 2007 the construction added value amounted to 15.6%, while in the same period, the added value in industry and market services was at a much lower level (7.7%). The construction is currently the most growing sector of the economy. A good condition of the Polish economy is affected by domestic demand (8.3% of the domestic demand growth in 2007), what is partly connected with foreign investments. Poland, among the new member states, recorded in 2007, the largest foreign investment (12.8 billion). For comparison, foreign investments in Czech Republic gained approximately 6 billion, Bulgaria - less than 6 billion, Hungary – approximately 4 billion. The development of the construction industry noted in July 2014 in Poland reached 0,8%, in Czech Republic amounted 3,3%, in Slovakia gained 1,2% and Hungary there was gained 5,2% of the growth. The survey results indicate that the Polish construction industry has the opportunity to maintain growth in coming years since in 2015 it reached 3.9%, what is related to an average growth of the largest companies that amounted 4.8%.⁵

According to Georg Kell, Executive Director of the UN Global Compact, the construction sector and real estate is likely to become a leader in the global initiative to a more sustainable financial, economic, social and environmental system, through cooperation and joint action. It was concluded as the result of two years cooperation between UN Global Compact and RICS, a global organization for professionals' construction and real estate of more than 100 thousand members in 146 countries and intensive dialogue with representatives of the sector in the world. Participation in Global Compact proves that company complies with 10 fundamental principles of human rights, labor standards, environment and anti-corruption and it is committed to carrying out the initiatives that will be the realization of these principles. Ten principles of Global Compact include following:

Principle 1. Support and respect human rights adopted by the international community.

Principle 2. The elimination of all violations of human rights by the company. Labour standards.

Principle 3. Respect for freedom of association.

Principle 4. The elimination of all forms of forced labor.

Principle 5. Abolition of child labor.

Principle 6. The elimination of discrimination in respect of employment.

Principle 7. Support a precautionary approach to environmental challenges.

⁵ Based on *The construction in Poland. 2014*, Ceec Research Analyses for Decision Making (in Polish).

Principle 8. Undertake initiatives to promote greater environmental responsibility.

Principle 9. The use and diffusion of environmentally friendly technologies.

Principle 10. Counteracting the corruption in all its forms, including extortion and bribery.

2. MEANING OF CSR IN THE CONSTRUCTION COMPANY POLICY

Action in the context of CSR (Corporate Social Responsibility) is based primarily on the involvement of companies in a variety of initiatives for the environment and social and welfare placing on the management that do not directly generate profits, but indirectly affect the success of enterprises.

CSR is completely voluntary strategy. The key is in its framework to take into account the business aspects of social, ethical and environmental contacts with stakeholders (employees, customers, shareholders, suppliers and the local community). The essence of CSR is to support society, what is defined as conducting a business focused on profit recording with regard to stakeholders. CSR is not only an element of public relations, but it is a concept far more complex. Popular management tools consistent with the idea of CSR is the CRM (cause related marketing), what is defined as marketing socially engaged and social campaigns. In CSR, there are often applied ethics programs for employees, corporate governance, eco-labelling and social labelling and socially responsible investments.

The concept of the corporate social responsibility, its key values and ideas are identified and described in the practical guide ISO 26000. Mentioned standard provides guidelines for all organizations:

- ideas, terminology and definitions related to social responsibility,
- sources, features and directions of development of social responsibility,
- rules and procedures relating to social responsibility,
- key areas and issues of social responsibility,
- creating, implementing and promoting socially responsible behaviour in the organization, and through the use of its principles and practice, in the sphere of its influence,
- deepening the involvement of stakeholders and their identification with the organization,
- communicating about the commitment, performance and other areas related to social responsibility.

The standard ISO 26000 is to support all organizations in action this the pursuit of sustainable development. Today, the sustainable development is a determinant of political, social, economic activities. This concept is an element of a number of existing policies, programs, both international organizations e.g. European Union, as well as national (the principle of the sustainable development is a constitutional principle in Poland) or local (it is recognized in the strategies of cities, municipalities, businesses).

Sustainable development according to law Polish Environmental Protection Law is defined as socio-economic development, in which there is a process of integration of political, economic and social benefits from maintaining natural balance and permanence of basic natural processes in order to guarantee the possibility of satisfying basic needs of individual communities or citizens of both the present generation and future generations. A significant position in the efforts to pursue sustainable development is occupied by the construction industry, whose importance in the economy of the European Union has been highlighted by LMI (Lead Market Initiative). In this initiative as one of the six leading markets due to the large growth potential and susceptibility to innovation was appointed the construction. This sector of the economy is essential for sustainable development, as it affects: the environment, society, economy.

The meaning of the environment within the sustainable environment is connected with the fact that the construction and operation of buildings is the cause of 42% of final energy consumption in the EU and it cause 35% emissions of greenhouse gases into the atmosphere, as well as substantial consumption of raw materials such as water and aggregates (sand, gravel, etc.). Threat to the environment are also the remains of the building demolition.

Within the second aspect of the sustainable development – society - the average citizen of a developed country spent inside buildings about 80% of your life. The way of construction, created the conditions, comfort offices and housing depends largely on the quality of people's lives. Finally, taking into consideration economical aspects of the sustainable development idea, European Union construction employs 7% of the workforce and generates around 10% of GDP.

In order to implement the sustainable development concept in the construction, it is therefore an important building development aimed at introducing innovative technology, modern solutions, which also will:

- economically advantageous,
- care about the health and comfort of users,
- reduce the negative impact of buildings on the environment and climate.

In the context of the above information, it is evident, that sustainable construction is an extremely broad concept that outside aspect of the building also has a economic, cultural and social aspects. This results in the basic objectives of the sustainable construction. There are some causes of the sustainable construction occurrence. However, the main ones include: the impact of construction on the environment, increasingly strict legal standards (national, European), increase of the consumer awareness.

The construction company implementing investments within the “sustainable construction idea” is obligated to adjust the organization of the construction site, the nature of the construction work in accordance to the specified requirements. The main include:

- reducing noise level emission (the contractor is expected to the use of electrical vibration of concrete instead of pneumatic or mounting surface of the formwork using the key and not the hammer),
- limitation of dust and sediments emission during the construction work (the contractor is expected to build a robust and regularly be cleaned access roads for vehicles; ensure that, in a hot weather and periods without rain the roads were regularly watered to reduce the amount of dust floating in the air),
- reducing the level of air pollution (the contractor is expected to reduce emissions of pollutants and irritating odours, to achieve the most frequently used device with gas-powered or electric powered devices instead of fuel or thermal),
- waste reduction, reducing the level of water and land pollution (the contractor is expected to use cost-effective installation and metering systems, directly connected to the sewage network and special containers decanter for water,
- reducing the electrical energy consumption (the contractor is expected to install a meter to make monthly readings of energy consumption).

Sustainable buildings are often defined by four words:

1. Reduction, what is associated with the lower consumption of building materials, natural resources and energy to the construction of the building.
2. Reuse what means that construction materials are re-used where possible.
3. Recycle - used in the construction materials are recycled, and the building is designed so that the materials can be recovered.
4. Renewability - energy comes from natural resources and supports renewable energy, and building components are made from renewable raw materials.

3. RESEARCH ANALYSIS AND DISCUSSION

Implementation of the sustainable development concept in the analysed construction company assumes the desire to ensure that awareness of corporate social responsibility pervades all business processes in the company and in the order to cause CSR becomes a part of the business strategy of the analysed company. It is possible to achieve, among others, by identifying all the stakeholders (stakeholders) and through sincere and open dialogue with them.

The analysed construction company is the first large construction company in Poland, which joined the Global Compact, and was among the 82 companies, cities, universities and non-governmental organizations representing Poland in this initiative alongside (others: PKN Orlen, Telekomunikacja Polska, LOTOS Group, BRE Bank, city of Wroclaw, PGNiG).

The company is also continuously since 2011 in the RESPECT Index. RESPECT Index is the first in Central and Eastern Europe stock index focusing stocks of socially responsible companies. The index was created in 2010. The companies in the RESPECT Index pass the three-step test completed audit in the company aimed to confirm the highest CSR standards implemented by the company. Such verification is carried out once a year. The project partners are the Warsaw Stock Exchange, Deloitte and SEG.

Identified stakeholder groups in the analysed company are as follows: employees, trade union, shareholders and stock exchange investors, a strategic investor, customers, providers, subcontractors, students / technical universities, scientists/technical scientific organizations, banks, local communities (residents/local government), media, public opinion.

The analysed enterprise implements the following objectives within CSR policy in period 2014 - 2015:

1. Ensuring secure organization and execution of particularly dangerous works through the preparation instructions of Safe Performance of Works - 100% of the works specified in plans as particularly dangerous (2014).
2. Conducting of a training and communication activities on good health and safety practices at 80% of construction sites in 2014.
3. The introduction of the standard and equipment of sanitary facilities on construction sites, the implementation of which began in the 3rd quarter of 2014 (2015).
4. The implementation of standards for the organization and execution of work at height - 100% construction, the implementation of which began in the 3rd quarter 2014 (2015).

5. Implementation of the standard equipment of employees and of persons working at the construction site in the basic personal protection (protective helmet, protective goggles, safety shoes reflective clothes with second class of reflectivity or a reflective vest) - 100% construction projects the implementation of which began in the 3rd quarter 2014 (2015).
6. The establishment of qualitative and quantitative records of the materials reused from demolition, dismantling, earthworks (2014).
7. A review of production processes in order to optimize them in terms of fuel consumption and the associated environmental pollution, preparation of an action plan and begin its implementation. Reducing fuel consumption by 5% (2014).
8. A review of production processes in order to optimize them in terms of electricity consumption and the associated environmental pollution, preparation of an action plan and begin its implementation. Reducing electricity consumption by 5% (2014).
9. Optimization of electricity consumption consists in replacing the currently functioning lighting LEDs in three offices (2014).
10. Equipment construction in environmental medicine cabinet - 100% construction projects, whose implementation started in the 2nd quarter of 2014. (1st quarter 2015).
11. Gradual reduction of the use of paper in favour of electronic newspapers. Reducing the number of paper copies of newspapers purchased by 15% (2nd quarter 2015).
12. Ensuring proper management of hazardous waste at construction sites 100%, (signing of agreements with companies having appropriate authorization in the field of hazardous waste management) (2015).
13. Increasing the amount of segregated waste generated at construction sites by 30% compared to 2013 (2015).
14. Increasing the amount of waste sent to individuals or organizational units to non-entrepreneurs to use for their own purposes by 30% compared to 2013 (2015).
15. Promotion of the savings in the energy, water and paper. Educating employees using internal information portal Budinet.1 publication on a quarterly basis (2015).
16. Making changes in the procedure 06-02 (Procedure for purchases and qualifying suppliers): introduction to the procedure pattern minutes of negotiations, in which one of the points will be the area of health and safety issues (2014).

17. Development of the report, which allows set negatively (scoring from 1 to 5, were obtained “1”) evaluated in the field to meet the conditions of occupational safety and health by a subcontractor, and in terms of Conduct for the Protection of the Environment and Ecology (2014).
18. Verification of the company contracts’ standards and adapting the provisions contained therein in order to provide a more partnerships with contractors of the company (2014).
19. Expansion of the report functionality within e-mail notifications to the Department of Health and Safety with information about providers that currently received a negative evaluation in the field of the health and safety and/or the environment protection (2015).
20. The introduction in 2014, the training “Welcome Group” in CSR module (2014).
21. Creating a document “Risk Management Policy in the company (working title) (2015).
22. Creating a document “Policy cooperation with the local communities on ongoing construction contracts (working title) (2015).

4. CONCLUSION

CSR policy implemented in the construction company underlines the entire important aspects that are specific for the unique character of the construction activity and industry. One of the significant aspect of the construction company activity is ensuring hygiene and safety at work site, what is related not only with the workers safety, but also with applied construction materials and ways of construction devices using at construction site. The supportive element for the improvement of the hygiene and safety policy is a training policy with regard to social aspects of the workers integration.

Benefits that are related to CSR objectives realization in the construction company concern mostly rational natural resources and waste management at construction site and involvement of business partners within environmental actions that increase awareness of the local community on ecological ideas implemented by the company.

Sažetak:

DRUŠTVENA ODGOVORNOST ORGANIZACIJE KAO FAKTOR OBLIKOVANJA KVALITETE I SIGURNOSTI U GRAĐEVINSKIM KOMPANIJAMA

Koncept društvene odgovornosti povezan je s konceptom održivog razvoja koji pretpostavlja da poslovne aktivnosti ne mogu biti usmjerene samo na ekonomske rezultate. U poslovanje organizacije treba integrirati ekonomske i socijalne aspekte te aspekte okoliša. Faktori koji omogućuju postizanje uspjeha u građevinarstvu povezani su s realizacijom investicija na način da ispunjavaju zahtjeve korisnika održavanjem visoke razine kvalitete usluge, uzimajući u obzir život i zdravlje radnika i smanjivanje negativnog utjecaja građenja na okoliš. Članak donosi aspekte društvene odgovornosti organizacije prema normi ISO 26000 u politici odabranog vodećeg građevinskog poduzeća u Poljskoj.

Ključne riječi: društvena odgovornost organizacije, građevinska kompanija, održivi razvoj.

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RIZICI PRIHVAĆANJA I ODBACIVANJA U PROIZVODNJI BETONA

RISKS BY ACCEPTANCE AND REJECTION
IN CONCRETE PRODUCTION

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SAŽETAK

Kontrola kvalitete u građevinarstvu podrazumijeva osiguranje usklađenosti karakteristika materijala, građevnih proizvoda i izvođenja radova sa zahtjevima koji su propisani tehničkim propisima, normama i relevantnim zakonima, sve s ciljem kako bi se osigurala svojstva i ponašanje predviđeno projektom. U industriji betona, primjenjuju se kriteriji sukladnosti definirani normom HRN EN 206 kako bi se provjerila zahtijevana svojstva betona, koja izravno utječu na sigurnost betonskih građevina. U radu je kroz primjer prikazan sustav ocjene sukladnosti tlačne čvrstoće betona, razvijen na konceptu granične vrijednosti prosječne izlazne kvalitete (AOQL). Tlačna čvrstoća betona opisuje se pomoću karakteristične tlačne čvrstoće betona f_{ck} koja odgovara 5%-tnom fraktilu teorijske raspodjele čvrstoće promatranog razreda betona. Za pretpostavljenu funkciju distribucije tlačne čvrstoće betona i za dani kriterij sukladnosti, može se izračunati vjerojatnost prihvatanja serije betona. Uvijek postoji rizik da se beton prihvatljive kvalitete odbaci, tzv. proizvođačev rizik, te jednako tako postoji i rizik da se beton lošije kvalitete od zahtijevane prihvati, tzv. potro-

šačev rizik. Poželjno je da oba rizika budu minimizirana unutar granica sigurnosti i ekonomičnosti. Budući razina kvalitete betona može značajno varirati, kvantifikaciju navedenih rizika moguće je grafički prikazati pomoću operativnih (OC) krivulja.

Ključne riječi: razred tlačne čvrstoće betona, kriterij sukladnosti, operativna krivulja.

1. UVOD

Građevinarstvo kao jedna od najstarijih tehničkih struka koja se bavi svim fazama cjelovitog postupka izvođenja građevina različitih namjena: planiranjem, projektiranjem, izgradnjom i nadzorom nad izgradnjom, proizvodnjom materijala te ispitivanjem materijala i konstrukcija, predstavlja široko područje ljudskog djelovanja čiji je presudan čimbenik kontrola i osiguranje kvalitete. Kontrola kvalitete u građevinarstvu podrazumijeva osiguranje usklađenosti karakteristika materijala, građevnih proizvoda i izvođenja radova sa zahtjevima koji su propisani tehničkim propisima i normama, kako bi se osigurala svojstva i ponašanje predviđeno projektom. Beton je najviše korišten građevinski materijal u svijetu, a samo u Europi godišnje se proizvede preko 750 milijuna m³ betona, što čini približno 4 t betona po glavi stanovnika¹. Time betonska industrija predstavlja značajnu komponentu građevinskog sektora, što se ogleda i kroz zapošljavanje više od 550.000 ljudi u EU². Za kontrolu kvalitete proizvodnje betona, primjenjuju se kriteriji sukladnosti definirani normom HRN EN 206³. Suvremena kontrola kvalitete betona zasniva se na konceptu granične vrijednosti prosječne izlazne kvalitete (*engl. Average Outgoing Quality Level – AOQL*) za promatrano svojstvo tlačne čvrstoće betona. Kvantifikaciju rizika koji se pojavljuju u ovakom konceptu kontrole kvalitete moguće je grafički predočiti pomoću operativne krivulje (*engl. Operating characteristic curve – OC*).

¹ Dubravka Bjegović, Nina Štirmer i Marijana Serdar, "Ecological Aspects of Concrete Production", 2nd Int. Conf. on Sust. construction materials and technologies, Ancona, Italija, 2010, pp. 1483-1492.

² Jesicca Johnson, <http://www.theconcreteinitiative.eu/newsroom/press-releases/48-concrete-sector-launches-new-initiative-to-tackle-challenges-of-sustainable-construction>; The Concrete Initiative, 2014.

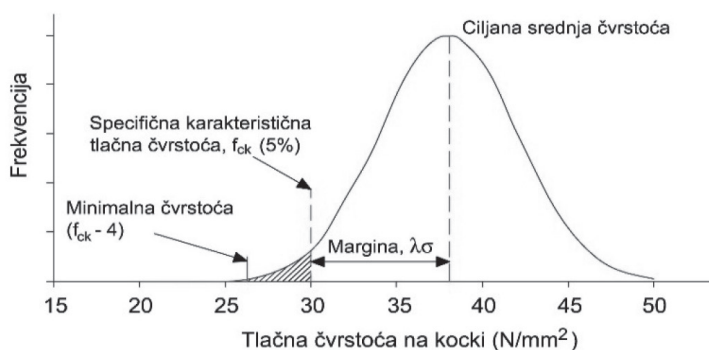
³ HRN EN 206 "Beton – Specifikacija, svojstva, proizvodnja i sukladnost (EN 206:2013)"

2. TLAČNA ČVRSTOĆA BETONA

Tlačna čvrstoća betona osnovno je mjerilo njegove kvalitete. Konstruktorima je važno znati kako će se element i/ili cijela konstrukcija ponašati pod predvidivim opterećenjem u uporabi, kako bi ih mogli pravilno oblikovati i dimenzionirati u skladu s postavljenim zahtjevima i važećom regulativom. Tehnolozi moraju znati kako će se beton ponašati pod opterećenjem kako bi mogli optimirati njegov sastav, način proizvodnje, ugradbu i njegu⁴.

Tlačna čvrstoća betona određuje se u određenoj starosti, uobičajeno nakon 28 dana. Stoga, ako se nakon 28 dana ustanovi da beton ugrađen u konstrukciju ne zadovoljava projektiranu tlačnu čvrstoću, možebitno je narušena sigurnost same građevine, ali i ljudi koji bi trebali koristiti tu građevinu.

Slika 1. Distribucija tlačne čvrstoće betona



Izvor: Roshavelov, T., "Basics of EN 206:2013", *TAIEX Workshop on Construction Products Regulation and Standards*, Skopje, 2014.

Tlačna čvrstoća betona opisuje se pomoću karakteristične tlačne čvrstoće betona f_{ck} . Ako se ispituje tlačna čvrstoća n uzoraka betona, rezultati ispitivanja će imati normalnu raspodjelu prikazanu na Slici 1. Označeno područje razdiobe od 5% definirano je kao karakteristična tlačna čvrstoća betona f_{ck} . Drugim riječima, f_{ck} odgovara 5%-tnom fraktilu teorijske raspodjele čvrstoće promatranog razreda betona. Dakle, f_{ck} je vrijednost čvrstoće ispod koje se očekuje da "pasti" 5% populacije ispitanog betona.

⁴ Dubravka Bjegović i Nina Štirmer, «Teorija i tehnologija betona», Sveučilište u Zagrebu, Građevinski fakultet, Zagreb, 2015.

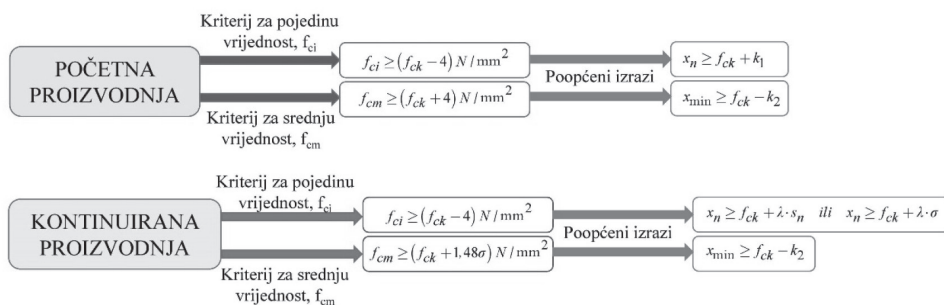
3. KRITERIJI SUKLADNOSTI TLAČNE ČVRSTOĆE BETONA

Kriteriji sukladnosti tlačne čvrstoće betona definirani u normi HRN EN 206 razlikuju se ovisno je li riječ o *početnoj* ili *kontinuiranoj* proizvodnji betona (Slika 2).

Pod *početnom proizvodnjom* podrazumijeva se proizvodnja sve dok nije dostupno najmanje 35 rezultata ispitivanja. *Kontinuirana proizvodnja* je postignuta kada je najmanje 35 rezultata ispitivanja zadobiveno tijekom perioda ne dužeg od 12 mjeseci.

Ako je proizvodnja pojedine mješavine betona prekinuta na više od 12 mjeseci, tada proizvođač mora prihvatiti kriterije, plan uzorkovanja i plan ispitivanja koji odgovaraju početnoj proizvodnji. Uzorci betona moraju se odabirati i uzimati slučajno.

Slika 2. Kriteriji sukladnosti za tlačnu čvrstoću betona



Izvor: HRN EN 206 i izvorno autorsko.

U izrazima prikazanim na Slici 2 x_n je srednja vrijednost tlačne čvrstoće uzorka, σ je poznata standardna devijacija čvrstoće populacije, s_n je standardna devijacija uzorka, x_{min} je najmanja vrijednost čvrstoće u uzorku a λ , k_1 , k_2 su parametri. U nastavku će se obrazložiti odabir vrijednosti λ , k_1 , k_2 definiranih u normi HRN EN 206.

3.1. Faktori k_1 , k_2

Vrijednost faktora k_1 , k_2 odabrana je kao 4. Naime, čvrstoća betona ispod vrijednosti f_{ck} ne znači podbačaj budući da je statistički očekivano i prihvaćeno da će 5% rezultata biti ispod vrijednosti f_{ck} . Međutim, iz razloga sigurnosti, serija s čvrstoćama betona značajno ispod f_{ck} je isključena, iako zapravo čini

dio očekivane populacije (5% ispod f_{ck}). Posljedično, norma HRN EN 206 definira zahtjev za minimalnu čvrstoću pojedinih rezultata (f_{ci}) kao ($f_{ck}-4$), Slika 1. Svaka serija s rezultatima ispod te vrijednosti čvrstoće je nesukladna serija, odnosno mora se odbaciti⁵.

Valja naglasiti da kriterij sukladnosti $f_{ci} \geq (f_{ck}-4)$ vrijedi samo za karakteristične tlačne čvrstoće betona $\leq C 50/60$ (obični beton). Za razrede čvrstoće betona $\geq C55/67$ (beton velikih čvrstoća) vrijedi kriterij sukladnosti $f_{ci} \geq 0,9f_{ck}$.

3.2. Faktor λ

Faktor λ naziva se konstanta prihvaćanja i za veličinu od 15 uzoraka (kontinuirana proizvodnja) u normi HRN EN 206 definirana je kao $\lambda_{n=15} = 1,48$. Oznaka λ_n u slučaju t-distribucije (Studentove distribucije) je t_n . Vrijednost $\lambda_{n=15} = 1,48$ preuzela je ulogu faktora Studentove distribucije iz prijašnjih normi. Vrijednost Studentovog t_n faktora ovisi o veličini uzorka i u svim je slučajevima iznosila najmanje $t_n = 1,645$, ali je u slučajevima malih uzoraka ta vrijednost bila značajno veća. U sadašnjem propisu definirana konstanta prihvaćanja λ_n , ili u starijim propisima Studentov faktor t_n , pomnožen sa standardnim devijacijama σ ili s_n predstavlja raspon (marginu) između srednje vrijednosti čvrstoće i karakteristične čvrstoće, što je prikazano na dijagramu funkcije distribucije čvrstoće na Slici 1. Pojedini znanstvenici smatraju da je takva promjena, odnosno zamjena Studentovog faktora s konstantom prihvaćanja, zapravo pogodovanje proizvođačima betona jer se manjim faktorom dobiva blaži zahtjev sukladnosti te je u tom slučaju proizvođačima jednostavnije zadovoljiti takav uvjet⁶.

Do zamjene Studentovog faktora konstantom prihvaćanja λ_n došlo je, jer se prihvaćanje tlačne čvrstoće betona željelo osigurati na način koji je dio sustava kontrole kvalitete. U okviru tako promatranog prihvaćanja čvrstoće betona, odnosno osiguranja njezine sukladnosti, karakteristična tlačna čvrstoća f_{ck} je promatrana kao najveći dopušteni (prihvaćeni) postotak proizvoda (uzorka betona) s nedostacima (čvrstoćom ispod dopuštene razine) p . Postotak vrijednosti čvrstoće ispod karakteristične čvrstoće iznosi $p = 5\%$, te on predstavlja prihvatljivu razinu kvalitete (*engl. Acceptable Quality Level – AQL*). Trebalo je definirati vjerojatnost prihvaćanja P_a betona s tako definiranom veličinom p karakteristične čvrstoće. Takav pristup predstavlja principe formira-

⁵ Theodor Roshavelov, "Basics of EN 206:2013", *TAIEX Workshop on Construction Products Regulation and Standards*, Skopje, 2014.

⁶ Tibor Kausay and Tamas K. Simon, "Acceptance of concrete compressive strength", *Concrete Structures*, Vol. 8, No. 122, 123, 2007, pp. 54-63.

nja operativnih OC krivulja za definirane planove uzorkovanja betona. Temelj ovakvom pristupu definiranja prihvaćanja sukladnosti tlačne čvrstoće betona dao je Taerwe. On je predložio da sustav kontrole kvalitete betona za sve vrijednosti p zadovoljava kriterij $p \cdot P_a(p) \leq 5\%$, gdje $p \cdot P_a(p)$ predstavlja AOQL. Taerwe je kao zadovoljavajuću OC krivulju pretpostavio onu koja tangira ‹nesigurno› područje, ali ne ulazi u njega, što bi osiguralo dovoljnu sigurnost i ekonomičnost u provjeri sukladnosti betona. $AOQL = (p \cdot P_a)_{max} = 0,05$ je granica ‹nesigurnog› područja, a numeričkim proračunima je dobivena konstanta prihvaćanja $\lambda_n = 15 = 1,48$ koja definira OC krivulju s vjerojatnošću prihvaćanja $P_a(0,05) \approx 0,7$ koja optimalno tangira ‹nesigurno› područje ⁷⁸.

3.3. Uvjet odabira parametara σ ili s_n

Kao što je prethodno navedeno, kontinuirana proizvodnja betona započinje u trenutku kada je dostupno najmanje 35 rezultata ispitivanja betona proizvedenih pod istim uvjetima, unutar perioda dulja od 3 mjeseca, ali ne duža od 12 mjeseci (do tog trenutka proizvodnja se naziva početnom proizvodnjom). Iz rezultata ispitivanja početne proizvodnje mora se izračunati standardna devijacija σ , koja daje dobru aproksimaciju teorijske standardne devijacije i koja se pod određenim okolnostima može uzeti u obzir tijekom ocjene rezultata ispitivanja kontinuiranje proizvodnje. Najmanja vrijednost σ standardne devijacije iznosi 3 N/mm^2 u slučaju običnog betona, odnosno 5 N/mm^2 u slučaju betona velikih čvrstoća.

Ako nije poznata standardna devijacija σ početne proizvodnje, za ocjenu sukladnosti rezultata kontinuirane proizvodnje može se koristiti faktor s_n . Za ocjenu rezultata kontinuirane proizvodnje potrebno je barem 15 rezultata ispitivanja te je potrebno proračunati standardnu devijaciju tih 15 rezultata ispitivanja. Standardna devijacija 15 uzoraka iz kontinuirane proizvodnje ne bi smjela značajno odstupati od vrijednosti standardne devijacije 35 uzoraka iz početne proizvodnje. Smatra se da odstupanje nije značajno ako vrijedi ⁹:

$$0,63 \cdot \sigma \leq s_{15} \leq 1,37 \cdot \sigma \quad (1)$$

⁷ Luc Taerwe and Robby Caspeele, "Conformity control of concrete: some basic aspects", *4th International Probabilistic Symposium*, Berlin, 2006, pp. 57-70.

⁸ Tibor Kausay and Tamas K. Simon, "Acceptance of concrete compressive strength", *Concrete Structures*, Vol. 8, No. 122, 123, 2007, pp. 54-63.

⁹ Tibor Kausay and Tamas K. Simon, "Acceptance of concrete compressive strength", *Concrete Structures*, Vol. 8, No. 122, 123, 2007, pp. 54-63.

4. OPERATIVNE KRIVULJE

Za pretpostavljenu funkciju distribucije tlačne čvrstoće betona i za dani kriterij sukladnosti, može se izračunati vjerojatnost prihvatanja serije betona, okarakterizirane vrijednošću Θ . Ta se vjerojatnost naziva vjerojatnost prihvatanja i označava se kao P_a ili P_x . Funkcija $P_a(\Theta)$ naziva se operativna krivulja OC krivulja za odabrani kriterij. OC krivulja za odabrani plan uzorkovanja kvantificira rizik proizvođača i rizik potrošača:

Proizvođačev rizik – dobre isporuke (isporuke koje sadržavaju postotak proizvoda s nedostacima koji je manji ili jednak AQL) mogu biti odbačene. Taj rizik odgovara α riziku i on se računa za postotak proizvoda s nedostacima koji je jednak AQL-u.

Potrošačev rizik – loše isporuke (isporuke znatno lošije kvalitete od zahtijevane) mogu biti prihvaćene. Taj rizik odgovara β riziku i on se računa za postotak proizvoda s nedostacima koji je jednak graničnoj razini kvalitete LQL-u (*engl. Limiting Quality Level*).

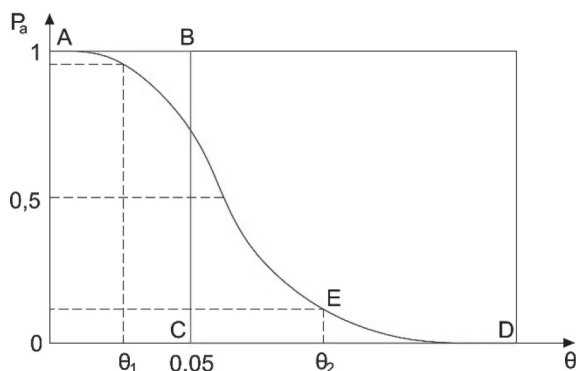
Plan uzorkovanja zadovoljava zahtjeve za ekstremne vrijednosti dobre i loše kvalitete, ali on to ne čini i za intermedijarne vrijednosti. Iz tog razloga se koriste OC krivulje. Krivulje su jedinstvene za svaku kombinaciju veličine uzorka n i broj prihvatanja c . Drugim riječima, operativne krivulje prikazuju vjerojatnost prihvatanja serija s varirajućim postotkom defektnih elemenata^{10,11}. OC krivulja se može razviti određivanjem vjerojatnosti prihvatanja nekoliko vrijednosti ulazne kvalitete p . Vjerojatnost prihvatanja je vjerojatnost da je broj proizvoda s nedostacima u uzorku jednak ili manji od broja prihvatanja za plan uzorkovanja.

Karakterističan oblik OC krivulje za beton prikazan je na Slici 3. Idealna OC krivulja bila bi linija ABCD, koja je opisana sa $P_a = 1$ za $\Theta < 0,05$ i $P_a = 0$ za $\Theta > 0,05$. Takva OC krivulja koja odgovara hipotetskom uzorku beskonačne veličine omogućava savršeno razlikovanje između dobrih i loših proizvoda. Radna OC krivulja predstavljena je krivuljom AED. Proizvodnja s $\Theta > 0,05$ još uvijek ima značajnu vjerojatnost prihvatanja ali pri $\Theta < 0,05$ postoji mogućnost da proizvodnja neće uvijek biti prihvaćena.

¹⁰ Predavanja iz kolegija "Upravljanje kvalitetom", Zavod za materijale, Građevinski fakultet, Sveučilište u Zagrebu, rujan 2015.

¹¹ Joseph M. Juran and Frank.M. Gryna, *Planiranje i analiza kvalitete*, MATE, Zagreb, 1999.

Slika 3. Tipični oblik OC krivulje za beton



Izvor: Luc Taerwe and Robby Caspele, "Conformity control of concrete: some basic aspects", *4th International Probabilistic Symposium*, Berlin, 2006, pp. 57-70.

Ukoliko je veličina uzorka n relativno velika, a broj nesukladnih (loših) jedinica p razmjerno mali, tada se za potrebe konstruiranja OC krivulje može pretpostaviti Poissonova distribucija:

$$P_x = \frac{n!}{x!(n-x)!} p^x \cdot q^{n-x} \quad \text{za } x = 0, 1, 2, \dots, n \quad (2)$$

gdje je P_x vjerojatnost prihvatanja ispitane serije, n je veličina uzorka, x predstavlja broj prihvatanja loših jedinica, p je postotak loših jedinica a q predstavlja postotak dobrih jedinica ($q=1-p$).

5. PRIMJER PRORAČUNA RIZIKA PRIHVAĆANJA I ODBACIVANJA U PROIZVODNJI BETONA

U nastavku će se provesti ocjena sukladnosti tlačne čvrstoće betona za projektirani razred tlačne čvrstoće betona C 30/37. Tlačna čvrstoća ispitana je na uzorcima oblika kocke brida 15 cm nakon 28 dana starosti, uzetima tijekom perioda proizvodnje betona u tvornici betona kraćem od 12 mjeseci. Sukladnost je potvrđena ako su zadovoljena oba kriterija za početnu proizvodnju sa Slike 2.. Rezultati tlačne čvrstoće dobiveni ispitivanjem 15 uzoraka prikazani su u Tablici 1. Za razred tlačne čvrstoće betona C 30/37, karakteristična tlačna čvrstoća f_{ck} ispitana na kocki iznosi 37 N/mm² te će se kriteriji sukladnosti provesti za tu vrijednost f_{ck} . Za slučaj početne proizvodnje kriteriji sukladnosti

definirani prema HRN EN 206 zahtijevaju grupiranje po 3 rezultata ispitivanja i prema tome ispunjavanje oba kriterija sukladnosti za svaku grupu, Tablica 1.

Tablica 1. Primjer postupka ocjene sukladnosti ispitane serije betona

Br. uzorka	$f_{ci,28}$ (MPa)	f_{cm} (MPa)	Prihvatanje ili odbijanje (≥ 41 MPa)	$f_{ci,min}$	Prihvatanje ili odbijanje (≥ 33 MPa)	Ocjena grupe
1	41,62	43,30	Prihvatanje	41,62	Prihvatanje	Prihvatanje
2	43,09					
3	45,20					
4	36,50	37,89	Odbijanje	36,50	Prihvatanje	Odbijanje
5	39,17					
6	37,99					
7	44,22	42,91	Prihvatanje	41,02	Prihvatanje	Prihvatanje
8	43,50					
9	41,02					
10	40,55	42,51	Prihvatanje	40,55	Prihvatanje	Prihvatanje
11	42,67					
12	44,32					
13	42,90	43,02	Prihvatanje	41,27	Prihvatanje	Prihvatanje
14	41,27					
15	44,89					

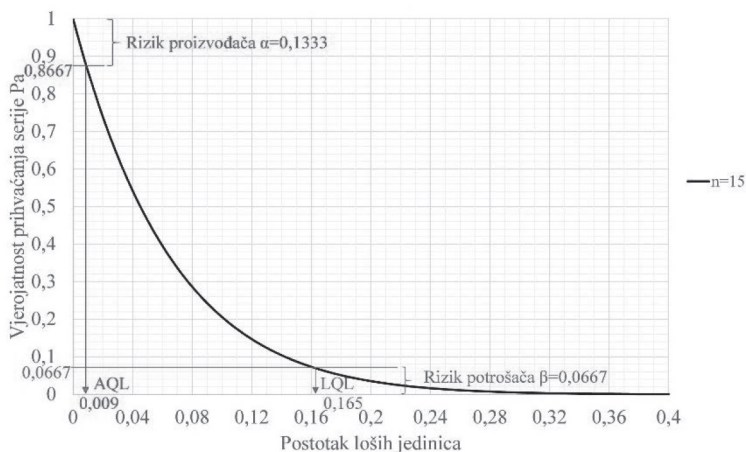
Izvor: Izvorno autorsko.

Kriterij sukladnosti za srednju vrijednost tlačnost čvrstoće grupe: $\geq f_{ck}+4 = 37+4 = 41$ MPa. Kriterij sukladnosti za minimalnu vrijednost tlačne čvrstoće grupe: $\geq f_{ck}-4 = 37-4 = 33$ MPa

Iz Tablice 1. vidljivo je da je druga grupa rezultata (uzorci br. 4 – 6) odbačena, jer ne zadovoljava kriterij srednje vrijednosti tlačne čvrstoće grupe. Uzorci br. 5 (39,17 MPa) i br. 6 (37,99 MPa) čije su tlačne čvrstoće veće od karakteristične tlačne čvrstoće $f_{ck} = 37$ MPa deklariranog razreda C 30/37, su odbačeni jer su tijekom uzorkovanja smješteni u grupu s uzorkom čija je tlačna čvrstoća podbacila - uzorak br. 4 (36,50 MPa) ima tlačnu čvrstoću ispod $f_{ck} = 37$ MPa deklariranog razreda C 30/37. Stoga u ovom slučaju, proizvođač betona ima rizik da mu dva dobra uzorka iz serije veličine 15 uzoraka budu odbijena od strane potrošača zajedno s lošim uzorkom. Time se u ovom slučaju proizvođačev rizik može kvantificirati s 13,33 %. Slična se analogija može primijeniti za kvantifikaciju potrošačevog rizika. U gornjem je slučaju

jedan loš uzorak, br. 4 (36,50 MPa) mogao biti prihvaćen zajedno s dobrim uzorcima u seriji ukupne veličine 15 uzoraka. Na taj se način potrošačev rizik može kvantificirati sa 6,67 %.

Slika 4. OC krivulja za ispitanu tlačnu čvrstoću betona na 15 uzoraka



Izvor: Izvorno autorsko.

Slika 4. prikazuje OC krivulju za promatrani beton za zadane parametre (n , x , p). Na krivulji su označeni proračunani rizik proizvođača α i njemu pripadajuća vrijednost AQL te proračunani rizik potrošača β i njemu pripadajuća vrijednost LQL. Dakle, izvjesni rizici proizvođača i potrošača postoje, iako su procedure ocjene sukladnosti tlačne čvrstoće betona propisane normom.

6. ZAKLJUČNA RAZMATRANJA

Niz tehničkih propisa i normi predstavljaju okvir za osiguranje kvalitete cjelokupne građevine u svim njezinim fazama: kvaliteta prethodnih ispitivanja lokacije, izvedbe projekata, proizvodnje i ugradnje građevinskih materijala i proizvoda, izvedbe, korištenja i održavanja te uklanjanja građevine.

Osiguranjem kvalitete proizvoda stvara se odnos povjerenja između proizvođača i potrošača. Odabirom i razradom plana uzorkovanja te izradom operativnih krivulja moguće je optimizirati rizik proizvođača i rizik potrošača ovisno o namjeni proizvoda i uvjetima koje mora zadovoljiti.

U radu je prikazan sustav ocjene sukladnosti tlačne čvrstoće betona, osnovnog svojstva betona, razvijen na temelju AOQL koncepta. AOQL koncept definira OC krivulje za beton na temelju kojih je moguće odrediti rizik proizviđača i rizik potrošača, što je prikazano kroz dani primjer u radu.

Abstract:

RISKS BY ACCEPTANCE AND REJECTION IN CONSTRUCTION SECTOR

Quality control in construction sector implies ensuring compliance characteristics of the materials, construction products and construction works with the requirements prescribed by standards, technical regulations and rules of the profession, all with the aim to ensure the characteristics and performance as required in design. The concrete industry uses conformity criteria defined by standard HRN EN 206 in order to verify compliance and to ensure the desired properties of concrete, which directly affect the safety of concrete structures. In this paper is through the example presented system for conformity assessment of concrete compressive strength, developed based on the concept of Average Outgoing Quality Limit (AOQL). The compressive strength of concrete is defined by the characteristic compressive strength of concrete f_{ck} corresponding to the 5% fractile of theoretical distribution of the observed concrete strength class. For the assumed distribution function of the concrete compressive strength and for a given conformity assessment criterion, the probability of accepting a series of concrete can be calculated. There is always a risk that the concrete of acceptable quality will be rejected, so-called manufacturer's risk, and likewise there is a risk that the concrete of significantly lower quality than the required one will be accepted, so-called the consumer's risk. The both risks should be minimized within the limits of safety and economy. Since the level of concrete quality can vary considerably, the quantification of the risks mentioned above, can be represented graphically by means of operating (OC) curves.

Key words: concrete compressive strength class, conformity criteria, operating characteristic curve.

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THE WOODEN FURNITURE PRODUCT VALUE CREATING WITH QFD METHOD APPLYING

UTVRĐIVANJE VRIJEDNOTI PROIZVODA DRVENOG NAMJEŠTAJA
PRIMJENOM QFD METODE

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ABSTRACT

The basis for the product value assessment based on the customer satisfaction level evaluation is identification of clients' expectations, needs and requirements for the product, then the interpretation of the results in the context of the particular product characteristics. Knowledge on the product's parameters important from the point of the customer's view and parameters' evaluation based on measurable technical values allows both better product's adjustment to the market needs and gain a competitive advantage. The paper presents the stages of the wooden furniture product development based on the selected quality management method that enables the identification and assessment of the product value in terms of Value Engineering approach. As a result of the research analysis, there have been suggested design guidelines for the product on the basis of the comparison of the certain product parameters' and characteristics of competing products.

Key words: wooden furniture products, Quality Function Deployment, technical parameters.

1. INTRODUCTION

The growing construction market competition forces producers to use methods that allow the generation of products that meet customers' needs with regard to a higher degree than a competitive product. Meeting customer requirements is provided mainly by direct contact with the customer, which allows producers to identify clients' requirements and needs with respect to the product and to assess the extent to which the manufacturer has adapted its products to the expectations of the customer. This is done mostly through direct interviews, gathering customers' opinions and tests. Identification of the customers' satisfaction in the context of their expectations and experience with regard to the use of the product is basis for Customers' satisfaction evaluation and their opinion on the competitive products.

Analysis of market trends, competitive products and users' opinions is a complicated process since it requires the appropriate research methodology of the information collecting and its processing. There is also a problem with the lack of the customer expertise knowledge about product technical parameters, what doesn't allow to evaluate all product's function specific for the client. This way the product design process involves increasing costs.¹

Focusing on research and development costs reduction and shortening its duration resulted in the need to develop a method for translating the conscious and unconscious customers' requirements specifications into technological parameters while taking into consideration technological possibilities, individual characteristics importance and relationships between them.² As a result of searching the appropriate method there was established Quality Function Deployment methodology that is often referred to as House of Quality, which is associated with characteristic analytical matrix.

Quality Function Deployment method allows interpreting customers' requirements in the design process, technology development and the manufacturing process or creating services. This quality management method determines general technical characteristics of the product and its parts and then process parameters in accordance to clients' requirements and designers' proposals. The product value is creating on the every stage of the design process, where quality determinants specific for the analysed product are identified and evaluated. Quality function deployment to help resolve issues with the fact that mass pro-

¹ F. Jariri and Zegor di S. H., „Quality Function Deployment, Value Engineering and Target Costing, an Integrated Framework in Design Cost Management: A Mathematical Programming Approach,” *Scientia Iranica*, Vol. 15, No. 3, pp 405-411 Sharif University of Technology, June 2008, pp. 405 – 411.

² A. R. Benner and F. Linnemann, “Quality function deployment (QFD){Can it be used to develop food products?}”, *Food Quality and Preference*, Vol. 14, No. 4, 2003. pp. 327-339.

duction gives the company a small possibility of direct contact with a potential client and in a situation where products are becoming more technologically advanced, and also simultaneously satisfy many needs.

The aim of the paper is presentation of the wooden furniture product creating that is based on the applying of QFD method which enables identification and evaluation of the valuable product technical characteristics. The result of the research analysis are presented in the form of producer guidelines that are used in the design process using advanced computer software that applies QFD method philosophy.

2. QUALITY FUNCTION DEPLOYMENT – THEORETICAL BACKGROUND

Quality function deployment was developed by Japanese engineers to ensure the quality of the project already in the design phase of the product. During the Second World War, the Japanese economy suffered huge losses. After the war, the production was based mainly on the production of low-quality copies of American products. Then, influenced by the ideas presented by Deming and others who came to Japan specialists in the quality management, the Japanese engineers realized that only innovative products of high quality can ensure their success. The concept of QFD method was introduced in Japan by Yoji Akao in 1966.³

The method name is a translation of Japanese words *hinshitsu kino tenkai*. In the English-Japanese dictionary the word *tenkai* means evolution or deployment. The first time the name of the method was translated in 1978 as *quality function evolution*, but it was concluded that the word *deployment* sounds more creatively and method received its present name Quality Function Deployment.

According to Akao (1990), QFD is a method for developing a design quality aimed at satisfying the consumer and then translating the consumer's demand into design targets and major quality assurance points to be used throughout the production phase.⁴ Akao underlines that QFD has demonstrated the reduction of development time by one-half to one-third.

It is often underlined that the main objective of any manufacturing company is to bring new (and carryover) products to market sooner than the competition with lower cost and improved quality, what is identified as mechanism called quality function deployment. In accordance to the concept of Sullivan,

³ Dinesh Verma, Rajes Chilapati and B. S. Blanchard, "Quality Function Deployment (QFD): Integration of logistics requirements into mainstream system design. Industrial and Systems Engineering" Virginia Tech Blacksburg, Virginia, 2002.

⁴ Yoji Akao ed., *Quality Function Deployment*, Productivity Press, Cambridge, MA, 1990.

QFD is an overall concept that provides a means of translating customer requirements into the appropriate technical requirements for each stage of product development and production (i.e., marketing strategies, planning, product design and engineering, prototype evaluation, production process development, production, sales). Sullivan further notes that the QFD system has been used by Toyota since 1977, following four years of training and preparation. Results have been impressive. Between January 1977 and April 1984, Toyota Autobody introduced four new van-type vehicles. Using 1977 as a base, Toyota reported a 20% reduction in start-up costs on the launch of the new van in October 1979; a 38% reduction in November 1982; and a cumulative 61% reduction at April 1984. During this period, the product development cycle (time to market) was reduced by one third with a corresponding improvement in quality because of a reduction in the number of engineering changes.⁵

QFD is also determined as the system engineering process which transforms desires of the customer/user into the language required, at all project levels, to implement a product.⁶ Mizuno and Akao (1994) indicates that QFD is far more than has previously been disclosed. It is clearly the mechanism for deploying quality, reliability, cost, and technology throughout the product, the project to bring forth the product, and the enterprise as a whole.

The first application of QFD method was in 1972 in the shipyard of Mitsubishi in Kobe. Then it has been used in the Japanese motorway industry. After a few years, it also gained popularity in the United States, where it was used successfully in plants of Ford and General Motors, and later at Digital Equipment, Hewlett-Packard, AT & T and ITT.

A study conducted in 1986 by the Japanese Union of Scientists and Engineers (JUSE) shown that 54 of the 148 companies use the QFD method. Most often it was used in the following sectors: transport (86%), the construction (82%), precision mechanics (66%), electronic industry (63%). However, the method's using in the service companies was lower, but still significant (32%). A German study conducted in the early nineties shown, that QFD method is not yet widely used in Europe, such as in Japan or the USA (66% of enterprises do not yet apply the method QFD, and only 4% used it regularly).

Quality Function Deployment streamlines the process of merging customer requirements and product technical parameters. In practice, engineers and designers communicate in the other language than customers. There is a barrier in the communication that forms between customers and engineers and designers,

⁵ L. P. Sullivan, *Quality Function Deployment*, Quality Progress, 1986.

⁶ Edwin B. Dean, "Quality Function Deployment for Large Systems", Proceedings of the 1992 International Engineering Management Conference, Eatontown, NJ, 25-28 October, 1992.

what makes it difficult to design products that are well suited to customer needs. Designers and engineers communicate using technical terms and assign numeric values to each of the parameters. However, such terms are not understood by customers because they make use of fuzzy criteria and they want the product to be large or small, fast or durable. Translating of these terms to technical specifications is not so simple. Quality Function Deployment should streamline the process of communication between the client and the company and contribute to the growth of mutual satisfaction.

This method is a systematic process of the business concentration on the customer and his needs. A precondition for the correct application of the method are market research of the customer needs. These studies have to answer three basic questions:

- What do customers expect?
- How is it important for them?
- Is there compatibility between customers' expectations and the product?

Knowledge of responses to the above questions is absolutely necessary and determines the effectiveness of further analysis.

Quality Function Deployment method provides the enterprise different benefits that can be divided into the following groups:

- corporate - associated with the organizational structure, organization of work, etc;
- economic - costs and profits resulting from application of the method;
- socio-psychological - employees and customers experience, satisfaction, leadership styles, communication, etc.

The stimulus for the development of QFD was a decisive factor in the financial condition of the company that is related to buyers of products or indirectly - institutions, affecting the customers' purchase decision (e.g. owing to the product advertising). Even if the product is designed correctly - from an engineering standpoint - his production may be misconceived if the market will not accept it. The QFD method help to resolve issues connected with the fact that mass production or large series production give the company a small possibility of direct contact with a potential client if products are becoming more technologically advanced.⁷ The scope of QFD method using possibilities is wide and there are following applications:⁸

⁷ Stanislaw Borkowski and Robert Ulewicz, *Instruments of Production Processes Improvement*, PTM, Warszawa, pp. 37.

⁸ J. Łańcucki, *Fundamentals of total quality management*, TQM, Poznań, pp. 47 (in Polish), 2001.

in preparation, construction and the new products manufacturing launching in such diverse industries as shipbuilding or the construction, mechanical engineering;

- in development of new services in banks and health care;
- in developing new computer systems hardware and software.

Table 1 presents detailed extensive list of benefits arising from the application of QFD method in the company.

QFD method is used to design new products and services or to modify existing in such a way that it satisfies as possible in accordance to customers' requirements. It means that the design does not come out from the planning characteristics of the product, but the requirements of the customer and then designed the product or service to meet these requirements.

Table 1. The advantages of QFD method using

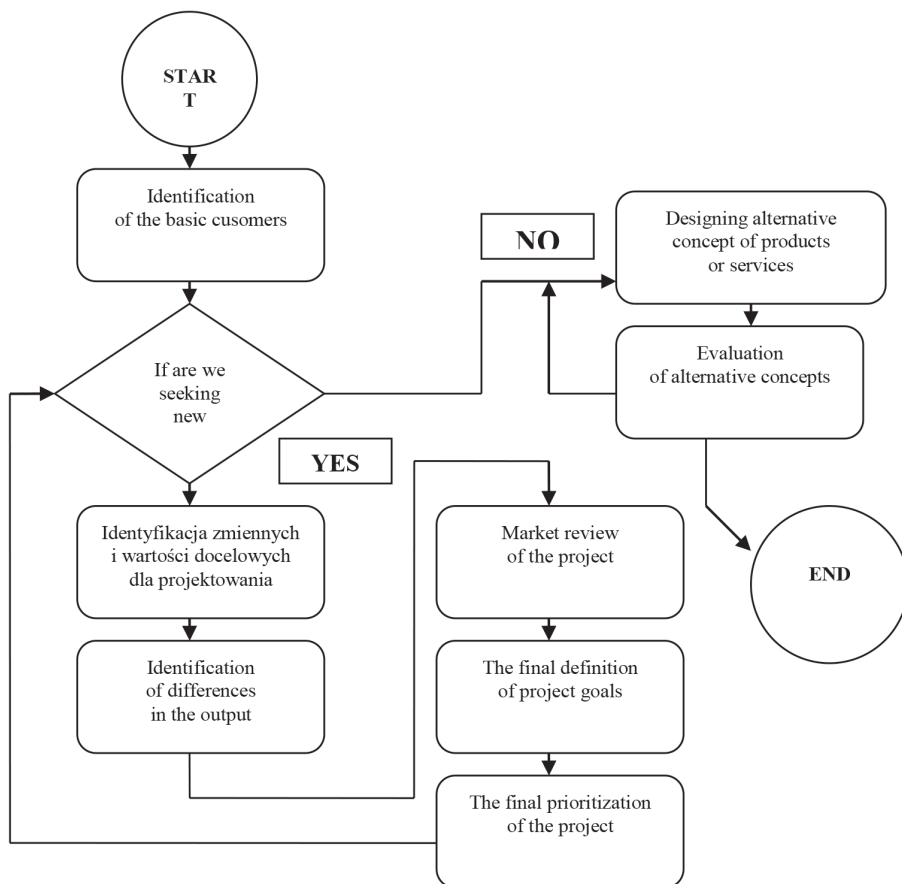
Organizational	Economical	Socio-psychological	
		For the enterprise	For the client
<ul style="list-style-type: none"> ▪ shortening the product design stage ▪ reducing the number of changes in product design and process ▪ the transmission of information to all departments of the enterprise, as customer needs translate into their actions ▪ the creation of the enterprise unified organizational structure ▪ ongoing monitoring compliance with the work schedule ▪ creating of detailed documentation of the analysed problems ▪ identifying of weak points of the process and product 	<ul style="list-style-type: none"> ▪ reduces the cost of design changes ▪ it decreases cost of testing and inspection of the products ▪ educes the cost of manufacturing defects (both internal and external) ▪ makes products more competitive on prices 	<ul style="list-style-type: none"> ▪ improve communication enterprise ▪ provides integration of employees through collaborative forms of work ▪ breaks down the divisions between different organizational units ▪ systematizes the workers knowledge ▪ properly conducted increases the intellectual potential and employee satisfaction ▪ identify areas of competitive advantage 	<ul style="list-style-type: none"> ▪ focus on customer needs with regard to the product ▪ facilitates identification of customer's needs, allowing him to use his own terms ▪ improves communication between client and the enterprise ▪ increases customer satisfaction with the obtained product

Source: Eugeniusz Krzemień,., and Radoslaw Jaromir Wolniak, *The use of computer-aided applications in QFD method*, Problemy Jakości, July 2001, pp. 12-13 (in Polish).

Customer-oriented design can be presented in the form of the flowchart shown in Figure 1. Good new product or service should have the following characteristics: give rise to significant simplifying life for the customer - this can be achieved through a detailed definition of its needs;

- must supply the client products with greater value than competitive products - for this purpose it should be carried out benchmarking of the competition, and carefully planned portfolio of technology and innovation in the organization;
- it should be adjusted to correct marketing strategy and well organized its introduction to the market (customers should be aware of the existence of this product and should be readily available).

Figure 1. Customer-oriented design.



Source: Radoslaw Jaromir Wolniak, *The 30 concept of the matrix deployment of QFD method*, *Problemy Jakości*, 2003, pp. 7-9 (in Polish)

These goals are easy to formulate but in the practice its fulfilment is a very complicated process. Application of QFD in the embodiment shown is undoubtedly a very good tool, which should allow enterprises to create new products by the customer with the required parameters.

3. RESEARCH METHODOLOGY

The basic tool of Quality Function Deployment method is a diagram shown in Figure 2. Because of its shape, this diagram is often called the Quality House. QFD diagram contains a specially defined fields. Its number depends on the nature and complexity of the task and the objective to be achieved. In the example shown in the figure are fields:

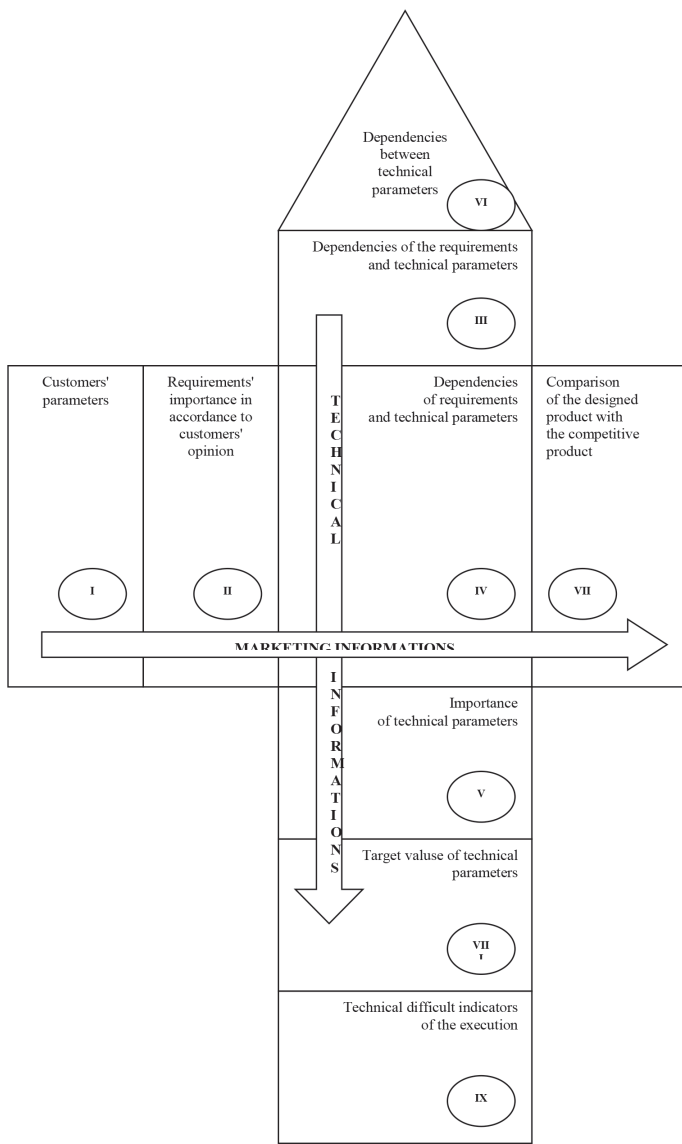
- I. Customers' requirements.
- II. Requirements' importance in accordance to customers' opinion.
- III. Technical parameters of the product.
- IV. Dependencies between customer requirements and technical parameters.
- V. Importance of technical parameters.
- VI. Dependencies between technical parameters.
- VII. Comparison of the designed project with competitive products.
- VIII. Target values of technical parameters.
- XI. Technical difficulty indicators of the execution.

The Quality House in embodiment illustrated in Figure 2 or on an appropriately adjusted to the problem to be solved, is used in all phases of QFD. Identification of the customers' requirements by defining product characteristics is described in a field I. Potential users of the product, when defining their expectations typically use terms like "easy to use", "aesthetic look", "stable and reliable" or "attractive appearance". For the designer, such expressions can have many meanings and is therefore required to be a reasonable specification. For example, "easy to use" in relation to a car roof rack means that it can be easily disassembled and installed. On the other hand, the requirement that a universal means that it should be capable of being used both in the car small as well as large. It is appropriate dividing the requirements of customers into several groups. With respect to the trunk - it can be divided into three subgroups: disassembly, easy to store, easy mounting of luggage. In the first group (removal) may indicate specific requirements: quickly and without the help of special tools.

Determination of the requirements' importance according to customers' requirements is described in a field II. Not all of the product features identified by the customer have the same meaning. Some features are relevant unconditional meaning (e.g. "Safe use") and others have only meaning ("user-friendly"). To determine the product feature importance on a point scale (e.g. 1 ÷ 5) there can be used marketing research techniques. There is often included a category of "attractiveness", taking into account the fact that some features of the product do not affect its functional properties, but strongly affects the way of receiving the product by the user. A typical example might be the paint colour of the car. The result of the analysis phase of the customers' requirements importance is assignment of individual characteristics factors importance (W).

Determination of product technical parameters is described in a field III. Technical parameters characterize the product from the point of view of the designer. They must be selected to meet the user's requirements expressed in his language. Technical characteristics that ensure satisfying the user's requirements must be measurable and real, that is obtainable at the production stage. Therefore, establishing lists for the product characteristics specified by the customer, it is particularly important and difficult. Technical parameters can be of a minimant, a maksymant or a nominant. Depending on the adopted conditions there indicated as follows: (↓) or (-) for a minimant (↑) or (+) for a maksymant and (●) for a nominant. If the parameter is a minimant, it means that the product will meet the users' requirements better, the smaller will be the value of the parameter expressed in its assigned part. For nominants there exists optimum value for a parameter, which should be met in as much as possible.

Figure 2. Scheme of the Quality House.



Source: J. Łańcucki, *Fundamentals of total quality management*, TQM, Poznań, 2001, pp. 47 (in Polish).

Determination of dependencies between technical parameters and customers' requirements is described in a field IV. Dependencies between product technical parameters and technical requirements are determined on the basis of functionality and customers' experience analysis, analysis of advertising, re-

pair history for the analyzed product. There are several levels of dependences (usually 3 - 4), identifying them as adopted by the team conducting the analysis. This could be denoted as follows: (×) – strong dependence, (-) - the average dependence, (Ø) - weak dependence. Its value can be also quantified by specifying the dependency ratio (Z), for example: 9 - the strong dependence, 3 – medium dependence, 1 – a weak dependence. Generally, the grading scale is an individual choice of the product designer. If there are no dependency between technical parameters and customers' requirements, the corresponding cell matrix is not fulfilled. It should be take into account that some technical parameters have an impact on the fulfilment of several requirements - for example, some car technical parameters affect its dynamics and driving comfort.

Assessment of the technical parameters importance is described in a field V. If in the fields II and IV a numerical assessment is applied, there can be determined an importance of technical parameters as the sum of importance coefficients ratio for further requirements and factors of their dependencies with the technical parameter. If W_i is the ratio of the requirements' validity and Z_{ij} is the dependency coefficient between the requirement "i" and technical parameter "j", a coefficient of technical parameter validity "j" is T_j and it is identified in a formula:

$$T_j = \sum_{i=1}^I * W_i * Z_{ij} \quad (1)$$

That number of factors obtained in the analysis allows the designer to easily identify particularly important the product technical problems.

Identifying significant dependencies between technical parameters is described in a field VI. In many cases, product specifications interact, which often affects the ability to meet customers' demand. The impact can be both positive (e.g. marked with "+") and negative (sign "-"). Interactions between technical parameters are usually described in additional table, placed at the top of the QFD diagram, creating its distinctive roof. If in this table there are dominated negative characters of the impact, it means that in the optimization of the product (design, process) there may appear some significant limitations resulting from the need to introduce compromises.

Assessment of competitive product characteristics is described in a field VII. Before deciding on the product purchase, a potential buyer often compares it with the competitive products. The criteria for these assessments are sometimes difficult to define. If the design team makes upgrading an existing product, there should be indicated elements that must be changed (to get a

better performance than in competing products), but also those that give correspond competitive advantage to particular product. Comparisons of products are assessed in a suitably adopted scale.

The determination of target values for product technical parameters is described in a field VIII. After research analysis related to the creation of the QFD diagram, the designer gets a good idea of the proposed product, including the customers' expectations, competitive products and the way in which technical parameters affect the fulfilment of defined requirements. Owing to this information, it is possible to establish a target value, which must achieve measurable technical parameters, in order to meet customer requirements and increase the competitiveness of the product.

The determination of the technical difficulty indicators of the execution is described in a field IX. It is to identify indicators which measure the technical and organizational difficulties which occurrence can be expected in achieving of target values for technical parameters. It is mostly in a scale of $1 \div 5$. The high value indicates that considerable problems can be identified and there is a need to focus on the use of the increased scope of control, careful design parameters of the manufacturing process, etc.

A complete QFD analysis involves three main phases:

PHASE I: Determination and evaluation of dependencies between customers' requirements and product technical parameters.

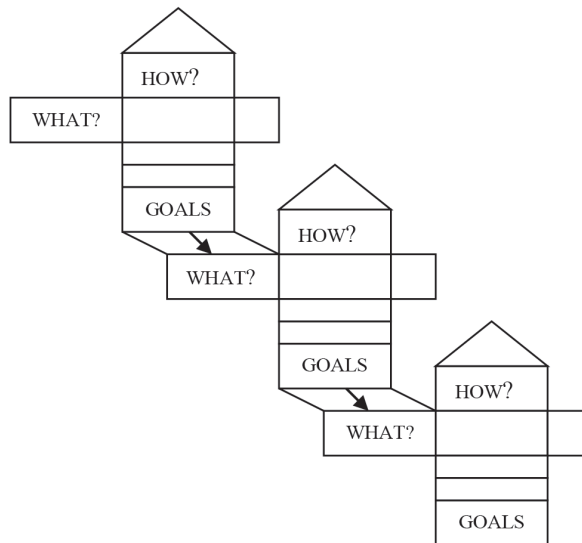
PHASE II: Transfer of product technical parameters for its assemblies and then into its individual parts.

PHASE III: Evaluation of the individual operations, process technology and assembly due to the effect on the characteristics set out in Phase II.

As it results from the QFD method, it is a tool developing and supporting concurrent engineering. It is a systematic approach for interpreting customers' requirements for the technical conditions in the product construction design.

Relationships of successive phases of the QFD analysis can be presented in a visual way, as shown in Figure 3. In each phase for the question "what (get)?" there is an answer "how (get)". It is related to requirements created by the constructor that must be met by technologist regarding the accuracy of parts, and then technologist – with regard to quality control. This procedure means that the supplier at a given stage of the QFD, becomes the client in the next stage. There is formed customers' chain (a potential buyer of the product - designer - constructor - technologist - quality controller - mechanic in the service).

Figure 3. Transfer of requirements through Quality House.



Source: J. **Łańcucki**, Fundamentals of total quality management, TQM, Poznań, 2001. pp. 49 (in Polish).

Traditionally, QFD method was carried out manually. This situation led to the tedious task of filling the tables and drawing relation matrix. Large designs had to be performed a large number of calculations, and as a result it was difficult to avoid errors. Computer aided avoids these drawbacks while keeping all advantages of the method developed in the traditional way.

An example of a computer program supporting QFD analysis is QFD Scope program made by an American company Integrated Quality Dynamics. The program provides computer support during the design by Quality Function Deployment, starting with the establishment of a hierarchy and interaction parameters until the construction of the “Quality House” and perform the necessary calculations.

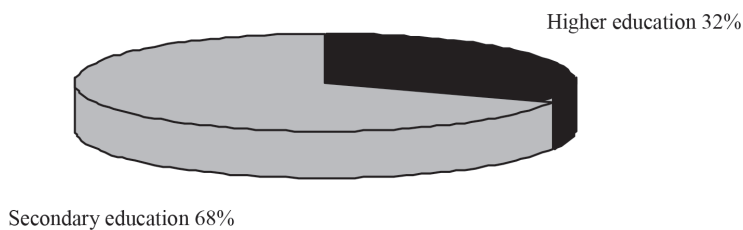
4. RESEARCH OBJECT CHARACTERISTIC AND RESEARCH RESULTS

The analysed enterprise is Polish furniture company that was founded in 1992 on the initiative of Canadian citizens. The idea of the organization creating was established in 1986 and it was based on the experience of successful people in USA and achievements of companies dealing with the sliding doors all over

the world. The program, which was prepared and implemented is based mainly on the experience of French companies that best fit the realities of the international market in a particular EU market. In 1994 - 1998 the enterprise launched production of sliding door systems and building interiors cabinets in the form of the system wardrobes and came into possession of a large industrial facility located in Canada and Poland. Polish branch embraced export markets in Eastern Europe, Western Europe and the rest of the world. In 1994 - 1998 there was established specialized marketing program "COMMANDER STANDARD" based on a computer program for the industry and gained professionals to carry out the entire project. In 1998, the enterprise began to build a network of complementation to support the program service "COMMANDER STANDARD".

The dynamic development of the company is the reason for the continuing increase in employment. Currently, Polish branch employs almost 800 people. Management team has extensive experience in the industry and the necessary professional education. It ensured the consistently high quality products by implementing international quality standard ISO 9001: 2000. The characteristics of the analyzed enterprise have been shown in figure 4.

Figure 4. Characteristic of workers in the analyzed enterprise.



The analysed enterprise efforts in the area of quality focus on maintaining high standards. In 2002, manufacturing system of the enterprise has been certified by the certification body DNV Certification BV, confirming compliance with the requirements of ISO 9001: 2000. It means that it was introduced and successfully used a Quality Management System for the design and production of interior furnishing and built-in wardrobes. The main activity of the company is the production and sale of sliding door systems built-in wardrobes. Moreover, the company is engaged in manufacturing of accessories for interior and creates specialized computer software to design wardrobes and sales management and production. The strong point is well organized and available domestic market network of services operating under the name Commander standard.

The enterprise based manufacturing processes on customers' requirements by applying software called Designer system that is a comprehensive information system, a fundamental tool to support the process of customer service, sales management and production processes within the structure of the distribution network. It is a modern application that meets the users' requirements with various profiles, ranging from sales representatives directly involved in customer service, including complementation plants responsible for the preparation of final products. The product is implemented in a client-server architecture. As the database layer is used Firebird SQL server. Designer system works on all versions of Microsoft Windows operating system, starting with Windows 98 SE. Programming currently is available in several languages, and thanks to the applied solutions, preparation of the next nation version is as simple and basically includes translation of the texts used by the application. Any exchange of data between organizational units sowing is done completely automatically, through electronic channels (Internet). The application thanks to its modular design, can be flexibly adapted to the specific requirements of individual users.

The primary and the most impressive module forming a part of this group is a module for the visual design of interiors. The most important advantage is the maximum simplification of the design process solutions dream by the customer. Designing is done in surround mode, with full visualization, based on defined library. Design solutions are constantly checked what allows improving functionality of the product by virtually any design solutions. There is also conducted regular financial valuation that enables the customers to be informed at any time of design process about impact of decisions taken by him on the final valuation of the project. All of these activities that enterprise uses in the execution of the contract are related to the use of QFD method. While the company does not use computer-aided methods of QFD, or doesn't apply the so-called building QFD matrix, it can be safely concluded that a computer program designer and the knowledge and skills of employees largely uses all the characteristic elements of the method QFD.

Any information relating to the customers' preferences, the analysed enterprise collects based on own relationships with buyers, control charts and surveys of market research on the characteristics of ordered products. These data are the most important basic elements that characterize customer requirements. Installation of the wardrobe system is a special and unique furniture, because each element is its own concept of the customer. Due to the fact that wardrobe belongs to the individual cabinetry design, it is extremely important to the company performing such a development had known all the necessary information on its product and especially it could use in the design phase preferences of their customers. They determine the appearance of the

wardrobe (cabinet), its component elements, and the task of the company is fit to customer requirements. After gathering all the information the analysed enterprise establishes key relationships between customers' requirements and factors determining these expectations by matrix analysis applying. Table 2 shows the characteristics of these relations.

Table 2. The matrix diagram of the customers' requirements for the cabinet

	Material	The depth of the cabinet	The door filling	Interior features	Driving elements in the door	The interior finish
Durability	V	O	X	X	V	V
Functionality	X	V	X	V	X	X
Aesthetics	V	O	V	V	O	V
V – strong dependence, X – average dependence, O – weak dependence						

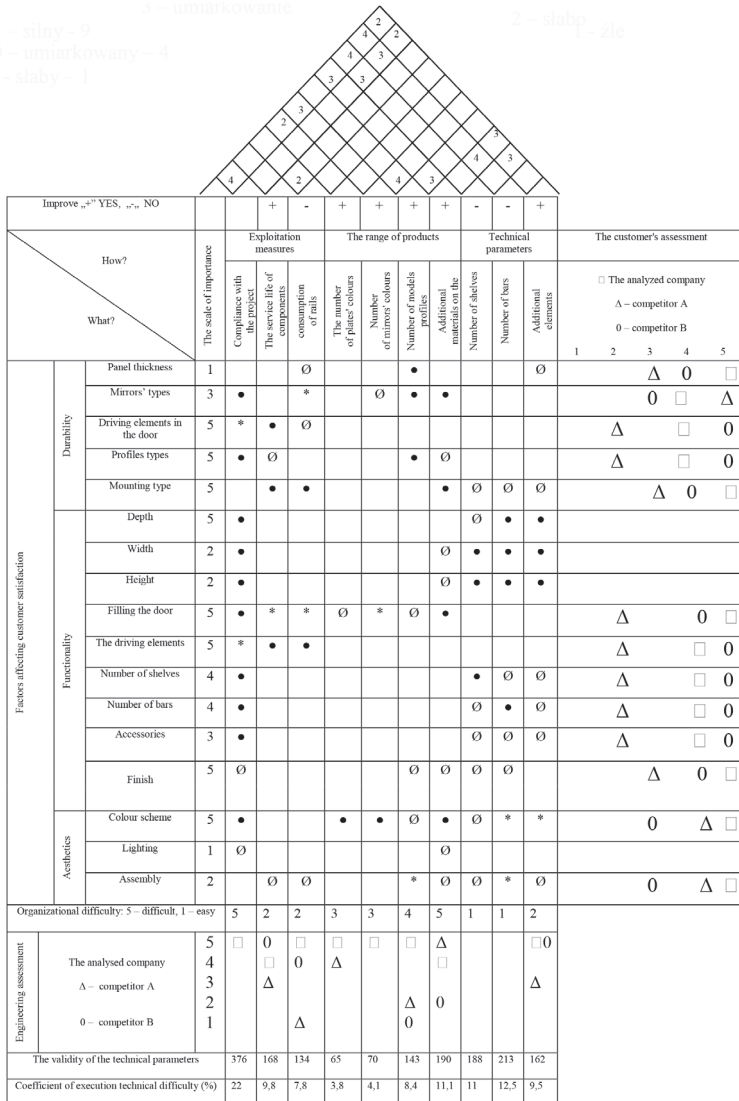
Source: own study.

Diagram presented in table 2 shows that features as aesthetic and functionality are the most important for the clients. The requirements for aesthetics with regard to the cabinet are determined by the quality of several factors which are mainly: material, interior features, doors filling. Analysis of the diagram indicates that that the designed wardrobe was aesthetic, what was affected by these factors. If a client determines his product design to be functional, the main attention must be paid to its depth, which largely facilitates the free distribution of clothes, as well as pieces of equipment, so that all the stuff can be easily put inside the cabinet. Durability is related to material as well as elements of driving in the door as in the case of sliding doors. Following the above analysis it can be concluded, that matrix data analysis, despite its destiny, is an insufficient source of information for the company, so in order to fully identify customer requirements and links all of the factors the company introduced the QFD method.

The main tool used in implementing QFD method is the Quality House diagram shown in figure 5. There was applied a scale of importance: 1 ÷ 5, where 1 means the least important, and 5 – the most important. Figure 5 includes also symbols:

- – means high importance of the factor (9),
- ∅ – means medium importance of the factor (4),
- * - means low importance of the factor (1).

Figure 5. The Quality House diagram for the analysed product – wooden cabinet.



Source: own elaboration.

Diagram QFD includes in its structure a number of specifically defined fields, the amount of which depends on the nature and tax complexity and the objective to be achieved. In this case, these analysed fields are following:

1. Customers' requirement.
2. The requirements' validity in accordance to customers.
3. Technical parameters of the product.

4. The relationship between customers' requirements and technical parameters.
5. Evaluation of the validity of the technical parameters.
6. Dependencies between technical parameters.
7. Comparison of the product with their own products competing companies.
8. Engineering assessment.
9. Coefficient of execution technical difficulty.

The matrix field (Fig. 5) presents that experience and years of customers' observations show that many of them give the greatest attention to three basic order criteria that include: durability, functionality and aesthetics. However, each of these factors contains a number of other very important elements, which are important in the order implementation. Potential user of the wooden cabinet installation, during defining own expectations, often used to determine the order object as: "I would like to have a nice, roomy and durable wardrobe." For the designer such a term usually is a general, because in the course of the conversation the customer, after hearing the offer and possibilities, is able to precisely identify their needs. It is particularly necessary information for a designer in the product designing process. The main factors that are significant for the customer are: "stable", "functional" and "aesthetic" what are general terms, and therefore it is necessary to divide them into subgroups whose purpose is to identify the exact preferences of the buyer. There have been divided 3 subgroups of the mentioned general categories, e.g.: durability, functionality and aesthetics. Each subgroup is connected with some factors related to those 3 categories. Table 3 presents factors that affect the customers' satisfaction in the order realization.

Table 3. Factors that affect the customers' satisfaction in the order realization of the wooden cabinet.

Durability	Durability	Aesthetics
<ul style="list-style-type: none"> - Thickness of the plate - A kind of mirror - Elements of driving in the door - Type profiles - Mounting 	<ul style="list-style-type: none"> - Cabinet depth - Width of the cabinet - Height of the cabinet - The door filling - Elements of driving in the door - Number of shelves - The quantity of bars - Additional features - Finish 	<ul style="list-style-type: none"> - colour scheme - lighting - professional installation

Source: own elaboration.

In accordance to field describing the customers' requirements validity, not all features of the product indicated by the client have the same importance. Therefore, to in order to facilitate the analysed issues, there was incorporated a scale (1 ÷ 5), where 1 has low importance to the user, while 5 means that meaning is high. In the case of the durability, the buyer gives attention to 3 factors which are: driving elements of the door, profiles types and mounting type. The buyer, who appreciates above all the aesthetic, give the attention to colours of both the door and the interior.

In contrast to the factors affecting customers' satisfaction, product technical parameters (field 3) are closely related to the individual designer. They must be chosen in such a manner as precisely as possible to reflect the requirements of the buyers (customer). Product technical parameters applied in the Quality House are essential components used by the designer at the design stage and then the contract. These parameters are divided into 3 groups: exploitation measures, the range of the products, technical details (parameters). The most important factor are technical parameters of the project's compliance with the performance of the finished product. The task of designer is to control and monitor the various phases of design and production. Other important technical parameters are the driving elements of the sliding door, as well as guides. The analysed company applies modern technology, offers its customers the highest quality products, made from the best quality materials. All the above mentioned specifications have a major impact on the overall character of the product and are the basis of the designer's work.

The relationship between the technical parameters and customer's requirements (field 4) are particularly important part of the Quality House construction. In the present case, the grading scale was applied in order to determine analysed dependencies: ● - high (9); Ø - moderate (4), * - low (1). The analysis of technical parameters and factors affecting customer satisfaction clearly show correlations between almost every single element of customer's satisfaction and technical parameter (subgroup called exploitation measures) – a compliance with the project. It can be confirmed, that mentioned element has in many cases a strong impact on the preferences of buyers, because it is necessary and practically the most important factor used in the design phase and determining the needs of the recipient of the contract. In many cases, there are no interactions, so part of the field is empty. High values of correlations also occur in the case of technical parameters such as: number of shelves and optional accessories. It should, however, be noted, interestingly, that these other factors are very closely linked to the project and its compliance.

After examining the relationship between technical parameters and factors affecting customer satisfaction, the assessment of the above items was applied (field 5). In the present case, the validity of product technical parameters

was identified as the sum of the validity coefficients for the following requirements and rates in relation to the relevant technical parameter which is expressed in the formula:

$$T_j = \sum_{i=1}^I * W_i * Z_{ij} \quad (2)$$

After substituting the appropriate numerical values into the formula it was obtain following result:

$$T_j = \sum_{i=1}^i * 27 + 20 + 45 + 45 + 48 + 48 + 45 + 20 + 36 + 36 + 27 + 5 + 45 + 4 = 376$$

The value 376 is the sum of the technical parameter validity called the compliance with the project and elements of factors affecting customer satisfaction. Similar numerical calculations take place at each successive factor of the technical parameter. After all the calculations and the conclusion, it can be stated, that the most important technical parameter is undoubtedly the compliance with the project, which practically has been proved in field 5 as the largest number of mutual technical parameters to customers' requirements. High values have been also gained by factors from a subgroup of technical parameters and exploitation measures.

In many cases, technical parameters of the product interact with each other, which often affects the ability to meet customer demand. After analysing the relationships of technical parameters (field 6), it is concluded, that if the higher the numerical value can be obtained, it the optimization of the design process development is not required, what is justified by frequent high coefficients of relationships technical parameters that is reflected in a well-organized labour team of the company.

Before a decision on the wooden cabinet purchase, the potential buyer usually compares it with products of competitors in terms of price, the offer and quality. The right side of the Quality House is a comparison of the analysed company with the products of companies competing within the furniture industry. All elements of the factors of customer satisfaction are also the basis for the evaluation of each company. Adopted grading scale (1 ÷ 5) is the determinant of a company's position in the overall comparison. The analysed company has been assessed on the highest position with regard to competitors in the furniture industry.

After performing all activities related to the QFD diagram and analysed all the previous fields, the designer gets full and clear picture of the designed prod-

uct with all its elements. Customer expectations, competitive products and the ways in which technical parameters influence the fulfilment of defined expectations help to subsequent implementation of the production process. Conclusion, which result from the examination clearly shows that, the analysed company stands out from its rivals.

5. CONCLUSION

The aim of the study was to present QFD method on the example of a company dealing with the manufacturing of the furniture. Continuous improvement of quality materials, richer range of services and increasing the number of promotional offers manufacturers tend to reach for more new tools for attracting customers, as well as the instruments used in the production processes. However, before the product is released to the market, it must pass the most important phase – design process what affects the final quality level.

Owing to QFD method all product technical parameters necessary to accomplish design process can be identified. The construction of the Quality House and its elements and relationships are becoming very important, as well as valuable information for designers who are responsible for the shape and appearance of the products.

Sažetak:

UTVRĐIVANJE VRIJEDNOTI PROIZVODA DRVENOG NAMJEŠTAJA PRIMJENOM QFD METODE

Uporište za ispitivanja vrijednosti proizvoda utemeljeno je na evaluaciji razine zadovoljstva korisnika i njegovih očekivanja, potreba i zahtjeva za proizvod, kao i tumačenja rezultata u kontekstu karakteristika određenog proizvoda. Poznavanje karakteristika proizvoda važno je sa stajališta poznavanja karakteristika od strane korisnika i evaluacije koja se temelji na mjernim tehnikama vrijednosti, što omogućuje poboljšavanje proizvoda u skladu s potrebama tržišta i dobivanje konkurentske prednosti. Članak donosi faze razvoja proizvodnje drvenog namještaja na temelju izabranih metoda upravljanja kvalitetom, koje omogućuje prepoznavanje i utvrđivanje vrijednosti proizvoda u okviru pristupa „Vrijednost Inženjeringa“. Kao rezultat istraživanja, predlaže se vodič za proizvod na temelju usporedbe nekih karakteristika proizvoda s drugim proizvodima.

Ključne riječi: proizvodi drvenog namještaja, QFD metoda, tehnički parametri

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A PRODUCT DESIGN BASED ON MODELLED CUSTOMERS' NEEDS

DIZAJN PROIZVODA NA TEMELJU POTREBA KORISNIKA

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ABSTRACT

As is generally known, quality of a product is basically defined by what customers want. It is their desires and needs that are reflected in product design. Such a design is the one that has the potential to fulfill what quality is by its own most general definition. The question then is what the needs and desires are, especially when there is no answer to this question because the product has not yet been produced. Different models exist that may describe the needs and desires of customers, and the objective of this paper is to discuss one of these model and explore, based on empirical data, its precision.

Key words: quality, product design, customer needs, model.

1. INTRODUCTION

It is absolutely necessary for profit and non-profit organizations to know what their customers want if they are to achieve their vision, mission and objectives. This fact has been reflected for decades in many documents of different kind that had defined for at least a limited period of time how quality

should be perceived. In this context, the internationally valid ISO norms may serve as a typical example. Other examples would include the EFQM model of excellence and industry-specific and more rigorous standards, such as VDA from the German automotive industry. The extent to which inherent product characteristics are fulfilled, which is loosely the definition of the term quality, is related directly to customer, after all, since it is the customer whose needs and desires are to be met by product distinctive features. The question then arises how one should find out whether customers like or dislike a product, and so whether the product has appropriate quality or not. Of course, the easiest way to make this revelation is to run a poll, for instance, and using a properly prepared questionnaire, customers perceptions and expectations can be captured. This would be typically done when an existing product is to be improved. However, this is a reasonable procedure only when there already is a product the quality of which is being assessed through what customers want. But what if we are interested in making a product that would appeal to customers, but this product is yet to be designed, it has not been produced, and so it cannot be a subject of customers' praise or criticism at the moment. What such a product should look like? It is possible to answer this question provided that proper analytical steps are taken, and this is the objective of this paper. The aim is to present procedures and approaches that represent a model of what product customers might want and like, the model reflecting customers' preferences that are related to individual product features, such as color, price or size, and which exist regardless of whether the product has or has not been produced. Obviously, since a model is involved in the analysis of customers, it is a question to what extent the model is precise, and how to measure this precision. These question together with answers are the subject of this paper.

2. PRODUCT EVALUATION MODEL

Each customer knows if he or she prefers black to red, a round shape to a pointed one, low price to higher price and so on. They are, however, usually unable to give precise details of what product perfectly meets their desires as a whole until they see one. On the other hand, organizations cannot provide customers with such a product, because they don't know what product customers exactly want because customers are unable to tell them this. This sounds like a vicious circle with no way out, yet a possible solution exists to this problem. What might be done is an evaluation of various product configurations designed on the basis of customers general preferences, such as the ones suggested at the beginning of this section. The product configuration the value

of which would be the highest by an evaluation model might then be considered to be the one with the right customer-oriented setting. In order to perform the evaluation, an evaluation model must be available, and for the model to be justified, the precision of the model must be judged, of course. In other words, it must be determined whether the model truly or well enough reflects the product configuration that customers really want to see. To do so, a model must be formulated, and its validity must be checked, using empirical data, if possible. In this section, such a model is presented and described. It is a model known from the theory of multicriteria decision-making, which calculates the overall value of a product configuration, taking into account how important different product features are to the customer¹. These features make up the configuration. The model works with a set of weights, with each weight reflecting the importance of a given product feature. The overall evaluation H , given by customer's preferences, of a product configuration c is of the form:

$$H(c) = a_1w_1 + a_2w_2 + \dots + a_kw_k, \quad (1)$$

where a_i is the i -th product feature level, expressed by a number, and w_i is its weight or importance, as perceived by the customer. Since a_i 's are nonnegative numbers from interval $[0, 1]$ and w_i 's are nonnegative numbers from interval $[0, 1]$, expression (1) is the weighted - average product level. The product feature levels are offered by the producer, given its production capabilities and limitations, whereas the weights must be provided by customers because the weights reflect customers' preferences. Price, quantitatively - coded color, display resolution, car petrol consumption or motor power are but a few examples of what can mean. Its quantification is usually such that the a_i 's are handled on a single scale without any physical units, so that mathematical operations of various kinds can be performed on them. Also, the scale is selected in such a way that the higher the a_i , the better the product with respect to its i -th feature. To calculate the weights, many methods were suggested in the literature, including the well - known Saaty's approach to quantifying weights, based on observed customers' preferences^{2,3}. We shall not encumber the reader with technical details that can be found in the referenced literature, the emphasis is placed here on the fundamental ideas of the presen-

¹ Alessio Ishizaka and Philippe Nemery, *Multi-criteria Decision Analysis: Methods and Software*, John Wiley and Sons, West Sussex, United Kingdom, 2013.

² Eng U. Choo, Bertram Schoner, and William C. Wedley, "Interpretation of criteria weights in multicriteria decision making," *Computer & Industrial Engineering*, Vol. 37, No. 3, Tarrytown, NY, 1999.

³ Thomas L. Saaty, *Decision Making for Leaders: The Analytic Hierarchy Process for Decisions in a Complex World*, RWS Publications, Pittsburgh, Pennsylvania, 2008.

ted approach. Given that the possibility of diverse product configurations is assumed, diverse settings of the features 's can be assumed here. In that case, (1) can be rewritten to

$$H(c_i) = a_{i1}w_1 + a_{i2}w_2 + \dots + a_{ik}w_k, \quad i = 1, 2, \dots, n \quad (2)$$

to reflect the diversity. Here, a_{ij} is the level of the j -th feature for the i -th product configuration, and (2) measures the overall value of the i -th product configuration. The proper configuration can then be considered to be the one with the highest overall value, i.e. the one with the value $\max_{1 \leq i \leq n} H(c_i)$.

3. MODEL PRECISION

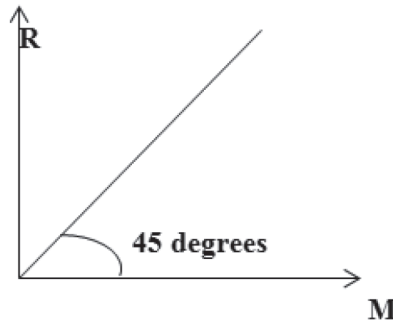
The question now is how precise the model is. In other words, if different configurations were evaluated and ranked by their value from best to worst, or from highest to lowest, would these ranks based on a model correspond well to true ranks defined or provided by customers? If a product configuration was the best because of its highest value, would this configuration also be the best to the customer? The same question may be asked for the remaining configurations, as well: is the second-ranked configuration, as determined by the model, the second best to the customer, for instance? To answer the question, a poll should be run to understand customers' preferences and to calculate their individual weights assigned to different product features, so that (2) can be evaluated. Also, each polled respondent should rank the different configurations from best to worst as he or she sees it without any relation to any model. The configuration ranks resulting from (2) and their real ranks resulting from the poll can then undergo a comparative analysis. To do the analysis, various statistical techniques can be employed, since the data originated from the poll, i.e. from a data sample drawn randomly from a hypothetical population of customers. The modelled rank (M) can be regarded a variable taking on values from the set and the same is true for the true or real rank (R).

Having these findings, we can form pairs representing points in a plane, and we may search for a regression curve which would describe the relation between what is modelled and what is real, or between the modelled rank and the real rank. Various regression criteria exist that can be used to select a proper regression curve, such as the coefficient of determination or its adjusted version, Akaike's information criterion or prediction – based criteria⁴. When a

⁴ William H. Greene, *Econometric Analysis*, Prentice Hall, USA, 2011.

proper regression curve is selected, the amount of precision of (2) can be determined statistically. If the model worked perfectly, the modelled ranks would equal the real ranks, and so the points, formed from a poll of customers from the entire hypothetical population of customers, would represent a line running through the plane at an angle of forty – five degrees (Fig. 1).

Figure 1. Relation between reality and a perfect model – straight line



Source: Made by author.

To find out whether the model is perfect, at least on average, i.e. whether the average real rank equals the modelled rank, hypothesis testing as a statistical technique can be exploited. Assuming that the sample regression curve is a line, although not necessarily the one from Fig. 1, and it is an estimate of the population regression line, the technique would test the hypothesis If the hypothesis was accepted, the model would be, on average, perfect. In the opposite case, it would not be perfect. This test can be carried out as part of the procedures known as testing restrictions in a regression model⁵.

It can be expected that the hypothesis will not be accepted, and in that case, one may argue whether using the model has any meaning at all, since it doesn't give the result it should, not even on average. This, however, doesn't mean the model is useless, as it can still be the case that in many instances, and may be even in a majority of instances, it will give the result it should. This can also be tested statistically, and to keep things simple, we shall focus on what is modelled as best because this will usually be of greatest interest, naturally. Thus, the question is: whatever is modelled with rank 1, is it ranked in reality by most customers as one, as well? To find it out, it is necessary to realize that in the hypothetical population of real ranks created for what is ranked highest

⁵ Ibid.

by the model, there is a proportion p of real best ranks (of ranks one). This population statistically represents a conditional distribution of real ranks, conditioned on the modelled rank being equal to one (being best). Our data sample of real ranks corresponding to modelled rank 1 is a random drawing from this population. Each of the drawings is a drawing from a binomial distribution with the probability of drawing one (with the probability that the real rank is one) being p . Therefore, within the framework of testing parameters of a probability distribution, we can test, for instance, the hypothesis $H_0: p \leq 0.5$, where p is a specified value greater than 0.5. If the hypothesis is accepted, it can be concluded that whatever product configuration is most preferred by the model, it will really be the best for most of the customers! Again, standard statistical tests valid for both small and large samples exist that can validate or reject the hypothesis (we test the parameter of a binomial distribution)⁶. Thus, through proper application of statistical methods, it can be concluded whether the model works exactly, on average, in the specified market segment defined by the modelled rank, and if not, whether it works at least in most individual cases.

$$\frac{\sum_{i=1}^5 i \cdot n_i}{\sum_{i=1}^5 n_i} < 1.5 \quad (3)$$

Then

$$n_1 + \sum_{i=2}^5 i \cdot n_i < 1.5n_1 + 1.5 \sum_{i=2}^5 n_i \quad (4)$$

$$0.5n_1 > \sum_{i=2}^5 i \cdot n_i - 1.5 \sum_{i=2}^5 n_i \geq 0.5 \sum_{i=2}^5 n_i, \quad (5)$$

and so

$$\frac{n_1}{\sum_{i=2}^5 n_i} > 1. \quad (6)$$

Yet another possibility of finding out whether the model is correct in most cases, if not in all cases, is through a confidence interval constructed for \bar{R} , and particularly for the case $M = 1$, i.e. for the expression $\beta_0 + \beta_1$. This would be a interval for the average *real* rank in the population of customers for which the *modelled* rank is one. If the upper bound of the interval turns out to be lower than 1.5, then in the population of *real* ranks, corresponding to the customers for which the modelled rank is one, a *majority* of real ranks equals one.

⁶ Robert S. Witte and John S. Witte, *Statistics*, Wiley, Hoboken, New Jersey, 2013.

This would imply the model works correctly in most cases. To see this, let us consider the population of real ranks where the symbol n_1 denotes the number of ones in that population, n_2 denotes the number of twos, ..., n_5 denotes the number of fives in that population. Let the population average is smaller than 1.5, i.e. In other words, the number of ones is higher than the number of all other real ranks together.

4. CONCLUSION

In this paper, a model that evaluates products was introduced, and proper statistical tools were presented that have the potential to assess, based on empirical data, to what extent, and if at all, the model can be used to reflect customers' desires. Since knowing these needs is a fundamental step on the way to achieving supreme quality, the approach is of high practical value, and may be exploited to fine-tune the final image of a product. The evaluation model takes into account all major product features and their importance, as perceived by customers, whereas the statistical tool involve hypothesis testing of market proportions for which the evaluation model works well, and also confidence intervals.

5. ACKNOWLEDGEMENT

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Sažetak:

DIZAJN PROIZVODA NA TEMELJU POTREBA KORISNIKA

Kao što je opće poznato, kvaliteta proizvoda temelji se na željama korisnika. To su njihove želje i potrebe koje se manifestiraju na dizajn proizvoda. Takav dizajn ima potencijal ispunjenja zahtjeva opće definicije kvalitete. Pitanje je što su potrebe i želje, osobito kad nema odgovora na ovo pitanje jer proizvod još nije proizveden. Postoje različiti modeli kojima se mogu objasniti potrebe i želje korisnika i cilj je ovog rada prezentirati jedan od ovih modela i istražiti, na temelju iskustvenih podataka.

Ključne riječi: kvaliteta, dizajn proizvoda, potrebe korisnika, model.

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THE QUANTIFICATION OF THE QUALITY PROBLEMS IDENTIFIED IN THE CONSTRUCTION PRODUCTS STORAGE PROCESS

KVANTIFIKACIJA PROBLEMA KVALITETE UTVRĐENIH
U PROCESU SKLADIŠTENJA GRAĐEVINSKIH PROIZVODA

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ABSTRACT

The paper discusses the problem of destructive factors that influence on the stored construction materials' quality. The construction area is very comprehensive and that's why the study focuses on important phenomena affecting the quality of the construction products, which is important for investors and contractors in the construction investment. The aim of the study is identification of the determinants of the construction products storage process. Authors used tools of the product quality management pointing to a specific type of issues causing quality problems. The final result of the work is a graphical presentation of the problem of destruction of building materials using appropriate tools of quality management.

Key words: quality, construction materials, Ishikawa diagram, Pareto-Lorenz diagram.

1. INTRODUCTION

The construction product is identified as a movable thing, regardless of its processing degree, generated for the use in a permanent manner in the construction object, marketed as a single product or as a set of products for the use in a combination as an integral whole utility and having an impact on the fulfilment of the basic requirements that concerns: the construction safety, the fire safety, hygiene conditions and health and environmental protection, protection against noise and vibration, energy savings and proper thermal insulation of partitions.¹

The manufacturer may introduce the construction product on the market if the product is suitable for the use in the building works, to the extent of its properties and purpose. A construction product is suitable for use in building works, if it is:²

1. CE-marked, what means that the evaluation of its compliance with a harmonized standard or a European technical approval or a national technical specification of a European Union Member State or the European Economic Area, recognized by the European Commission with the consent of the essential requirements, or
2. Placed in the specified by the European Commission list of products having little relevance to health and safety, for which the manufacturer has issued a declaration of conformity with the recognized rules of the trade.

The CE marking of the construction product which does not pose a specific threat to the health or safety and it is not responsible or partly responsible technical specifications referred to the point 1, it is also acceptable, but only after an appropriate conformity assessment. Consequently, it must be stated that the construction product can be marketed if it has been marked with the CE mark construction or has been placed on the list of the construction products with little importance to the health and the safety. The manufacturer can mark a construction product with CE if the product has been assessed with regard to its compliance.

¹ E. Szymański, *The construction materials*, part I, Warszawa, 2003, pp. 8 (in Polish).

² *Ibid.*, pp. 9 (in Polish).

2. QUALITY CHARACTERISTICS OF THE CONSTRUCTION MATERIALS

In the construction industry there is a wide range of materials. These materials, so that they can properly provide its functions during the building lifetime, they must be characterized by certain properties, that are called technical features.

In the construction, there are not only materials whose technical characteristics are well known for a long time, but there are also new materials whose properties are not identified. The construction cannot use materials that shorten the construction object lifetime, but they should have sufficient strength, and in addition they should be characterized by technical characteristics that would ensure the sustainability of the required strength characteristics during the entire period of the products operation.

Building materials cannot cause harm to human health. Based on the knowledge of the material characteristics it can be predicted, how it will behave in a variety of weather conditions or fire. Using a ceramic bricks of inappropriate quality in the wall construction can cause the walls of the lesions arising. In addition, increasing the degree of moisture of the material changes its thermal properties.³ Therefore, the construction materials in terms of their composition and physico-chemical characteristics enter all fields of physics, inorganic and organic chemistry.

Various types of materials have different characteristics.⁴ Technical features of the materials can be divided into three main groups: physical characteristics, mechanical properties, chemical characteristics. The first set of features includes indications concerning the physical characteristics of the plastic and mark characterizing the influence of temperature and water on the material. It should be mentioned here such indications such as: density, bulk density, porosity, leaks, humidity, water absorption, hygroscopic, frost resistance, fire resistance, flammability. In addition, this group of the products includes product indication that concern: sound insulation, bonding time, ductility, resistance to change colour when it is exposed to sunlight, shrinkage, swelling and others. The mechanical properties of the construction materials are related to the strength of the material against all kinds of external forces. The mechanical properties decisive for the technical value of the material include:⁵ compressive strength, tensile and flexural strength, resistance

³ W. Żenczykowski, 1992, *The construction*, part 1, Arkady, Warszawa, pp. 17-18, (in Polish).

⁴ Jan Mizera, *The construction materials*, Opole, 1995, pp. 15 (in Polish).

⁵ E. Szymański, *The construction materials*, part I, Warszawa, 2003, pp. 26 (in Polish).

to freezing, hardness, elasticity, brittleness, friability. Building materials are usually mixtures of various substances, which are chemical compounds. Under certain conditions they are involved in chemical reactions that may lead to changes in the technical properties of the material, or even destroy it. The technology works apply chemical reactions, which result in the transformation of one substance in another, preferred from the view point of the structure, trim or stability of the building (e.g. the process of setting and hardening of concrete, mortar, some synthetic resins, sealants, paints, etc). On the other hand, the chemical compounds contained in the construction materials are in a contact with the air and a water, as well as many substances during use of the building, which results in chemical processes take place which are destructive.⁶ The group of chemical characteristics should include: the corrosion resistant plastic, the chemical qualitative and the quantitative composition of the oxide.

Every construction object consists of building materials that constitute the construction and finishing elements. The selection of appropriate materials affects the following factors in the construction object: the structural strength, durability and aesthetic. Understanding the basic technical characteristics of building materials is very important in their selection for a particular purpose.⁷ An appropriate construction material is the product that meet requirements of the construction works regulations and operation conditions. Accordingly, the materials used in construction must have an appropriate destination for the technical characteristics. These properties include mechanical strength of the material, which guarantees resistance and stability of buildings, as well as the properties of providing weather ability, chemical, suitable thermal properties, acoustic, sorption, fire-resistant, as well as hygiene and health.

The construction products are required to be hygienic and have no harmful impact on the health of building users (the absence of radioactive elements, emission of toxic substances, electrification and electric fields). Each building material has its characteristic properties that determine its usefulness, the use of the building. These properties can now increasingly influenced and shape them by affecting the material composition, its structure by an appropriate technologies and techniques applying. Today there is an ability to obtain products with desired characteristics, corresponding to the particular requirements of the object.⁸

⁶ Z. Wolski, *The outline of the construction materials*, Warszawa, 1994, pp. 29 (in Polish).

⁷ S. Lewowicki, *The outline of the construction materials technology*, Częstochowa, 2000, pp. 6 (in Polish).

⁸ E. Osiecka, *The construction materials*, Warszawa, 2002, pp. 33 (in Polish).

The behaviour of the construction materials is understood as the way in which they can respond to the loads imposed on the performance of its functions in the building. The construction objects must be designed and constructed in such a way that the loadings that are liable to act on it during its constructions and use will not lead to destroy all or part of the building and major deformations to an inadmissible degree.

Construction products should have the properties that the construction objects properly designed and built, which will be applied to, would meet basic construction requirements.⁹ Whereas various kinds of factors affecting the materials in the buildings, there are three main groups of properties of construction products:¹⁰

1. the physical properties that can be used to describe the material under the influence of load of the physical type such as humidity or heat, and others,
2. mechanical properties in which the strength of the material opposed to the stresses arising as a result of external forces (construction load, temperature effects, etc),
3. chemical properties characterizing materials subject to action loads of chemical type, are due to the chemical composition and mineral materials, determine their chemical resistance (acid resistance).

2.1. Durability of the construction materials

The material properties are indicative of the construction of its durability. Durability of materials is unquestionable impact on the durability of buildings, which of course also depends on the design solution, proper execution, the conditions of operation of the facility.¹¹

Enhanced requirements on the materials durability that are faced by construction materials primarily caused the need for materials with increased resistance to breaking. The strength of each structure can be said that it is appropriately chosen function of the properties of used materials, the construction and design, as well as the environmental impact on buildings. In addition, there should also selected the way of the building exploitation and maintenance. Both designers and contractors find themselves faced with very considerable difficulties in choosing appropriate materials relevant to the specific application. Mismatched materials, improper operation, improper workmanship, poor design solutions and others, it is they affected and cause destruc-

⁹ E. Szymański, *The construction materials*, part I, Warszawa, 2003, pp. 8 (in Polish).

¹⁰ E. Osiecka, *The construction materials*, Warszawa, 2002, pp. 36 (in Polish).

¹¹ E. Osiecka, *The construction materials*, Warszawa, 2002, pp. 38 (in Polish).

tion of the earlier buildings, and already in the worst case of life-threatening building catastrophes. Disregarding of all the factors degrading or inappropriate environment impact assessment in the design can be an example of underestimating the problems of durability.

The construction products are affected by many destructive factors such as: water, temperature that directly impact on the construction works and cause a change in its performance. Gradual implementation of these changes is dependent on the article, which consists of building object. The influence of harmful actions may be: moisture, the formation of deformation that may adversely affect the quality. Depending on the nature of the construction work it can be affected by various damaging factors that can be associated with the product manufacturing process or its quality (improperly mixed components). Internal factors related to the physic-chemical interactions of the material and its components with each other, thereby cause changes in the composition of the mineral materials. The source of origin of these factors include properties of some products and materials (e.g. the ability to release or draw heat from the environment, secretion and absorption of moisture, gases and vapours).¹² Irreversible and progressive reduction of the technical and aesthetic properties of the construction product, and consequently the final degradation of the material is referred to the corrosion of construction material, which causes a huge loss. Ensuring the sustainability of the construction works is now becoming one of the basic problems of construction and expressed higher requirements for the building materials.

2.2. Storage conditions of the construction materials

The properties of the warehouse for the storage of the construction material are determined by the sensitivity of the material on the external conditions, what determines division of the construction materials into the following groups: ¹³

- a) materials insensitive to precipitation, temperature fluctuations and humidity, the operation of the sun, pollution, mechanical damage, proximity to other materials,
- b) materials insensitive to only one or some of the factors enumerated in point a) and the other insensitive,
- c) materials insensitive to all the factors enumerated in point a),
- d) materials that require constant and strict maintenance of certain

¹² A. Korzeniowski, M. Bigońska, and J. Karczewsk, *Storage conditions of the warehouses*, PWE, 1978, pp. 23 (in Polish).

¹³ T. Raabe and R. Rejs, *Storage of raw materials*, Warszawa, 1973, pp. 15-16 (in Polish).

conditions, primarily temperature, humidity and light or methodological change them.

Group of resistant materials, which are insensitive to any harmful factors, is usually stored in the open warehouses. They are usually of considerable dimensions due to the storage of bulk materials, and so all kinds of aggregates, ceiling and wall products. Maintenance of the full value of the usable materials is strongly affected by external factors such as: humidity room temperature, ventilation, lighting and heating. Typical maintenance of the stored materials should include: ventilation, drying, removal of dust, lubrication, pouring, activities designed to protect the product against corrosion, prevent the action of microorganisms. In addition to the general rules for all materials and its storing, there here are specific provisions storage of various materials.¹⁴ Different types of materials should be stored in warehouses open as follows:

- the construction and road aggregates, that include gravel or sand, are stored in a specially adapted for this purpose heaps. An indispensable condition for storage is to prevent contamination of aggregates (garbage, rubble, clay, soil, etc.) and pulling contaminated water from the subsoil. In the case of storage fractionated aggregates it is necessary to accurately separate the landfill so that the various fractions have not undergone accidentally mixed up;¹⁵
- ceramic roof tiles should be stored under cover, but can also be stored in open spaces. Tiles are set on the long edge of pairs of oppositely arranged hooks. During short-term storage tiles can be stored in the open air;¹⁶
- the wall hollow and ceiling are placed on the storage yard holes up in layers in the stacks (hollow slabs to 4 layers in the stack, and wall in 4-10 layers);¹⁷
- brick products are usually shipped on pallets, wrapped with belts or pursuers that prevent products damage. Sand-lime bricks and blocks of gas concrete should be protected by covering or foil;
- reinforced concrete prefabricated elements should be placed in such positions, which will work in what will be built into the structure of

¹⁴ W. Martinek and Z. Michnowski, *Roofing and Roofers Building*, Warszawa, 1999, pp. 74 (in Polish).

¹⁵ E. Szymański, *Construction materials sciences and concrete technology*, Warszawa, 2002, pp. 37 (in Polish).

¹⁶ W. Martinek and Z. Michnowski, *Roofing and Roofers Building*, Warszawa, 1999, pp. 74 (in Polish).

¹⁷ T. Maj, *The construction organization*, Warszawa, 2007., pp. 94 (in Polish).

- a building. Wall panels placed vertically in special compartments of steel buffer stops or slightly slanted trestle. Slabs are placed horizontally on supports and spacers, located in the zone of the support plates,
- rods, steel sections are stored in a specially adapted for this purpose stands. They are adapted to the shape, dimensions and weight of devices intended for storage. For storing large quantities of long rolled products are used in racks bar charts;
 - polystyrene foam is a material that can be stored in the warehouse open, but it is not required. It is resistant to weather conditions in the form of rain, but must be protected from strong winds. It should be ensured that the single sheets of polystyrene were covered. This material should be stored on pallets in order to maintain the aesthetic appearance.

The open warehouses shouldn't be arranged for a confined space, but not touching areas with other at least three sides. Certain products and building materials should be stored in warehouses obscured from sunlight or precipitation, but without providing specific humidity and temperature. Such materials are stored in half-open warehouses. These warehouses are equipped only with a roof support on poles without walls, possibly with a curtain wall. Sleeves of this type are storage sheds, cover sheet or plastics. Examples of the construction materials that can be stored in warehouses half-open are described below:

- roofing tar and asphalt boards can be stored under a shelter in well-ventilated, dry, protected against the weather, especially against excessive sunlight and heat;
- the timber should be arranged on joists by size and layers to be adequate airflow. The material degraded, damaged should be removed and used to clean;
- peat, chipboard and reed boards should be stored in rooms protected from moisture, should be arranged in a horizontal position on supports or joists;

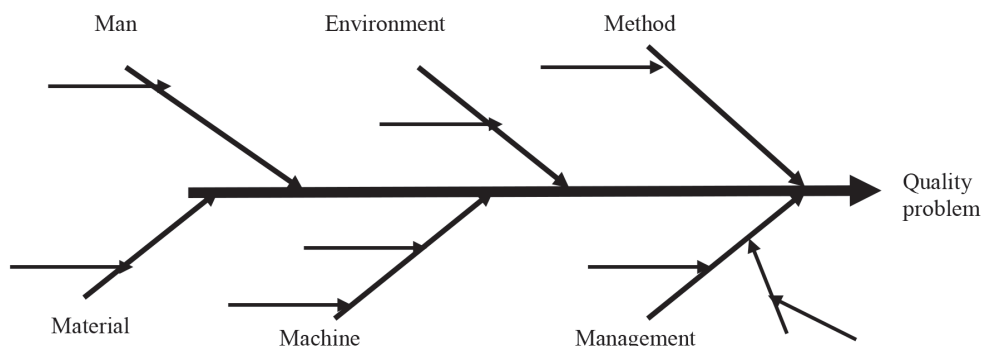
The third type of storage, where construction products can be stored are closed warehouse. These are objects completely enclosed, covered with a roof and equipped with floors, doors and windows. There are stored materials that require the complete separation of the prevailing weather conditions outside. A few of the many materials stored in warehouses closed are listed below: binders, mineral wool, plasterboards.

3. RESEARCH METHODOLOGY, RESEARCH RESULTS AND DISCUSSION

The quality is often referred to as a collective characteristics of the product, including marketing, design, implementation and maintenance, which means that the product meets the requirements and customer expectations. Quality is also the concept of absolute and relative terms, as it relates to both the service and the products themselves. Management tools are instruments to monitor and diagnose: design process, manufacturing process, inspection process, assembly process and other other activities carried out in the product life cycle. The paper describes only chosen quality management tools that include:

- a block diagram (Fig. 3), that is identified as a graphical diagram showing specific operations performed on the information signal while passing through parts of the system without engaging in the binding part of the system and any entry in the realization of these operations,
- Ishikawa diagram (Fig. 1) also known as cause-and-effect diagrams determining factors that cause the problem occurrence in different issues categories (e.g. 6M: man, machine, material, method, management, environmental),
- Pareto – Lorenz diagram that allows identifying the most important factors that determine the quality problem occurrence in accordance to 20/80 principle.

Fig. 1. The cause – effect diagram.

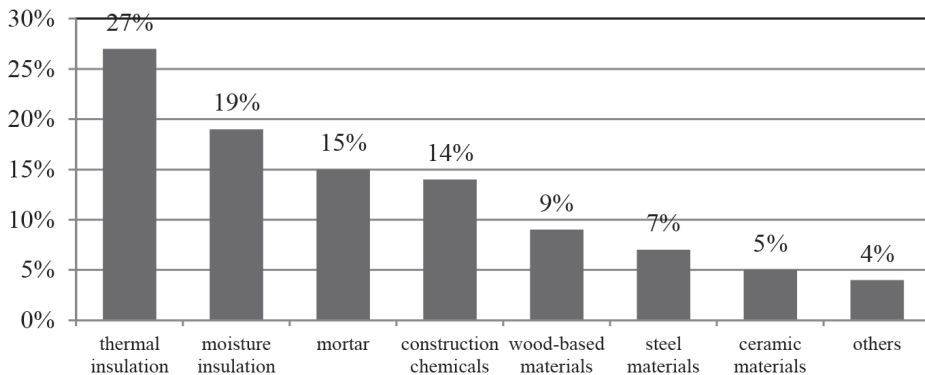


Source: Stanislaw Borkowski, The quality level measurement, Wydawnictwo Wyższej Szkoły Zarządzania i Marketingu, Sosnowiec, 2004, pp. 39 (in Polish).

The study object is the chosen enterprise dealing with the construction materials sale in Poland. The company was founded in 1974 as a little shop. Currently the usable manual area is a free-standing building, in which a lower part which is connected with the construction products sale and upper part that provides close warehouse for products insensitive to weather conditions. Behind the building there is usable field, which is ideal for storage of building materials. Storage space is paved, which facilitates the transport of goods by forklift truck, as well as loading and unloading.

Due to the varied customers' needs, tastes and different levels of individual customers' incomes, the company has established cooperation with manufacturers of goods from a group of the construction chemicals, specializing in the production: mix, mortar, cement, construction adhesives, etc. Besides mentioned assortment, the enterprise has also a wide assortment of other construction products: wood-based materials (e.g. chipboard), ceramic materials, products of cellular concrete, ceramic wall materials, building block products. A very large area of the square are covered by the moisture materials. Figure 2 shows the distribution of the construction materials in the trade by the company achieved in 2014.

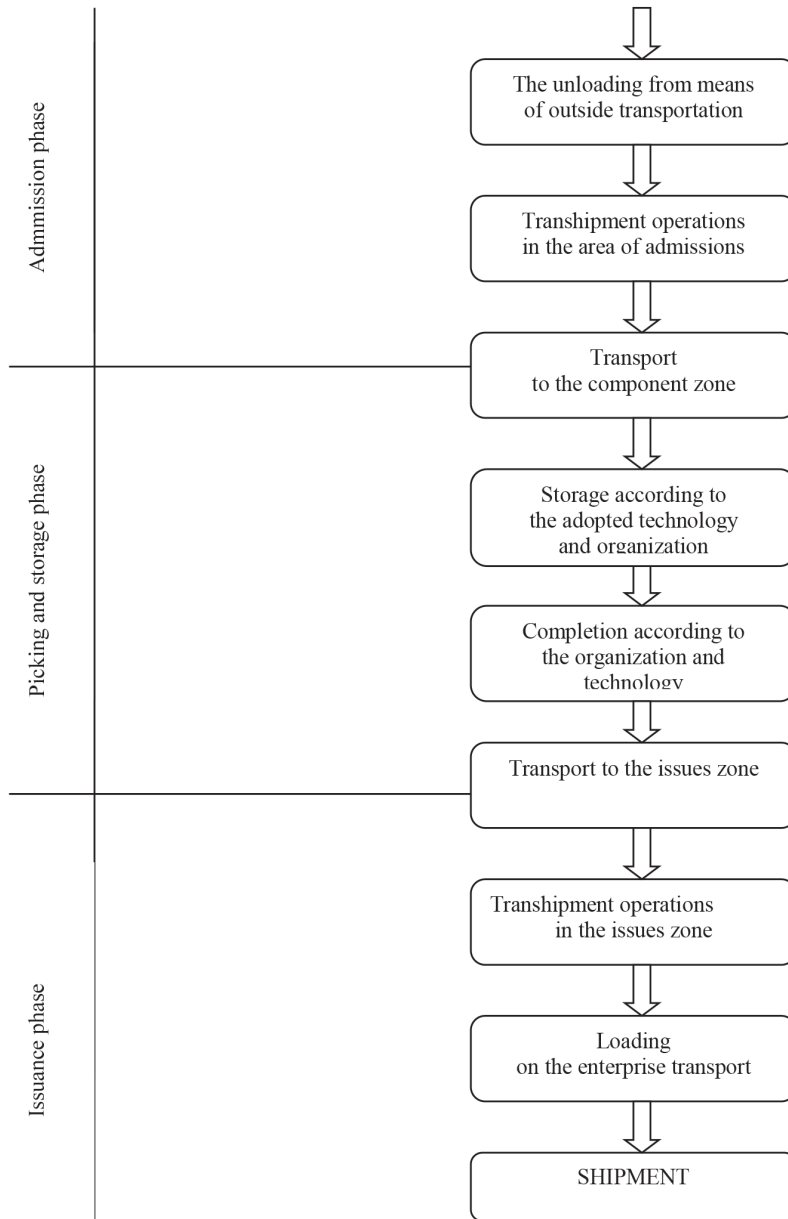
Fig. 2. The percentage of the construction materials sale for the analysed enterprises in 2014.



Source: own elaboration based on the materials of the chosen enterprises.

This part of a paper contains an analysis of the process conducted by the analyzed enterprise X and the research results based on the use of selected quality management tools. Figure 7 shows the manufacturing process of storage.

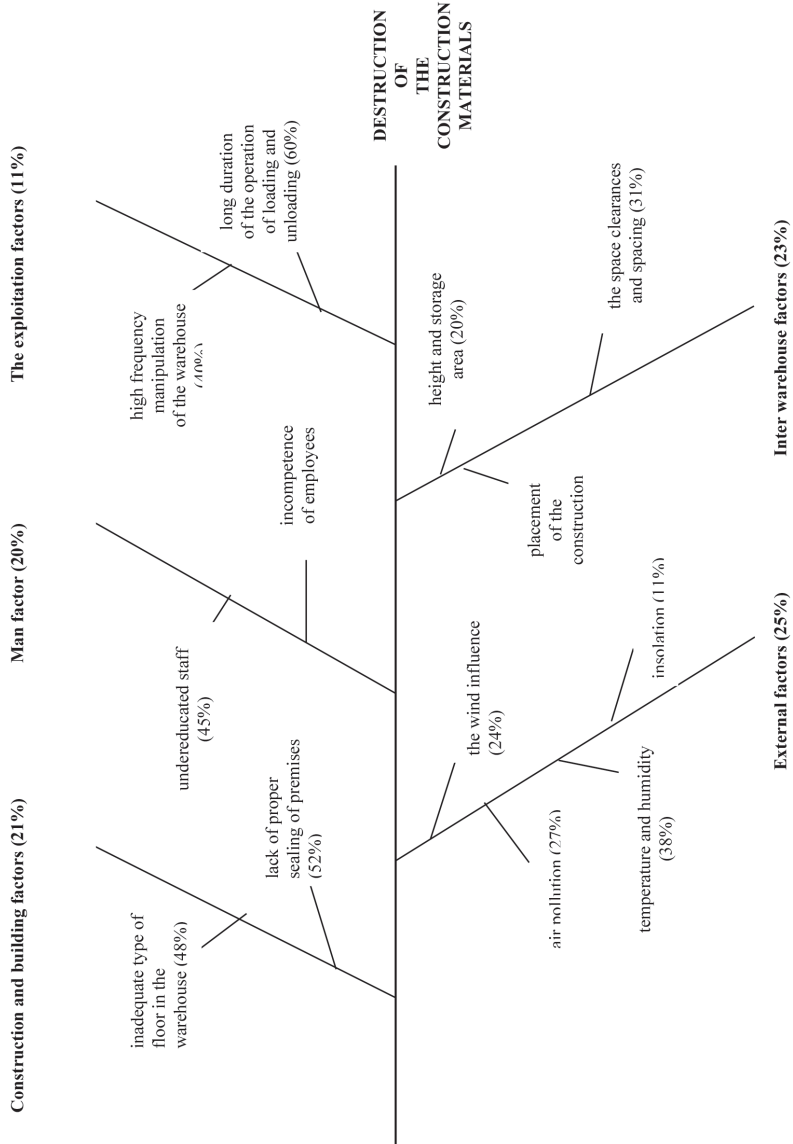
Fig. 3. Diagram of the technological frame storage system in the company X.



Source: own elaboration based on the materials of the chosen enterprises.

Receiving of the construction materials directly from manufacturers takes place in the zone of uploading, where supplies are directed taken with the lift truck use to the area of admissions.

Fig. 4. Ishikawa diagram for the identified problem in the construction materials storage process in the analyzed enterprise



Source: own elaboration.

In the area of admissions building materials are subjected to activities depending on the requirements of the technology (there is the control process associated with the appropriate amount of ordered goods, quality control or

products are not mechanically damaged during transport) and received and checked materials are transported in adequate storage space.

Figure 4 presents analysis of the quality problems identified in the construction materials storage process related to the destruction of building materials.

Figure 4 presents the Ishikawa diagram for the causes of the construction materials destruction, which occurred in the warehouse of building materials in the analysed company. Another quality management tool applied to present the problem of the construction materials destruction occurrence problem is Pareto-Lorenz diagram. It was used for analysis in the study period (2014), which revealed the following reasons for nonconformities in the analysed materials storage process: inadequate supervision (N1), lack of motivation (N2), inadequate handling forklift (N3), mechanical damage (N4), incorrect transport and storage (N5), inadequate material storage (N6), inadequate supervision (N7), inadequate supervision (N8), weather conditions (N9), reactions of other material components (N10). In order to analyse the problems relating to the destruction of the storage construction materials, identified storage process problems have been arranged in order of the occurrence frequency in the study period (2014).

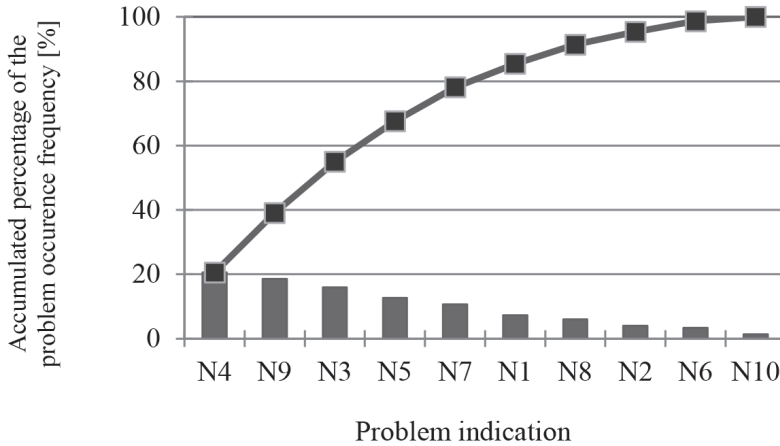
Table 1. The structure of the problem occurrence frequency in the analysed research period for the chosen enterprise dealing with the construction materials storage

Problem indication	The name of the problem	The problem occurrence frequency	Percentage problem indicator [%]	Accumulated percentage of the problem indicator [%]
N4	mechanical damage	31	20,53	20,53
N9	Weather conditions	28	18,54	39,07
N3	inadequate handling forklift	24	15,90	54,97
N5	incorrect transport and storage	19	12,58	67,55
N7	inadequate supervision	16	10,60	78,15
N1	inadequate supervision	11	7,29	85,44
N8	inadequate supervision	9	5,96	91,40
N2	lack of motivation	6	3,97	95,37
N6	inadequate material storage	5	3,31	98,68
N10	reactions of other material components	2	1,32	100
Total		151	100	

Source: own elaboration.

The percentage rate and the cumulative percentage of these problems are presented in Table 1 and Figure 5.

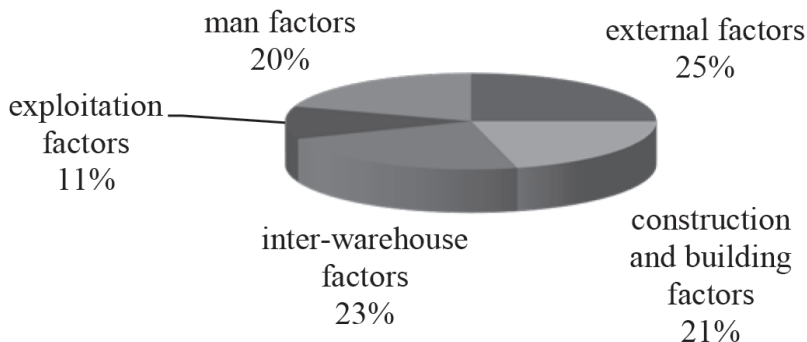
Fig. 5. Pareto-Lorenz diagram for the construction materials storage problems analysis.



Source: own elaboration.

Based on the data presented in a figure 5, it was stated, that 40% of the construction materials storage problems causes affects 67.55% effects occurrence related to the construction materials destruction. At the same time we can say that for 67.55% of all the problems occurring during the destruction of building materials correspond to 4 nonconformities identified in the storage process and the other 6 is responsible for 32.45% effects. In the analysed period, the causes responsible for the damages of the construction materials are following: mechanical damages, weather conditions, inadequate handling forklift and inappropriate transport and storage of building materials. The qualitative conditions of the construction materials storage are affected by climatic conditions. Base on the observations it can be stated, that the greatest losses of construction materials have a negative impact of the climate. Factors affecting the stored products can be divided into five main groups as it was shown in Figure 6.

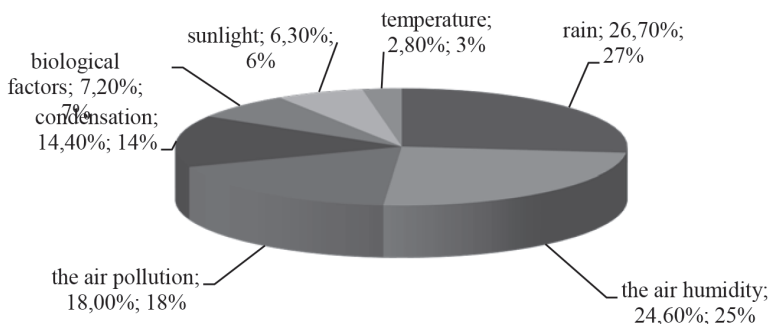
Fig. 6. Percentage of climatic factors destructive for the construction materials.



Source: own elaboration.

The reasons for the destruction of the construction materials related to the climate conditions include the following factors: the strength and intensity of the wind, all kinds of pollution, the intensity of sunlight and the amount of heat and humidity. In addition, there is an influence of the stored materials by its own properties.

Fig. 7. Percentage distribution of climatic factors.



Source: own elaboration.

There are also important to include: an effective hedge of warehouse as well as the frequency of its opening, movement materials and finally loading and unloading play an important role in the protection of the stored products. In practice, the share of destructive climatic factors has been shown in figure 7.

4. CONCLUSION

The paper is a compilation of information focusing on the built environment. The main objective of the work is to present how the building materials are subject to destruction. For the analysis of the problem of materials destruction there were used quality management tools in the form of cause-and-effect diagram (Ishikawa diagram) and Pareto-Lorenz diagram.

Analysis of collected data allowed for a summary of factors that determine the quality of building materials. Research suggests that climatic conditions of storage have a significant impact on the construction products degradation. Its intervention is not less than technological factors (e.g. improper operation of the transportation means in the warehouse or negative human intervention in assigned duties).

Sažetak:

KVANTIFIKACIJA PROBLEMA KVALITETE UTVRĐENIH U PROCESU SKLADIŠTENJA GRAĐEVINSKIH PROIZVODA

U radu se obrađuje problem destruktivnih čimbenika koji utječu na kvalitetu uskladištenog građevinskog materijala. Područje građenja je vrlo široko i zato je ovaj rad usmjeren na značajan fenomen koji utječe na kvalitetu građevinskih proizvoda, što je značajno za investitore i izvođače. Cilj istraživanja je utvrditi odrednice procesa skladištenja građevinskih proizvoda. Autori koriste alate za upravljanje kvalitetom proizvoda kako bi pokazali specifične pojave koje uzrokuju probleme kvalitete. Konačni rezultat ovog rada je grafička prezentacija problema destrukcije građevinskog materijala, primjenom odgovarajućih alata upravljanja kvalitetom.

Ključne riječi: kvaliteta, građevinski materijal, Ishikawa dijagram, Pareto-Lorenz dijagram.

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Tematska cjelina/*Thematic unit*
KVALITETA U POLJOPRIVREDI
I PREHRAMBENOJ INDUSTRIJI
QUALITY IN AGRI-SECTOR AND FOOD INDUSTRY

Zadar, Hrvatska/*Croatia*
16. – 18. ožujka 2016.
March 16th – 18th, 2016

QUALITY ASPECTS OF THE EU ACCESSION PROCESS IN THE AGRI-FOOD SECTOR

ASPEKTI KVALITETE PROCESA PRISTUPANJA EU
U POLJOPRIVREDNO – PREHRAMBENOM SEKTORU

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ABSTRACT

Accession negotiations with the European Union and preparation for membership are for a long time determining the developments in a candidate country. It is especially characteristic for the agri-food sector, where the Common Agricultural Policy is the most comprehensive and demanding common policy of the EU. The success of negotiations and of preparation for membership largely depend on the quality mindness of the stakeholders in the sector. Based on his wide experience the author analysis three aspects: quality in the negotiating process, quality policy in the CAP and quality management in the agri-food establishments. The analysis, presentation of best practices and recommendations not only help understanding past processes but give assistance to present and future candidate countries for a successful preparation for membership with the EU.

Key words: accession process, candidate countries, Common Agricultural Policy, quality policy, quality management.

1. INTRODUCTION

Accession to the European Union is a long and complex process. According to experience gained from recent accessions (2004, 2007, 2013) about 10 years elapse between the time of submission of the request for accession and the date of membership.

EU accession is a complex challenge for the whole society and economy in a candidate country. This is especially valid for the agri-food sector, as the Common Agricultural Policy (CAP) is one of the oldest and most comprehensive parts of the *acquis communautaire*. A candidate country has mostly the same or similar agricultural policy objectives as the EU – sustainable use of natural resources, employment in rural areas, supply of safe food, of high quality local products to the consumers, improvement of quality of life in rural areas – still the set of objectives, the legislation, the institutions and the markets are different. With membership an „EU-type” functioning of the agricultural policy has to be adopted, with all its advantages and even sometimes disadvantages or limitations.

Behind the political events of accession, running the negotiations and preparation for membership is a complex technical issue, where the aspects of quality play an important role. They can contribute both to the length and success of the negotiations, they are essentially influencing the success of accession for a country, for economic sectors, for individuals. A key issue for a country is to share the common values of the European Union, to build up and organise the social and economic life of the country based on the common values, on the common legislation, while maintaining national traditions, values, heritage. Individuals aim at finding a better quality of life within the Union, than outside of it. For the economic undertakings the great challenge is to act competitively and profitably in the single European market. At each level quality-mindedness is essential for sustainable success.

In this paper we are examining three areas of the EU accession process in the agri-food sector from the point of view of quality:

- the accession negotiating process (organisation, human resources, communication);
- the quality and food safety policies of the Common Agricultural Policy, and
- the quality management challenges for the agri-food operators.

2. ORGANISATION OF THE ACCESSION NEGOTIATIONS

To conduct the negotiations is task of the government and practically all of its institutions are involved. It is a huge challenge to head the negotiations, to coordinate them among and within the great number of participating bodies. It is a huge project management task where the key elements for quality are:

- continuity of the activities, of the organisation and of the people involved;
- professionalism of the participants involved;
- regularity of the activities, e.g. meetings of coordinating bodies;
- good preparation of the meetings;
- decision-taking at appropriate times;
- precise records of the activities and a usable system of the database;
- priority of spirit of cooperation over eventual rivalisation;
- not formal, but substantial involvement of the stakeholders.

In the practice politics have a great impact on the quality of the organisation. A change in the government or even in the person (minister) responsible for the negotiations can have an impact on any aspect mentioned above. Nevertheless the negotiations have a certain order and rhythm, which is basically determined by the Member States and the Commission. Still a substantial change in the negotiation policy within a candidate country can influence the pace of the negotiations, the image of the candidate country and – what is not so easy to measure – the success of the outcome of the negotiations.

A positive example for the quality of the organisation of the negotiations is in my opinion Hungary, where above mentioned criteria were respected. Even the changes in the government, to be led by the former opposition parties (in 1998 after the start and in 2002 before the finish of the accession negotiations) – despite internal political discussion – did not result in substantial changes of the negotiating positions or of the persons negotiating, no temporary closed chapter was reopened. Within the Ministry of Agriculture, the Department of EU Integration had a stable staff over the whole accession period. It was a separate department, which was attached during the negotiating period directly to the minister. The Department had sufficient staff (about 15 heads) not only to act as a communication port among the outside partners (mainly Ministry of Foreign Affairs and Commission) and the other departments of the ministry, but with well-trained staff they have actively influenced the whole process. They gave advice to the line departments, contributed substantially to the negotiating documents, prepared documents to the hierarchy, participated in the information campaigns.

The quality of the human resources, of the manpower is the key element for the success both of the negotiations and of the accession. This is generally recognised by the candidate countries but not always sufficiently respected. In the candidate countries there is generally a lack of long-term human resource development plans and of their consequent realisation. The argument inefficient actions is mainly lack of sufficient budgetary means. The consequence is a high fluctuation in the manpower, which lower the efficiency even of the realised trainings, study tours and other investments. Trainings are also often formal and ad hoc, without real benefit and measurement of the benefit. Motivation is mostly considered both by the hierarchy and by the employees as a financial measure, although there are several non-financial ways for the efficient motivation (like belonging to a team, working on the future of the country, trainings reserved only for team members, possibilities of study trips, scholarships, participation at conferences organised by the Commission or by Member States, promotion within the country governmental organisations, improved chances for a future job at an EU institution, etc.)

Once again I can quote a positive experience from the Ministry of Agriculture in Hungary. Despite all budgetary restraints – which existed already in those times – the Ministry employed 16 young and able people already in 1996 (8 years before the accession in 2004), who had exclusively the task to become experts in the different areas of the CAP. To achieve that, they have received special training within Hungary, with Member States Agricultural Ministries, with the Commission. For that aim a special budgetary source was created, which was co-financed from pre-accession assistance funds of the EU, but Member States have also contributed, for example by bearing the costs of the 2-3 week trainings in their ministries. The young people in the age of 25-30 years were selected on the basis of strict criteria (e.g. high level knowledge of English and preferably of a second EU language) during a two-days written and oral test. They have actively participated in the accession negotiations by preparing documents, making presentations and also in the domestic campaigns for raising awareness and prepare the farming community for membership. One of the members of the group worked at the Human Resource Department ensuring that their needs and potentials were duly recognised and utilised. Similar „young experts pools” were created also in Poland and Latvia and they have also positively contributed to the accession processes of their countries.

For the success of the negotiations and for the preparation of the candidate country for membership proper communication with the stakeholders is unavoidable. High-quality communication involves regular information on the state of play of the negotiations and of developments within the EU and its policies (like on the CAP), listening to the views and requests coming from the ag-

gricultural community and incorporate them into the government activities. Experience even of recent times shows that farmers do not follow regularly internet sources and these informations play a limited role in their decisions. Informations through the media are good to call the attention to certain issues, but these informations are mostly not complete. The most efficient channels of communication were and are still the direct informations to the agricultural stakeholders via tailor-made brochures, leaflets, and by many personal meetings via seminars, agricultural fairs, and through the agricultural advisory services. Attention should be given that these meetings be not formal with a mere presentation on behalf of the speaker. It should be well prepared by detailed information on the issues to be dealt.

The communication strategy and its implementation in Hungary was coordinated by the Ministry of Foreign Affairs. Within the Ministry of Agriculture communication was a joint activity of the Press Office and of the Department for EU Integration. Press Office people knew the ways of communication, but the „substance”, the text of the documents had to be delivered by the EU experts. As much as possible the experts working in the line departments were also involved, although their availability was in time very limited. Also in the communication a major role was played by the pool of the young experts.

A special tool in the set of communication of the Ministry of Agriculture was a textbook on the European Union institutions, policies (especially on the CAP) and on the Hungarian-EU agri-food relations. The textbook of about 300 pages was written by university professors and by colleagues of the Ministry of Agriculture. It was first published in 1993, followed by two more updated editions and was used at all agricultural faculties as part of the curriculum.

3. QUALITY AND FOOD SAFETY POLICIES IN THE COMMON AGRICULTURAL POLICY

Food safety: Food is considered as safe and nutritious if it is not harming rather protecting the health of the consumers. Food safety is essential for the functioning of the single European market of food and feed, therefore it is also an essential criterion observed by the Member States when negotiating with a candidate country. The issue is part of negotiating chapter 12 (Food safety, veterinary and phytosanitary issues). The EU has adopted an integrated approach to food safety „from farm to table.” EC Regulation 853/2004 on food safety requests from all food establishments to apply HACCP (Hazard Analysis and Critical Control Point) to have a Handbook on it and to have documents of its application. HACCP is based on GAP (Good Agricultural Practice), GMP (Good Manufacturing Practice) and GHP (Good Hygiene Practice),

for which the EU itself and most Member States have their own Handbooks. Anyhow there is no obligation to have HACCP approved by an accredited institution, the relevant food safety authority (in most candidate countries the veterinary service), has to control its existence and implementation. HACCP is generally a high issue in a candidate country, when the national legislation is adopted on it and until the majority of the food establishments implement it. Later it often becomes a routine issue both for the establishment and for the control authorities as several different quality management schemes will be introduced on the request of the buyers, which generally include and go beyond the requirements of HACCP (like ISO 9001, 14000, 22000; IFS 22000; Lean, Six Sigma and many others).

Quality of foodstuffs and „Improvement of the quality” are terms often used in the agri-food sector. In this respect „quality” means the satisfaction of the existing and of the expected requirements of the consumers. These requirements are changing by time, by regions, by different target groups of consumers.

The minimum quality requirements have been elaborated by international organisations which are continuously revising them. Such organisations are the Codex Alimentarius Committee, a joint committee of the UN Food and Agricultural Organisation (FAO) and the World Health Organisation (WHO) and the International Plant Protection Convention. The agreements of these organisations are not obligatory, they have to be transposed by the national (EU) legislation. All candidate countries are members of these organisations, still their national transposition is often different of that of the EU, because of the national specialities.

The notion of „**quality policy**” is also part of the CAP. In general it means, that EU law provides strict requirements for the quality of all marketed agricultural products and foodstuffs. More specifically it covers quality schemes, where the requirements go beyond the general ones, the products are identified by exacting specifications and enjoy protection. Quality policy consists of:

- marketing standards;
- common EU quality schemes (Protected Denomination of Origin, PDO; Protected Geographical indication, PGI, and Traditional Speciality Guaranteed, TSG);
- rules for organic farming;
- rules for products from the outermost regions;
- voluntary quality schemes (national, regional ones, schemes initiated by producer organisations or by retailers etc.).

Quality policy during the accession negotiations is dealt in Chapter 11 (Agriculture and Rural Development). Its implementation in a candidate country is for the existing Member States not an as essential criterium as that of food safety. Nevertheless it is an element of the competitiveness, so it is rather the interest of the candidate country to introduce legislation and promote its implementation.

EU Regulation 1151/2012 is the basic legislation on quality schemes for **agricultural products and foodstuffs**. These products can receive approval as a PDO or a PGI, or TSG. All three schemes have stringent rules for application and approval. „**Mountain products**” is an optional quality term which may be used for products, where the raw materials and the animal feed come essentially from mountain areas, while for processed products production generally takes place in such areas. It is a new term in the EU legislation and it opens new possibilities also for candidate countries for the production and marketing of high-quality products from mountain areas.

As for **wine** the basic rules of application and approval for PDO and PGI are provided in EU Regulation 1308/2013, Title II. Chapter I. Section 2. Commission Regulation 607/2009 lays down certain detailed rules as regards protected designations of origin and geographical indications, traditional terms, labelling and presentation of certain wine products.

With regard to **spirit drinks** it is EC Regulation 110/2008, which lays down the rules for the definition, description, labelling and the protection of geographical indications. For **aromatised wine products** the basic EU legislation is EU Regulation 251/2014. The definitions and rules of procedures are more and more harmonised to those for agricultural products and foodstuffs.

There more than 3000 products in the EU, eligible to use one of the quality logos and they account to 15% of EU agricultural exports. On the products approved the EU has a register. There are altogether 4 databases: DOOR: for agricultural and food products, E-Bacchus for wine, E-spirit for spirit drinks and a special register for the geographical indication for aromatised wines.

The possibility exists also for candidate countries and other third countries to apply for protection of geographical indications in the EU, if their national legislation is considered as equivalent. Practically geographical indications of wines from Serbia, Montenegro and Bosnia and Hercegovina can be found in the EU registers, based on the Stabilisation and Association Agreements, but not other agricultural and food products because the national legislations are not yet fully harmonised. For example Serbia has a law on the protection of trade marks and geographical indications since 2010 and a Decree of the Minister of Agriculture on the application procedure for agricultural and food products. Although based on this legislation, Serbia has 36 products registered as PDO or PGI, because of the differences in the legislation they could not be forwarded to the

Commission and Serbia needs a modification and alignment in its legislation. Another example: during the accession negotiations of Hungary there was good hope, that the PDO and PGI products of Hungary may have a fast track approval process upon accession. After conclusion of the negotiations it became clear, that Hungary has to make application even for the earlier approved products according the normal procedure, which in the mid-2000 years lasted 3-5 years.

Beside the EU schemes it proves to be useful, if Member States and also candidate countries introduce **voluntary quality schemes**. Such initiatives existed in Hungary before accession (Gutes aus Ungarn) and exist also in Serbia (Najbolje iz Srbije). At the beginning of 2016 in Hungary there are four schemes, which are acknowledged by the Government: KMÉ (Kiváló Magyar Élelmiszer – Excellent Hungarian Foodstuff), HIR Program (Hagyományok-Ízek-Régiók – Traditions-Tastes-Regions), Nemzeti Parki Termékek (Products from National Parks) and Kiváló Magyar Sertéshús (Excellent Hungarian Pigeon). National schemes and logos are easier to understand and accept by the consumers than EU schemes and the procedures are also somewhat simpler. Experience gained from participation in national schemes can serve for the food operators as a „pre-school” for the application for EU logos. Quality schemes can be well connected to agricultural policy objectives like the promotion of „local products”, „support to small farmers”, promotion of direct marketing. Therefore when the issue of „adopting and implementing EU quality policy legislation” is on the agenda in a candidate country, voluntary national/regional quality schemes should also be considered.

Both EU and national schemes have to be accompanied by information and promotion activities. To the farmers the advantages of belonging to a scheme has to be explained (like increased attention and trust by the consumers, better access to marketing channels, higher prices for the special quality). To the consumers information should focus on their advantages when buying a product with quality logo (like guaranteed and controlled quality, products with special characteristics, contribution to maintaining rural heritage).

4. QUALITY MANAGEMENT BY THE AGRI-FOOD OPERATORS

The key challenge of accession to the EU for agricultural and food producers is the participation in the single European market and to manage the market pressure. Since 1993 there exist common veterinary, phytosanitary and food law requirements in the EU, its whole territory is considered as one market, like before accession it is the whole territory of a candidate country. Actors on the single market has to fulfil minimum quality requirements, food safety requirements, prescriptions for labelling, packaging marketing.

EU legislation generally requests much more administration from farmers and processors than it is in the candidate countries. Starting from registration of farms to informations requested for EU subsidies, records on the use of chemicals, are just a few examples. They contribute to the principle of traceability, but provide also informations for the farmers and processors to evaluate their activities. The great number of informations available are helpful to develop food safety and food quality management systems, to receive certification for them by accredited organisations.

It is first of all the duty of the agri-food producers, to prepare for the increasing competition on the single market during the period of accession negotiations. The governments can and are giving to that manifold support. They are adopting and implementing legislation ruling on the EU market. The food safety legislation is generally among the first acts which are harmonised in a candidate country. In Hungary the Veterinary Law was harmonised in 1995 (membership in 2004), Serbia has also harmonised its Food Safety Law in 2009 and is amending it in 2016. The full alignment of the food safety and food quality legislation often happens gradually in several steps, partly because the differences are important, partly because the EU legislation is also changing by time.

Successful activity on the single market requires the implementation of **quality management schemes**. Farmers are generally reluctant towards changes, but the pressure is strong for that, both by the changing legislation and by the increasing competition.

The global agrifood system has developed complex value chains. Actors selling the products to final consumers try to convince them about the safety and quality of their products. therefore they develop specific requirements towards the processors and the agricultural producers. These are **voluntary standards, regulations, labels**, and if agri-food producers wish to become or remain suppliers, they have to fulfil these standards. To verify the conformity of the product, process or service, an assessment (audit) is carried out and in case of a positive result a certificate is issued. The audit can be a self-assessment (generally just a first phase), or done by the body, who is establishing the voluntary standard (like a supermarket chain), or by an independent, impartial accredited organisation. In recent times unannounced audits are also taking place more and more often.

Food processors and even more agricultural producers are often hesitant or reluctant to undergo the certification process. They find it burdensome, costly and hope to find market channels without that. Practically it can happen (like direct marketing), but to maintain consumers needs in any case a kind of a quality management. With a certificate the opportunities for marketing are

better and also price and profit can be higher. Many small operators went bankrupt because of the lack of certification, because of poor quality management.

Control of the quality of the final products by a quality controller in the 1950-60ies changed to present times to total quality management (TQM) of the different main activities of a company, and to a comprehensive General Quality Management of all activities. The key responsible person for quality is often the first deputy of the general manager and follows the general manager in its position.

The approach to quality management is different in medium and large companies compared to micro or small companies. Agricultural farms run by one family think to keep control of quality, safety of products and marketing in their hands. But often this smallholders receive minimum prices for their products, which they mostly sell to middle-men and do not have information about retail prices and real expectations of the final consumers of their products. They could make better prices, better products and services by improving quality management. This is especially an issue in candidate countries with many small farmers. The lack of proper quality management is one of the reasons of the fast concentration of holdings, of moving agricultural production from small family farms to larger farms and changing rural employment of farm owners to employees at larger holdings. One way to improve quality management in small farmers is their association or cooperation.

In quality management the basic level are the „good practices”, like Good Agricultural Practice (GAP). As a next level can be regarded The Hazard Analysis and Critical Control Point (HACCP). EU Regulation 852/2004 requires from all food operators at any stage of food production, processing or marketing to apply HACCP and to develop HACCP handbooks. These handbooks do not have to be certified by an accredited organisations but they are regularly controlled by the food safety authority. They and can apply for production, purchasing, storage, cleaning or other activities of the operator. Candidate countries generally introduce the obligation of HACCP already before accession. For example in Hungary it became an obligation by January 1, 2002. The government gave extensive assistance to the food operators by trainings, booklets, through the advisory service. In the years 2000-2001 there was an EU financed PHARE project on „Systems and tools of quality assurance in the agriculture and food sectors”, which provided useful assistance. A third level for quality management is the implementation of the ISO (International Standards Organisation) standards. In 1987 the ISO 9000 on quality management was elaborated, with adjustments in 1989, 2000 and latest in 2015, already as ISO 9001. The ISO 9001 can be applied to different activities of a company, it includes HACCP as well, still it is a more complex approach. The

International Standards Organisation later elaborated standards for environment management (ISO 14000). ISO 22000 is a merge of the quality and environment management standards.

International voluntary standards are elaborated and introduced mainly by retail associations, but non-governmental organisations, producer organisations may also be the initiators. Some of the most widely used voluntary standards on the single European market are Global GAP, IFS, BRC. Also producers in candidate countries face these standards when marketing their products and more and more of these producers acquire accreditation. GlobalGAP is an independent certification system used mainly in agricultural production. It has modules for crops, for livestock, for propagating materials, for compound feed etc. IFS (International Food Standards) and BRC (British Retailers Consortium) standards are mainly used as requirements towards food producers, wholesalers and service providers.

5. CONCLUSION

Governments in candidate countries recognise the importance of quality schemes and of voluntary standards. They give support to the agri-food producers already in the pre-accession period to the costs of certification on a quality management scheme as well as for application for a quality policy scheme, from national or regional budget (like in 2015 in Serbia and in Vojvodina). Accredited companies for certification are to be found in candidate countries (mostly international companies) who offer their services to the producers.

Besides the governments non-governmental organisations are also providing assistance to agricultural and food operators to understand the importance of quality management, to obtain QM certification and to properly use them. They are organising trainings, courses, conferences, seminars, providing advice. The principal organisation at European level is the European organisation for Quality (EOQ). In Hungary it is the Hungarian National Committee of EOQ, in Croatia the Croatian Quality Managers Society, in Serbia the United Association of Serbia for Quality. The Hungarian National Committee of EOQ has a Subcommittee for Agriculture and another one for the Food Industry. The members are governmental organisations, the National Agricultural Chamber, research institutes, universities and farming and processing enterprises. Both Subcommittees organise conferences, seminars, visits to best practice farms and companies and strengthen international relations especially with neighbouring countries.

Sažetak:

ASPEKTI KVALITETE PROCESA PRISTUPANJA EU U POLJOPRIVREDNO – PREHRAMBENOM SEKTORU

Pristupni pregovori s EU i priprema za članstvo dugoročno utječe na razvoj zemlje kandidatice. To se posebno odnosi na sektor poljoprivrede u kojem je CAP- zajednička agrarna politika vrlo opsežna i zahtijeva zajedničku politiku EU. Uspjeh u pregovorima i priprema za članstvo u velikoj mjeri ovisi o kvaliteti promišljanja dionika u sektoru. Na temelje njihova velikog iskustva autor analizira tri aspekta: kvalitetu u procesu pregovaranja, politiku kvalitete zajedničke agrarne politike u području agrarno prehrambenom sektoru. Analiza najbolje prakse i preporuka ne pomaže samo razumijevanju završenih procesa već pomaže u predstavljanju i budućim zemljama kandidaticama u uspješnoj pripremi za članstvo u EU.

Ključne riječi: proces pristupanja, zemlje kandidatice, zajednička agrarna politika, politika kvalitete, upravljanje kvalitetom.

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ODRŽIVOST U PREHRAMBENOJ INDUSTRIJI

SUSTAINABILITY IN FOOD INDUSTRY

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SAŽETAK

Održivost je pojam koji se počeo sve više pojavljivati i koristiti u prehrambenoj industriji. Danas održivost više nije opcija za proizvođače hrane i njihove dobavljače, već obaveza i potreba. Klimatske promjene i smanjenje resursa doprinose odgovornom pristupu, a prehrambena industrija i kupci žele znati kako i na koji način su zaštićene zalihe hrane i interesi budućih generacija. U ovom radu su predstavljeni standardi održivosti koji se sve više implementiraju i primjenjuju u prehrambenoj industriji. Neki od njih su SA 8000, SMETA, BSCI, RSPO/ISPO, Carbon Footprint, ISCC, Red Cert, MSC, ASC, BAP, ekološka proizvodnja. Primjenom odgovornog pristupa i održivosti, prirodni resursi nisu preopterećeni i ne uništavaju se.

Ključne riječi: održivost, prehrambena industrija, standardi održivosti.

1. UVOD

Održivost je pojam koji se počeo svakodnevno pojavljivati u svim segmentima našeg društva. Za proizvođače hrane održivost je postala obaveza i potreba kako bi se osigurao odgovoran pristup resursima, zaštita hrane i inte-

resi budućih generacija. Certifikacija sustava održivosti sve je više prisutna i osigurava proizvođačima odgovoran pristup.

2. DEFINICIJA

Održivost je sposobnost održavanja ravnoteže određenih procesa ili stanja u nekom sustavu. Definicija održivosti često uključuje tri aspekta:

Slika 1. Održivost



Izvor: <https://hr.wikipedia.org/>

- socijalnu održivost;
- ekonomsku održivost;
- održivost okoliša.

3. SUSTAVI ODRŽIVOSTI

Certifikacije ili potvrde održivosti u TÜV Nord grupi uključuju jedan ili više parametara uspješnosti: socijalne, ekonomske i parametre okoliša. Održivost se certificira ili potvrđuje prema različitim standardima i zahtjevima: SA 8000, SMETA, BSCI, RSPO/ISPO, Carbon Footprint, ISCC, Red Cert, MSC, ASC, BAP, ekološka proizvodnja.

3.1. SA 8000

SA 8000 je međunarodni standard za društveno odgovorno poslovanje. Uključuje upravljanje ljudskim pravima na radnom mjestu i radnim uvjetima. Tvrtke time uspješno dokazuju etičku odgovornost, a samim time imaju korist zbog lojalnosti svojih zaposlenika, dobivanja povjerenja potrošača i povećanja broja kupaca.

3.2. SMETA (eng. Sedex Members Ethical Trade Audit)

Sedex je neprofitna organizacija posvećena etičkim poboljšanjima u globalnom lancu opskrbe. Osigurava razmjenu i pregled informacija o uvjetima rada, zdravlja i sigurnosti, okoliša i poslovne etike. SMETA uključuje društvenu odgovornost posebno za trgovinu.

3.3. BSCI (eng. Business Social Compliance Initiative)

BSCI sustavom tvrtke pokreću inicijativu za implementacijom održivih poboljšanja u društvenim standardima za proizvodne objekte. BSCI članovi su većinom iz maloprodajnog sektora, ali se isto tako primjenjuje kod proizvođača i uvoznika.

3.4. RSPO/ISPO (eng. Roundtable on Sustainable Palm Oil/ Indonesian Sustainable Palm Oil)

RSPO uključuje sve aspekte održivosti i uključuje proizvođače, prerađivače i investitore. Sastoji se od skupa standarda za proizvodnju palminog ulja.

3.5. Carbon Footprint

Carbon Footprint označava ukupnu mjeru stakleničkih plinova. Certificiranje u ovom području pomaže tvrtkama da shvate svoje emisije stakleničkih plinova, te im pomaže da ih analiziraju. Na temelju navedenog mogu se prepoznati potencijalne uštede i mjere potrebne za smanjenje emisije.

3.6. ISCC

ISCC je međunarodni sustav certificiranja koji se koristi za dokazivanje održivosti i smanjenje stakleničkih plinova za sve vrste biomase i bioenergije. Uključuje zakonske zahtjeve za biogoriva i biomasu, npr. za proizvodnju električne energije ili u kemijskoj i prehrambenoj industriji.

3.7. REDCert

REDCert certifikacija se odnosi na održivi razvoj proizvodnje biomase.

3.8. MSC (Marine Stewardship Council), ASC (Aquaculture Stewardship Council), BAP (Best Aquaculture Practice)

Certifikacije prema zahtjevima MSC, ASC i BAP osiguravaju usklađenost sa standardima za održivi uzgoj ribe i sustav certifikacije omogućuje potrošačima prepoznavanje odgovornog ribarstva.

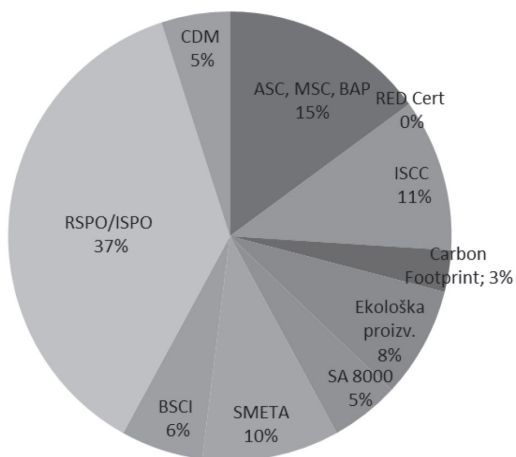
3.9. Ekološka proizvodnja

Ekološka proizvodnja je sustav održivog gospodarenja u poljoprivredi koji obuhvaća uzgoj bilja i životinja, proizvodnju hrane, sirovina, te preradu primarnih proizvoda. Uključuje sve ekološke, gospodarske i društveno opravdane proizvodno-tehnološke metode, zahvate i sustave, najpovoljnije koristeći plodnost tla i raspoložive vode, prirodna svojstva biljaka, životinja, povećanje prinosa i otpornosti biljaka s pomoću prirodnih sila i zakona, uz propisanu uporabu gnojiva, sredstava za zaštitu bilja i životinja, sukladno s međunarodno usvojenim normama i načelima.

4. CERTIFIKCIJA SUSTAVA ODRŽIVOSTI

U TÜV Nord Grupi sve je više prisutno certificiranje sustava održivosti. U primarnoj proizvodnji i prehrambenoj industriji u svijetu najviše je prisutna certifikacija RSPO i certifikacija održivog uzgoja ribe i ribljih proizvoda.

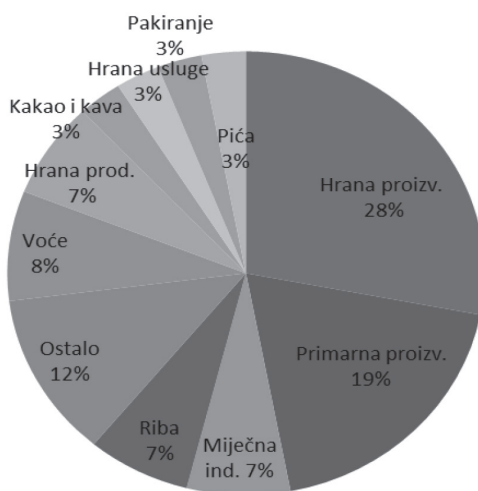
Slika 2. Certifikacija održivosti



Izvor: TNG Agrifood izvještaj.

Po sektorima je najveći udio certifikacije sustava održivosti u proizvodnji hrane i primarnoj proizvodnji. Slika 2 prikazuje udjele pojedinih sustava na tržištu.

Slika 3. Certifikacije sustava održivosti po pojedinim sektorima u prehrambenoj industriji



Izvor: TNG Agrifood report.

Slika 3 prikazuje certifikacije sustava održivosti po pojedinim sektorima u prehrambenoj industriji.

5. ZAKLJUČAK

Certifikacija sustava održivosti je dobrovoljna. Provodi se prema standardima koji se odnose na zaštitu okoliša, društvena i etička pitanja i sigurnost hrane. Tvrtke sa implementiranim sustavima održivosti sposobne su pokazati uspješnost svoje organizacije ili proizvoda u određenim područjima. Sve to doprinosi odgovornom pristupu prema resursima, zalihama hrane i interesima budućih generacija.

Abstract:

SUSTAINABILITY IN FOOD INDUSTRY

Sustainability is a term that began to appear more often in the food industry. Today sustainability is no longer an option for food manufacturers and their suppliers, but an obligation and a need. Climate changes and reduction of resources contribute to a responsible approach, and the food industry and customers want to know how and in what way are protected food supplies and interest of future generations. This paper presents standards of sustainability that are increasingly implemented and applied in the food industry. Some of them are SA 8000, SMETA, BSCI, RSPO / ISPO, Carbon Footprint, ISCC, Red Cert, MSC, ASC, BAP, organic production. By applying a responsible approach and sustainability, natural resources are not overloaded and destroyed.

Key words: sustainability, food industry, sustainability standards.

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CERTIFICIRANJE SUK-A: PRIMJER HALAL CERTIFICIRANJE

QUALITY MENAGEMENT SYSTEM CERTIFICATION: HALAL CERTIFICATION CASE

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SAŽETAK

Osnovni atribut koji daje obilježje kvaliteti proizvoda i usluga je zadovoljstvo potrošača. Ovaj zahtjev se nezaobilazno postavlja u tehnološkom i marketinškom aspektu (smislu) pred proizvođače hrane koji moraju uzimat u obzir i poštivanje prehrambenih običaja i navika različitih populacijskih grupa. Prehrambeni običaji i navike su uglavnom vezani za naciju, vjeru, zemlju ili regiju, ali način ishrane prilično varira u ovisnosti od vjerske pripadnosti. Svjetski trendovi upućuju na to da muslimani žele biti sigurni da su hrana koju jedu kao i usluge koje koriste halal, odnosno dozvoljeni. Tržište halal proizvoda i usluga u svijetu sve se više povećava i sve je više zahtjeva za dokazivanjem halal statusa u namirnicama i halal standarda u uslugama. Da bi zadovoljili zahtjeve muslimana, proizvođači hrane, kao i prerađivači, imaju interes da usklade proizvodnju, oblikuju je po određenim zahtjevima islamskih propisa i time ostvare ekonomski doprinos i zadovoljstvo. Također, sigurnost hrane i pića vrlo je važna za zdravlje ljudi, a ispunjavanje zakonskih normi i utvrđenih standarda je preduvjet za opstanak na domaćem i stra-

nom tržištu. Cilj ovog rada je prikazati važnost dobivanja halal certifikata na svim područjima rada, s posebnim naglaskom na povećanje konkurentnosti u ugostiteljskom sektoru i turizmu.

Ključne riječi: kvaliteta, upravljanje kvalitetom, normizacija, Halal certifikat, Halal turizam.

1. UVOD

Desetljećima kvaliteta i upravljanje kvalitetom riječi su koje odzvanjaju u poslovnom svijetu. Poslovni uspjeh ovisi o tome koliko se kvalitetan proizvod može proizvesti te koliko se kvalitetna usluga može pružiti klijentu, a da se pri tom nadmaši konkurencija i zadrži konkurentnost cijene. Visoka kvaliteta i njezino trajno održavanje prilikom stvaranja proizvodnog portfelja odgovorne tvrtke vodeći je čimbenik za provedbu dugoročnih poslovnih ambicija.

U vremenu u kojem su gotovo sva svjetska tržišta pogođena financijskom krizom, a samo rijetka gospodarstva su iz nje uspjela izaći, svaki proizvođač proizvoda i pružatelj usluga traži za sebe način da opstane te ostvari planirane poslovne rezultate. Zbog globalizacije tržišta i slobodnog kretanja roba gotovo je nemoguće zadržati postojeće i privući nove kupce ukoliko proizvod ili usluga nisu visoke kvalitete, sigurni i lako dostupni. Potrošačima su danas informacije o proizvodima i uslugama lako dostupne te imaju očekivanja vezana uz kvalitetu onoga što plaćaju, a ukoliko njihova očekivanja nisu ispunjena, okreću se novim proizvodima koje tržište nudi. Kvaliteta proizvoda nerijetko se veže uz sliku proizvođača koju ima u javnosti, njegovu tradiciju i način poslovanja. S druge strane, proizvođač koji želi poslovati s velikim kupcima, izvoziti i biti odabran od strane potrošača te konkurirati na javnim natjecajima, svjestan je da treba odgovoriti na nove trendove u poslovanju.

Usprkos kvaliteti, kapacitetu i menadžerskim sposobnostima niti jedan proizvod i usluga ne može se probiti (plasirati) na arapsko tržište, (čija vrijednost se procjenjuje na oko 550 milijardi dolara) ukoliko ne posjeduje certifikat o halal kvaliteti, a sve su veći zahtjevi i domaćih potrošača koji žele biti sigurni da konzumiraju proizvode koji su zdravi i bez loših aditiva. S ciljem podizanja razine kvalitete i proširenja ponude danas se sve više proizvođača i pružatelja usluga odlučuje za halal kvalitetu i uvođenje halal certifikata.

2. PROCES CERTIFIKACIJE

Certifikacija ili potvrđivanje je postupak kojim se potvrđuje sukladnost s propisanim zahtjevima, a u smislu Zakona o normizaciji (NN 55/96), obuhvaća potvrđivanje proizvoda, procesa i usluga, ocjenjivanje i potvrđivanje sustava kakvoće dobavljača te ocjenjivanje osposobljenosti osoba koje obavljaju radnje u svezi s ispitivanjem, potvrđivanjem i ocjenjivanjem sustava kakvoće dobavljača.¹

Certifikacija su postupci nepristrane treće strane kojima se dokazuje da postoji odgovarajuće povjerenje, da je naznačeni proizvod u sukladnosti s određenom normom ili drugim normativnim dokumentom. Rezultat tog postupka je certifikat koji se izdaje na osnovu ispitivanja. Rok do kojeg vrijedi certifikat naveden je na certifikatu.² Certifikaciju provode certifikacijska tijela.

Certifikat jamči kupcima i poslovnim partnerima uvijek jednako dobar ili bolji proizvod. Odluka o certificiranju često je motivirana željom za unapređenjem vlastitog poslovanja. Dobivanjem certifikata tvrtka ima višestruke koristi; da se bolje pozicionira na tržištu, razvija i održava dugoročne dobre odnose s kupcima, zadržava postojeće i stječe nove kupce, a važno je naglasiti kako sam certifikat nije garancija uspjeha.

Na certificiranje se tvrtke odlučuju i kada žele pravovremeno steći konkurentsku prednost. Tvrtka koja ga posjeduje i posao obavlja u skladu s propisanim normama nije zaštićena od konkurencije ili poslovnog neuspjeha, ali joj certifikat može pomoći u boljem upravljanju procesima, boljoj poziciji na tržištu, konkurentnosti prilikom prijave na javne natječaje, boljem odnosu kvalitete i cijene proizvoda te zadovoljstvu kupaca, zaposlenih, menadžmenta i okoline.

Procesom certifikacije potvrđuje se poštivanje načela dobrih praksa, upravljanje procesima unutar tvrtke, a što sve utječe na prepoznavanje mogućnosti smanjenja troškova poslovanja, te kvalitetnije planiranje prihoda i troškova. Većina nacionalnih i međunarodnih zahtjeva za certifikaciju proizvoda ima za cilj osigurati da je proizvod, namijenjen prodaji ili izvozu na određeno tržište, usklađen s propisima o kvaliteti, zdravstvenoj ispravnosti i sigurnosti te očuvanju okoliša.³ Broj certificiranih sustava upravljanja i proizvoda povećava se iz godine u godinu, što je i razumljivo s obzirom na činjenicu da tvrtke teže unapređenju poslovanja i kvalitete proizvoda te plasmanu proizvoda na nova tržišta.

¹ <http://www.hemco.hr/norme-i-certifikacija.html>

² <http://www.hemco.hr/norme-i-certifikacija.html>

³ <http://www.jatrgovac.com/2012/04/certifikati-potvrda-uspjeha-i-vjerodostojnosti/>

2.1. Proces certificiranja

Priprema za certifikaciju je najsloženiji dio procesa i odvija se u nekoliko koraka, a traje najčešće više mjeseci ovisno o veličini tvrtke, trenutnom načinu rada i organizaciji poslovanja. Tvrtka na početku usklađuje vlastito poslovanje sa zahtjevima norme po kojoj se želi certificirati. Nakon postizanja usklađenosti poslovanja sa željenom normom, upućuje zahtjev jednoj od certifikacijskih kuća po vlastitom izboru. Odabir certifikacijskog tijela uglavnom ovisi o cijeni certifikacije, zahtjevu kupca za certifikatom određene certifikacijske kuće te osobnim poznanstvom ili stavovima prema određenom certifikacijskom tijelu.

Odabrana certifikacijska kuća provodi certifikacijski audit te kroz razgovor s ljudima, promatranjem procesa i pregleda dokumentacije donosi odluku o zadovoljavanju ili nezadovoljavanju zahtjevima norme te izdaje certifikat ukoliko je tvrtka pozitivno ocijenjena.

Certificirati se može unaprijed definirani opseg poslovanja, koji može, ali i ne mora, podrazumijevati kompletnu djelatnost tvrtke. Certifikat se izdaje na razdoblje od tri godine tijekom kojeg se jednom godišnje tvrtka provjerava kontrolnim (nadzornim) auditom. Ukoliko tvrtka nakon tri godine želi zadržati certifikat, provodi se recertifikacija sustava ili certifikat prestaje vrijediti.

Certifikat je moguće izgubiti i prije isteka roka na koji je izdan ukoliko kontrolni (nadzorni) audit utvrdi da sustav upravljanja nije u skladu s normom. Nakon razdoblja od tri godine većina tvrtki se odlučuje za recertifikaciju sustava i zadržavanje certifikata.⁴

2.2. Certificiranje nekad i sad

Prve tvrtke u svijetu certificirale su se prije tridesetak godina, u Hrvatskoj ti početci sežu u sredinu devedesetih godina prošlog stoljeća. Najuspješnije međunarodne tvrtke brzo su uvidjele prednosti primjene svjetski priznatih normi i standarda, kako u smislu marketinških i prodajnih aktivnosti, tako i kao mogućnost unapređenja internih procesa, bolje organiziranosti, lakše komunikacije sa zaposlenicima, dobavljačima i kupcima te kontinuiranog unapređenja poslovanja koje vodi do rasta i razvoja, a time i ostvarivanja željenih poslovnih ciljeva.

Danas u Hrvatskoj gotovo da nema velikog i srednjeg proizvođača koji nema uveden bar jedan sustav upravljanja; najčešće je to sustav upravljanja kvalitetom prema normi ISO 9001 te HACCP sustav upravljanja sigurnošću hrane koji je i zakonska obaveza za sve proizvođače od siječnja 2009. godine.

⁴ <http://www.jatrgovac.com/author/>

U kontekstu malih proizvođača situacija je nešto drugačija iako se i tu trendovi brzo mijenjaju. Dobivanje certifikata za male proizvođače znači mnogo; mogućnost ulaska na police velikih trgovačkih lanaca, mogućnost izvoza, mogućnost proizvodnje trgovačkih robnih marki i slično. Međutim, iz perspektive malih proizvođača certifikat je često vrlo skup te je trošak certificiranja nerijetko odlučujući faktor kada se mali proizvođač odlučuje za ovakvo unapređenje poslovanja.

U zadnjih nekoliko godina sve više se spominju i eko certifikati koji jamče da je sirovina koju sadrži gotovi proizvod uzgojena prema ekološkim standardima. Hrvatski proizvođači uvidjeli su i prednosti certificiranja HALAL i KOŠER proizvoda koji su primjereni za konzumaciju osobama muslimanske i židovske vjeroispovijesti te proizvedeni u skladu s islamskim i židovskim zakonima i običajima.

Za tvrtke koje žele svoje proizvode plasirati na europsko tržište, europske direktive preuzete su u nacionalnu regulativu i postavljaju nova pravila. Kako je Hrvatska punopravna članica Europske unije, usvojene su direktive kroz prilagodbu zakonske regulative vezane uz sigurnost i kvalitetu proizvoda. Cilj ovih direktiva je zaštita zdravlja i sigurnosti potrošača.⁵

3. HALAL

HALAL je riječ arapskog porijekla, a u prijevodu znači, prema islamskim propisima dozvoljeno, dopušteno i ugodno. Iako se halal ne prevodi kao pojam, već se uvijek komunicira da se posjeduje halal certifikat ili se posluje prema halal načelima.

Halal (kao izraz) se često koristi kad je nešto duševno ili religijski "čisto". Halal koristimo u jezičnom, vjerskom, kulturoškom, tradicijskom i zdravstvenom kontekstu.

Suprotno od halala je arapska riječ haram koji znači zabranjeno, tj. nedozvoljeno te također imamo MeŠbuh što znači sumnjivo. MeŠbuh je haram dok se ne dokaže da je halal. Te su dvije riječi kod pripadnika islamske vjeroispovijesti smjernice kako razlikovati dobro od lošeg, tj. dozvoljeno od nedozvoljenog. Halal je stil življenja u prvom građana muslimanske vjeroispovijesti od rođenja do smrti, a odnosi se na mnogo toga. Obzirom na to da je to stil življenja, tako obuhvaća usluge kao što su financije, bankarstvo, ugostiteljstvo te proizvode, odnosno hranu, kozmetiku, lijekove i predmete od opće uporabe.

Halal industrija se temelji na uvjerenju da bi muslimani trebali jesti halal proizvode i koristiti kozmetičke proizvode te koristiti usluge koji su dopu-

⁵ <http://www.jatrgovac.com/author/>

šteni i u skladu s vjerskim propisima. Prodaja hrane koja je halal, odnosno u skladu s islamskim vjerskim propisima, u Europi će u godinama koje dolaze snažno rasti s obzirom na činjenicu da sve više konzumenata i nemuslimanske vjeroispovijesti konzumira halal hranu. Time se potiče prehrambenu industriju i maloprodajne lance da svoju poslovnu strategiju usmjeravaju na ovaj sektor. Na području Republike Hrvatske oznaku HALAL mogu dobiti hrana, kozmetika, lijekovi, predmeti opće upotrebe i ugostiteljski objekti (hoteli i restorani) ukoliko su certificirani od strane Centra za certificiranje halal kvalitete Mešihata Islamske zajednice u Hrvatskoj sa sjedištem u Zagrebu⁶.

Prema procjenama određenih organizacija koje se bave statistikama, halal tržište prehrambene industrije se procjenjuje na 635 milijardi američkih dolara, raste zadnjih godina 10-20% te se u idućih 4-5 godina predviđa rast od 40%, a halal turističko tržište 2013. godine bilo je vrijedno oko 140 milijardi dolara, s udjelom od oko 13% u ukupnoj globalnoj industriji turizma. U današnjem materijalističkom svijetu, gdje se sve vrti oko cijene, dostupnosti i vizualnog izgleda proizvoda, još uvijek postoji dio populacije ili tržišta koji će, neovisno o navedenim elementima, izdvojiti određena materijalna sredstva ili napor da bi došao do proizvoda koji zadovoljava određenu kvalitetu. Zbog sve veće industrijalizacije i ubrzanog načina proizvodnje, zanemaruje se kvaliteta određenog proizvoda, te njegov sastav.

Tako se, primjerice, u prehrambenoj industriji upotrebljavaju razne kemijske tvari koje štete čovjekovu zdravlju, a koje su posebno zabranjene za pripadnike određenih religija, među kojima je i islam. Ljudi danas premalo pažnje pridaju onome što jedu, tj. ne obraćaju pažnju kako je pripravljena hrana koju konzumiraju, te gdje je i na koji način došla do krajnjeg potrošača.

Halal obilježje u proizvodnji i distribuciji hrane, ima veliko značenje za konzumente takve vrste hrane te su zagovornici i stručnjaci tog načina prehrane donijeli odluku o stavljanju obilježja halal certifikata ili kvalitete na određeni proizvod. Kako bi konzumenti i kupci bili sigurni da je proizvod ili hrana napravljena u skladu prema halal standardima, halal proizvod je obilježen halal certifikatom.

3.1. Halal standard BAS 1049:2010

Halal standard jasno određuje procedure halal certificiranja, registriran je kod Instituta za standardizaciju Bosne i Hercegovine (BiH) kao nacionalni standard pod nazivom halal hrana–zahtjevi i mjere, BAS 1049:2010⁷. To je

⁶ www.halal.hr

⁷ <http://www.supera-kvaliteta.hr/poslovna-savjetovanja/halal/166-halal-kvaliteta.html>

skup karakteristika nekog proizvoda koje su u skladu sa islamskim propisima i ispunjavaju zahtjeve kvalitete te su kao takvi dopušteni muslimanima za upotrebu. Utemeljena je na šerijatskim principima, Codex Alimentariusu, Halal standardu BAS 1049:2010 i drugim aktima u kojima su utvrđena načela halal certificiranja. Halal kvalitetu može potvrđivati isključivo islamska zajednica ili autorizirana certifikacijska kuća koju za to ovlasti Islamska zajednica. Na području BiH, Hrvatske, Srbije, Crne Gore i Makedonije za djelatnost ovlaštena je Agencija za certificiranje halal kvalitete.

Halal standardom je utvrđeno što je dozvoljeno, a što zabranjeno muslimanima, kako se certificira i provjerava primjena odredbi halal standarda, kako se vrši halal klanje životinja, kako se označavaju halal proizvodi te koji su aditivi halal, a koji nisu. Halal standard je kompatibilan s drugim međunarodnim standardima sustava upravljanja (ISO, HACCP, IFS, BRC, GLOBAL GAP i drugi). Halal proizvodi, osim što su novi trend na svjetskom tržištu hrane, imaju potražnju i u svijetu već 1,8 milijardi ljudi konzumira Halal proizvode, a u zemljama zapadne Europe Halal proizvode masovno konzumiraju i ljudi koji nisu islamske vjere jer su svjesni da Halal kvaliteta znači zdraviji i kvalitetniji način proizvodnje. Standardom se utvrđuje:⁸

- Što je dozvoljeno, a što zabranjeno prema islamskim propisima;
- Kako se certificira i provjerava poštivanje odredbi standarda;
- Kako se vrši halal klanje životinja;
- Kako se obilježavaju halal proizvodi;
- Koji su aditivi halal, a koji nisu.

Da bi jedna tvrtka dobila halal certifikat nužno je da svoju proizvodnju uskladi sa zahtjevima Halal standarda, a sam proces dobivanja certifikata utvrđen je procedurom certificiranja koja je sastavni dio standarda. Halal standard utvrđuje zahtjeve i mjere koji se moraju ispuniti, odnosno poduzeti, kako bi se osigurali uvjeti za dobivanje certifikata za halal kvalitetu. Za dobivanje halal certifikata u Republici Hrvatskoj nadležan je Centar za certificiranje halal kvalitete dok je u zemljama regije: BiH, Srbiji, Makedoniji i Crnoj Gori, nadležna Agencija za certificiranje halal kvalitete u Tuzli, BiH. Navedene institucije čine jedinstvenu mrežu halal certifikacijskih tijela u zemljama regije. Proces dobivanja halal certifikata utvrđen je postupkom certificiranja halal kvalitete koja je sastavni dio halal standarda.

Zainteresirane tvrtke podnose zahtjev za certificiranjem i dostavljaju dokumentaciju kojom dokazuju da posluju u skladu sa zakonom i da mogu zadovoljiti zahtjeve halal kvalitete. Nakon provjere dokumentacije od strane Centra

⁸ <http://www.made-in-croatia.com.hr/index.php?inc=OstaliProizvodi-halal-certifikat>

za certificiranje halal kvalitete potpisuje se ugovor o certificiranju te se izvršava edukacija zaposlenika (internih auditora) koji su zaduženi za implementaciju i održavanje zahtjeva halal kvalitete.

Dakle, tvrtka treba pripremiti dokumentaciju u kojoj su opisani svi postupci te implementirati zahtjeve halal kvalitete od nabave sirovina, prijema i skladištenja sirovine, proizvodnje te skladištenja i transporta gotovih proizvoda. Nakon što tvrtka implementira navedene zahtjeve Centar za certificiranje halal kvalitete organizira i provodi certifikacijski audit. Komisija za verifikaciju provjerava da li je certificiranje obavljeno na propisan način, zatim Upravno vijeće donosi odluku o dodjeli certifikata te se tvrtci dodjeljuje certifikat. Centar za certificiranje halal kvalitete najavljenim i nenajavljenim auditima te analizama gotovih proizvoda na prisutnost harama vrši provjeru poštivanja zahtjeva i mjera halal standarda.⁹

4. HALAL TURIZAM

Halal turizam je novi oblik turističke ponude koja je već prisutna u svijetu i obično se ne razlikuje mnogo od onoga što mi poznajemo kao turizam. U najkraćem, podrazumijeva da turistima muslimanima budu zadovoljena dva osnovna aspekta, a to su omogućavanje uvjeta za obavljanje vjerskih obreda i dostupnost halal hrane.¹⁰

Halal turizam u svijetu je još u **početnoj** fazi razvoja i taj koncept je star oko četiri godine. Svjetsko halal turističko tržište je u 2013. godini bilo vrijedno oko 140 milijardi dolara, s udjelom od oko 13% u ukupnoj globalnoj industriji turizma. Halal turizam je relativno nova pojava na svjetskom turističkom tržištu, a predstavlja djelatnost pružanja usluga tijekom putovanja osobama koje žive u skladu s halal normama ili halal „lifestyle-om“. Ova djelatnost obuhvaća aktivnosti organiziranja i realizacije putovanja, smještaj, uvjete za obavljanje vjerskih obreda, pripremanje i posluživanja hrane te ostale aktivnosti tijekom boravka, poput slobodnih aktivnosti, izleta, obilazaka, rekreacije i slično.

Potrebno je napomenuti da se pod halal turizmom mogu svrstati usluge koje nisu isključivo vezane za turiste, već za bilo koju osobu kojoj je potrebna i halal usluga, bez obzira na motiv putovanja i bez posebnog ograničavanja na bilo koju sezonu ili godišnje doba. To mogu biti i poslovni ljudi, sportaši, osobe koje putuju radi liječenja ili nekim drugim povodom. Također i agencije,

⁹ <http://www.made-in-croatia.com.hr/index.php?inc=OstaliProizvodi-halal-certifikat>

¹⁰ http://www.halal.ba/site/index.php?option=com_content&view=article&id=647:halal-turisti-iz-svijeta-vide-bih-kao-halal-destinaciju&catid=52:novosti&Itemid=105&lang=ba

organizacije ili objekti koji pružaju halal usluge mogu pružati i druge usluge koje nisu halal pod točno definiranim zahtjevima Pravilnika o certificiranju i kategorizaciji ugostiteljskih objekata, pružanja usluga u turizmu i zdravstvenim uslugama prema zahtjevima halal kvalitete.¹¹

Globalno halal tržište nije ograničeno samo na islamske/muslimanske zemlje jer gosti koji traže halal mogu biti iz bilo koje države svijeta. Pažnja gostiju s halal tržišta usmjerena je na to koliko su uvjeti i okruženje u kojima se usluga realizira „prijateljski“ za osobe koji traže halal usluge, a obuhvaćaju fizičko okruženje, infrastrukturu te gostoprimstvo i ljubaznost osoblja koje pruža uslugu.

4.1. Halal kao konkurenska prednost

Proizvodi i usluge koji su predmet razmjene na turističkom i inim tržištima, odavno nisu samo skup fizičkih i korisnih svojstava nego su, prije svega, temelj komunikacije s kupcima i korisnicima putem dodanih obilježja.¹² Naime, važno je prepoznati motive koji upravljaju ponašanjem i zbog kojih se potrošač/korisnik ponaša na određeni način. Iznimno značenje religijske komponente kao sastavnog dijela kulture i tradicije potrošača/korisnika, ima svoj utjecaj u turizmu, kako na strani ponude tako i na strani potražnje.

Turistička djelatnost, kao i turistička ponuda, ne zasnivaju se isključivo na turističkim apelima, već se s ciljem senzibiliziranja potrošača/turista, apeli mogu usmjeravati i na nacionalne, kulturološke i religijske osjećaje kao jake čimbenike koji utječu na željeno ponašanje.¹³ Goleme jahte bogataša iz arapskog svijeta sve su češći prizor u hrvatskim marinama na obali gdje im se, osim sunca i mora, malo toga nudi. “To su gosti koji su financijski izrazito moćni i stabilni koji, zapravo, gledaju gdje bi potrošili novac i to su gosti koji ne pitaju koliko je nešto nego kako je”¹⁴

Javlja se potreba za kreiranjem ponude novih oblika turizma i prilagodba kvalitete za goste s dalekih tržišta, s mogućnošću rasta i razvoja regije. Halal turizam u dobrom dijelu je i ekološki turizam. Obzirom da Islam ima svoju posebnu ekonomsku, etičku, sociološku i kulturnu dimenziju u okviru koje

¹¹ <http://www.poslovniturizam.com/intervjui/aldin-dugonjic-posjedovanje-halal-certifikata-sve-vise-postaje-presudno-za-dobivanje-posla/1603/>

¹² http://www.nzbi.hr/index2.php?option=com_docman&task=doc_view&gid=2&Itemid=33

¹³ http://www.nzbi.hr/index2.php?option=com_docman&task=doc_view&gid=2&Itemid=33

¹⁴ <http://www.index.hr/vijesti/clanak/sultani-seici-i-arapski-princevi-vole-jadran-a-nemaju-gdje-jesti-i-piti/700760.aspx>

su određeni i drugačiji oblici ponašanja potrošača/korisnika, halal stil življenja, između ostalog, uključuje svjesnost o očuvanju prirode. Za hrvatski turizam halal gosti su veliki potencijal s obzirom da zanemarivo mali broj njih posjećuje Hrvatsku, ali također halal turizam može biti i novi tržišni mamac za europske goste.¹⁵ Hrvatska je još uvijek nepoznata kao turistička destinacija islamskim zemljama. Istraživanje Instituta za turizam pokazalo je da gosti s Arapskog poluotoka za Hrvatsku ne znaju i da su im poželjni naši glavni konkurenti, što ukazuje na nedovoljnu promociju, s izuzetkom Turistička zajednica grada Zagreba koja već godinama izlaže i promovira grad Zagreb, a time i Republiku Hrvatsku, na vodećem turističkom sajmu na Bliskom istoku „Arabian Travel Marketu“.

5. ZAKLJUČAK

U svijetu poduzetništva i globalnog marketinga smatra se da postoje tri bitne stvari za osvajanje tržišta i pridobivanje kupaca: kvaliteta, rok i cijena. Kvaliteta se podrazumijeva (tako da se o njoj uopće ne razgovara), rok se dogovara, a o cijeni se pregovara. Nekim organizacijama je jedino važno dobiti certifikat koji će moći pokazati svojim kupcima i reći: imamo certifikat, znači da smo dobri i kvalitetni. No, ako certifikat žele samo radi toga da zadovolje nečije formalne zahtjeve, ako se sustav kvalitete implementira bez pravog razumijevanja zahtjeva norme, dobili su samo komad papira, ali ne i Sustav upravljanja kvalitetom koji bi mogao presudno utjecati na poboljšanje njihove konkurentnosti na tržištu. Halal tržište u Hrvatskoj je u začetku u posljednjih nekoliko godina, ono obuhvaća poduzeća iz prehrambene industrije, ugostitelje i hotelijere. Potražnja se javlja za cjelokupnom halal ponudom, od proizvoda do usluga. Trenutačno u Hrvatskoj 70-tak poduzeća posjeduju halal certifikat. Dugoročna ulaganja u halal proizvodnju i dobivanje halal certifikata jedan je od načina osiguranja mogućnosti izvoza koji se pokazao kao uspješna strategija održivosti i izlaska iz financijskih problema. Uspostavljanje halal standarda za velik broj proizvoda i usluga privući će turiste muslimanske vjeroispovijesti koji u prosjeku troše više turističkim od drugih gostiju. Potražnja za halalom mogla bi bila veća kad bi kupci bili bolje informirani i o halal hrani i značenju riječi halal. Bilo bi potrebno istaknuti prednost halal hrane u odnosu na druge načine ishrane, pogotovo u današnje vrijeme globalizacije kada je tržište raznoliko te su prisutne razne namirnice koje su štetne i sumnjivog porijekla, a bolja potražnja i prepoznatli-

¹⁵ <http://www.poslovniturizam.com/intervjui/aldin-dugonjic-posjedovanje-halal-certifikata-sve-vise-postaje-presudno-za-dobivanje-posla/1603>

vost za halalom postigla izdvajanjem halal hrane od ostale u ponudi trgovine. Poduzeća, proizvođače i potrošače treba educirati i informirati o halal hrani, te prehrambene proizvode s halal certifikatom bolje istaknuti i sortirati na određena mjesta u trgovačkim lancima koja su lako vidljiva i istaknuta da bi ih prepoznali potencijalni kupci. Prilika za promociju i plasman halal proizvoda leži i u halal turizmu, odnosno u ponudi halal hrane kroz ponudu domaćih ugostitelja i hotelijera. Već spomenuti halal turizam također je zanimljiv na našim prostorima te je potrebno pratiti njegov razvoj. Halal usluge i proizvodi još nisu dovoljno razvijeni na našem tržištu. Također, ekonomska je situacija uzrok odabira što jeftinijih proizvoda bez razmišljanja o porijeklu i vrijednosti samog proizvoda. Takvo stanje utječe ne samo na potrošače već i na proizvođače u Hrvatskoj koji se također brinu o uštedama. Budući da se radi o proizvodima velikoga izvoznog potencijala moguće je i kroz zakonodavnu i poreznu regulativu pokušati potaknuti domaće proizvođače na dobivanje halal certifikata i što uspješniji plasman na međunarodno tržište.

Abstract:

QUALITY MENAGEMENT SYSTEM CERTIFICATION:
HALAL CERTIFICATION CASE

The main attribute that gives a products characteristic quality and services is customer satisfaction. This application must set the technological and marketing aspects (sense) in front of the food manufacturers who have to respect food customs and habits of different groups of population. Food customs and habits are generally tied to the nation, religion, country or region, but nutrition varies considerably depending on the religious affiliation. Global trends indicate that Muslims want to be sure that the services and food they eat use halal are permissible. The world market of halal products and services is more increasing, and makes more requirements for proving the halal status in food and halal standards in services. To meet the demands of Muslims, food manufacturers and processors, have an interest to coordinate production, shaped it by the particular requirements of the Islam laws of, and thereby achieve economic benefits and satisfaction. However, the safety of food and drink is very important to human health and compliance with legal norms and established standards is a prerequisite for the survival of the domestic and foreign markets.

The aim of this paper is to demonstrate the importance of getting halal certification in all working areas, with special emphasis to increase competitiveness in the hospitality in tourism sector.

Key words: quality, quality management, standardization, Halal certificate, Halal tourism.

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Tematska cjelina/*Thematic unit*
KVALITETA U TRGOVINI I OPSKRBNOM LANCU
QUALITY IN RETAIL AN SUPPLY CHAIN

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EXPLORATION THE MEANING OF “QUALITY” IN SUBJECTIVE EXPERIENCE OF SHOPPING

ISTRAŽIVANJE ZNAČENJA “KVALITETE”
U SUBJEKTIVNOM ISKUSTVU KUPOVANJA

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ABSTRACT

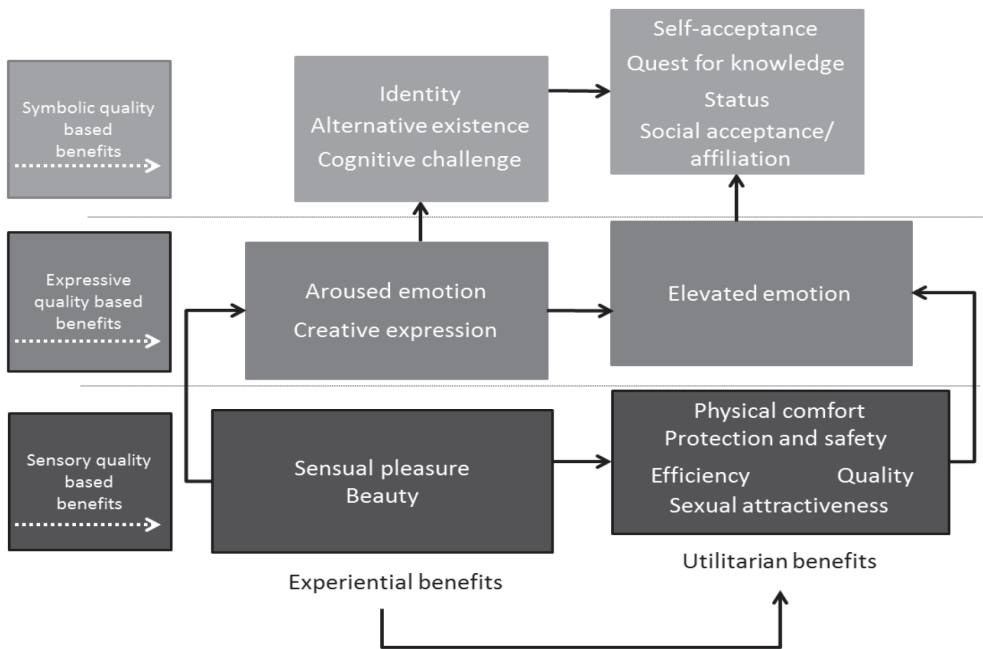
The present study focuses on exploring latent factors of quality perception in shopping experience. It is a very “soft” topic and hard to measure field with quantitative tools. Various and distinct parts of shopping experience are frequently studied, like consumer satisfaction in shopping places, preferences (or brand preferences), usability and environmental factors of the rental places, but in this article we want to examine a holistic aspect of sensory, symbolic and expressive quality based benefits in perceived shopping experience. Q-methodology is used to data collection and the sample is analysed with a modified factor analysis, because this method provides researchers a systematic and rigorously quantitative tool for examining human subjectivity.

Key words: Q-methodology, shopping experience, perception, sensory quality based benefits, symbolic quality based benefits, expressive quality based benefits.

1. INTRODUCTION

Before 1970s “consumption experience” researches were grounded in the information-processing approach.¹ That regarded the consumer to be a logical thinker, who aimed to purchase the best product from available product choices. After Hirschmann and Holbrook² presented a new model for understanding consumer’s way of thinking and decisions. Fiore and Ogle³ presented a similar model of Holbrook. Fiore and Ogle’s typology is adapted for this paper, their shopping experience model based on a value derived approach.

Figure 1. Typology of value derived from shopping experience



Source: Made by author.

¹ James R. Bettman, “An information processing theory of consumer choice” Regarding, MA, Addison-Weseley 1979.

² Elizabeth C. Hirschman and Morris B. Holbrook, “Hedonic consumption: Emerging concepts, methods propositions”, Journal of Marketing, No. 46, 1982, p. 92-101.

³ Ann Marie Fiore, and Jennifer Paff Ogle, “Facilitating the integration of textiles and clothing subject matter by students. Part I: Dimension of model and taxonomy.” Clothing and Textiles Research Journal, Vol. 18, No. 1, 2000, p. 31-45.

(Figure 1.) This value derived model distinguish experimental and utilitarian benefits in subjective shopping experience, and these benefits based on 3 different level. These are: sensory quality, expressive quality and symbolic quality based benefits.

2. Q-METHODOLOGY

The theoretical basis of the present work is the concept of Q-methodology. Q-methodology is primarily an exploratory technique, it cannot prove hypotheses. However, it brings a sense of coherence to research questions that have many, potentially complex and social contested answers.⁴

2.1. Historical background

The idea behind the development of this methodology was to inquire into the subjectivity of human mind. The examples of such subjectivity are limitless and include aesthetic judgment, appreciation of art, preferences for music, families' experiences after tragic events, and attitudes towards political groups. These were difficult, if not impossible, areas that could not be measured and reported scientifically by the conventional quantitative methods available at 30's. Q-methodology emerged as a direct result of that deficiency. In the 1970s and 1980s advanced computer programs were developed to perform statistical analysis of data derived by the Q methods. Authors have built up a model that deals with question of environmental awareness and individual attitude. Nowadays, Q-sorting has several benefits:⁵

- Q-sort offers a means for an in-depth study of small sample populations;
- It can help with exploratory research;
- A well-developed theoretical literature guides and supports its usage;
- It captures subjectivity in operation through a person's self-reference;
- Participants need not be randomly selected;
- It may be administered over Internet;
- Its analysis techniques help protect respondent self-reference from researcher influence.

⁴ Simon Watts and Paul Stenner, "Doing Q methodology: Theory, method and interpretation", *Qualitative Research in Psychology*, No. 2, 2005, p. 67-91.

⁵ Domic M. Thomas and Richard T. Watson, "Q-Sorting and MIS Research: A Primer," *Communications of the Association for Information Systems*, No, 8, 2002, p. 141-156.

Q methodology “combines the strengths of both qualitative and quantitative research traditions”⁶ and in other respects provides a bridge between the two.⁷ As such, subjectivity is always anchored in self-reference, that is a person’s internal frame of reference, and, Q studies from conception to completion adhere to the methodological axiom that subjectivity is always self-referent.⁸

2.2. Statistical background

Statistical Analysis typically involves the sequential application of three sets of statistical procedures to the Q-sort data – correlation, factor analysis and the computation of factor scores.⁹ Factor analysis is a statistical method of data reduction used to identify a small number of latent constructs (factors) that explain underlying, unobservable relationships among a large number of interrelated variables. The main applications of factor analytic techniques are: (1) to reduce the number of variables and (2) to detect structure in the relationships between variables, that is to classify variables. Therefore, factor analysis is applied as a data reduction or structure detection method. Firstly, Q-methodology inverts the direction of factor extraction and correlates the persons over a set of variables instead of the variables over a set of persons. Secondly – and this distinction is much more important than the mere difference in statistical procedure – Q-methodology follows a completely different approach to scientific reasoning. This becomes especially clear when looking at the way the isolated factors – which in the case of Q-methodology unite and represent persons, or, more precisely, their Q-Sorts – are rotated. While conventional factor analysis is used in scale development and tries to group items or variables, Q method tries to group subjects. Therefore, people of the same group or having the same factor will have a similar pattern of chosen statements. Q method is participant-led and seeks to understand the subjective expressions and viewpoints of participants.¹⁰

⁶ Dennis, K. E. and Andre Paul Goldberg, “Weight control self-efficacy types and transitions affect weight-loss outcomes in obese women”, *Addictive Behaviors*, No. 21, 1996, 103-116..

⁷ Sell, D. K. and Steven R. Brown, “Q methodology as a bridge between qualitative and quantitative research: Application to the analysis of attitude change in foreign study program participants”, In J.L. Vacca & H.A. Johnson (Eds.), *Qualitative research in education (Graduate School of Education Monograph Series)* (pp. 79-87). Kent, OH: Kent State University, Bureau of Educational Research and Service, 1984.

⁸ Bruce F. McKeown and Dan B. Thomas, *Q methodology*, Sullivan, J. L. & Niemi, R. G. (Eds.), *Quantitative applications in the social sciences*, Newbury Park: Sage Publications, 1988.

⁹ *Ibid.*

¹⁰ Simon Watts and Paul Stenner, “Doing Q methodology: Theory, method and interpretation”, *Qualitative Research in Psychology*, No. 2, 2005, p. 67-91.

The population, in the conventional research methodological term, refers to the group of people in which the results of the study can be applied. The sample refers to those people on which the study is actually been conducted. Classical test theory assumes that each person has a “true score” (T) that would be obtained if there were no errors in measurement. A person’s true score is defined as the expected number-correct score over an infinite number of independent administrations of the test. Unfortunately, test or questionnaires never observe a person’s true score, only an observed score, X. It is assumed that observed score = true score plus some error:

$$X=T+E \tag{1}$$

Where:

X: observed test score [-]

T: true test score [-]

E: error [-]

In Q methodology, the population and the sample is not as rigidly defined as in quantitative research. The sample needs not to be randomly drawn from the population. Often times, the persons are chosen for the research because they have special relevance to the topic or hold strong views about the topics of interest. Also the sample size is relatively small and it is not unusual to have one case study in detail. In fact, the subjective distortion (the “error”) can be study with Q methodology.

2.3. Steps in Q-methodology

The first reason to adopt the Q methodology in the field of product experience is that it allows the participants to express their subjectivity without confining them to the researcher’s categories. A Q sort gives the sorter room to construct a picture of his or her own viewpoint and to interpret each statement in his or her own way. Of course, Q’s merits on this count should not be exaggerated, as the researcher’s priori assumptions still enter into the construction of the set of statements, the selection of participants, and factor selection and rotation.¹¹ Q is better able to encompass the full range of ideas that participants may have because the selection of statements is approached as sampling from a universe of possible statements on the topic—as opposed to R method, which typically approaches the selection of statements as designing

¹¹ Paul Robbins and Robert Krueger, “Beyond bias? The promise and limits of Q-method in human geography”, *Professional Geographer*, Vol. 52, No. 4, 2000, p. 636-648.

measurements of specific hypothesized characteristics.¹² Q methodology is usually carried out in six stages:¹³

1. Researchers identify a particular discourse, which is the subject of exploration, and the relevant population. Research hypothesis as it applies to quantitative research is not necessary in Q methodology. A hypothesis reflects the viewpoint of the researcher and what he/she expects to prove or disprove by the particular research. As Q methodology is based on an individual respondent's viewpoint and not the researchers viewpoint, each of the respondent is taken valid and as a valuable source of information research.
2. The researcher conducts structured interviews or any sources with a sample of the population. A selection of statements comes from these interviews. This set of statements is usually enlarged with additional statements originating from other sources, such as newspaper or expert literature, with the goal of gathering a collection of statements that represent a relevant communication concourse that express a range of perspectives that exist for a particular area of interest. At this stage the researchers typically work with a set of 100–200 statements.
3. The investigator then constructs a Q sample. This refers to a selection of statements that will be shown to respondents, and form the basis for sorting and selection by respondents. The structure of the Q sample reflects a given research question. A typical Q statement set usually includes 30–60 items (stimuli).
4. Selected individuals are asked to evaluate and order statements on a pre-prepared scale, which is pyramid shaped, with placement or scores for each statement from the Q sample ranging from “Agree with most strongly” to “Disagree with most strongly.” Q studies commonly use 9 or 13-point scales. Usually a smaller number of respondents is adequate; more important than the size of the sample is the structure.
5. The researcher statistically analyzes the data, based on Q sorting by respondents, in order to reveal patterns across the participants. Q methodology is based on person-by-person correlation and factor analysis process. The aim of the analysis is to identify a few

¹² Thomas, D. and Baas, L., The issue of generalization in Q Methodology, “Reliable schematics” revisited, *Operant Subjectivity*, Vol. 16, No. 1, 1992, p. 18-36.

¹³ John Barry and Proops, “Seeking Sustainability Discourses with Q Methodology, *Ecological Economics*, No. 28, 1999, p. 337-345.

“typical” Q sorts that point out common attributes of several individual Q sorts.

6. Typical Q sorts are interpreted to uncover the content of shared views (i.e., discourses) with regard to the theoretical framework of the given study. Since the typical Q sort comprises several actors’ views, identified discourses are not representations of any particular individuals. They rather stand for the “bestestimate”, “essential,” or “ideal type” account of a view that is collectively shared within each group of actors.

3. OBJECTIVE AND RESEARCH METHOD

Purchasing goods is subjective and situation-dependent experience for every individual, therefore the ideal methodology to be applied for the examination of shopping experience was one that maintained as much of this subjectivity as possible. Unlike traditional questionnaire surveys or quantitative and qualitative research methods based on representative samples, the Q methodology is based on a small sample, but enables quantitative examinations with keeping the individual subjectivity.

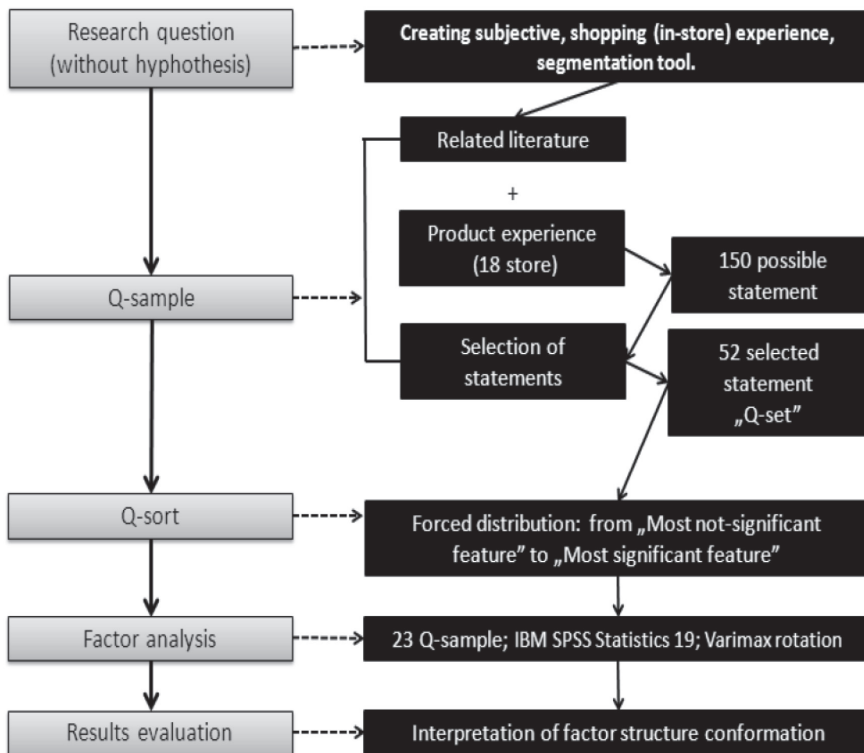
After collecting the relevant literature on the subject, we formulated own methodology related to the experience of shopping and with the help of it we performed the analyses on samples prepared by one „quick segmentation process.”¹⁴The most sensitive spot in the development and application of the Q-methodology was the construction and selection of the stimulation material (Q-sample). For this, besides studying the related literature, we also performed an individual/special/extraordinary guerilla-kind of ethnographic field study, to be able to perform measurements with the most practical statements later on. As a result of this, presented the outcome of 294 Q-sample.

For the calculations we established separate subsamples based on the theory of Limbic Type[®] model and then divided them by gender. The Limbic Type[®] model created by the Nymphemburg group is based on several thousands of brain research tests and their evaluations. The model published in 2004 was established on the fMRI results of over twenty thousand examined individuals. The model is extremely popular in German-speaking regions, as it is a comprehensive study that showcases how customers actually think and act, at the same time providing knowledge that can easily be applied in the marketing practice. The Limbic Type[®] model is only one

¹⁴ Emma Lógó and Balazs Peter Hámornik, *Develop a market segmentation tool, based on consumer behavior and motivation*, 2014.

from a line of customer behaviour models, but its main strength is that it is not based on questionnaires but on brain research data obtained at the location of customer decision.

Figure 2. Steps in our research method



Source: Made by author.

Based on Häusel (2008) – in a slightly simplified form – it was accepted that besides vital necessities there are three more emotional systems of great extent which determine our everyday lives and which are relevant from the point of view of customer behaviour. This so-called “Big 3” that is continuously at work in our mind and psyche is the following:

- The balance system is based on the customer’s desire for safety.
- The **stimulant** system is based on the customer’s desire for experiences, novelties and individuality.
- The **dominance** system is based on the customer’s desire for power, status, superiority and autonomy, accordingly.

Based on these three emotional systems¹⁵ the notion of the so-called Limbic Map[®] was introduced that has already been proven to be well-applicable in approaching the experiences connected to the usage of different products, and, on its basis, the deeper understanding of customer decisions and sometimes even for making predictions about them. The background for its name is that there are of our brain from the brain-stem to the cerebrum that is divided into many subcenters is the so-called limbic system that is primarily responsible for all of our emotional reactions. The limbic map connects the motivational and emotional systems with the values, so it is considered a useful tool in providing a clearer overview of purchase decisions of customers and consumers.

4. RESULTS EVALUATION

Our results shows that perceived quality or some synonyms are appeared is shoppers most and least preferred in-store experiences.

Table 1. Shopping experience factors derived from Q-methodology

	Male		Female	
	The most preferred in-store experience	The least preferred in-store experience	The most preferred in-store experience	The least preferred in-store experience
Balanced	„Demanding and customer oriented”	„Undemanding and frustrating” „Sluggish but correct” „Depressing extraneous” „Unfriendly Scamming”	„Positive group experience” „Reliable” „Multicolored” „Available luxury”	„Unfriendly discount” „Inelegant” „Unpleasant physical evidences”
Stimulatio	„Quality oriented”	„Scamming” „Elegant but depressing” „Too cheap, undemanding”	„Reliable group experience”	„Crowded depressing” „Without positive feelings”
Dominant	„Elegant fashionable”	„RUN!” „Zippy Scamming” „Exclusive but jarring”	„Reliable and kind”	„Bad physical evidences” „Tesco” „Low status” „Unfriendly”

Source: Made by author.

¹⁵ Hans Georg Häusel and F.Brain, View: Warum Kunden kaufen, Haufe Mediengruppe Rudolf Haufe Verlag GmbH & Co. KG, Niederlassung Planegg/München, 2008.

The most significant perceived quality factor reflects in the group of Stimulation “Seeking” Male participants.

They had only one significant so-called Quality oriented factor, because they most preferred for high quality store environment with high perceived quality products, with the experience of expert staff and services.

Sažetak:

ISTRAŽIVANJE ZNAČENJA “KVALITETE” U SUBJEKTIVNOM ISKUSTVU KUPOVANJA

Ovaj rad usmjeren je na istraživanje skrivenih faktora percepcije kvalitete u iskustvu kupovanja. To je veoma „kratkotrajna“ tema i teško mjerljiva kvantitativnim alatima. Različiti i posebni dijelovi iskustva kupovanja stalno se izučavaju, kao zadovoljstvo kupca na mjestu kupovanja, prioriteti (ili brend prioriteti), iskoristivost i faktori okruženja iznajmljenog mjesta, ali u ovom radu želimo ispitati cjeloviti aspekt osjetila, simboliku i izraženu kvalitetu koja se temelji na koristima i spoznajnom iskustvu kupovanja. Q-metodologija se koristi za prikupljanje podataka i uzorka analize primjenom modificirane faktorske analize, budući ta metoda pruža istraživačima sustavan i precizan kvantitativni alat za istraživanje ljudske subjektivnosti.

Ključne riječi: Q-metodologija, iskustvo kupovanja, percepcija, koristi koje se temelje na osjetilima kvalitete, koristi koje se temelje na simboličkim kvalitetama, koristi koje se temelje na izražavanju.

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KLJUČNE DETERMINANTE SUSTAVA UPRAVLJANJA KVALITETOM OPSKRBNOG LANCA

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SAŽETAK

U literaturi se posljednjih godina javlja sve više različitih pristupa izučavanju problematike upravljanja kvalitetom unutar opskrbnog lanca. To je posebno važno u uvjetima kada sve više poduzeća pribjegava strategijama vertikalne integracije i partnerstva sa sudionicima opskrbnog lanca zbog velikih pritisaka na smanjenje troškova i realizaciju maksimalne troškovne učinkovitosti. Iako se radi o temi koja je veoma zastupljena u literaturi, još uvijek postoje nejasnoće prilikom tumačenja koncepta upravljanja opskrbnim lancem, upravljanja kvalitetom opskrbnog lanca i kvalitete nabave. Stoga je osnovni cilj ovog rada analizirati i razgraničiti navedene pojmove te istražiti njihove međusobne odnose. Kroz pregled literature su definirane ključne determinante sustava upravljanja kvalitetom opskrbnog lanca te su iznesene pretpostavke o odnosima između sustava upravljanja kvalitetom opskrbnog lanca te upravljanja opskrbnim lancem i performansi opskrbnog lanca. Razu-

mijevanje odnosa među ovim sustavima i pristupima upravljanju moglo bi pomoći menadžerima da jednostavnije integriraju svoje aktivnosti upravljanja kvalitetom i upravljanja opskrbnim lancem.

Ključne riječi: upravljanje opskrbnim lancem, upravljanje kvalitetom, determinante kvalitete, odnosi s dobavljačima.

1. UVOD

Upravljanje kvalitetom i upravljanje opskrbnim lancem (supply chain management - SCM) su temeljni strateški elementi svake organizacije na tržištu. Oba koncepta su se razvijala na sličan način, ali uz različit stupanj uključenosti dionika (Vanichchinchai, 2012). Upravljanje kvalitetom se razvilo iz aktivnosti inspekcije i kontrole, a fokusira se više na interne korisnike i krajnje korisnike proizvoda ili usluga. Nasuprot tome, SCM se razvilo unutar logistike te uključuje dobavljače i kupce unutar opskrbnog lanca. Oba koncepta su se razvila iz organizacijskih funkcija te proširila na sve dionike organizacije, uključujući interne i eksterne korisnike. Također, oba koncepta dijele isti cilj, tj. zadovoljstvo krajnjih korisnika. Prema tome, integracija ovih konceptata unutar organizacije omogućuje realizaciju brojnih koristi.

Implementacija praksi upravljanja kvalitetom vodi do većeg zadovoljstva korisnika, učinkovitosti, konkurentnosti i boljih performansi organizacije (Abdullah i Tari, 2012; Fotopoulos i Psomas, 2009; Prajogo et al., 2012). Slično tome, SCM prakse vode ka zadovoljstvu korisnika, boljem pristupu tržištu, boljim organizacijskim performansama i konkurentnosti (Das i Sengupta, 2010; Ellinger et al., 2012; Fawcett et al., 2008; Green et al., 2012; Kannan i Tan, 2005; Zelbst et al., 2010). Prema tome, integracija upravljanja kvalitetom i SCM bi trebala imati pozitivan učinak na organizacijske performanse. Na temelju navedene premise, istraživači su razvili koncept upravljanja kvalitetom opskrbnog lanca (supply chain quality management – SCQM) (Robinson i Malhotra, 2005). Koncept uključuje implementaciju praksi upravljanja kvalitetom u svim procesima unutar opskrbnog lanca. Razlika između upravljanja kvalitetom i SCQM je u obuhvatu konceptata. Upravljanje kvalitetom je organizacijski koncept fokusiran na organizaciju i dionike organizacije, dok je SCQM koncept koji uključuje mrežu i fokusira se na sve sudionike opskrbnog lanca. SCQM promovira implementaciju praksi kvalitete u svim aktivnostima unutar opskrbnog lanca putem izgradnje partnerskih odnosa i sudjelovanja svih dionika. Ovaj koncept pozitivno utječe na kvalitetu nabave i rezultate opskrbnog lanca u cjelini (Lin et al., 2013; Robinson i Malhotra, 2005).

U ovom radu se analizira utjecaj SCQM na kvalitetu nabave i poslovne performanse organizacije. Na temelju analize literature iznose se teze o odnosima između SCQM, SCM, kvalitete nabave i performansi opskrbnog lanca. Većina prethodnih istraživanja se fokusirala samo na direktan utjecaj upravljanja kvalitetom na performanse opskrbnog lanca (Jraisat i Sawalha, 2013; Kannan i Tan, 2005; Terziovski i Hermel, 2011). Nadalje, Cagnazzo i sur. (2010) te Kannan i Tan (2005) su primijetili da utjecaj kvalitete nabave na performanse ili kvalitetu proizvoda i usluga nije analiziran u literaturi te da je potrebno oblikovati model koji bi omogućio istraživanje navedenih odnosa. Također, Mellat-Parast (2013) tvrdi da je razumijevanje praksi kvalitete unutar lanaca opskrbe ograničeno. Prema tome, fokus rada je na analizi odnosa između navedenih varijabli te izdvajanje ključnih determinanti koje će omogućiti razumijevanje koncepta kvalitete unutar opskrbnog lanca i osigurati okvir za ispitivanje odnosa između SCQM, SCM, kvalitete nabave i performansi organizacije. Bolje razumijevanje navedenih koncepata bi moglo olakšati menadžerima proces integracije praksi kvalitete u upravljanje opskrbnim lancem.

2. UPRAVLJANJE KVALITETOM U OPSKRBNOM LANCU

Upravljanje kvalitetom u opskrbnom lancu proizlazi iz aktivnosti unutar sustava kvalitete koje su povezane s nabavom i izgradnjom partnerskih odnosa s dobavljačima i ostalim partnerima. Utjecaj kvalitete dobavljača i uloge odnosa s dobavljačima na kvalitetu je detaljno istražen u literaturi (Cagnazzo et al., 2010). Kannan i Tan (2007) su zaključili da implementacija sustava kvalitete na razini poduzeća omogućuje izgradnju povjerenja koje osigurava učinkovite odnose unutar opskrbnog lanca. Sila i sur. (2006) su u svom istraživanju otkrili da proizvođači obično uključuju krajnje korisnike u aktivnosti sustava kvalitete, ali ne uključuju ključne dobavljače. Aktivnosti kvalitete bi trebale uključiti cjelokupni opskrbni lanac, uz strateško usmjerenje na pitanja kvalitete unutar opskrbnog lanca (Wiengarten et al., 2013). Neka od pitanja kvalitete, kao na primjer procesni pristup i uključenost zaposlenika, su determinante uspješne integracije opskrbnog lanca i upravljanja partnerskim odnosima u lancu (Trkman et al., 2007; Vanchinchai, 2012).

Većina istraživanja koja su uključila upravljanje kvalitetom i SCM su se fokusirala na utjecaj upravljanja kvalitetom na razini organizacije na performanse (Kannan and Tan, 2007). Tradicionalni pogled na kvalitetu obično obuhvaća organizaciju unutar koje je vrhovni menadžment pokretač promjena. Takav pogled na kvalitetu samo djelomično može obuhvatiti problemati-

ku među-organizacijskih procesa i aktivnosti (Mellat-Parast, 2013; Robinson i Malhotra, 2005; Zu i Kaynak, 2012). U pogledu opskrbnog lanca, kvaliteta treba uključiti među-organizacijske procese, a odluke o kvaliteti bi se trebale donositi na razini mreže, umjesto na razini vrhovnog vodstva (Mellat-Parast, 2013). S druge strane, prakse kvalitete olakšavaju upravljanje različitim procesima unutar poduzeća i među poduzećima prilikom upravljanja opskrbnim lancem (SCM). Prakse kvalitete, kao što su predanost, komunikacija, kvaliteta proizvoda, zadovoljstvo, kvaliteta informacija, vodstvo, izgradnja međusobnih odnosa i trening unaprjeđuju odnose među svim subjektima u opskrbnom lancu (Jraisat i Sawalha, 2013). Budući da su prakse kvalitete neizostavan dio SCM-a, potrebno je integrirati dva pristupa upravljanju kako bi se realizirali poslovni ciljevi. Nedostatak učinkovitog sustava upravljanja kvalitetom u mreži opskrbnog lanca povećava rizike veza ne uz funkcioniranje opskrbnog lanca, poslovne performanse i ugled (Zu i Kaynak, 2012). Na primjer, ukoliko nema istinske predanosti vodstva većina aktivnosti usmjerenih na unaprjeđenje kvalitete unutar opskrbnog lanca neće polučiti željene rezultate.

Dellana i Kros (2014) ističu da integracija filozofije upravljanja kvalitetom povećava učinkovitost praksi SCM-a. Organizacije s jakim sustavom kvalitete ostvaruju bolju integraciju SCM-a, kvalitetu proizvoda i višu razinu usluga za korisnike. Istraživanja redovito potvrđuju kako ulaganja u prakse kvalitete, kao što su ISO 9001, značajno poboljšavaju operativne performanse opskrbnog lanca (Berliacqua et al., 2013; Carmignani, 2009; Prajogo et al., 2012; Weingarten et al., 2013). Organizacije koje su certificirane prema normi ISO 9001 skraćuju broj dana držanja proizvoda na zalihama (Berliacqua et al., 2013), a napredna razina implementacije norme ISO 9001 pozitivno utječe na interno upravljanje procesima, korisnike i dobavljače (Prajogo et al., 2012). Carmignani (2009) predlaže upotrebu norme ISO 9001 prilikom početnih aktivnosti za razvoj SCQM-a, te je razvio normu temeljenu na ISO 9001 kako bi se izbjegla ograničenja njene primjene u opskrbnim lancima. Specifičnost SCQM-a je u tome što obuhvat norme mora biti širi od konteksta organizacije na koji se norma orijentira.

Mnogi autori su analizirali sličnosti između praksi upravljanja kvalitetom i SCM inicijativa te mogućnosti njihove integracije (Cangazzo et al., 2010; Kanji i Wong, 1999; Kannan i Tan, 2005; Mellat-Parast, 2013; Talib et al., 2011; Vanchchinchai i Igel, 2009). Kanji i Wong (1999) su zaključili da se SCM modeli mogu obogatiti uključivanjem praksi i koncepata upravljanja kvalitetom. Oba koncepta su menadžerske filozofije koje imaju krajnji cilj postizanje zadovoljstva korisnika (Talib et al., 2011; Vanchchinchai

i Igel, 2009). Međutim, primarni ciljevi ovih menadžerskih filozofija su različiti zbog naglaska na kvalitetu i nabavu (Vanchchinchai i Igel, 2009). Upravljanje kvalitetom se temelji na razvoju korporativne kulture koja ističe fokus na korisnike, kontinuirano unaprjeđenje, osnaživanje zaposlenika i donošenje odluka na temelju činjenica, dok SCM zahtijeva integraciju procesa odlučivanja kupaca i prodavatelja sa ciljem unaprjeđenja protoka materijala i proizvoda kroz opskrbeni lanac (Kannan i Tan, 2005). Upravljanje kvalitetom i SCM su sustavi upravljanja koji su vođeni potrebama korisnika (Talib et al., 2011). Oba koncepta će poboljšati svoje performanse samo uz kontinuiranu podršku vrhovnog menadžmenta, fokus na korisnike te putem izgradnje odnosa sa dobavljačima i upravljanja tim odnosima (Mellat-Parast, 2013). Iako upravljanje kvalitetom ističe interno sudjelovanje, a SCM se fokusira na eksterno sudjelovanje, organizacije trebaju staviti veći naglasak na prakse upravljanja kvalitetom u cjelokupnom opskrbnom lancu kako bi ostvarili bolje rezultate unutar opskrbnog lanca (Vanchchinchai i Igel, 2009). Vanchchinchai (2014) je u svom istraživanju zaključio da proizvođači automobila više primjenjuju prakse upravljanja kvalitetom nego SCM zbog toga jer se SCM koncept razvio mnogo kasnije od koncepta kvalitete. Više strateških pitanja vezanih uz SCM bi se trebalo naglasiti i integrirati u prakse upravljanja kvalitetom, kao što su upravljanje partnerstvima, kompetencije i dijeljenje resursa.

Sila i sur. (2006) tvrde da je razumijevanje problematike kvalitete u opskrbnom lancu ključno za uspjeh organizacije i rezultate opskrbnog lanca. Robinson i Malhotra (2005) predlažu sljedeće elemente za upravljanje opskrbnim lancem: strategija, kvaliteta vodstva, prakse kvalitete i interno fokusirana integracija i upravljanje procesima. Kako bi se unaprijedio eksterni opskrbeni lanac predlažu sljedeće elemente: komunikacija i partnerstvo, kvaliteta menadžmenta u opskrbnom lancu, prakse kvalitete i SCM-a, eksterno fokusirana integracija i upravljanje procesima. Ovo unaprjeđenje kvalitete procesa u opskrbnom lancu vodi do smanjenja troškova, boljeg korištenja resursa i veće djelotvornosti procesa (Jraisat i Sawalha, 2013). Prakse upravljanja kvalitetom i SCM-a se nadopunjuju te bi se trebale integrirati radi ostvarenja boljih poslovnih rezultata (Kannan i Tan, 2005; Mellat-Parast, 2013; Zu i Kaynak, 2012). Prakash (2011) je razvio model za mjerenje kvalitete usluge u opskrbnom lancu. Prema njegovom modelu kvaliteta usluga se vezuje uz lojalnost, zadovoljstvo, konkurentsku prednost i performanse organizacije.

Ravnoteža između 'mekih' i 'tvrdih' praksi kvalitete je potrebna kako bi se ostvarile bolje performanse i integracija unutar opskrbnog lanca (Terzi-

ovski i Hermel, 2011). Na primjer, razvoj partnerstava s dionicima u opskrbnom lancu i osnaživanje zaposlenika su dio ‘mekih’ praksi koje bi se trebale primijeniti zajedno s dokumentiranim procedurama i primjenom temeljnih alata kvalitete koji predstavljaju ‘tvrde’ prakse kvalitete. Utjecaj praksi kvalitete na performanse opskrbnog lanca se također mogu pratiti kroz prakse upravljanja utjecajima na okoliš, kao što je ISO 14001, zaštitu zagađenja, reciklažu materijala i smanjenje otpada (Wiengarten et al., 2013).

Konačno, SCQM se može definirati kao (Ross 1998, citirano u Sila et al., 2006:492): „[...] sudjelovanje svih članova mreže opskrbnog lanca u kontinuiranom i sinkroniziranom unaprjeđenju svih procesa, proizvoda, usluga i radne kulture fokusirane na generiranje izvora produktivnosti i konkurentske diferencijacije putem aktivne promocije proizvoda koji osvajaju tržište i usluga koje će pružiti potpunu vrijednost i zadovoljstvo korisnika“. Robinson i Malhotra (2005:319) definiraju SCQM kao: “formalnu koordinaciju i integraciju poslovnih procesa uključujući sve partnerske organizacije u kanalu opskrbnog lanca“.

3. ANALIZA UTJECAJA SUSTAVA KVALITETE NA PERFORMANSE UNUTAR OPSKRIBNOG LANCA

Neki elementi sustava upravljanja kvalitetom su ključni za održiv opskrbi lanac. Na primjer, proaktivno upravljanje odnosima i razvoj prikladne organizacijske kulture i povjerenja, koji se mogu ostvariti pomoću programa osnaživanja zaposlenika, su potrebni da bi se postigla održivost opskrbnog lanca (Cheung i Rowilson, 2011). Implementacija načela upravljanja kvalitetom omogućuje integraciju aktivnosti SCM-a. Prema Chicksandu i sur. (2012) integracija SCM-a se ne može ostvariti bez ispunjenja potreba korisnika, unaprjeđenja djelotvornosti i partnerstva s dobavljačima koje je utemeljeno na povjerenju. Fokus na korisnike unutar praksi upravljanja kvalitetom olakšava razumijevanje potreba svakog korisnika u opskrbnom lancu, procedure za razvoj proizvoda poboljšavaju fleksibilnost i prilagodljivost opskrbnog lanca s obzirom na potrebe korisnika, a uključenost zaposlenika vodi do jake organizacijske kulture. Das i Sengupta (2010) su predložili mrežu opskrbnog lanca orijentiranu na upravljanje kvalitetom koja omogućuje koordinaciju između dobavljača i partnera koja vodi do učinkovite mreže opskrbnog lanca i maksimizacije profita.

U ovom radu se pretpostavlja da *upravljanje opskrbnim lancem (SCM) pozitivno utječe na kvalitetu nabave i performanse opskrbnog lanca*. Dobar SCM je ključan za kreiranje vrijednosti za dionike kroz utjecaj na zadovolj-

stvo korisnika te je pokretač financijskih uspjeha organizacije (Ellinger et al., 2012). Unaprjeđenje zadovoljstva korisnika je važno zbog utjecaja na performanse. Zadovoljstvo korisnika je povezano s povećanjem tržišnog udjela i profitabilnosti, produktivnosti, dodane vrijednosti, vrijednosti za korisnike i uspjeha na burzi. Sposobnost organizacije da brzo odgovori na potrebe korisnika je ključna odrednica njihovog zadovoljstva (Kannan i Tan, 2007). Na strateškoj razini će opskrbeni lanac uspjeti ukoliko se prilagodi i uskladi s potrebama vanjskog okruženja (Fawcett et al., 2008). Usklađivanje tržišnih strategija sa partnerima unutar opskrbnog lanca se pozitivno odražava na performanse opskrbnog lanca (Green et al., 2012). Jedan od elemenata je izgradnja partnerskog odnosa s dobavljačima (Dellana i Kros, 2014). Kvaliteta odnosa u opskrbnom lancu direktno utječe na performanse. Razvoj dobavljača, odnosi s dobavljačima i njihova uključenost te strateško nabavljanje pozitivno utječu na operativne performanse (Kannan i Tan, 2005). Možemo zaključiti da uspješan dizajn i implementacija SCM-a smanjuje troškove, unaprjeđuje fleksibilnost, poboljšava kvalitetu i osigurava zadovoljstvo krajnjih korisnika (Mellat-Parast, 2013). Prajogo i sur. (2012) su potvrdili da upravljanje procesima nabave pozitivno utječe na poslovne rezultate organizacije. Agilnost, prilagodljivost i usklađeno djelovanje u opskrbnom lancu su ključne determinante uspjeha (Whitten et al., 2012). Na temelju svega navedenog, evidentno je da SCM utječe na elemente kvalitete, kao što su upravljanje procesima, odnosi s dobavljačima, zadovoljstvo korisnika. Stoga bi se SCM trebao proširiti na način da u uključi SCQM.

Također, pretpostavlja se da *SCQM pozitivno utječe na kvalitetu nabave i performanse opskrbnog lanca*. Na primjer, mnogi autori su dokazali da implementacija praksi kvalitete, kao što su ISO 9001, utječu na performanse opskrbnog lanca (Berliacqua et al., 2013; Carmignani, 2009; Prajogo et al., 2012; Wiengarten et al., 2013). Sustav upravljanja kvalitetom ima pozitivan učinak na odnose između svih dionika (Mellat-Parast, 2013), a to je jedna od ključnih pretpostavki za postizanje učinkovitosti procesa u opskrbnom lancu. Stoga se često preporuča integracija SCM strateških aktivnosti sa praksama upravljanja kvalitetom (Vanchinchai, 2014). U opskrbnom lancu je razina kvalitete koju prima krajnji korisnik rezultat upravljanja kvalitetom svih veza i sudionika u lancu (Jraisat i Sawalha, 2013).

Predanost kvaliteti i razumijevanje dinamike unutar opskrbnog lanca najviše utječu na performanse. Interne i eksterne prakse upravljanja kvalitetom utječu na rezultate, ali vanjske prakse imaju veći utjecaj te ih zbog toga menadžeri smatraju važnijima (Kannan i Tan, 2007). Brojni su autori potvrdili da prakse kvalitete utječu na performanse opskrbnog lanca (Kannan

i Tan, 2005; Mellat-Parast, 2013; Terziovski i Hernel, 2011; Wiengarten et al., 2013; Zu i Kaynak, 2012). Na primjer, poslovni procesi temeljeni na kvaliteti mogu pomoći kod osnaživanja poslovnih odnosa, razvoja sinkroniziranih veza među sudionicima opskrbnog lanca i posljedično dovesti do konkurentске prednosti (Prakash, 2011). Osim toga, trening zaposlenika i njihov angažman i uključenost su ključni za postizanje inovacija i unaprjeđenja. Menadžeri ne smiju zanemariti trening, edukaciju i povezivanje ljudi u lancu opskrbe jer im ono može pomoći da potaknu uspješnu suradnju i inovacije (Fawcett et al., 2008).

Razumijevanje problematike kvalitete je ključno za realizaciju performansi opskrbnog lanca (Sila et al., 2006). Prakse kvalitete utječu na učinkovitost praksi SCM, integraciju SCM, kvalitetu proizvoda i razinu usluge koja se pruža korisnicima (Dellana i Kros, 2014). Prakse kao što je upravljanje potpunom kvalitetom (TQM) potiču agilnost proizvodnje koja potom poboljšava operativne rezultate i performanse logistike (Zelbst et al., 2010). Konačno, kvaliteta u lancu opskrbe utječe na smanjenje troškova, bolje korištenje resursa i bolju učinkovitost procesa (Jraisat i Sawalha, 2013). Možemo zaključiti da bi bolje razumijevanje determinanti SCQM-a mogao doprinijeti realizaciji veće razine kvalitete nabave i performansi opskrbnog lanca.

4. KLJUČNE DETERMINANTE SUSTAVA UPRAVLJANJA KVALITETOM OPSKRIBNOG LANCA

Na temelju pregleda recentne literature u tablici 1, definirane su sljedeće ključne determinante sustava upravljanja kvalitetom opskrbnog lanca: predanost vodstva, fokus na korisnika, kvaliteta informacija, *upravljanje ljudskim potencijalima, prakse i procedure kvalitete, odnosi s dobavljačima, komunikacija, edukacije i trening, strategija, mjerenje i analiza kvalitete.*

Vodstvo koje razumije važnost kvalitete i koje komunicira prema svojim zaposlenicima potrebu za implementacijom praksi kvalitete je temelj za izgradnju održivog upravljanja kvalitetom u opskrbnom lancu (Cheung i Rowlinson, 2011; Dellana i Kros, 2014; Kuei et al., 2011; Lin et al., 2013; Parker et al., 2006; Tamimi, 1998). Kod upravljanja kvalitetom u opskrbnom lancu menadžment mora razumjeti i uvažavati interne i eksterne čimbenike jer kvaliteta procesa ovisi o svim sudionicima u lancu. Stoga se odluke o kvaliteti trebaju donositi u suradnji sa dobavljačima, kupcima i ostalim sudionicima lanca (Lin et al., 2013). Pri tome, uspjeh ovisi o povjerenju i uvažavanju između svih sudionika u lancu.

Fokus na korisnike je sljedeći element u SCQM-u. Bez ispunjenja potreba i očekivanja korisnika se ne može postići kvaliteta u opskrbnom lancu. SCQM mora biti postavljen na način da ispunjava sve elemente kvalitete koje korisnici očekuju (Baird et al., 2011; Carmignani, 2009; Foster, 2008; Martinez i Poole, 2004; Sroufe i Curkovic, 2008; Vladimirov, 2011; Zuniga-Arias et al., 2009). Zbog toga je potrebno redovito pratiti njihovo zadovoljstvo, a na temelju rezultata se određuju aktivnosti poboljšanja. Nastoji se izgraditi partnerski odnos sa korisnicima koji se temelji na međusobnom uvažavanju i povjerenju. Kada se to postigne stvara se kultura kvalitete u opskrbnom lancu koja predstavlja izvor konkurentske prednosti putem utjecaja na lojalnost korisnika.

Kvaliteta informacija je također važna determinanta SCQM-a (Faria-Fernandes et al., 2009; Fawcett et al., 2008; Martinez i Poole, 2004; Mikko-la, 2008; Parker et al., 2006; Saraph et al., 1989; Vladimirov, 2011). Ona uključuje jasnu, konciznu i ažurnu dokumentaciju te pravovremeno dostupne informacije potrebne za donošenje poslovnih odluka u opskrbnom lancu. Na taj se način omogućuje donošenje poslovnih odluka temeljenih na činjenicama i stvarnim performansama opskrbnog lanca. Odnosi povjerenja i partnerstvo sa svim sudionicima u opskrbnom lancu su ključni kako bi se osigurala kvaliteta informacija (Fawcett et al., 2008).

Determinanta koja ima posebno važan utjecaj na kvalitetu i performanse opskrbnog lanca je *upravljanje ljudskim potencijalima*. Jedino sustav koji je temeljen na stalnom osnaživanju, poticanju i motiviranju svih zaposlenika može polučiti rezultate tj. dovesti do unaprjeđenja kvalitete i performansi opskrbnog lanca (Cagnazzo et al., 2010; Kannan i Tan, 2007; Mellat-Parast, 2013; Terziovski i Hermel, 2011; Vanichchinchai, 2012). Motivirani zaposlenici će biti produktivniji, a poticanje i osnaživanje zaposlenika će utjecati na bolje razumijevanje uloga i odgovornosti u opskrbnom lancu te će se lakše provesti mjere poboljšanja radnih procesa.

Tablica 1. Determinante sustava upravljanja kvalitetom opskrbnog lanca

	Baird et al.	Bevilacqua et al.	Cagnazzo et al.	Carmignani	Cheung i Rowlinson	Dellana i Kros	Faria-Fernandes et al.	Fawcett et al.	Flynn i Flynn	Foster
Kvaliteta proizvoda	✓						✓			
Kvaliteta informacija	✓			✓			✓	✓		
Fokus na korisnika	✓	✓	✓	✓		✓	✓		✓	✓
Okolišni čimbenici	✓	✓								
Politika kvalitete	✓									
Razvoj proizvoda i usluga		✓								
Upravljanje resursima		✓	✓	✓						
Procesni pristup		✓			✓			✓	✓	
Predanost vodstva			✓		✓	✓			✓	✓
Promjena kulture			✓		✓					
Komunikacija			✓					✓		
Edukacije i trening			✓					✓		
Strategija			✓	✓					✓	
Upravljanje ljudskim potencijalima			✓			✓		✓	✓	✓
Mjerenje i analiza kvalitete			✓	✓		✓		✓	✓	
Projektni pristup			✓					✓		
Kontinuirano unaprjeđenje						✓				
Upravljanje pritužbama korisnika						✓				
Timski rad						✓				
Prakse i procedure kvalitete								✓		✓
Odabir dobavljača										✓
Odnosi s dobavljačima								✓		✓
Financijska podrška								✓		✓
Tehnologija										
Društvena odgovornost										

Tablica 1. Determinante sustava upravljanja kvalitetom opskrbnog lanca (nastavak)

	Jraisat i Sawalha	Joseph et al.	Kannan i Tan	Kaynak i Hartley	Kuei et al.	Lin et al.	Malhotra et al.	Martinez i Poole	Mellat-Parast	Mikkola
Kvaliteta proizvoda	✓							✓		✓
Kvaliteta informacija	✓	✓						✓	✓	✓
Fokus na korisnika	✓			✓	✓			✓	✓	✓
Okolišni čimbenici	✓									
Politika kvalitete	✓	✓							✓	
Razvoj proizvoda i usluga			✓							
Upravljanje resursima										
Procesni pristup				✓	✓	✓				
Predanost vodstva	✓	✓	✓	✓	✓	✓		✓	✓	✓
Promjena kulture										
Komunikacija	✓				✓		✓	✓		✓
Edukacije i trening	✓	✓	✓			✓		✓		✓
Strategija			✓		✓	✓				
Upravljanje ljudskim potencijalima		✓	✓	✓	✓	✓		✓	✓	
Mjerenje i analiza kvalitete				✓	✓					
Projektni pristup										
Kontinuirano unaprjeđenje	✓								✓	
Upravljanje pritužbama korisnika										
Timski rad										
Prakse i procedure kvalitete	✓	✓		✓	✓	✓		✓		
Odabir dobavljača		✓	✓	✓						
Odnosi s dobavljačima	✓	✓		✓		✓				✓
Financijska podrška	✓							✓		
Tehnologija		✓				✓				
Društvena odgovornost										

Tablica 1. Determinante sustava upravljanja kvalitetom opskrbnog lanca (nastavak)

	Parker et al.	Psonas et al.	Saraph et al.	Sroufe i Curkovic	Talib et al.	Tamimi	Terziovski i Hermel	Vanichchinchai	Vladimirov	Yeung	Zuniga-Artias et al.
Kvaliteta proizvoda	✓				✓				✓		✓
Kvaliteta informacija	✓		✓	✓	✓			✓	✓		✓
Fokus na korisnika				✓	✓		✓	✓	✓	✓	✓
Okolišni čimbenici					✓						
Politika kvalitete					✓		✓				
Razvoj proizvoda i usluga			✓			✓					
Upravljanje resursima							✓				
Procesni pristup			✓				✓				
Predanost vodstva	✓		✓		✓	✓	✓	✓			✓
Promjena kulture							✓				
Komunikacija	✓			✓		✓			✓	✓	✓
Edukacije i trening			✓			✓			✓		✓
Strategija							✓	✓		✓	
Upravljanje ljudskim potencijalima			✓	✓	✓	✓	✓	✓			
Mjerenje i analiza kvalitete		✓		✓				✓			
Projektni pristup											
Kontinuirano unaprjeđenje		✓									✓
Upravljanje pritužbama korisnika											
Timski rad											
Prakse i procedure kvalitete		✓	✓	✓				✓		✓	✓
Odabir dobavljača				✓						✓	
Odnosi s dobavljačima	✓		✓	✓		✓		✓		✓	✓
Financijska podrška						✓	✓				
Tehnologija											
Društvena odgovornost							✓				

Prakse i procedure kvalitete se odnose na primjenu metoda, alata i modela za upravljanje kvalitetom u opskrbnom lancu. Često se ističe da primjena norme ISO 9001 omogućuje realizaciju pozitivnih učinaka u opskrbnom lancu, kao što su: veća djelotvornost, zadovoljniji korisnici i sl. (Foster, 2008; Kaynak i Hartley, 2008; Malhotra et al., 2005; Martinez i Poole, 2004; Psomas et al., 2011; Saraph et al., 1989; Yeung, 2008). Primjena praksi kvalitete osigurava da svi sudionici u opskrbnom lancu bolje razumiju i lakše ispunje određene zahtjeve korisnika (Lin et al., 2013).

Odnosi s dobavljačima u opskrbnom lancu su posebno važna determinanta. Obostrano korisni odnosi s dobavljačima, temeljeni na uvažavanju, povjerenju i partnerstvu osiguravaju postizanje boljih rezultata i više razine kvalitete (Fawcett et al., 2008; Joseph et al., 1999; Kaynak i Hartley, 2008; Mikkola, 2008; Parker et al., 2006; Yeung, 2008; Zuniga-Arias et al., 2009). Na primjer, primjena suvremenih metoda upravljanja zalihama, kao što je just-in-time, ovisi o odnosima s dobavljačima (Kannan i Tan, 2005). Također, kvaliteta proizvoda i usluga u opskrbnom lancu ovisi o kvaliteti ugrađenih komponenata.

Sljedeća determinanta je *komunikacija*. Komunikacija u opskrbnom lancu je preduvjet za izgradnju dobrih odnosa među svim sudionicima (Caganazzo et al., 2010; Kuei et al., 2011; Martinez i Poole, 2004; Parker et al., 2006; Sroufe i Curkovic, 2008; Vladimirov, 2011; Zuniga-Arias et al., 2009). Također, komunikacija je ključna radi prijenosa svih potrebnih informacija kako bi se osiguralo pravovremeno donošenje poslovnih odluka. Bez dobre komunikacije se ne može potaknuti i motivirati zaposlenika. Stoga je za uspjeh opskrbnog lanca neophodno uspostaviti dobar sustav komunikacije između svih sudionika unutar lanca.

Edukacije i trening su temelj za izgradnju sustava upravljanja kvalitetom u opskrbnom lancu jer se putem njih postiže bolje razumijevanje sustava od strane zaposlenika te se oni osposobljavaju za primjenu specifičnih alata i praksi kvalitete. Sustav kvalitete u opskrbnom lancu zahtjeva stalnu prilagodbu potrebama korisnika i konkurentskom okruženju pa su edukacije i treninzi nužan preduvjet za dugoročan uspjeh opskrbnog lanca (Jraist i Sawalha, 2013; Lin et al., 2013; Mikkola, 2008; Saraph et al., 1989; Tamimi, 1998; Vladimirov, 2011). Bez primjene suvremenih alata i metoda se ne može pratiti konkurenciju i zadržati poziciju u tržišnoj utakmici. Stoga je zadaća menadžmenta osigurati redovite treninge svojih zaposlenika.

Vodstvo mora izraditi *strategiju* za upravljanje kvalitetom u opskrbnom lancu koja će definirati okvire unutar kojih se određuju ciljevi kvalitete. Strategija koja uključuje sve sudionike opskrbnog lanca omogućuje lakše definiranje i praćenje procesa kvalitete (Carmignani, 2009; Flynn i Flynn, 2005; Kannan i Tan, 2005; Terziovski i Hermel, 2011; Yeung, 2008).

Mjerenje i analiza su osnova kontinuiranog unaprjeđenja jer se bez rezultata mjerenja performansi svih procesa u opskrbnom lancu ne bi mogla pratiti djelotvornost sustava upravljanja kvalitetom (Dellana i Kros, 2014; Flynn i Flynn, 2005; Kaynak i Hartley, 2008; Psomas et al., 2011; Sroufe i Curkovic, 2008; Vanchinchai, 2014). Također, rezultati mjerenja i analiza otkrivaju elemente procesa kod kojih se trebaju provesti mjere poboljšanja i koji mogu dovesti do boljih rezultata.

Osim ovih determinanti u literaturi se navode i druge kojima se SCQM može upotpuniti i unaprijediti. Neke od tih determinanti su: kvaliteta proizvoda, procesni pristup, odabir dobavljača, politika kvalitete, kontinuirano unaprjeđenje, okolišni čimbenici, upravljanje resursima, razvoj proizvoda i usluga i sl. Međutim, deset prethodno analiziranih determinanti su temelj za kreiranje i održavanje sustava upravljanja kvalitetom u opskrbnom lancu. Rezultati analize literature su ukazali na ključna područja koja menadžeri trebaju obuhvatiti u svom SCQM-u te na koji način deset ključnih determinanti utječe na kvalitetu nabave i performanse opskrbnog lanca.

5. ZAKLJUČAK

U ovom radu se analizirao odnos sustava upravljanja kvalitetom unutar opskrbnog lanca i sustava upravljanja opskrbnim lancem te su izdvojene ključne determinante upravljanja kvalitetom koje su najznačajnije za postizanje boljih performansi u opskrbnom lancu. Na temelju pregleda literature, utvrđeno je da sustav upravljanja kvalitetom ima izuzetno važan utjecaj na kvalitetu nabave i performanse opskrbnog lanca. Pored navedenog, SCM bi trebao uključiti prakse i procedure SCQM-a kako bi se osiguralo dugoročno održivo upravljanje opskrbnim lancem. Posebno se ističe potreba za uključivanjem eksternih sudionika opskrbnog lanca u SCQM kako bi se, kroz partnerstvo i suradnju, realizirali postavljeni ciljevi uz najveću razinu djelotvornosti i zadovoljstvo korisnika. Predloženi model praćenja kvalitete u opskrbnom lancu obuhvaća sve sudionike i krajnje rezultate za razliku od većine prethodnih modela koji su se najčešće fokusirali na utjecaj sustava kvalitete na razini organizacije na performanse opskrbnog lanca. Dakle, obuhvat sustava kvalitete uključuje sve dionike u opskrbnom lancu, a sustav donošenja odluka bi se trebao temeljiti na međusobnoj suradnji i partnerstvu.

Pregledom literature iz područja upravljanja kvalitetom opskrbnog lanca definirano je deset ključnih determinanti SCQM-a koji su osnova za realizaciju poslovnih ciljeva i unaprjeđenje performansi opskrbnog lanca. Pored navedenog, istaknute su i druge determinante čijom implementacijom se mogu realizirati dodatni pozitivni efekti na funkcioniranje opskrbnog lanca i kvalitetu nabave. Vodstvo organizacija koje nastoje unaprijediti performanse svog

opskrbnog lanca bi trebalo posebnu pažnju usmjeriti na navedene determinante i koristiti ih prilikom implementacije praksi SCQM-a.

Abstract:

KEY DETERMINANTS OF SUPPLY CHAIN QUALITY MANAGMENT

In the recent years, literature presents numerous approaches to analyse quality management issues in the supply chains. This is especially important in the situation when increasing number of companies applied vertical integration strategies and development of partnership with subjects in the supply chain in order to decrease expenses and achieve high cost effectiveness. Although the subject is widely analysed in the literature, the concepts of supply chain management, supply chain quality management, and supply quality are still misinterpreted. Therefore, the aim of this paper is to analyse and distinguish between those concepts and to examine their interrelations. Based on the literature review, key determinants of supply chain quality management were defined and propositions regarding relationships between supply chain quality management, supply chain management, and supply chain performances were analysed. Understanding of the relationships between mentioned variables could help managers to more easily integrate their quality management activities and practices with supply chain management.

Key words: supply chain management, quality management, quality determinants, supplier relations.

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THE USE OF QUALITY FUNCTION DEPLOYMENT METHOD IN DEFINING *VOICE OF CUSTOMER*: CASE OF GRC GROUP

PRIMJENA QFD METODE PRI DEFINIRANJU *GLASA KUPCA*:
PRIMJER PODUZEĆA GRC GRUPA

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ABSTRACT

The aim of this paper is to identify the areas that can raise the level of business quality of a certain business organization and its main process by applying QFD method as well as defining „the voice of customer“. The company GRC group d.o.o. offers solutions for business software, which is the company's core business. Before applying QFD method, a market research has been conducted using interview method. The users of GRC group services have been interviewed in order to find out how satisfied they are with the service. Based on the general features given, the users have evaluated the importance of certain software features as well as the behaviour of service provider. After that, on the basis of the same features, they compared the GRC group with its main competitor. The result of the research has shown that GRC group has more positive business results, but, at the same time, there are certain activities in

the process that should be improved. These areas of improvement are related to the behaviour of staff (not kind enough) and to the high price of software. In order to decrease the effect of these negative elements and, at the same time, to increase the quality, it has been recommended to invest in the employee development, communication and training and to reduce the price and/or make the existing products more attractive by offering extra services such as longer guarantee or free software testing, which would eventually increase customer satisfaction and make the business results of GRC group better.

Key words: QFD method, voice of customer, improvement of business, business software, customer satisfaction.

1. INTRODUCTORY EXPLANATION OF TERMS: QFD AND VOICE OF CUSTOMER

Quality is a term used in every day communication and it is hard to define it unambiguously. One of the first definitions of quality originates from ancient Phoenicians and it says that quality is something good. In order to manage quality it is necessary to get familiar with it. Quality is an adequate level at which a certain entity meets the requirements of its user. This adequate level is defined by the organization itself, and entities may refer to various areas, from tangible entities to intangible ones which are related to processes, behaviours, commitment, consistency and the like.¹

One of the useful methods that may help in defining the quality of the observed product is certainly QFD method (Quality function deployment) or simply, method of quality function deployment. This is a structured approach to defining customer needs and desires, and reflecting them into production system, i.e. the approach which on the basis of input creates the required output. QFD method is one of the primary activities of total quality management (TQM). TQM helps the organization in a way that its offer is based on the adequate level which meets customer needs and desires and it reflects its three primary activities: *Hoshing planning* (strategic planning which defines key goals, ensures implementation of plans, and supervises and adjusts implementation), QFD and *Statistical process control* (SPC) which supervises and controls a complete process by means of statistical methods.²

¹ Mohamed Zairi, *Hoshing planning: strategy of a different kind*, <http://www.emeraldinsight.com/doi/full/10.1108/10775730610618765>, 10.12.2015.

² Ibid.

Out of all three primary activities of TQM, QFD method is based on market to the largest extent, i.e. the product design and its creation by means of *voice of customer* technique reflect the market needs. It is important that business processes are well organized and that organization is continuously supervised. Likewise, if the need incorporated in the product creation is not recognized, market results will not meet the expectations.³

As explained above, QFD method is a structured approach to defining customer needs and desires, while *voice of customer* describes in fact the desires and needs expressed through interviews, surveys, focus groups, observations and other research methods.⁴ On the basis of structured questions the respondents express their opinion about design, functionality and price of the product. The answers are finally analyzed and graphically presented in the *house of quality*. The *house of quality* presents production planning matrix which, based on average grades, shows the product trend, depending on a category³.

When the market research is conducted using the *voice of customer* a comparison of two or three companies is made in order to find out in which segment of a chosen product the observed company is better or worse than the company it was compared with. Similar comparison is used in *benchmark* method and it is a useful way of defining positive and negative attributes of a particular business process and it enables learning and necessary changes of behaviour.⁵

2. GRC GROUP AND BUSINESS PROCESS ORIENTATION

With a slogan „Business solutions may be simple“⁶, GRC group has really implemented this idea and become a leading company for business software design in the Republic of Croatia with approximately 3.000 users in its present base. In accordance with the data from their IT system, the major users of GRC group business solutions are caterers and retailers. Software solutions of GRC group are their own product which is completely designed and creat-

³ Jašarević, S., Diering, Manuela. i Brdarević, S., *Opinions of the consultants and certification houses regarding the quality factors and achieved effects of the introduced quality system*, Tehnički vjesnik, Vol. 19, No. 2, 2012.

⁴ John D. Politis, *QFD organisational creativity and productivity*, <http://www.emeraldinsight.com/doi/full/10.1108/02656710510572995>, 10.12.2015.

⁵ Osmanagić Bedenik, Nidžara. i Vlatka Ivezić, *Benchmarking kao instrument suvremenog kontrolinga*, hrcak.srce.hr/file/16858, 15.12.2015.

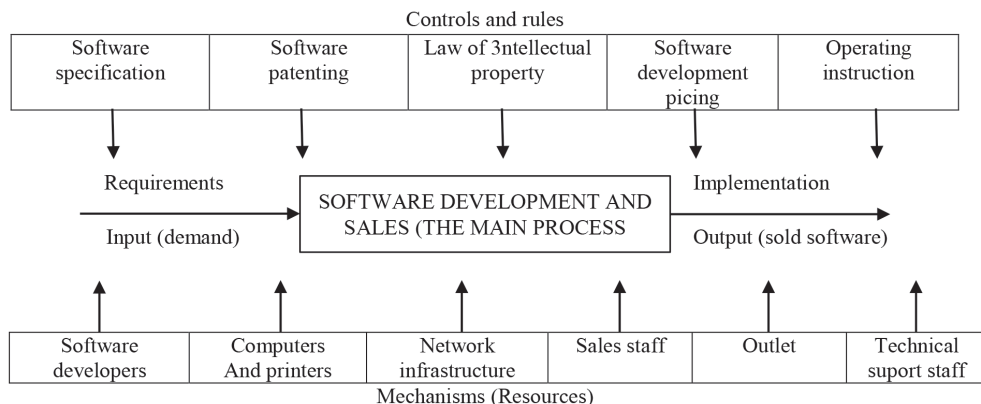
⁶ John D. Politis, *QFD organisational creativity and productivity*, <http://www.emeraldinsight.com/doi/full/10.1108/02656710510572995>, 10.12.2015.

ed by its employees and IT experts, in cooperation with users. The company’s business is based on development and integration of solutions that enable users to access information more easily, thus facilitating the business process.

In the last 5 years GRC group has grown steadily. On its homepage the company has shown both the total revenues and the revenues generated from software, which leads to the conclusion that software sales are the core business of GRC group. This information confirms the fact mentioned earlier that demand for workforce is largest in the service sector with focus on software development.

A wide range of software offered by GRC group, as well as its quality, complexity and simplicity have differentiated GRC group from other companies. The company has developed seven different softwares and it is possible to choose a different version. Some of the most popular softwares are UGO POS, *smart*-fiscal software for catering industry, and fiscal software for reception desk activities.

Figure 1. Basic structure of the main process of the GRC group



Source: Authors’.

Added value of GRC group is not reflected only in the revenues previously mentioned but also in improving and adding new softwares. Revenue increase, knowledge increase based on a learning process that occurs when using and implementing that knowledge, contributed to the growth and development of GRC group. Ideas and information about GRC group are circulated throughout the whole company, thus smoothly flowing and contributing to the atmosphere that encourages creation of new ideas and proposals.

GRC group recognized the importance of process oriented business, i.e. the importance to identify and manage business processes which are focused on the market and its demands. It is concluded that the main process i.e. the process on which a certain business segment is based, is related to software design and sales. In the following part the main process of the GRC group is outlined.

From Figure 1. it is obvious that the main process of GRC group is software development and sales. Input data from the market, i.e. the demand that refers to the current market shortages and forecast of future demand, makes a basis for software development. Controlling mechanisms are of technical nature and relate to software specifications, i.e. what type of activity it is designed for, how intellectual property will be protected, the costs of software design and the guidelines that should be followed when developing a software.

Resources refer to those parts relating to software development and its sales. Those mechanisms include the people who develop software, necessary infrastructure related to equipment and network, sales staff and technical support staff, and the outlet where the product is delivered.

GRC group believes that defining adequately input demands is crucial for running the main process efficiently. Therefore, a special attention is paid and substantial resources are allocated to customer requirements, i.e. *to voice of customer*.

3. APPLICATION OF QFD METHOD IN GRC GROUP

Despite positive effects of QFD method, GRC group has not implemented this system of identifying desires and needs from the market into its business. If GRC group considered introduction of QFD method in its business it would have a more precise picture about desirable features of its products. In this way not only could GRC group have a better insight into what the desires and needs from the market are but could also identify its advantages and disadvantages in comparison with similar companies.

It is likely that the GRC group is not familiar with the effects of this method. By training people about QFD method, it is more likely that it will be introduced. Also, by presenting this paper and similar papers on this topic, it can be explained in a practical way how the method works, and how its results positively affect the decision making process.

For the purpose of QFD method i.e. *voice of customer*, market research has been conducted through interview method on a sample of 10 respondents. The respondents represent active users of GRC group but also of Milenij company which is the strongest competitor of the company in question.

The respondents were offered general features of software and description of employee behaviour (software providers) and they had to assess the importance of a certain product feature using grades ranging from 1 to 5 (from least important to most important). Then they had to compare, based on the requirements mentioned in the previous question, GRC group with Milenij company in a way that for each feature the company is graded from 1 (minimum) to 5 (maximum). Then they had to assess the level of technical requirements met by each company by grade 1 (worst) to 5 (best).

The authors of this paper have established the correlation between customers and technical requirements, so that the strength of this correlation is adequately graded. Based on the analysis of the obtained results a graph of QFD method has been made. On the roof of the house of quality there is a graph showing a positive/negative correlation.

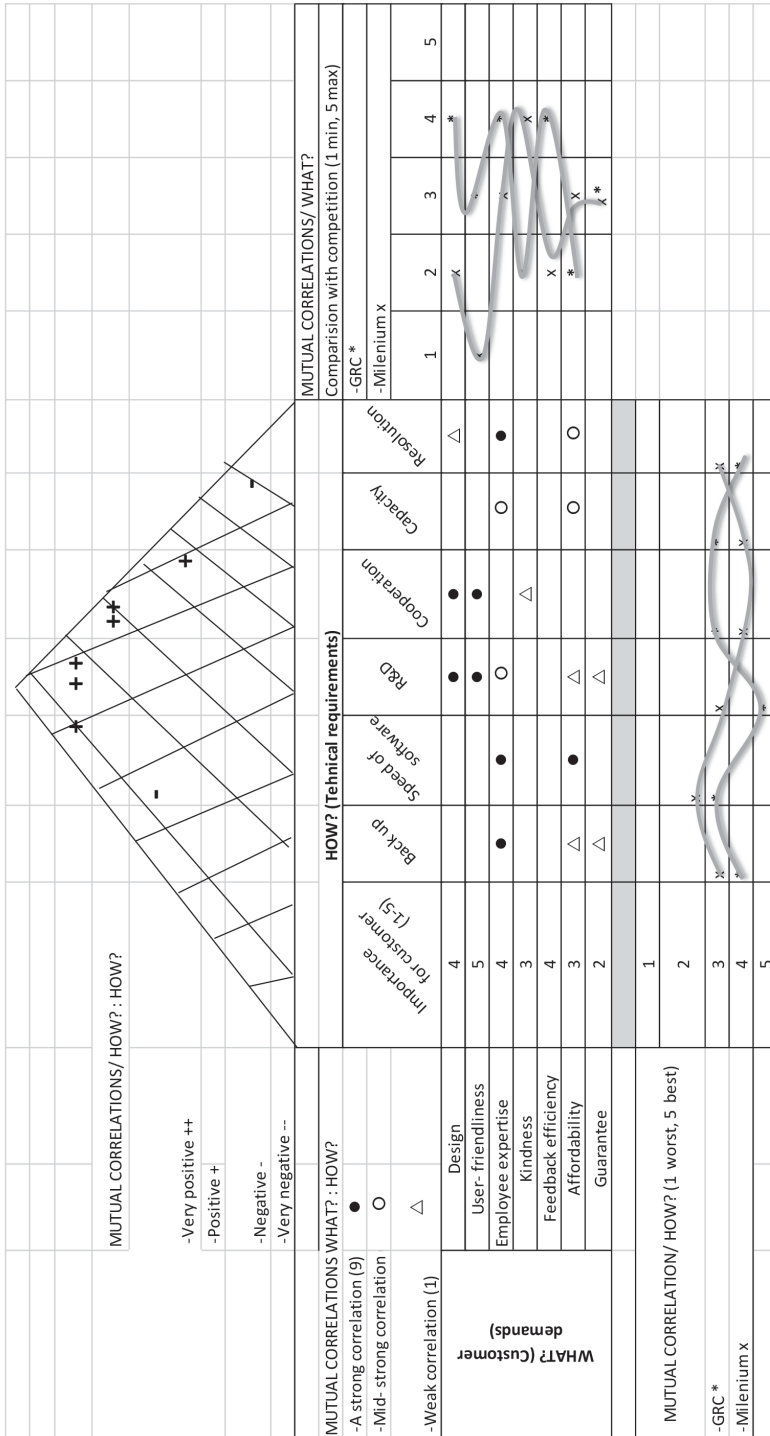
Respondents' replies are shown in Figure 2. on the basis of grades given for certain features and the trend resulting in the grades given. If GRC group and Milenij company are compared, it is clear that GRC group has a more positive trend than Milenij company. However, certain aspects of business should be improved in order to increase customer satisfaction, i.e. to meet the requirements of the market.

The biggest advantage of the software the customers use is that it is user friendly. GRC group is highly ranked regarding this particular requirement, followed by software design, employee expertise and feedback efficiency which is also highly ranked. Employees' social skills (technical support primarily) are assessed by an average grade regarding its importance (3), but with a low grade (2) regarding evaluation of GRC group itself. In order to make customers satisfied this customer requirement must be enhanced.

Affordability is assessed with a low grade as well, which means that GRC group has significantly higher prices than its competitors, which does not meet customer requirements. Providing guarantee for software is assessed by a medium grade regarding importance for the customer and for the company itself (GRC group) which is not an alarming area (feature) that the company should change. The trend shows that GRC group meets customer requirements more than Milenij company.

As regards technical requirements, all areas are quite highly ranked (3 and above). The only feature graded by 2 is the speed of software. By showing the given trend it can be noticed that GRC group is more developed than Milenij company regarding technical requirements. Customers believe that research and development is a technical characteristic of GRC group which is most invested in.

Figure 2. QFD-house of quality



The strongest correlation between customer requirements and technical requirements, is between employee expertise and existence of software backup data, employee expertise and speed of software, its design and simplicity of using software assisted by research and development and cooperation, employee expertise and software resolution and affordability mostly associated with speed of software. On the top of the house of quality it can be noticed that the correlation between design and R&D (research and development) is very strong, along with the simplicity of software use and cooperation with design.

4. CONCLUSION AND RECOMMENDATIONS

It is concluded that the cooperation of employees working in GRC group is important, both when designing software and cooperating in sales and customer support. As staff communication skills are ranked low in GRC group, the company should invest in training of employees to improve their communication skills. Employees are considered to be very skilled but they have problems when communicating with customers. This problem can be solved by investing in employees' training.

Next segment of GRC group which got low grades is the price of software. The customers link the software price with the speed of software, which means that GRC group has adequate price i.e. the price corresponds to the speed. Regardless of this, the customers think that the price is not adequate. It is suggested that the company should reduce the price of software or add some extra features to its software in order to justify the price. The possibility of extended guarantee or free use of software during test period is another way how GRC group may improve this feature in order to meet the market requirements.

GRC group believes that by applying QFD method, i.e. recognizing *voice of customer* the relationship between the company and customers will strengthen, and the product will meet all the requirements in order to achieve customer satisfaction, if not their excitement. This way the competitiveness of GRC group will increase on the home market.

Sažetak:

PRIMJENA QFD METODE PRI DEFINIRANJU GLASA KUPCA: PRIMJER PODUZEĆA GRC GRUPA

Svrha ovoga rada je otkrivanje područja koja mogu unaprijediti dosadašnju razinu kvalitete poslovanja određene poslovne organizacije i njezinog glavnog procesa primjenom QFD metode i definiranjem „glasa kupca“. Poduzeće GRC grupa d.o.o. nudi rješenja poslovnih softvera, što je glavna djelatnost poduzeća. Prije primjene QFD metode, istražilo se tržište metodom intervjua korisnika usluga GRC grupe kako bi se ispitalo njihovo zadovoljstvo. Korisnici su na temelju ponuđenih općih karakteristika ocijenili važnost pojedinih obilježja softvera i ponašanje pružatelja usluge. Nakon toga su, temeljem istih karakteristika, usporedili GRC grupu i njezinog glavnog konkurenta. Rezultat istraživanja pokazao je kako GRC grupa ima pozitivnije poslovanje, ali isto tako, da postoje pojedine procesne aktivnosti koje bi se trebale unaprijediti. Ta područja unaprjeđenja su vezana uz ljubaznost osoblja i visoku cijenu softvera. Kako bi se ublažili ti negativni elementi poslovanja, a samim time i povećala kvaliteta, preporuča se ulaganje u razvoj, komunikaciju i edukaciju zaposlenika te snižavanje cijena i/ili obogaćivanje postojećih proizvoda dodatnim karakteristikama kao što su produljeno jamstvo ili besplatno testno korištenje softvera, što bi se u konačnici odrazilo i na zadovoljnije kupce i bolje poslovne rezultate poduzeća GRC grupa.

Ključne riječi: *QFD metoda, glas kupca, unaprjeđenje poslovanja, poslovni softveri, zadovoljstvo korisnika.*

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RISK MANAGEMENT IMPACT ON THE QUALITY OF STRATEGIC INVESTMENT PROJECTS IN SOUTH EAST EUROPE

UTJECAJ UPRAVLJANJA RIZICIMA NA KVALITETU STRATEŠKIH
INVESTICIJSKIH PROJEKATA U JUGOISTOČNOJ EUROPI

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ABSTRACT

This paper explores the impacts of the main elements, of the strategic investment projects management process in South East Europe, on achieving the quality of the project measured through achievement of the project objectives, as well as the impact of project characteristics on the project's risk management process. The initial hypotheses of this research are based on literature review. The proposed hypotheses were tested by the SEM (Structural Equation Modelling) methodology and on a sample of 311 strategic investment projects within the territory of the Republic of Serbia, Bosnia and Herzegovina and Macedonia. The results obtained verify the accuracy of

the hypothetical framework set, and numerous significant conclusions are based on them. The impact of each selected factor on the quality of the strategic project outputs was assessed using the MCDA tool based on the PROMETHEE GAIA methodology.

Key words: risk management, strategic investment projects, project quality.

1. INTRODUCTION

Strategic projects are projects of special significance for organizations, considering that they enable achievement of the organization's strategic objectives. They can be major investment projects, such as construction of a new factory or plant, the introduction of modern technology, the improvement of energy efficiency etc., or somewhat smaller project undertakings, such as information system introduction, the creation and introduction of a new organizational structure, quality system introduction and others.

The quality of those projects is mostly defined by the expectations of the final users and the abilities and potential of the project proposing company. On the other hand, those project are usually connected with many potential risks which can influence the ability of the organization to ascertain defined level of quality.

Efficient strategic project management may be achieved if the project manager and the project team in charge of its management perform all the required activities within the valuation and quality control of a strategic project, based on the defined elements of influence on evaluation and control¹. They also need to use contemporary methods and techniques necessary for the efficient quality management of strategic projects².

¹ Suramon Puthamont and Chotchai Charoenggam, "Strategic project selection in public sector: Construction projects of the Ministry of Defence in Thailand", *International Journal of Project Management*, No. 25, 2007, p. 178–188; David Meunier, Alain Quinet and Emile Quinet, "Project appraisal and long term strategic vision", 41st European Transport Conference, Frankfurt, Germany, 2013; Jacques W. Brook and Fabrizio Pagnanelli, "Integrating sustainability into innovation project portfolio management – A strategic perspective", *Journal of Engineering and Technology Management*, Vol. 34, No. 4, 2014, p. 6-62.

² Tony Grundy, "Strategic project management and strategic behaviour", *International Journal of Project Management*, No. 18, 2000, p. 93-103; Sang Hyung Lee, Pena Mora Feniosky and Park Moonseo, "Dynamic planning and control methodology for strategic and operational construction project management", *Automation in Construction*, No. 15, 2006, p. 84–97; Min-Yuan Cheng, Hsing Chic Tsai and C. L. Liu, "Artificial intelligence approaches to achieve strategic control over project cash flows", *Automation in Construction*, Vol. 18, No. 4, 2009, p.386-393; Yen Chih Huang, Ma Ron and Kuo Wei Lee, "Exploitative learning in project teams: Do cognitive capability and strategic orientations act as moderator variables?", *International Journal of Project Management*, No. 33, 2015, p. 760-771.

This paper researches the process of managing strategic investment projects in industrial companies in South East Europe, through risk and quality management, primarily in terms of understanding the effective management process. Therefore, the objective of this paper is to analyze the impact of the main elements of the risk management process of strategic investment projects in South East Europe on the achievement of project objectives, as well as the impact of project characteristics on the project risk management process.

The research part of the paper, was published in previous publication³. This manuscript included questionnaire analysis of the risk impact assessment on success of strategic investment project. The respondents included in the survey, were practicing engineering managers from different companies belonging to industrial and non-industrial sectors in Serbia, Macedonia and Bosnia and Herzegovina. This publication is presenting the additional finding of obtained results, mostly based on the PROMETHEE GAIA, Multi Component Decision Making (MCDA) techniques for ranking of the importance of the risk management tools influencing the quality of the strategic projects.

2. RESEARCH METHODOLOGY

To assess the influence of the project types and the position of employees in organization on success on risk management of the strategic investment projects, as well as success of the projects in achieving the predefined quality goals, Multi-Criteria Decision Analysis (MCDA), was used⁴.

During application of the PROMETHEE II methodology, the alternatives are ranked based on the values of their net flows, which is the complex ranking procedure. Very important issue of this method is ability to use the DECISION LAB software, which enables obtaining the graphical visualization of obtained results in the form of the GAIA plane (Geometrical Analysis for Interactive Aid). The position of considered alternatives (triangles) are determining the strengths and weakness of the actions determining the criterions (rectangles). The closest the alternative lies to the direction of the criterion vector, the alternative is ranked better from the point of this criterion⁵.

³ Filip Jovanović, Ivan Mihajlović, Nenad Milijić i Makedonka Dimirova, "Risk management impact assessment on the success of strategic investment projects in South East Europe, submitted for publication in Engineering Management Journal.

⁴ Bernard Roy, Phillipe Vincke, "Multicriteria analyses: survey and new directions", European journal of operational research, Vol. 8, No. 3, 1981, p. 207-218.

⁵ Jean-Pierre Brans and Bertrand Mareschal, „The PROMCALC & GAIA decision support system for multicriteria decision aid”, Decision Support Systems, No. 12, 1994, p. 297-310.

In combination to obtained results of statistical analysis of the results, described in the reference⁶, the absolute weights for each criterion were defined. The entropic approach was used for this weights determination⁷.

3. RESULTS AND DISCUSSIONS

Based on the survey of project managers, which was performed in companies and enterprises dealing with strategic investment project management, results presented in following text were obtained. A total of 400 questionnaires were sent. 311 correctly completed questionnaires were returned within the stipulated deadline, filled in by the project managers of 311 companies and enterprises within the territory of the Republic of Serbia, Bosnia and Herzegovina and Macedonia. A relatively high response rate was achieved owing to persistence, direct contact between the authors of this paper and the managers who were sent the questionnaire. The activities of the companies the correctly completed questionnaires were sent from are as follows: IT sector (50 companies), finance (13 companies), energy sector (29 companies), public administration (31 enterprises), traffic (13 companies), education (49 enterprises), scientific research (71 organizations) and other (55 companies). Apart from demographic questions, the surveyed project managers responded to 42 questions with objective of obtaining their personal opinion on the importance of certain factors for risk management and strategic investment project management in general, as well as their influence on the quality of the final project results. The respondents answered the questions through the gradation of the offered replies. The Likert scale was used for the gradation, where 1 represents the lowest significance (I absolutely disagree) and 5 represents the highest significance (I absolutely agree). Also, answers to a certain number of the questions were of a dichotomous character (yes/no).

The influence of two demographic parameters (the type of project and the position of the respondent in the organization) on the methodology applied on the strategic investment project risk management was applied. The starting data used for the PROMETHEE procedure are presented in Table 1. The values in Table 1 are presenting the average ranking of the individual groups of questions assessed by the employees which are involved in different strategic

⁶ Filip Jovanović, Ivan Mihajlović, Nenad Milijić i Makedonka Dimirova, "Risk management impact assessment on the success of strategic investment projects in South East Europe, submitted for publication in Engineering Management Journal.

⁷ Zou Zhi-hong, Yun Yi and Sun Jing-nan, "Entropy method for determination of weight of evaluating indicators in fuzzy synthetic evaluation for water quality assessment", Journal of Environmental Sciences, No. 18, 2006, 1020-1023.

investment projects in the SEE region, at different work place locations. For each work place, which is actually the position of the employee in the project team (top manager P1, middle management level P2, operational management level P3 and employee P4), for each of investigated project types (ICT (T1), I&R (T2), civil construction works (T3), public sector (T4), scientific research work (T5) and else (T6)), the average ranking of the employees were calculated and presented in Table 1.

Table 1. Starting data used in the PROMETHEE multi criteria decision making analyses for the strategic investment projects (SIP)

Criteria	Applied methods of project risk assessment and analysis (G1)	Risk factors that affect SIP success (G2)	Risk factors that affect SIP success (G3)	Elements of significance in the process of SIP control (G4)	Methods for evaluation and control of SIP (G5)	Main criteria for the measurement of SIP success (G6)	Did applied management method gave good results? (Q1)	Was the SIP management successful? (Q2)
ICT, Top manager / director (T1P1)	3.40	3.90	4.00	4.10	2.60	4.30	2.00	2.00
ICT, Operational level of management (T1P3)	1.50	2.80	2.60	2.70	2.10	2.30	1.00	1.00
R&D, Top manager / director (T2P1)	3.10	3.70	3.60	4.40	3.60	3.80	2.00	2.00
R&D, Employees (T2P4)	2.60	4.10	3.80	4.10	2.90	4.80	2.00	2.00
Construction, Middle management (T3P2)	2.70	4.20	4.20	4.00	3.80	4.50	2.00	2.00
Public administration, Middle management (T4P2)	2.10	3.00	3.20	2.50	2.70	3.70	1.00	1.00
Public administration, Employees (T4P4)	2.90	2.60	4.00	4.10	3.60	3.00	1.00	1.00
Scientific-research, Middle management (T5P2)	2.20	4.00	4.20	3.90	1.60	4.20	1.00	1.00
Scientific-research, Operational level of management (T5P3)	2.50	3.70	4.10	2.80	2.40	3.70	1.10	1.10
Scientific-research, Employees (T5P4)	3.10	3.80	3.70	3.70	2.80	3.90	2.00	1.40
Other, Top manager / director (T6P1)	2.40	3.50	3.80	3.30	2.30	3.90	1.30	1.30
Other, Operational level of management (T6P3)	2.20	3.50	3.80	3.70	2.60	4.30	1.10	2.00

Considering that PROMETHEE methodology includes the weight coefficient for each selected criterion, associated with selecting the type of the decision function, this are presented in Table 2. The weight coefficients can be described as raw indicators of relative importance of each selected criterion in the analysis. The Min/Max values are based on the character of the questions and their potential influences on the investigated factors.

Table 2. Preference function and weight coefficient of criterions

Criterion	G1	G2	G3	G4	G5	G6	Q1	Q2
Weight coefficient	0.1246	0.1235	0.1232	0.1240	0.1253	0.1241	0.1279	0.1275
Preference function	Level	Level	Level	Level	Level	Level	Level	Level
Min/Max	MAX	MAX	MAX	MAX	MAX	MAX	MAX	MAX

The data presented in the Table 1, were analyzed using the software Decision Lab 2000. Results of complete ranking based on the PROMETHEE II method are presented in the Table 3 and Figure 1. Visual presentation of obtained ranking is presented in Figure 2.

Based on the results of MCDA, presented in Table 3 and Figures 1 and 2, it can be concluded that employees at both investigated levels of research & development projects (T2P1 and T2P4) are completely satisfied with the success of management of the project risks, as well as the success of the projects. This was also the opinion for the middle level managers of civil works construction projects (T3P2).

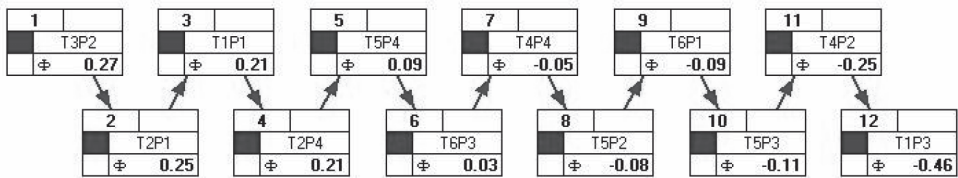
Table 3. Results of complete ranking of the success in the risk management of the strategic investment projects based on the opinions of employees at different project team positions

Rank	Alternatives	Φ^+	Φ^-	Φ
1	T3P2	0.2789	0.0057	0.2733
2	T2P1	0.2679	0.0225	0.2454
3	T1P1	0.2223	0.0171	0.2053
4	T2P4	0.2278	0.0227	0.2051
5	T5P4	0.1480	0.0630	0.0850
6	T6P3	0.1195	0.0857	0.0338
7	T4P4	0.1246	0.1762	-0.0516
8	T5P2	0.0844	0.1660	-0.0816
9	T6P1	0.0620	0.1541	-0.0922
10	T5P3	0.0507	0.1654	-0.1147
11	T4P2	0.0339	0.2834	-0.2494
12	T1P3	0.0000	0.4584	-0.4584

On the other hand, the employees which strongly emphasized the negative state in the management of the project risks in the projects in which they are involved, as well as low success of the projects, are the operational lev-

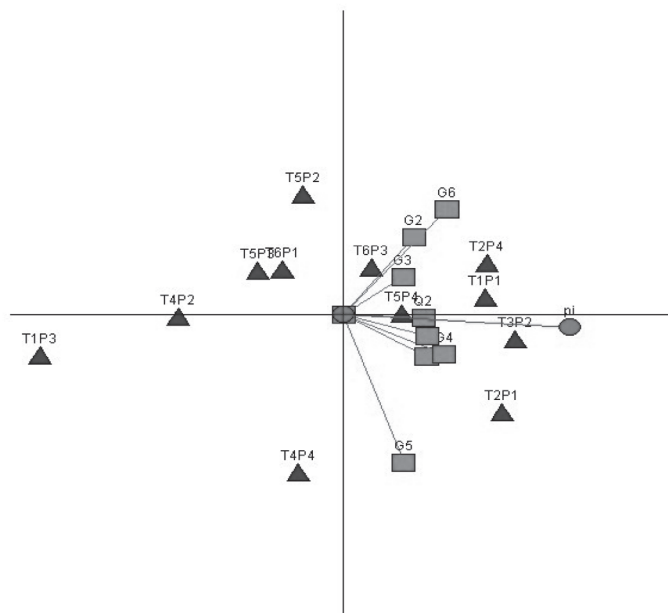
el managers at scientific/research projects (T5P3) and middle level managers in public institutions (T4P2). The worst ranking of the investigated factors was obtained in the ICT projects, based on the opinion of the operational level managers (T1P3).

Figure 1. Results of the complete ranking of the success of the strategic investment project risk management, based on the PROMETHEE II methodology



As presented in GAIA plane, Figure 2, the criteria Q1, Q2 and G4 are with the largest influence on ranking the alternatives, based on their position toward the pi vector – the decision stick (the red vector in the plane).

Figure 2. Graphic presentation at GAIA plane for ranking of the success of the risk management of the strategic investment projects



On the other side, the criteria G2 and G6 have the lowest influence on their decisions, based on the position relative to the pi stick.

4. CONCLUSIONS

Strategic investment projects represent the foundation of economic development, as well as the development of the entire society. Potential risks and their adverse effects represent a particularly significant part of that process, with a view to eliminating or minimizing them, or in order to respond to them appropriately. Statistical analysis of data collected through a survey of employees in 311 companies and organizations within the territory of South East Europe, dealing with strategic investment project management within their operations, conducted during 2015 was presented in the reference manuscript⁸. The initial questions in the questionnaire, as well as the initial hypothetical framework of research, have been defined based on the analysis of the available literature related to this field. Accordingly six research hypothesis were proposed based on the relation between application of the methods for risk analysis and identified risk factors influencing the strategic investment projects success, in investigated region of South East Europe⁹.

Based on the previous results presented in the reference¹⁰ MCDA ranking of the most important factors of the project risk management and overall management of the strategic investment projects was conducted and presented in this manuscript. The ranking was based in accordance of the opinion of the employees working at different levels in the project teams of the projects in different fields.

⁸ Filip Jovanović, Ivan Mihajlović, Nenad Milijić i Makedonka Dimirova, "Risk management impact assessment on the success of strategic investment projects in South East Europe, submitted for publication in Engineering Management Journal.

⁹ Ibid.

¹⁰ Ibid.

Sažetak:

UTJECAJ UPRAVLJANJA RIZICIMA NA KVALITETU STRATEŠKIH INVESTICIJSKIH PROJEKATA U JUGOISTOČNOJ EUROPI

Ovaj rad istražuje uticaj osnovnih elemenata upravljanja stratejskim investicionim projektima, na prostoru jugoistočne Evrope, na postizanje kvaliteta projekta izmerno preko postizanja ciljeva projekta, kao i uticaj karakteristika projekata na proces upravljanje rizicima. Polazne hipoteze ovog istraživanja su zasnovane na pregledu literature. Predložene hipoteze su testirane putem SEM (modelovanja po principu strukturnih jednačina) metodologije u okviru kompanija koje posluju na teritoriji Republike Srbije, Bosne i Hercegovine i Makedonije. Dobijeni rezultati potvrdili su tačnost pretpostavljenog hipotetičkog okvira i brojni značajni zaključci su zasnovani na njima. Uticaj svakog selektivnog faktora na kvalitet izlaza stratejskih izlaza projekata baziran je na primeni MCDA metoda zasnovanih na PROMETHEE GAIA metodologiji.

Key words: upravljanje rizicima, strateški investicijski projekti, kvaliteta projekta.

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ERM VENTURE SOFTVER – JEDNOSTAVNO I KVALITETNO UPRAVLJANJE RIZICIMA

ERM VENTURE SOFTWARE – SIMPLE
AND QUALITY RISK MANAGEMENT

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SAŽETAK

U današnjem globaliziranom svijetu, razumijevanje i integriranje upravljanja rizikom kao ključnog dijela poslovne strategije predstavlja krucijalni napredak, kako za upravljanje rizikom, tako i za razvoj održivih performansi. Menadžeri i menadžeri rizika na svim razinama poslovanja su odgovorni za uspostavljanje održivog okvira rizika. Odgovarajuća softverska potpora omogućuje im korištenje inovativnog, na rizicima temeljenog pristupa upravljanju i usklađivanju kako bi stekli holistički, široki pogled na izloženost organizacije riziku, ali i gotovo u realnom vremenu upravljanje rizicima i nadzor. Softverska potpora procesu upravljanja rizicima trebala bi organizacijama osigurati efikasnu evaluaciju i procjenu rizika, stalni nadzor, izvješćivanje i jednostavnije poboljšanje tog procesa. U radu je prezentirana analiza osnovnih značajki koje bi trebao imati softver za upravljanje rizicima. Ta analiza se temelji na ranije provedenom istraživanju na odabranom broju poduzeća u Hrvatskoj i Bosni i Hercegovini. Rezultati tog istraživanja su definirane osnove značajke koje bi softver za upravljanje rizikom trebao imati kako bi ispunio korisnička očekivanja. U ovom radu te se značajke koriste za evaluiranje karakteristika ERM Venture softvera – konkretnog softverskog proizvoda za potporu procesu upravljanja rizicima.

Ključne riječi: upravljanje rizikom, softver, ERM Venture softver.

1. UVOD – ZAŠTO SOFTVER ZA UPRAVLJANJE RIZICIMA

Financijske institucije, kao što su banke i osiguravajuća društva, odavno su prepoznale nužnost upravljanja rizikom, prije svega zbog toga što je njihov temeljni posao visoko rizičan. Međutim, u današnjem globaliziranom svijetu, koji se iznimno brzo i nepredvidljivo mijenja te koji iz dana u dan postaje sve kompleksniji, sve organizacije se, bez obzira na djelatnost, gotovo svakodnevno suočavaju s različitim brojem rizika i prinuđene su tražiti načine kako upravljati i „boriti se“ s tim rizicima. Zato nije nimalo čudno da identificiranje, upravljanje i analiza rizika postaje jedan od ključnih faktora uspješnosti i dugoročnog opstanka bilo koje organizacije.

Norma ISO 31000 je objavljena 2009. godine s osnovnim ciljem osigurati potporu za novi, menadžmentu bliži način promišljanja o riziku i upravljanju rizikom, kao i osigurati okvir za rješavanje mnogih proturječnosti i neodređenosti koje su postojale u različitim pristupima i definicijama. Rizik se definira kao „djelovanje nesigurnosti na ciljeve“ (AS/NZS, 2010). Ovakvo definiranje rizika u normi ISO 31000 predstavlja značajan pomak, s ranijeg isticanja i bavljenja događajem, a sada na mogućnost djelovanja, posebice djelovanja rizika na ciljeve organizacije. Dakle, rizik sam po sebi nije niti pozitivan niti negativan, ali njegove posljedice po organizaciju (djelovanje) mogu varirati od gubitka i štete do dobitka. Ovakav pristup definiranju rizika jasno ukazuje na to da je upravljanje rizikom proces koji treba postizanje ciljeva organizacije učini što vjerojatnijim.¹

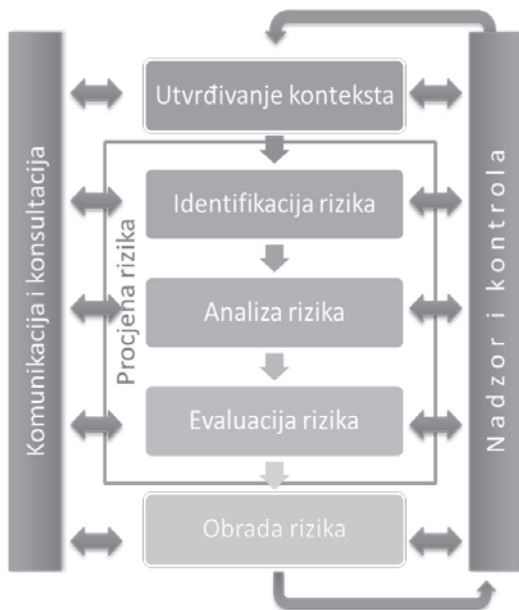
Norma ISO 31000 sadrži vokabular, skup kriterija performansi, zajednički proces identificiranja, analiziranja, evaluiranja i obrade rizika, kao i smjernice kako bi taj proces trebalo integrirati u proces donošenja odluka bilo koje organizacije.²

Norma ISO 31000 polazi od globalnog procesa upravljanja rizikom (Slika 1) s tim da je „utvrđivanja konteksta“, prvi korak koji bi trebao obuhvatiti temeljne ciljeve organizacije, okruženje u kojem organizacija djeluje i u kojem pokušava realizirati svoje ciljeve, dioničare tj. osnovne učesnike, kao i eventualno posebne kriterije rizika kako bi se olakšala kasnija ocjena značajki i složenosti rizika organizacije.

¹ Grant Purdy, ISO 31000:2009 – Setting a New Standard for Risk Management, Risk Analysis, Vol. 30, No. 6, 2010.

² Ibid.

Slika 1. ISO 31000:2009 proces upravljanja rizikom



Izvor: Prilagođeno prema „A structured approach to Enterprise Risk Management (ERM) and the requirements of ISO 31000“, AIRMIC, Alarm and IRM.

Norma ISO 31000 daje temeljna načela i generičke upute za upravljanje rizikom te nudi jasan okvir kako bi se olakšala izrada i provedba planova upravljanja rizikom, pri tome vodeći računa o specifičnim potrebama konkretne organizacije, njihovoj promjenjivosti, o specifičnim ciljevima organizacije, njejoj organizacijskoj strukturi, procesima, proizvodima ili uslugama, postojećoj praksi zaposlenih i sl.

Procjena rizika prema normi ISO 31000 obuhvaća tri osnovna koraka: identifikaciju, analizu i evaluaciju rizika. Identifikacija rizika zahtijeva primjenu sustavnog pristupa kako bi se razumjelo što bi se moglo dogoditi, kako, kada i zašto. Analiza rizika se odnosi na poboljšanje razumijevanja svakog rizika, njegovih posljedica i vjerojatnosti tih posljedica. Evaluacija rizika se odnosi na donošenje odluke o razini rizika i prioritetu za praćenje. Obrada rizika je proces pomoću kojega se postojeće kontrole poboljšavaju ili se nove kontrole razvijaju i primjenjuju. To obuhvaća vrednovanje i odabir odgovarajućih opcija, analizu troškova i dobit, ocjenu novih rizika koje može generirati odabir konkretne opcije, te uspostavljanje prioriteta i primjenu odabrane obrade rizika u okviru dobro planiranog procesa. Postoji veliki broj iteracija između vred-

novanja i obrade rizika pošto se svaki skup opcija obrade rizika testira sve dok se ne pronađe preferirani skup koji daje najveću korist uz najmanje troškove.³

Iz svega navedenog jasno je da uspješno upravljanje rizicima, zbog svoje kompleksnosti, traži timski rad većeg broja osoba različitih znanja i iskustva, kao i njihovu stalnu interakciju. Osigurati takav način rada, bez kvalitetne softverske potpore, postaje iznimno zahtjevan, ako ne i nemoguć zadatak. Može se zaključiti da je, kako bi proces upravljanja rizikom tekao glatko te bio efikasan i efektivan, neophodno da organizacija ima odgovarajuću softversku potporu.

2. OSNOVNE ZNAČAJKE SOFTVERSKÉ POTPORE U UPRAVLJANJU RIZICIMA

Danas na svjetskom tržištu postoji veliki broj softvera za upravljanje rizikom koji se razlikuju po svojim mogućnostima i zrelosti. Zbog toga je većina organizacija suočena s problemom kako odabrati odgovarajuće softversko rješenje za proces upravljanja rizikom. Pronalaženje softvera koji će odgovarati potrebama organizacije nije uvijek jednostavno, ali prilagođavanje organizacije zahtjevima softvera je još zahtjevnije. Zato softverska rješenja koja nude mogućnost prilagodbe zahtjevima korisnika mogu značajno skratiti vrijeme implementacije. Značajan izazov u odabiru i implementaciji softvera za upravljanje rizikom leži u činjenici da u praktičnoj primjeni upravljanja rizikom postoji veliki broj varijacija, posebno na detaljnoj razini.

U posljednjih nekoliko godina napravljena su istraživanja kako o proizvođačima softvera i osnovnim značajkama njihovih rješenja, tako i očekivanjima korisnika^{4,5,6}. U Republici Hrvatskoj i Bosni i Hercegovini je u svibnju 2015. provedeno istraživanje o stavovima korisnika koje značajke bi trebao imati softver za upravljanje rizicima⁷. Iako su u ovom istraživanju razdvojene tehničke i funkcionalne značajke, a ispitivani su samo korisnici, a ne proizvođači softvera, rezultati se ne razlikuju bitno od navedenih istraživanja u svijetu. U tablici 1 dan je pregled 11, od ukupno ponuđenih 20, osnovnih tehničkih značajki softvera za upravljanje rizikom za koje je preko 80% ispita-

³ Ibid.

⁴ Dave Tweedy, 2013 RMIS Review, Advisen Insurance Intelligence, 2013.

⁵ T. Osborn and M. Chambers, „Risk software survey 2014“, risk, compliance and capacity, Risk magazine, 2014.

⁶ Aon e-Solutions, RiskConsole UX, Aon Risk Solutions-eSolutions, 2014.

⁷ Dražen Gašpar, Mirela Mabić i Ivica Ćorić, Risk Management Software – Standpoints of Users, ENTenterprise REsearch InNOVation Conference – ENTRENOVA'15, September 2015, Kotor, Montenegro, 2015.

nika označilo da ih softver „mora imati“ ili „poželjno je da ima“⁸. U tablici 2 dan je pregled 13, od ukupno ponuđenih 30, obveznih („mora imati“ ili „poželjno je da ima“) funkcionalnih značajki softvera⁹.

Tablica 1. „Obvezni“ skup tehničkih značajki softvera

Šifra	Softver za upravljanje rizikom treba
TZ1	... omogućiti prihvat podataka iz različitih vanjskih izvora
TZ2	... biti moguće instalirati na lokalnoj opremi korisnika
TZ3	... biti web orijentiran
TZ5	... imati kontekst senzitivnu pomoć (help)
TZ6	... omogućiti export izvješća u MS Word
TZ7	... omogućiti export izvješća u pdf
TZ8	... omogućiti export izvješća u MS Excel
TZ14	... imati tehničku potporu i/ili help desk 24/7/365
TZ16	... omogućiti prikazivanje rizika na mapi
TZ18	... sadržavati nadzorne ploče (dashboard)
TZ19	... omogućiti prilagodbu nadzornih ploča

Izvor: Dražena Gašpar, Mirela Mabić, Ivica Ćorić, „Risk Management Software – Standpoints of Users“, The 2015 ENTerprise REsearch InNOVation Conference (ENTRENOVA 2015), Kotor, Montenegro, 10-11.09.2015.

Rezultati navedenog istraživanja¹⁰, a posebno Tablica 1. i Tablica 2., mogu poslužiti korisnicima koji traže odgovarajuće softversko rješenje za potporu upravljanju rizicima u svojim organizacijama, kao polazna osnova za definiranje osnovnih kriterija za odabir rješenja koje će najbolje odgovoriti potrebama njihove organizacije.

Tablica 2. „Obvezni skup“ funkcionalnih značajki softvera

Šifra	Softver za upravljanje rizikom treba
FZ1	... omogućiti integriranje standardnih ključnih indikatora performansi (KPI) i indikatora rizika
FZ10	omogućiti definiranje kriterija za procjenu rizika
FZ11	... omogućiti definiranje matrice rizika
FZ12	... omogućiti definiranje strukture svih aktivnosti u procesu ili projektu

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

FZ18	... omogućiti analizu rizika
FZ19	... omogućiti praćenje povijesti događaja povezanih s aktivnostima i rizikom koji se procjenjuje
FZ20	... omogućiti automatsku evaluaciju i rangiranje rizika
FZ22	... omogućiti definiranje izvješćivanja i odgovornosti
FZ24	... podržati proces odobravanja rizika (npr. prihvaćanje rizika...)
FZ25	... omogućiti kvantifikaciju rizika
FZ26	... omogućiti kvalitativnu procjenu rizika
FZ28	... omogućiti definiranje indikatora opasnosti
FZ29	... omogućiti povezivanje (obradu) rizika (kontrola i akcije) tj. definiranje mjera koje se poduzimaju u procesu obrade rizika

Izvor: Dražena Gašpar, Mirela Mabić, Ivica Ćorić, „Risk Management Software – Standpoints of Users”, The 2015 ENTerprise REsearch InNOVation Conference (ENTRENOVA 2015), Kotor, Montenegro, 10-11.09.2015.

I proizvođači softvera koji su u fazi razvoja ili su već razvili softver za upravljanje rizicima mogu iz navedenih tablica vidjeti koje su to osnovne značajke koje bi jedan takav softver trebao imati kako bi zadovoljio potrebe korisnika.

U ovom radu su navedene tablice korištene kao osnova za ocjenu značajki ERM Venture softvera za upravljanje rizicima.

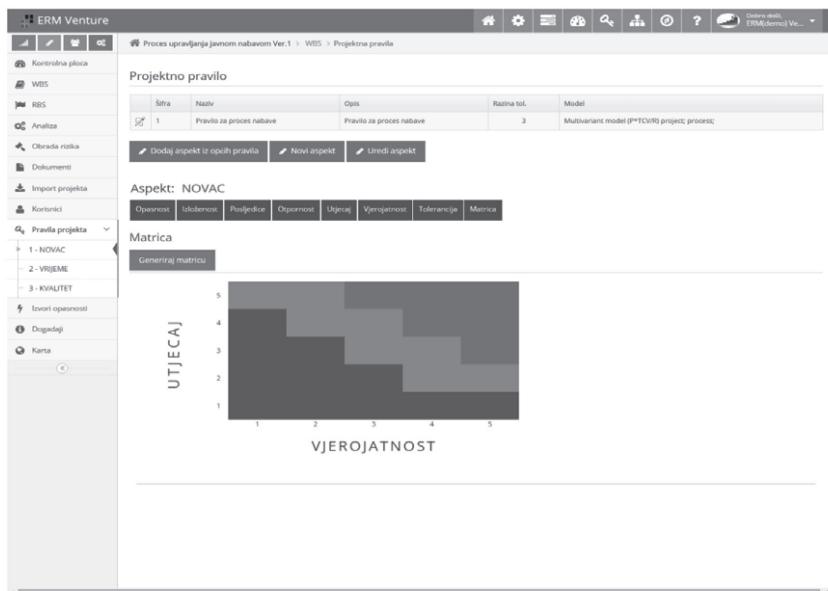
3. ERM VENTURE SOFTVER ZA UPRAVLJANJE RIZICIMA

Softver ERM¹¹ Venture osigurava računalnu potporu korisnicima u svim fazama procesa upravljanja rizikom (Slika 1). ERM Venture softver je nastao kao rezultat suradnje poduzeća „Hera“ d.o.o iz Mostara i „Oskar“ d.o.o. iz Zagreba. Softver se temelji na metodologiji Višedimenzionalno Procjenjivanje Rizika - VPR12 koju je razvilo poduzeće „Oskar“ i koja je rezultat dugogodišnjeg iskustva tog poduzeća u izobrazbi i savjetovanju u području suvremenih sustava upravljanja, ponajprije kvalitete, okoliša, sigurnosti i upravljanja rizicima. VPR metodologija se koristi za identificiranje, procjenjivanje i obradu rizika na temelju međunarodno priznatih i preporučenih standarda i normi. VPR metodologija omogućava analiziranje, procjenu, rangiranje, obradu, nadzor i kontrolu rizika sa svih aspekata ugrožavanja s ciljem povećavanja stabilnosti organizacije i njenih interesnih partnera (dionika). VPR metodologija je primjenjiva na projektima, poslovnim procesima, zaštiti na radu i na kritičnim infrastrukturama.

¹¹ ERM - Enterprise Risk Management, hrv. Upravljanje rizikom poduzeća

¹² Engl. Multidimensional Risk Assessment (MRA) methodology

Slika 2. Matrica vjerojatnosti i utjecaja



Izvor: www.erm-venture.com, Vlasništvo Hera, 2015. Reproducirano uz dozvolu poduzeća Hera.

Za uporabu softvera dovoljan je pristup Internetu i web pretraživač. ERM Venture softver može se koristiti kao web servis (Softver kao servis) ili kao proizvod, instaliran i implementiran u vlastitom okruženju.

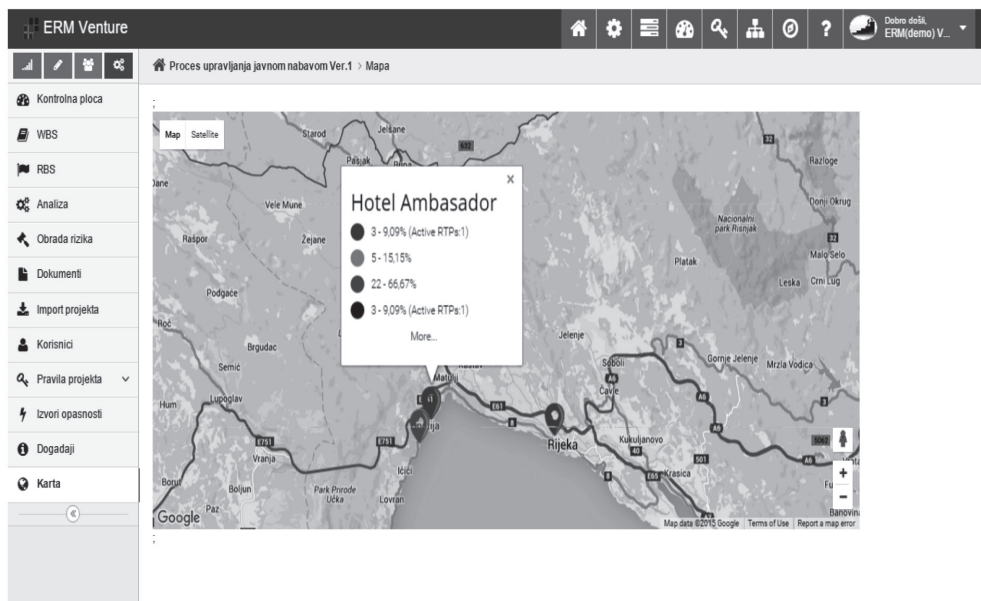
Budući je VPR metodologija temeljena na međunarodnim standardima i normama, slijedi i da ERM Venture softver podržava te standarde (ISO 9001:2015, ISO 31000:2009, ISO 31010:2010).

Osnovne značajke ERM Venture softvera, pored već navedene web orijentacije, odnosno mogućnosti korištenja softvera kao web servisa ili kao proizvoda, su sljedeće:

- Jednostavna prilagodba specifičnim potrebama korisnika (korisnik sam definira pravila, model i varijable koje želi koristiti, određuje aspekte promatranja rizika, određuje koliko i kojih kriterija će imati po kojem aspektu i po kojoj varijabli i sl.).
- Formiranje strukture potencijalnih rizika sukladno specifičnoj strukturi aktivnosti u projektu/procesu.
- Mogućnost kvantifikacije, ali i kvalitativne procjene rizika.
- Analiza rizika po svakom aspektu uz mogućnost odabira za korisnika najvažnijih varijabli.

- Automatsko generiranje matrica vjerojatnosti i utjecaja za svaki aspekt na osnovu tolerancije rizika koju definira sam korisnik (Slika 2).
- Evidentiranje događaja podrazumijeva da su se predviđene ili nepredviđene rizične situacije dogodile, da su one evidentirane, kao i da su evidentirani direktni i indirektni troškovi.

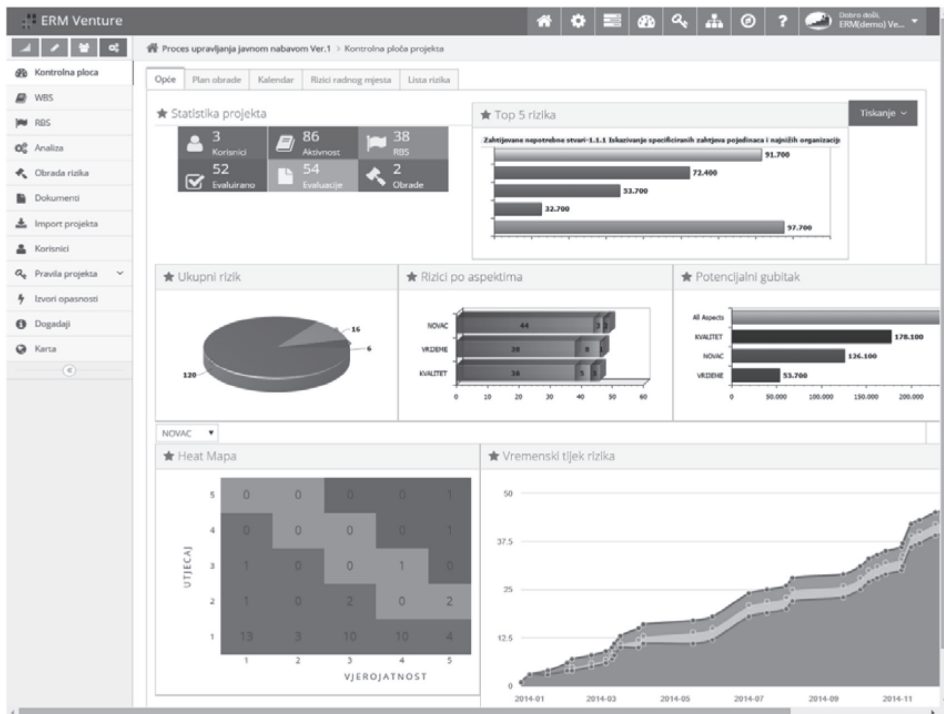
Slika 3. Prikaz rizika na mapi



Izvor: www.erm-venture.com, Vlasništvo Hera, 2015. Reproducirano uz dozvolu poduzeća Hera.

- Praćenje povijesti i sljedivosti procjene rizika.
- Evaluiranje rizika – automatska evaluacija i rangiranje rizika.
- Povezivanje obrade rizika i kontrole i akcije tj, definiranja mjera koje se poduzimaju u procesu obrade rizika.
- Mogućnost definiranja izvješćivanja i odgovornosti.
- Nadgledanje svih poduzetih mjera nad kritičnim rizicima.
- Mogućnost ponovne procjene kako bi se utvrdila efikasnost poduzetih mjera.

Slika 4. Nadzorna ploča



Izvor: www.erm-venture.com, Vlasništvo Hera, 2015. Reproducirano uz dozvolu poduzeća Hera.

- Mogućnost streaminga.
- Mogućnost prikaza rizika na mapi (Slika 3).
- Nadzorne ploče (Slika 4).
- Mogućnost prihvata podataka iz različitih izvora.
- Mogućnost izvoza izvješća u različitim formatima (pdf, excel).

Na osnovu navedenih osnovnih značajki softvera ERM Venture, može se zaključiti da taj softverski proizvod ima većinu značajki navedenih u tablicama 1 i 2.

4. ZAKLJUČAK

Osnovu kvalitetnog i uspješnog upravljanja rizikom čini njegovo razumijevanje i integriranje u okviru poslovne strategije organizacije. Međutim, za uspješno implementiranje upravljanja rizikom organizacija mora imati djelatnike sa znanjima iz upravljanja projektima, analitičkim vještinama, kao i s poznavanjem dobre prakse u upravljanju rizicima. Djelatnici prepoznati kao „vlasnici rizika“ su neposredno odgovorni za procijenjenu razinu rizika te za definiranje i primjenu planova odgovora na rizike kako bi se rizici sveli na definiranu razinu tolerancije. Ali, samo ljudi tj. djelatnici, nisu dovoljni. Da bi upravljanje rizikom bilo efikasno ono mora biti podržano odgovarajućom tehnologijom tj. softverom. Srećom, veliki broj proizvođača softvera je ušao ili ulazi u prostor upravljanja rizikom, tako da svaka godina donosi nove inovacije i poboljšanje značajki softvera.

U ovom radu je prezentirano softversko rješenje ERM Venture nastalo kao rezultat suradnje poduzeća iz Hrvatske i Bosne i Hercegovine. ERM Venture softver omogućuje snažnu potporu korisnicima u procesu upravljanja rizikom. Također, ovaj softver ima gotovo sve osnovne značajke koje su korisnici identificirali kao najbitnije za proizvod tog tipa. Uporabom ovog softvera organizacijski ciljevi i ključni rizici u postizanju tih ciljeva postaju jasno vidljivi menadžmentu, a planovi odgovora na rizike se mogu sistematično odobravati i stalno nadzirati. Također, ERM Venture softver omogućuje jednostavnije identificiranje i upravljanje kombiniranim rizicima. Kako se većina procesa upravljanja rizikom mijenja tijekom vremena, bitno je naglasiti da je ERM Venture softver razvijen tako da korisnicima omogući fleksibilnost i prilagodbu tim promjenama.

Abstract:

ERM VENTURE SOFTWARE – SIMPLE AND QUALITY RISK MANAGEMENT

In today's global environment, understanding and integrating of risk management as a key part of the business strategy is a crucial step forward both for the risk management and for the development of a sustainable performance. Managers and risk managers across all lines of business are accountable for a sustainable risk framework. Adequate software support enables them to take an innovative, risk-based approach to governance and compliance, to gain a holistic, enterprise wide view of risk exposure and near-real-time risk management and monitoring. Software support for risk management process should enable organisations with efficient risk evaluation and

assessment, continuous monitoring, reporting and easier improvement of the process. The paper presents the analysis of the main attributes that risk management software should have. This analysis was based on the results of previously conducted research on appropriate number of companies in Croatia and Bosnia and Herzegovina. Results of research defined the main attributes that risk management software should have in order to fulfill user expectations. This paper used that attributes in order to evaluate the characteristics of ERM Venture software – concrete software product for support of risk management process.

Key words: risk management, software, ERM Venture software.

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ISO ANNEX SL: A CATALYST FOR CHANGE

ISO ANEKS SL: KATALIZATOR PROMJENA

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ABSTRACT

The recent publication of the Annex SL presents a number of challenges. Whilst providing a welcoming framework or “template” for a generic management system such as ISO 9001, it represents a significant change to the way in which we approach and meet our management system requirements. It also presents a long awaited opportunity for the quality professional to play a more influential role in shaping the strategic direction of the organisation. Our paper explores the significant changes brought about by this template and the impact this has on the more traditional role of the quality professional. The authors will illustrate this with reference to their continuing research activities in the UK criminal justice service and recent published works into the way in which ISO 9001-2015 is providing a basis upon which a more integrated, responsive and competitive service is being built.

Key words: ISO Annex SL, Strategy, Quality Professional, Change management.

1. INTRODUCTION

Concerns about the growing rate of re-offending, together with an exploding prison population, has demanded a radical re-think about the processes by which offenders are managed and a critical look at the effectiveness of outcomes. This concern, together with a drive for reduced costs, and plans to introduce competition to the delivery of the service, has provided the impetus to radically re-examine this process.

2. A COMMITMENT TO QUALITY

Within individual bodies in the criminal justice service, there is evidence of real commitment to quality management systems, several organisations within the criminal justice system having achieved ISO accreditation and one such body recently having had the distinction of being the first public sector organisation ever to win the prestigious British Quality Foundation (BQF) UK Excellence Award. The challenge, then, was how to lever the existing quality standards in a bid to address these pressing strategic challenges by working in a more integrated way to deliver the service in a way that quality really does make a difference.

3. KEY COMPONENTS OF THE QUALITY STANDARD

The philosophy underpinning the new template (Annex SL) is designed to address some of the shortcomings experienced by companies in achieving a more external strategic and competitive focus, setting out some clear requirements that research findings, including the authors' own research, have found to be lacking and therefore a barrier to progress and sustainability.

4. SHORTCOMINGS IN EXISTING APPROACHES TO QUALITY MANAGEMENT

In the authors' previously published work involving a broad and in-depth study of companies they investigated the extent to which company competitiveness was advanced, or hindered, by their progress through what they termed the "quality eras". This work has been widely published and is often cited in publications as a classic text in assisting companies to identify where they need to focus their quality effort in order to survive and grow.

Companies that were surviving and had potential for growth were studied in some depth to enable findings to be made in relation to the learning for companies, as well as learning for the quality professional in how they might contribute to this. In the companies operating in what they termed a “competitive mode”, the quality strategy was driven by the voice of the market, stakeholders and the customer. Those companies operating in “survival mode”, however, exhibited a more inward looking approach to quality with an emphasis on inspection and detection.

Evidence was found of a shift in quality emphasis towards the creation of opportunities for innovation in service quality, towards establishing partnerships and collaborations designed to add customer value and overall a greater emphasis on strengthening relationships, and optimising talent and knowledge management.

Whilst many of the companies in the study had achieved recognised levels of quality management, such as accreditation to international standards, there was still a need for a mechanism through which a greater understanding and impetus for change at a strategic level could be achieved. The introduction of the new template to ISO standards Annex SL provides an opportunity to achieve a greater level of competitiveness than hitherto.

This paper addresses two aspects of the new template - firstly leadership, where there is a requirement for top management to demonstrate real commitment, and secondly, the concept of risk-based thinking applied at a strategic level in the management of uncertainty in the criminal justice case study.

5. METHODOLOGY: AN INTEGRATED DELIVERY MODEL

The authors’ methodology involved the design of an integrated service model in order to bring together the component parts of the offender management service (the supply chain) with a view to re-designing this key process. Attributes of Annex SL underpinned the design, including the integration of various quality systems across organisations, building in performance planning, including the plan-do-check-act cycle and the management of risk. Other quality management tools, such as “Servqual”, were introduced appropriately to explore interface issues in the supply chain.

5.1. The authors’ “Integrated Delivery Model”

The methodology and approach adopted provide a strategic driver with which to transform organisations as illustrated in the above case study exam-

ple, offering a powerful means with which to merge the different organisations into one “virtual” organisation. The integration in this way enabled the authors to work with leaders and key influencers to facilitate the development of a common vision and goals. An external analysis involved the identification and management of strategic risks and key operational risks, including the need to establish and monitor strategic financial indicators, reducing the financial risk of “payment by results”. The next steps were to identify the contribution that each partner in the supply chain made to the overall goals and objectives. This enabled the identification and management of risk at an operational level and the allocation of funding in a way that matched the resources that each partner required in order to make an effective contribution. Key performance indicators were allocated to each partner that matched more closely the overall goals of the “one” organisation.

The challenging issue of culture change was addressed by focusing on the strengths that each partner brought, in the case study example, this was a careful balance between a commercial orientation and those of social enterprises that were more values driven and community focused.

5.2. The Servqual Methodology

The Servqual methodology enabled the authors to contrast the “supplier” and “customers” view of working collaboratively in partnership, resulting in information sharing, such as offender profiling, to be shared along the supply chain. The complex system of interfaces resulted in a reduction in duplication and identified opportunities to share resources. Setting stretch goals and measures at each interface ensured expectations were being met and provided the basis of specifications for commercial tendering purposes. Innovation in service delivery was introduced involving closer working in the prison environment with the offender by helping to match the offender to the appropriate rehabilitation programme. This “customer-centred” approach reduced the risk that the offender failed to successfully complete a programme.

5.3. Leadership

The success of this integration depended upon how well the services worked together. The authors previously published work in this area had focused on closing the gaps in communication and understanding between the police, crown prosecution service, solicitors, probation service, witness service and courts. This work provided the foundation and methodology for the offender management service which addresses the role of the prison service and partner organisations concerned with the rehabilitation of offenders.

It was necessary for leaders to readjust the cultures, structures and organisations themselves to reflect the changed emphasis of their work which was concerned with protecting the public through a reduction in re-offending. With major parts of the service contracted out, the leaders brought a range of experience and skills including business management as well as criminal justice experience. A more responsive service was expected to be delivered through partnership working in the community. Joined up approaches were essential and to date a number of innovative practices are emerging as a result of these collaborations, including the introduction of some training schemes carried out in prisons.

In the new integrated services model the partner organisations concerned with rehabilitation deliver their service inside the prison, there is therefore no need for offices and departments operating as satellite services. Many services are now contracted to small, voluntary groups that specialise in particular offender issues and have the knowledge and experience to make a difference.

5.4. Risk-based thinking

Risk management has always played an important part in the role of offender management, having been concerned with the risk of offending behaviour to themselves and the public.

A major challenge was adjusting to a “payment by results” incentive scheme that had been introduced to reward those at the “sharp end” of the delivery chain i.e. the prison service and partners, for each offender that is not convicted of any further offences in a twelve month period from release of prison. This represented a huge culture shift and risk to a previously Government funded body. It was essential that resources were carefully targeted towards actions that had the greatest likelihood of achieving the desired outcomes.

6. PRESERVING QUALITY AND CONTINUOUS IMPROVEMENT

The components of Annex SL, provided an overarching requirement with which to integrate existing quality management systems in the prison service and partner bodies. The plan-do-check-act cycle was a reminder of the importance of establishing appropriate performance measures. Key performance indicators to date had typically been related to particular functions or productivity measures within each organisation. What was required were measures relating to effective outcomes and measures which were meaningful to each partner organisation in the supply chain.

7. THE CHANGING ROLE OF THE QUALITY PROFESSIONAL

What was emerging was a step change in quality thinking and practices which clearly had an impact on the role of the quality professional, leading us to question the extent to which we were equipping our new generation of quality professionals with the right skills to meet the challenges dictated by the current economic environment.

7.1. A move away from the more traditional role

Quality is defined as critical for the competitiveness of organisations by the overwhelming majority of opinion-formers but to date there has been a disappointing disconnect between aspiration and delivery which must be addressed if we are to meet the ongoing challenge of global competition. European-wide surveys of quality managers into success factors and problems with their role indicated that they felt successful when their activities led to substantial changes; however, a significant correlation was found between those working with ISO 9001 and the feeling that they were least successful, as their time was spent mainly in a “policing role” with only 24% of time spent on improvement activities.

The introduction of Annex SL to the International Standards has been heralded as an opportunity to place greater emphasis on building in a preventative approach at a strategic level rather than at an operational level where the emphasis had traditionally been on the identification of errors and in problem-solving. Understandably, this had raised concern amongst the quality professional community about how this would work in practice.

The challenge that results can be summarised as the need to make a transition from the more traditional role and the characteristics associated with this to a role which enables the quality professional to make a wider contribution and at a more strategic level.

7.2. The Quality Professional as a strategic influencer

Effective judgements and decisions at a strategic level are dependent upon comprehensive, reliable and appropriate information. In our studies the quality professional played a key role in influencing the planning process as follows.

7.3. Quality of information

With a drive to understand better the impact of their practice on reducing re-offending, services operating in different geographical areas have joined forces to explore in greater depth the data used to calculate adult re-offending rates and to identify and share learning. Until now the role of the quality professional had been to collate data relating to the “inputs” of the process rather than the “outcomes”, and included for example, the number of offenders and the numbers attending rehabilitation programmes. Whilst the information was valuable in managing resources in the system it was not helpful in making judgements about which rehabilitation programmes were the most effective in reducing reoffending.

Recognising that, in order to deliver a quality service, people needed the right tools, a new national case management system was introduced to ensure that the work being undertaken with offenders and victims is captured through accurate recording and evidencing of decisions and actions. The quality professional now played a key role in building relationships across organisations and in facilitating discussions about understanding and interpreting data at a strategic level.

7.4. Identifying needs and expectations of customers and stakeholders

The quality management system (ISO 9001) provided a framework with which to share and act on feedback from the surveys with victims and witnesses. New and innovative ways of working had resulted with offenders being made aware of the impact of their crime and closer working with partners in victim liaison roles.

7.5. Understanding the core strengths and weaknesses of the organisation

The focus on processes at a strategic level rather than at each organisation’s functional level meant that any non-conformities were analysed and reviewed systematically in terms of the risk posed, with the results fed through to the senior teams, enabling any trends to be identified and strategic action taken.

The emphasis of the quality professional’s role could be seen in risk-based thinking, bringing a preventative approach at the planning stage, moving away from a reactive emphasis in problem-solving at a later stage in the process.

Those partner organisations that had achieved quality awards or accreditation for their quality management system now had a clear plan of action with which to build on their achievements to date.

8. CONCLUSION

Whilst this study is at an early stage in determining overall strategic results for offender management, a number of positive outcomes are emerging, including the identification and sharing of good practice across organisations as well as elimination of waste, clearer definition of process outcomes and how these can be measured. Quality professionals play a key role in facilitating the sharing of knowledge and learning, together with the identification and management of risk.

The publication of Annex SL to the International Standards is proving to be a catalyst for change, not only in breaking through the barriers preventing the elevation of quality management systems to a strategic level experienced by many organisations but as a catalyst for change in highlighting the vital part that quality management plays in the sustainability and competitiveness of the organisations and the key role that the quality professional plays in this.

9. FUTURE WORK

The methodology is proving to be of value in a number of sectors, both commercial and public in the integration of quality management systems and in implementing good practice in the management of risk at a strategic level.

The authors are using their methodology with a number of organisations in order to facilitate the integration of quality management systems internally, across organisational departments, and externally with partners in the supply chain, facilitating a common sense of direction and purpose so that identified opportunities can be optimised in a shared pursuit of a greater competitiveness.

Sažetak:

ISO ANEKS SL: KATALIZATOR PROMJENA

Nedavno objavljena publikacija Annex SL donosi brojne promjene. Predstavlja dobar okvir ili predložak za generički sustava upravljanja kao što je ISO 9001 te predstavlja ozbiljne promjene u izboru pristupa za ispunjavanje zahtjeva sustava upravljanja. Također predstavlja dugo očekivanu priliku profesionalcima u kvaliteti u dobivanju

značajnije uloge u oblikovanju strateških odrednica organizacije. Ovaj članak donosi rezultate istraživanja ozbiljnih promjena koje donosi ovaj dokument kao i utjecaja koji ima na tradicionalnu ulogu profesionalaca u kvaliteti. Autori prikazuju ovaj fenomen pozivajući se na njihovo kontinuirano istraživanje aktivnosti u području kaznenog provosuda Velike Britanije i nedavno objavljenih radova koji se bave načinom na koji ISO 9001:2015 predstavlja osnovicu za veći stupanj integracije i postizanja konkurentnosti ovih usluga.

Ključne riječi: ISO Aneks SL, strategija, profesionalci u kvaliteti, upravljanje promjenama.

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KONTEKST ORGANIZACIJE I NJEGOVO NAUČNO SHVATANJE

CONTEXT OF ORGANIZATION AND ITS SCIENCE APPROACH

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SAŽETAK

U ovom autor se bavi problemom konteksta organizacije, jednog od zahtjeva novoga standarda ISO 9001:2015. Primjenom naučnoga pristupa predstavljaju se neki od ključnih elemenata unutrašnjega i vanjskoga konteksta organizacije. Sa aspekta unutrašnjega konteksta definisani su sljedeći elementi: organizacijska struktura, stilovi vodstva i organizacijska kultura. Sa aspekta vanjskoga konteksta organizacije fokus je na odnosu sa zainteresiranim stranama, stakeholderima.

Ključne riječi: organizacija, kvalitet, dionici, vodstvo, strategija.

1. UVOD

Kontekst organizacije predstavlja novinu u standardu ISO 9001:2015. Analizom standarda vidjeli smo da se u okviru konteksta organizacije najveća pažnja poklanja analizi okoline organizacije kao i analizi onih koji predstavljaju tu okolinu – stakeholdera ili dionika. Svaka organizacija prije nego izađe na tržište mora definisati svoju organizaciju kako bi lakše definisala odnose sa poslovnom okolinom. Takođe, rukovodstvo organizacije mora jasno identificirati sve zainteresirane strane koje imaju interes (pozitivan ili nega-

tivan) za poslovanje kompanije. U ovom radu ćemo predstaviti kakva treba biti unutarnja organizacija kompanije, sa aspekta strukture, vodstva i organizacijske kulture, a zatim ćemo se fokusirati na analizu svih ključnih zainteresiranih strana koje direktno utiču na poslovanje kompanije. Na kraju ćemo sa aspekta poslovne komunikacije ponuditi moguće strategije odnosa sa zainteresiranim stranama.

2. UNUTRAŠNJI KONTEKST ORGANIZACIJE

Svaka organizacija mora imati svoj unutrašnji ustroj kako bi mogla funkcionisati. Analiza literature je pokazala da je pojam organizacije uopšte vrlo širok pojam koji uključuje organizacijsku strukturu, vodstvo u organizaciji, motivaciju, učenje, upravljanje ljudskim resursima, organizacijsku kulturu i slično. Za potrebe ovoga rada fokusiraćemo se na tri elementa: **organizacijska struktura, vođenje i organizacijska kultura**. U daljem tekstu ćemo predstaviti ove elemente.

2.1. Organizacijska struktura

Postoji više oblika organizacijskih struktura. Za potrebe ovoga rada fokusiraćemo se na dva osnovna oblika: **funkcionalna struktura i divizionna struktura**.

Funkcionalna struktura podrazumijeva objedinjavanje poslova jedne poslovne funkcije u odgovarajuću organizacijsku jedinicu – sektor.¹ Tako npr. možemo poslove računovodstva, knjigovodstva, platnoga prometa smjestiti u jedan sektor koji ćemo nazvati „Finansije“.

Divizionna struktura podrazumijeva formiranje organizacionih jedinica sa aspekta rada, proizvodnje ili usluga pri čemu objekat može biti proizvod, prodajna linija, grupa proizvoda, geografska područja, vrijeme, kupci, oprema itd.²

Ovo su dvije osnovne organizacijske strukture iz kojih se dalje izvode ostale strukture. Najčešće su to **projektna i matična organizacijska struktura** koje su karakteristične za moderno poslovanje koje je uglavnom zasnovano na projektima. Projektna organizacija predstavlja projekat kao samostalnu organizacijsku jedinicu dok matična struktura nastaje iz funkcionalne i divizionne strukture. Matična struktura predstavlja projektne timove koji se formiraju za realizaciju konkretnoga projekta, a nakon toga prestaju postojati

¹ Zečić Hadžiahmetović, Senad Softić i Dženan Kulović, *Organizacija (teorije, strukture, ponašanje)*, Ekonomski fakultet, Sarajevo, 2008.

² Ibid.

ti. Projektna organizacija se rijetko susreće u praksi dok se matična struktura redovno susreće u savremenom poslovanju.

2.2. Vođenje organizacije

Vođenje je proces komuniciranja, uticaja i motivisanja drugih radi uspješnog ostvarivanja njihovih zadataka i postizanja organizacijskih ciljeva.³ Postoji više pristupa stilovima vodstva, a mi ćemo se u ovom radu fokusirati na najosnovniju klasifikaciju koja je definisana na Univerzitetu Ajova (Iowa) i po kojoj postoje tri stila vodstva.⁴

Autokratski stil, kojega karakteriše odsustvo učešća podređenih. Lider sam donosi odluke i snosi odgovornost za njihovo provođenje. On odlučuje kako će se odluka sprovoditi i usmjerava uposlene u tom pravcu.

Demokratski stil, kojega karakteriše da lider pokreće i usmjerava diskusiju podređenih, ali im dozvoljava da slobodno iznesu svoje mišljenje. Za odluku je presudna riječ lidera. U toku implementacije odluke lider dozvoljava značajan stepen autonomije uposlenima.

Laissez faire stil koji znači da se lider povlači iz procesa odlučivanja, prepuštajući članovima organizacije da odlučuju. Lider prepušta uposlenima da donose i provode odluke.

Praksa je pokazala da se ovi stilovi vođenja ne isključuju međusobno jer autokratski lideri su jednostavno osuđeni na neuspjeh kao i oni koji daju previše slobode. Svaki rukovodilac mora na početku jasno definisati odnose i ovlaštenja i ne smije se pasivno ponašati. Ovo se posebno odnosi kada je u pitanju upravljanje konfliktima jer praksa je pokazala da ne postoji poslovanje bez konflikata. Dodajmo ovome još i to da svaki menadžer mora izgraditi vlastiti imidž kao i međusobno povjerenje sa podređenima.

2.3. Kulturološke dimenzije

Kultura (uopšte) predstavlja skup zajedničkih motiva, vrijednosti, uvjerenja, identiteta i interpretacija ili mišljenja o značajnim događajima koji su rezultirali iz zajedničkih iskustava članova kolektiva i koji se prenose kroz generacije.⁵ Analizom literature smo zaključili da postoje dvije kulture, **nacionalna** i **organizaciona**. **Nacionalna kultura** predstavlja mentalno progra-

³ Zvonko Sajfert, Dejan Đorđević i Cariša Bešić, *Leksikon menadžmenta*, Agencija Matić, Beograd, 2006.

⁴ Nebojša Janićijević, *Organizaciono ponašanje*, Datastatus, Beograd, 2008.

⁵ Robert J. House, Paul J. Hanges, Mansour Javidan, Peter W. Dorfman and Vipin Gupta, *Culture, Leadership and Organizations: The Globe Study of 62 Societies*, Sage Publications, 2004.

miranje: obrazac mišljenja, osjećanja i djelovanja koje svaka osoba stekne u djetinjstvu i zatim primjenjuje kroz cijeli život.⁶ **Organizaciona kultura** je kolektivno programiranje uma koje razlikuje članove jedne organizacije od članova druge organizacije iz čega proizilazi da je organizacijska kultura karakteristika organizacije, a ne pojedinaca iako se manifestuje i mjeri pomoću verbalnih i neverbalnih ponašanja pojedinaca.⁷ Hofstede je definisao pet kulturoloških dimenzija nacionalne kulture:⁸

- **Izbjegavanje neizvjesnosti.** Poslovni ljudi ovakvih dimenzija pokušavaju budućnost učiniti predvidivom striktnim slijedom pravila i procedura. Organizacije pokušavaju izbjeći nesigurnost time što stvaraju pravila i propise koji daju iluziju stabilnosti.
- **Individualizam/kolektivizam.** Poslovni ljudi ovakvih dimenzija vjeruju da je grupni uspjeh važniji od individualnog postignuća. Lojalnost grupi je najvažnija. Zaposlenici su lojalni i emocionalno ovisni o svojoj organizaciji.
- **Distanca moći.** Poslovni ljudi ovakvih dimenzija vjeruju u neravnomjernu raspodjelu moći i boje se izraziti neslaganje sa svojim šefovima, koji ih rijetko pitaju za mišljenje.
- **Dugoročna/kratkoročna orijentacija.** Poslovni ljudi ovakvih dimenzija vrednuju ustrajnost, štednju i poštovanje tradicije. Od mlađih uposlenika se očekuje da slijede naloge starijih i da odgađaju zadovoljenje svojih materijalnih, socijalnih i emocionalnih potreba.
- **Muškost/ženskost.** Poslovni ljudi ovakvih dimenzija vrednuju sticanje novca i materijalnih dobara. Uspješni poslovni ljudi se doživljavaju kao agresivni, nepopustljivi i natjecateljski raspoloženi. Važni su zarada, priznanje dok kvaliteta života i suradnja nisu na visokoj cijeni.

S druge strane postoje četiri dimenzije organizacijske kulture:⁹

- **Kultura moći** je autoritarna kultura koja podrazumijeva relativno nisko izbjegavanje neizvjesnosti. Najčešće je prisutna u malim i tek osnovanim organizacijama u kojima lider ima centralnu ulogu. Ovu kulturu karakteriše autoritativni stil upravljanja ali i sklonost ka promjenama i riziku.

⁶ Nebojša Jančićević, „Uloga nacionalne kulture u izboru strategije promjena u organizacijama,“ *Ekonomski horizonti*, Vol. 16, No. 1, 2014, str. 3-15.

⁷ Ranka Jeknić, *Kulture i organizacije: Organizacijske kulture Guerta Hofstede*, Zbornik radova Pravnog fakulteta u Splitu, Vol. 48, No. 1, 2011, str. 103 – 123.

⁸ Fikreta Bahtijarević Šiber, Pere Sikavica i Nina Pološki Vokić, *Suvremeni menadžment, vještine, sustavi i izazovi*, Školska knjiga, Zagreb, 2008.

⁹ Mirjana Petković, Nebojša Jančićević i Biljana Bogičević Milikić, *Organizacija*, Ekonomski fakultet, Beograd, 2008.

- **Kultura uloga** je birokratska kultura u kojoj centralno mjesto pripada procedurama, hijerarhiji i formalizaciji. Izbjegavanje neizvjesnosti je visoko, a distanca moći niska što znači da ovakve organizacije nisu sklone riziku kao i da je stil upravljanja više autokratski nego demokratski.
- **Kultura zadatka** je fokusirana na zadatke i ciljeve koje treba ostvariti. Kako je kompetentnost izvršilaca ključ uspjeha organizacije to znači da se izvršiocima treba delegirati značajan autoritet donošenja odluka. Zato je distanca moći niska kao i izbjegavanje neizvjesnosti.
- **Kultura podrške** ima u fokusu individualne ciljeve pojedinaca i njihovu autonomiju. Zato ona podrazumijeva nisku distancu moći i visoko izbjegavanje neizvjesnosti.

Kao što smo mogli vidjeti i nacionalna i organizacijska kultura su međusobno povezane preko dvije nacionalne kulturološke dimenzije, **izbjegavanje neizvjesnosti** i **distanca moći**. Robbins ističe da su istraživanja pokazala da nacionalna kultura ima jači uticaj na zaposlene nego organizaciona kultura.¹⁰ Uzimajući primjer kompanije IBM Robbins ističe da će uposlenici IBM u Njemačkoj biti pod većim uticajem njemačke kulture nego organizacijske kulture IBM.

3. VANJSKI KONTEKST ORGANIZACIJE

Organizacija sama ne može ništa nego mora izaći na tržište u okruženje zainteresiranih strana koje u literaturi nazivamo stakeholderi. Svi stakeholderi imaju neki interes kada je u pitanju poslovanje organizacije, a rukovodstvo organizacije mora jasno definisati kako da se prema njima postavi jer neki žele dobro organizaciji, neki ne, dok se bez nekih ne može zamisliti poslovanje. Takođe, moderno poslovanje podrazumijeva da organizacije budu društveno odgovorne što podrazumijeva uspostavu ravnoteže između profita i zadovoljavanja potreba i interesa većeg broja interesno utjecajnih skupina kao što se može vidjeti na Slici 1. Ovaj pristup biće nam polazna osnova za analizu odnosa sa stakeholderima, a u analizi ćemo primijeniti kombinaciju naučnoga i empirijskoga pristupa.

¹⁰ Stephen P. Robbins, *Bitni elementi organizacijskog ponašanja*, Mate, Zagreb, 1995.

Slika 1. Organizacija i zainteresirane strane



Izvor: Pere Sikavica, Organizacija, Školska knjiga, Zagreb, 2011.

3.1. Analiza ključnih stakeholdera¹¹

U ovom dijelu napravićemo analizu glavnih stakeholdera. Analiza uključuje ono što stakeholderi očekuju od organizacije kao i mjere koje oni mogu poduzeti da bi to dobili.

Zaposleni predstavljaju najvažnije stakeholdere. Zaposlenici očekuju da njihov status u organizaciji bude stabilan (stalno zaposlenje umjesto ugovora na određeni rad), pravednu isplatu za svoj rad u organizaciji kao i rad u sigurnoj i ugodnoj okolini. Rad u sigurnoj i ugodnoj okolini podrazumijeva zdrave i bezbjedne radne uslove (ovo mora provesti svaka firma koja ima uveden integralni sistem upravljanja kvalitetom) kao i rad u sredini gdje nema konflikata. Da bi ovo postigli uposlenici mogu preduzeti inicijativu kolektivnog pregovaranja putem sindikata, a ako im to ne pođe za rukom, mogu preduzeti negativne mjere kao što su štrajkovi, a to povlači negativni publicitet organizacije u javnosti.

¹¹ Preuređeno prema: Ivona Santini, „Ugrožava li teorija interesno uticajnih skupina primat koncepta maksimizacije vrijednosti kao cilja ponašanja firme“, Ekonomski pregled, Vol. 58, No. 5-6, 2007, str 328-345.

Menadžment organizacije ima zadatak da upravlja organizacijom i da ostvaruje profit. On očekuje pomoć od vlasnika i dioničara u ostvarenju toga cilja kako u vidu kapitala tako i u vidu pomoći za ostvarenje kontakata na tržištu, a od uposlenika traže da slijede planove organizacije. Da bi to postigli moraju imati konstatnu komunikaciju i sa jednima i sa drugima. Dodatno prema uposlenicima uspostavljaju disciplinu s tim da ih moraju adekvatno nagraditi ako dobro rade. Među uposlenicima ne smiju imati svoje miljenike jer to stvara prostor za konflikte.

Vlasnici i dioničari očekuju da naplate svoj uloženi kapital tj. da dobiju dividendu. Takođe, imaju za cilj povećanje vrijednosti svojih dionica. Da bi to ostvarili koriste svoja glasačka prava kao i pravo uvida u poslovne knjige. To ostvaruju kroz imenovanje svojih ljudi u nadzorne odbore. Pored toga među dioničarima postoji stalna borba ko će biti većinski vlasnik, a ona se ogleda kroz stalne pokušaje kupovine dionica malih dioničara. Naglasimo ovdje još i to da vlasnici i dioničari pored prava na dividendu imaju i obavezu aktivnog učešća na tržištu što znači da su i oni obavezni tražiti potencijalne kupce.

Kupci očekuju da za novac koji plate dobiju adekvatan proizvod koji ih zadovoljava kako tehnički tako i u pogledu kvalitete. Kupac ima vrlo moćno oružje, a to je mogućnost da bojkotuje proizvod ili da ga kupuje kod konkurenata. A konkurenata ima svuda samo je razlika u tome da je konkurencija na nekim tržištima izrazito velika (npr tržište nekretnina), a na nekim mala (industrijska tržišta).

Dobavljači očekuju iskren odnos i povjerenje što vremenom treba da preraste u dugoročnu saradnju. Za isporučenu opremu očekuju da budu plaćeni na vrijeme. Ukoliko se ne poštuju uslovi saradnje dobavljač može odbiti isporuku i tražiti novoga partnera.

Vjerovnici su faktor poslovnoga okruženja bez kojega ne možemo zamisliti poslovanje. Nemoguće je zamisliti posao bez kreditora i osiguravajućih firmi, a kada završimo posao treba platiti porez poreznim institucijama. Ono što vjerovnici traže jeste da im se obaveze izmire na vrijeme, a ako se to ne učini onda slijede nepopularni koraci koji nekada završe i plijenidbom imovine.

Zajednica podrazumijeva onaj segment javnosti koji je ovisan od donacija poslovnog sektora. Nevladine organizacije, sportska udruženja kao i ostali oblici neprofitnih organizacija pripremaju projekte i traže sponzorstvo od poslovnih organizacija. Sadašnji koncept poslovanja zasnovan je kako na sticanju profita tako i na društvenoj odgovornosti koja predstavlja poseban oblik promocije. Stoga se od poslovnih organizacija očekuje da u skladu sa poslovnim mogućnostima rade i sponzorstva, a to je u današnjem poslovnom svijetu bolja promocija od bilo kakve reklame.

Sindikati su organizacije koje predstavljaju uposlenike. Sindikati uglavnom traže isto što i uposlenici s tim da im je opseg djelovanja širi jer su u direktnom kontaktu sa vladom i sa međunarodnim sindikatima. Sindikati vode pregovore kako sa vladom tako i sa poslodavcima sa ciljem sklapanja što boljeg kolektivnog ugovora koji štiti uposlenike.

Vlada je institucija koja predlaže zakone, a takođe i javne kompanije su u vlasništvu vlade. Vlada očekuje poštovanje zakona i plaćanja svih obaveznih doprinosa a organizacije očekuju od vlade da obezbijedi fer konkurenciju na tržištu kao i da ekonomskom diplomatijom obezbijedi učešće na stranim tržištima.

Ovim stakeholderima dodajmo i one najvažnije, **konkurenciju**. **Konkurencija**¹² želi biti profitabilna, osvojiti što veći dio tržišta i napredovati u poslovnom sektoru koji predstavlja njenu djelatnost. Da bi to postigla prati tehnologiju ili pokušava nižim cijenama osvojiti tržište.

3.2. Strategija odnosa sa stakeholderima

Na kraju ćemo definisati na kako se organizacija može odnositi prema stakeholderima. Tomić definiše četiri strategije odnosa prema stakeholderima:¹³

- **Strategija reakcije.** Ovakva strategija predstavlja direktnu konfrontaciju sa stakeholderima i povlačenje i ignorisanje svih njihovih pitanja. Ovakva strategija dobra je kada su u pitanju konkurenti dok kada su u pitanju ostali stakeholderi može imati negativne posljedice. Ovdje su vrlo bitne pregovaračke vještine jer sa adekvatnom strategijom pregovaranja može se kod potencijalnoga kupca ostvariti konkurentska prednost. Konkurenti će pokušati niskom cijenom da osvoje tržište, ali niža cijena ne znači bolji kvalitet proizvoda ili usluge
- **Strategija odbrane.** Ovakva strategija predstavlja odbranu vlastitih pozicija organizacije a odnos sa stakeholderima se svodi na minimum odnosa koji je neophodan. Ova strategija je dobra kada je u pitanju konkurencija kao i onaj dio javnosti koji iz nekih svojih interesa radi protiv organizacije. Međutim, ovakvu strategiju treba kombinovati sa gore navedenom strategijom reakcije jer je praksa pokazala da konstantno branjenje pozicija vremenom dovodi do gubitka istih.
- **Strategija prilagodbe.** Ovakva strategija predstavlja smanjenje jaza između organizacije i stakeholdera. Prihvatljiva je kada se moraju praviti ustupci, posebno kada su u pitanju oni stakeholderi bez kojih ne možemo zamisliti poslovanje, dobavljači, vjerovnici itd.

¹² Ibid.

¹³ Zoran Tomić, *Teorije i modeli odnosa s javnošću*, Synopsis, Zagreb, Sarajevo, 2013.

- **Proaktivna strategija.** Ovakva strategija je suradničkoga karaktera i podrazumijeva zajednički rad na svim spornim pitanjima između organizacije i stakeholdera.

Ove strategije treba uključiti u opštu strategiju komuniciranja koju treba definisati svaka organizacija u okviru upravljanja kvalitetom, a kao odgovorne osobe treba imenovati stručnjake za odnose s javnošću.

Od svih analiziranih strategija najopasnija je strategija odbrane jer kako smo naglasili vremenom dovodi do gubitka tržišne pozicije dok ostale tri su vrlo korisni ako se primjenjuju u kombinaciji. Naime, praksa je pokazala da nije moguća bilo kakva nagodba ili suradnja ukoliko nema aktivnog pristupa tržištu i dešavanjima na tržištu.

4. ZAKLJUČAK

U ovom radu bavili smo se problematikom konteksta organizacije. Glavni razlog za izbor ove teme jeste što je to novi element i zahtjev u novom standardu ISO 9001:2015. Primjenom naučnoga principa predstavili smo neke osnovne elemente kako unutrašnjega tako i vanjskoga konteksta organizacije. Kao što se može vidjeti iz napravljenje naučne analize, kontekst organizacije nije samo element standarda nego i osnova tržišne ekonomije i nastupa na tržištu. Jer ako želimo na tržište prije svega moramo ustrojiti organizaciju iznutra, a nakon toga jasno identificirati tržište na kojem želimo nastupiti i jasno odrediti ko će na tom tržištu imati, kako pozitivne, tako i negativne uticaje na naše poslovanje. Iz ovoga zaključujemo da je najvažnije imati dobre odnose sa uposlenicima jer samo u dobroj saradnji sa uposlenicima možemo ostvariti ciljeve organizacije. Što se tiče ostalih stakeholdera, ključan je odnos sa kupcima i vjerovnicima jer bez kupaca nema profita, a bez kreditora nije moguće finansirati projekte, a što je vrlo bitno u nekim fazama realizacije projekata. Prema konkurenciji treba voditi fer tržišnu utakmicu, a ne treba zaboraviti ni društvenu zajednicu koja nam nije ni konkurencija niti nam može pomoći u ostvarenju profita, ali davanjem adekvatnih donacija u odgovarajuće segmente društva postajemo cjenjeniji i na tržištu i u društvu uopšte.

Abstract:

CONTEXT OF ORGANIZATION AND ITS SCIENCE APPROACH

In this paper we dealt with problem of organizational context as the element of new standard ISO 9001:2015. Using scientific approach we presented some of key elements of internal and external organizational context. From the internal aspect we define next elements: organizational structure, leadership styles as well as organizational culture. From the external aspect we focused on stakeholder relationships.

Key words: organization, quality, stakeholders, leadership, strategy.

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OVERVIEW OF THE DEVELOPMENT OF REVISIONS OF THE STANDARD ISO 9004 AND ITS INFLUENCE ON THE REVISIONS OF ISO 9001 STANDARD

PREGLED RAZVOJA REVIZIJA NORME ISO 9004
I NJEN UTJECAJ NA RAZVOJ NORME ISO 9001

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ABSTRACT

Constant changes in the management and requirements for product quality have prompted the organization to introduce new methods to improve their skills necessary for the survival in the market. Increasingly, there is recognition of the need for applying effective and efficient system that will lead to continuous improvement of quality and continuous increase in customer satisfaction. One of the most applied norms of the business world is ISO 9001 according to which organizations or their quality management systems are certified. With the development of society, organizations and business concepts there is a constant need for the development of standards, not only for certification but also other standards of the same grade. On the development of the ISO 9001 standard affected the standard in the same class, ISO 9004. In the standard ISO 9004 are established the basic set of elements for the development and implementation of quality management systems. In 1987, ISO 9004 defines the

elements of quality management and quality system elements. Further development, ISO 9004 provided the instructions for organizations to improve the quality and instructions for improving the capabilities and operating instructions for the purpose of sustainable development organization.

Key words: ISO standards, revision of the standards, quality management systems, certification, quality management.

1. INTRODUCTION

In parallel with the technical and technological development have been developed specific standards that have become a means of communication in the process of work, which means that the development of standards related to quality and quality system did not start in 1987 but much earlier.

First standards were developed as a result of a need in the production of weapons and other military equipment. In the further development appeared standards that were not related to the production of military equipment and weaponry. In these standards was consolidated positive experience of building business systems in organizations based on the specifications of the general requirements for quality program and significantly contributed to the development of a series of standards ISO 9000 which determined the requirements for a quality system.

Due to the increasing number of products and services on the market, the expectations of customers in terms of quality become higher. In order to survive on the market and maintain strong economic performance, organizations should implement more efficient and effective systems that will lead to continuous improvement of quality and continuous increase in customer satisfaction.

As a response to market demand appeared standards that determined the requirements for the control of products and global expansion of the market has shown a need for international merger and integration of experiences and knowledge by creating an organization that would contribute to the coordination among the states.

2. OVERVIEW OF THE DEVELOPMENT OF REVISION OF THE STANDARD ISO 9004

In 1987 was published the ISO 9004 entitled *Elements of quality management and quality system elements* in which were identified basic sets of elements used for development and implementation of quality management

systems. The choice of elements that were mentioned in this standard, and the degree to which they should be accepted and implemented depended on many factors, such as types of products or services, production processes and customer needs. In order to increase interest in quality and customer satisfaction there was a need for improvement and quality assurance¹.

In 1991 was published the ISO 9004 entitled *Quality management and quality system elements*. This standard consisted of six parts that have defined the guidelines for quality management and quality system elements, guidelines for services, guidelines for processed materials, guidelines for improving quality management, guidelines for quality plans and guidelines for configuration management².

In 1993, was published a new supplemented edition of ISO 9004 entitled *Quality Management and quality system elements*. This standard consisted of seven parts of which six parts determined the same guidelines as in the previous edition and was added the seventh part in which were defined guidelines for quality assurance in project management³.

In 1994 published a new supplemented edition of ISO 9004 entitled *Quality management and quality system elements*. This standard consisted of eight parts of which seven parts determined the same guidelines as in the previous edition and was added the eighth part in which were determined the guidelines for quality principles and their application in the control work⁴.

The new edition of ISO 9004 standard was published in 2000. It was consisted of eight parts (ISO 9004-1 , ISO 9004-2 , ISO 9004-3 , ISO 9004-4 , ISO 9004-5 , ISO 9004-6 , ISO 9004-7 and ISO 9004-8) and has been replaced by ISO 9004 entitled *Quality management systems - Guidelines for quality* . In this revision ISO 9004 standard becomes a consistent pair with ISO 9001 and no longer sets the guidelines for quality management and quality system elements , but they are integrated in the quality management system. Also this edition of the standard are explained the eight basic principles that can be used to improve the performance capabilities of the organization. In addition to the basic principles, new to this edition of the standard is to encourage organizations to use a process approach to quality management⁵.

¹ ISO 9004:1987 Elements of quality management and quality system elements.

² ISO 9004-2:1991 Quality management and quality system elements-Part 2: Guidelines for services.

³ ISO 9004-4:1993 Quality management and quality system elements-Part 4: Guidelines for quality improvement.

⁴ ISO 9004-1:1994 Quality management and quality system elements-Part 1: Guidelines.

⁵ ISO 9004:2000 Quality management systems - Guidelines for quality.

In the next edition of ISO 9004 standard was in 2009. The standard was renamed from *Quality management systems - Access to improve the capabilities* to the *Management for the purpose of permanent organizational performance - Access to quality management*. This edition of the standard no longer provides instruction to improve skills but provides guidelines to maintain lasting success through access to quality management⁶.

In 1987 were published three international standards which were describing the meaning of quality assurance. Standard ISO 9001 *Quality systems. Model for quality assurance in design/development, production, installation and servicing*⁷, the standard ISO 9002 *Quality systems. Model for quality assurance in production and installation*⁸ and the standard ISO 9003 *Quality systems. Model for quality assurance in final inspection and test*⁹.

Each standard determined the specific requirements for ensuring the quality in the stages of the product life cycle. ISO 9001 determined the requirements for quality assurance in the stages of design /development, production, installation and servicing, ISO 9002 determined the requirements for quality assurance in production and installation stages and ISO 9003 determined the requirements for quality assurance in the stages of final inspection and testing.

Table 1. The revisions of ISO 9004 standard

YEAR	ISO STANDARD	NAME OF THE STANDARD	CONTENT OF THE STANDARD	REVISION CHANGES
1987.	ISO 9004	Elements of quality management and quality system elements	Established a set of basic elements with which to develop and implement quality management systems; Twenty points	The name of the standard was changed; Replaced by ISO 9004:1991; The change in the content of the norm from twenty points to six

⁶ ISO 9004:2009 Management for the purpose of permanent organizational performance - Access to quality management.

⁷ ISO 9001:1987 Quality systems. Model for quality assurance in design/development, production, installation and servicing.

⁸ ISO 9002:1987 Quality systems. Model for quality assurance in production and installation.

⁹ ISO 9003:1987 Quality systems. Model for quality assurance in final inspection and test.

1991.	ISO 9004	Quality management and quality system elements Part 1-Guidelines Part 2-Guidelines for services Part 3-Guidelines for processed materials Part 4-Guidelines for quality improvement Part 5-Guidelines for quality plan Part 6-Guidelis for configuration management	Quality assurance and corrective actions; Six points	Replaced by ISO 9004:1993; The change in the content, suffixed seventh point in which was defined quality assurance in project management
1993.	ISO 9004	Quality management and quality system elements Part 1-Guidelines Part 2-Guidelines for services Part 3-Guidelines for processed materials Part 4-Guidelines for quality improvement Part 5-Guidelines for quality plan Part 6-Guidelines for quality assurance in the project management Part 7- Guidelis for configuration management	Continuous quality improvement, corrective and preventive actions and processes; Seven points	Replaced by ISO 9004:1994; The change in the content, suffixed eight point where were defined guidelines for quality principles and their application in the management
1994.	ISO 9004	Quality management and quality system elements Part 1-Guidelines Part 2-Guidelines for services Part 3-Guidelines for processed materials Part 4-Guidelines for quality improvement Part 5-Guidelines for quality plan Part 6-Guidelines for quality assurance in the project management Part 7-Guidelines for configuration management Part 8-Guidelines for quality principles and their application in management	Process management and planning quality; Twenty points	Replaced by ISO 9004:2000; The name of the standard was changed; Consistent pair with ISO 9001; Guidelines for quality management and quality system elements come together in the quality management system ; The change in the content, form twenty points to eight points

2000.	ISO 9004	Quality management systems - Guidelines for quality	Harmonious pair with ISO 9001, the process approach and the fundamental principles of quality management; Eight points	Replaced by ISO 9004:2009; The name of the standard was changed; The change in the content , from eight to nine points; Provides guidelines for the maintenance of lasting success of organizations through access to quality management
2009.	ISO 9004	Management for the purpose of permanent organizational performance - Access to quality management	Sustainable success of the organization; Nine points	

Source: Made by the author.

In 1994, were published new, improved editions of standards. Those standards were determining the requirements for a quality system and were used for external quality assurance. ISO 9001 *Quality systems – Model for quality assurance in design/development, production, installation and servicing* replaced ISO 9001¹⁰, ISO 9002 *Quality systems – Model for quality assurance in production, installation and servicing*¹¹ replaced ISO 9002 and ISO 9003 *Quality systems . Model for quality assurance in final inspection and test*¹² replaced ISO 9003 from 1987. Changes in this revision are generally smaller and standards are upgraded.

3. OVERVIEW OF THE DEVELOPMENT OF REVISION OF THE STANDARD ISO 9001

In the next revision which took place in 2000 standards ISO 9002 i ISO 9003 are withdrawn and ISO 9001¹³ becomes a universal model entitled *Quality management systems – Requirements*. Title of the standard no longer includes quality assurance which reflects the fact that the requirements for the

¹⁰ ISO 9001:1994 Quality systems – Model for quality assurance in design/development, production, installation and servicing.

¹¹ ISO 9002:1994 Quality systems – Model for quality assurance in production, installation and servicing.

¹² ISO 9003:1994 Quality systems. Model for quality assurance in final inspection and test.

¹³ ISO 9001:2000 Quality management systems - Requirements

quality management system established in this edition of ISO 9001 in addition to quality assurance focused on increasing customer satisfaction. This edition of the standard refers to the orientation on quality management systems and encouraging the adoption of a process approach when developing, implementing and improving the effectiveness of the quality management system and increasing customer satisfaction by meeting their requirements. ISO 9001 is in this edition consistent with ISO 9004 which means that each point of the ISO 9001 corresponds to the point of ISO 9004 where they give instructions and guidance for the establishment of an universal model. The structure of the standard is changed. It consists of eight parts in which are specified requirements for a quality management system.

In 2008 was published the new edition of the standard ISO 9001¹⁴. A key feature of this release is in request for quality management system through a process approach. In the previous edition of ISO 9001 is still given rise to a process approach, while in this release states promoting the process approach. The advantage of this approach is in providing permanent surveillance of relationships between the individual processes within the process approach and their combination and interaction. This edition of the standard has not changed substantially compared to the previous edition. Still consists of eight points in which are specified requirements for a quality management system.

In the new edition of the standard ISO 9001:2015¹⁵ the content of the standard is changed. It no longer contain eight points, now it has ten points. Regarding the context of the organization, are superimposed two clauses: 4.1. Understanding the organization and its context and 4.2. Understanding the needs and expectations of stakeholders. Together these clauses require that organizations establish internal and external context that is relevant to its purpose and strategic direction as well as the needs and expectations of stakeholders.

Also, the requirement relating to the scope of application states that the organization needs to apply all the requirements specified in ISO 9001: 2015, if applicable, within assigned subjects and areas of application of its quality management system. The organization can claim compliance with the standard if it is found that the requirements that do not apply do not affect the ability or responsibility of the organization to ensure the conformity of products and services and to increase customer satisfaction. Requirements for processes in this edition of the standard are significantly increased. In total there are ten requirements: requirement for the inputs of the process; requirement for the expected outputs of the process; the requirement for the order and interac-

¹⁴ ISO 9001:2008 Quality management systems - Requirements

¹⁵ Draft ISO 9001:2015

tion processes; requirement for resources and opportunities; requirement for the criteria, methods and performance indicators; requirement for responsibility and authority for the process; requirement for risks and opportunities; request for evaluation of processes; requirement for any necessary changes; requirement for improving the process.

The key change in the new version of ISO 9001:2015 is the requirement that the organization deals with risks and opportunities in order to gain confidence in the management system and that it can achieve the anticipated results. In previous editions of ISO 9001 instruction were addressing to deal with risks through preventive measures, in this release are addressing that dealing with risks is a preventive activity. Regarding the request for environment of the organization for implementation processes, are added, accompanied by physical factors, social and psychological factors. With resource requirements for monitoring and measurement except for demand for measuring equipment in the standard are specified requirements and other resources used for the verification of conformity of products and services to the requirements (tests, questionnaires, test lists, telephone or internet research, etc.).¹⁶

Table 2. The revisions of ISO 9001 standard

YEAR	ISO STANDARD	NAME OF THE STANDARD	CONTENT OF THE STANDARD	REVISION CHANGES
1987	ISO 9001	Quality systems. Model for quality assurance in design/development, production, installation and servicing.	The requirements for the quality system ; The four points – fourth point contains twenty points	The name of the standard was changed
	ISO 9002	Quality systems. Model for quality assurance in production and installation.	The requirements for the quality system ; The four points – fourth point contains eighteen points	The name of the standard was changed; The requirements for the quality system ; The four points – fourth point contains twenty points
	ISO 9003	Quality systems. Model for quality assurance in final inspection and test.	The requirements for the quality system ; The four points – fourth point contains twelve points	The name of the standard was changed; The requirements for the quality system ; The four points – fourth point contains twenty points

¹⁶ Milovanov B., Stanić M.: How to audit quality management systems in accordance with ISO 9001:2015?; The quality system requirement for business success and competitiveness

1994	ISO 9001	Quality systems – Model for quality assurance in design/development, production, installation and servicing	Quality system - External quality assurance	The name of the standard was changed; The content of the standard was changed – form four points to eight points
	ISO 9002	Quality systems – Model for quality assurance in production, installation and servicing	Quality system - External quality assurance	Withdrawn in year 2000
	ISO 9003	Quality systems . Model for quality assurance in final inspection and test	Quality system - External quality assurance	Withdrawn in year 2000
2000	ISO 9001	Quality management systems - Requirements	Quality management system	The eight fundamental principles of quality management; Encouraging the process approach
2008	ISO 9001	Quality management systems - Requirements	Quality management system	The eight fundamental principles of quality management; Promoting the process approach
2015	ISO 9001	Quality management systems - Requirements	Quality management system	The content of the standard was changed – form eight points to ten points; Seven fundamental principles

Source: Made by the author.

The fundamental principles are changed. Of the eight fundamental principles, in this edition of the standard are mentioned only seven, namely:

- Focus on the customer;
- Leadership;
- Inclusion of people;
- Process approach;
- Improvement;
- Making decisions based on facts;
- Relationship management.

4. ANALYSIS OF THE DEVELOPMENT OF THE STANDARD ISO 9004 AND ITS INFLUENCE ON THE DEVELOPMENT OF ISO 9001 STANDARD

First developed standard MIL - Q - 9858 (1959) and MIL - I- 45208 (1961) are the result of a need in the production of weapons and other military equipment. In the further development of standards appeared norms that are not related to the production of military equipment and weaponry as standard ASQC / C specification for general quality requirements¹⁷.

In 1987 were published the series of standards ISO 9000. The series consisted of ISO 9000, ISO 9001, ISO 9002, ISO 9003 and ISO 9004. The standard ISO 9000 provided guidelines for selection and use of ISO 9001, ISO 9002 and ISO 9003. The standard ISO 9004 determined the elements of quality management and elements of quality systems. By increasing interest in quality and customer satisfaction there was a need for improvement and quality assurance. To enable the organizations to meet the evolving needs of the market in 1991 was published a series of ISO 9004. These series consisted of six parts that were related to the guidelines, the guidelines for the services, the guidelines for processed materials, guidelines for improving quality management, guidelines for the quality plan and guidelines for configuration management. Of this series of ISO 9004 was analyzed ISO 9004-2 which referred to the change from quality control to quality assurance and the corrective actions in order to increase customer satisfaction.

In ISO 9004-4 from 1993 is directed to the continuous improvement and preventive and corrective action, and its influence is visible in the editions of ISO 9001, ISO 9002 and ISO 9003 in 1994.

In 1994 were published supplemented ISO 9001, ISO 9002 and ISO 9003 that determined the requirements for quality assurance within the product life cycle.

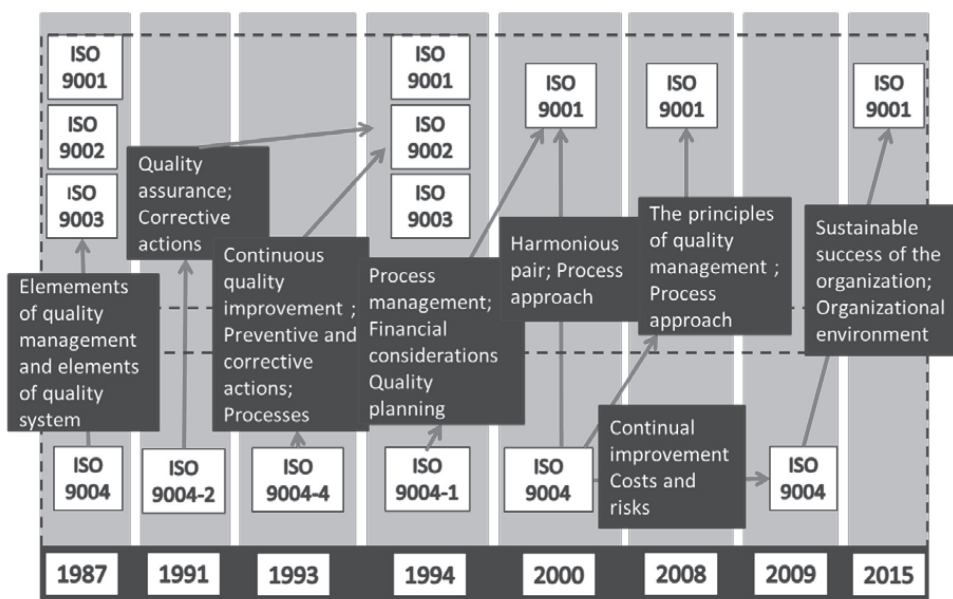
In addition to these standards, the same year was published a new edition of ISO 9004. In ISO 9004-1 from the same year appear terms for quality management and process management. This edition of the standard has influenced the development of ISO 9001 from 2000.

In 2000, ISO 9001, ISO 9002 and ISO 9003 have been replaced by ISO 9001, which become a harmonious pair with ISO 9004. The application of the process approach, the application of the eight fundamental principles of quality management, continuous improvement and meeting the needs and expectations of customers and other stakeholders is the key influence of ISO 9004 on ISO 9001. In ISO 9004 are listed the changes that will influence the further

¹⁷ Živko Kondić, Quality and ISO 9000 – Use, TIVA, Varaždin, 2002.

development of the ISO 9001 and that is the process approach, based on eight fundamental principles, which should be introduced as a requirement for organizations that want to improve the management system quality.

Image 1. Influence of the development of ISO 9004 on the development of ISO 9001



Source: Made by the author.

In 2008 was published a new edition of ISO 9001, which showed the influence of ISO 9004 on ISO 9001. In ISO 9001 as a request states the process approach to quality management which was so far only indicated. The advantage of this approach is to ensure permanent surveillance of relationships between the individual processes within the process approach and their combination and interaction.

The ISO 9004 from 2009, which describes the approach to the sustainable success of the organization, focusing on internal and external users, the importance of the organizational environment, and not just the work environment and the importance of financial resources suggest changes that will affect the next revision of the ISO 9001 standard.

In the new edition of ISO 9001 from 2015, one can notice the influence of ISO 9004 in 2009. In addition to the change of content, there are clauses

that indicate an understanding of the organization and its context and understanding the needs and expectations of stakeholders. These clauses require organizations to identify issues and requirements that may affect the planning of the quality management system. The two most important changes aim of ISO 9001 are the simplification of standards that will be equally applicable to micro, small, medium and large organizations, as well as greater flexibility in defining the plans set by the organization itself. Also in the standard is defined the obligation for the involvement of all managers and employees. It is given the importance of employee training seminars so that employees would be motivated to meet the goals of the organization¹⁸.

In this edition of ISO 9001 greatest importance is given to the top management, and refers to a significant shift in the leadership of the TQM concept and the concept of leadership¹⁹.

The basic principles are changed. Of the eight fundamental principles, in this edition standard refers to them only seven, namely: focus on the customer; leadership; involvement of people; process approach; improvement; decision-making based on facts; relationship management. Changes that are in ISO 9001: 2015 point to a uniform terminology and enable easier integration of different systems.

5. CONCLUSION

ISO 9004 originally determined basic set of elements for the development and implementation of quality management systems, through a series of revisions is formed in a standard that determines the guidelines for achieving sustainable success of the organization. Through the revisions, this standard has changed its content and guidelines, from the determination of elements in the system of quality guidelines to improving the ability to access quality management in order to lasting success of the organization. This standard affected the development of ISO 9001 by providing a broader view of quality of the suggested ways to improve and continuously improve the system of organizations in order to achieve maximum benefit for the organization and interested parties. ISO 9001 was determined by the first requirements for quality assurance, auditing standards requirements for the quality system and re-auditing

¹⁸ Zoran Punoševac, Ana Jelenković i Miloš Punoševac, „New version of ISO 9001:2015 – Is it passed time of documentation and has come time of situation“, The quality system requirement for business success and competitiveness.

¹⁹ Slavko Arsovski, „Leadership quality: The requirement for an effective QMS in terms of rapid change“, The quality system requirement for business success and competitiveness.

standard requirements for quality management system. ISO 9001:1994, ISO 9002:1994 and ISO 9003:1994 that determined the requirements for quality assurance in the conception, development, production, installation and servicing, the requirements for quality assurance in production, installation and maintenance as well as the requirements for quality assurance in final examination in 2000 were withdrawn. The same year was published the ISO 9001, which became a universal model and a harmonious pair with ISO 9004.

It was published new edition of ISO 9001, which in itself sums up part of the changes referred to in the latest edition of ISO 9004. The changes relate to the content, the understanding of the organization and its context and to understand the needs and expectations of stakeholders. All changes made in ISO 9001 among others were created to help organizations and their quality management systems to integrate with other management systems. Such integration allows organizations to control and oversight of all internal and external processes that affect the level of competitiveness and sustainable success organization.

Sažetak:

PREGLED RAZVOJA REVIZIJA NORME ISO 9004 I NJEN UTJECAJ NA RAZVOJ NORME ISO 9001

Stalne promjene u poslovanju, te zahtjevi za konkurentnijim i kvalitetnijim proizvodom potaknuli su organizacije na uvođenje novih modela upravljanja za poboljšanje svojih sposobnosti potrebnih za opstanak na tržištu. Sve više se dolazi do spoznaja o potrebi za primjenjivanjem djelotvornijih i učinkovitijih sustava koji će dovesti do stalnog poboljšavanja kvalitete i stalnog povećanja zadovoljstva kupaca, ali i svih ostalih zainteresiranih strana.. Jedna od najviše primjenjivanih normi u poslovnom svijetu je norma ISO 9001 prema kojoj se certificiraju organizacije, odnosno njihovi sustavi upravljanja kvalitetom. Razvojem društva i organizacija, te poslovnih koncepata stalna je potreba i za razvojem normi i to ne samo certifikacijskih već i ostalih normi istog razreda. Na razvoj norme ISO 9001 utjecala je norma iz istog razreda, tj. ISO 9004. Nastankom norme ISO 9004 utvrđen je osnovni skup elemenata pomoću kojih se razvijaju i provode sustavi upravljanja kvalitetom. Godine 1987. norma ISO 9004 definirala je elemente upravljanja kvalitetom i elemente sustava kvalitete. Daljnjim razvojem, norma ISO 9004 pružala je upute organizacijama za poboljšavanje kvalitete i upute za poboljšavanje sposobnosti, te upute za upravljanje u svrhu održivog razvoja organizacije.

Ključne reči: ISO norme, revizije normi, sustavi upravljanja kvalitetom, certificiranje, menadžment kvalitetom.

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7. ISO 9004-4:1993 Upravljanje kvalitetom i elementi sustava kvalitete – 4 dio: Smjernice za poboljšanje kvalitete.
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11. ISO 9001:1987 Model osiguravanja kvalitete u fazama konstruiranja/razvoja, proizvodnje, ugradnje i servisiranja.
12. ISO 9002:1987 Model osiguravanja kvalitete u fazama proizvodnje i ugradnje.
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BINDING ENGAGEMENT OF MANAGEMENT IN INNOVATIONS

OBVEZUJUĆA ULOGA MENADŽMENTA U INOVACIJAMA

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ABSTRACT

In order for an organisation to be able to respond flexibly to constant changes of business environment, it is fundamental that managers are able to affect organisational culture so that it creates required organisational identity in its environment. Engagement of management in innovations itself is mainly based on the condition that organisational management clearly demonstrates that they support and aim at positive innovations. Participation of management in innovation implementation is important, as each change in organisation requires strong professional and power bases and support. Based on experience, a combination of professional and power promoter of the project is an absolutely necessary condition of success in implementation and maintenance of innovative organisation. In this article, we will focus on theoretical, analytical as well as practical definition of the need of organisations operating in Slovakia to focus on binding engagement of management in innovations.

Key words: innovations, engagement of management, innovative organisation.

1. INTRODUCTION

The conviction of the necessity to innovate, appropriateness of the procedure and of its enforcement tools always has to be initiated by managing employees.¹ They are decisive bearers and only they can convince and get support of other employees within innovations. However, if big doubts and mistrust occur in difficult situations with dissociation with individual steps, it is impossible to expect their acceptance by subordinates.^{2,3}

It is a very sensitive part of the whole process, which top management has to uncompromisingly request in whole management hierarchy, and such approach needs to be encouraged in all people inside of the organization in order to create room for innovation implementation.

Actual innovation will be repeatedly defeated by politics, procedures and rituals in almost each big organization without actual zeal of top management. Chairmen or managing directors cannot wait anymore for others to come up with creative changes and innovations. They have to risk themselves and support positive proactive changes now.⁴ To change things means to have a leader who will lead the change, however to change things before all the others means to innovate.⁵

2. MATERIALS AND METHODS USED IN THE RESEARCH

In order to determine a suitable research sample, two stratification criteria were set out. The first criterion was a minimum number of employees in the organization, which was determined at 50 employees. The given stratification criterion excluded micro and small enterprises from the research on the one hand, however, on the other hand, the justness and need to focus on a formal system of human resources management in companies with more than

¹ Monika Hudáková, „Komunikácia verejného a súkromného sektora v krízových situáciách SR“, In *Ekonomika poľnohospodárstva*, Vol. 8, No 3, 2008, p. 57.

² Ján Závadský, Miloš Hitka and Marek Potkány, „Changes of employee motivation of Slovak enterprises due to global economic crisis“, In *E+M Economics and Management*, Vol. 1, 2015, p. 60

³ Renata Stasiak–Betlejewska, P. Piasecki, “Analysis of workers satisfaction in company logistic operator“ In *Human potential management in a company - Knowledge increase*, Trnava: Alumni Press, 2011, p. 40,

⁴ Ján Papula, Jana Volná, „A Descriptive Analysis of Intellectual Capital Concept Implementation within Slovak Companies“, In *Driving the Economy through Innovation and Entrepreneurship: Emerging Agenda for Technology Management*, Springer, India, 2012, p. 447.

⁵ John Adair, *Efektívni inovace*, Alfa Publishing, Nový Zlíchov, 2004. p. 78.

50 employees were observed and especially declared by means of this criterion. The second stratification criterion was a region of organization's operation, while the structural composition of the research sample was based on the data of the Statistical Office of the Slovak Republic).

According to the Statistical Office of the Slovak Republic the number of companies with a number of employees 50 and more was 3,261. The regional structure of companies with more than 50 employees is shown in Table 1.

Table 1. Regional structure of companies with more than 50 employees

Region	Whole Slovakia	Western Slovakia	Central Slovakia	Eastern Slovakia
Districts	All districts	Bratislava, Trnava, Trenčín, Nitra	Banská Bystrica, Žilina	Košice, Prešov
Number of companies	3,261	2,005	644	612

Source: Data processed according to the Statistical Office of the Slovak Republic.

Determining an optimal research sample of the given basic group of companies, Confidence Level of the research was set at 95%, and Confidence Interval of the research was set at $H = \pm 0.10$. On the grounds of the given criteria an additional, respectively relevant research sample for individual regions of Slovakia was set in the analyzed years. It is shown in Table 2.

Table 2. Size of the research sample for individual regions of Slovakia

Region	Western Slovakia	Central Slovakia	Eastern Slovakia
Districts	Bratislava, Trnava, Trenčín, Nitra	Banská Bystrica, Žilina	Košice, Prešov
Number of companies over	2,005	644	612
Size of the research sample	92	84	83

Source: Own processing.

Approximately 500 organisations were included in the research, however due to a great extent and the form of data collection only approximately 65% of questionnaires used to be returned comprehensively completed. Subsequently, 259 organisations, corresponding to the optimal research sample determined on the grounds of stratification criteria, were selected from these organisations.

Key methods used in the conducted research include logical methods, adopting the principles of logic and logical thinking. Particularly the methods of analysis, synthesis, deduction and comparison were applied from this group of methods. Mathematical and statistical methods were also applied in the paper. From software products available on the market, a text editor, a spreadsheet and statistical software were used in the research work, particularly including SPSS 15.0 statistical software for Windows®.

3. RESULTS AND DISCUSSION

In order to find out whether organisational managements support innovation implementation, we were primarily interested in whether they realise their importance at all, and therefore we asked them: **"Do you consider dealing of your organisation with innovations (in any sphere) as important?"** Answers to this question sounded beyond positive, as 93% of managing employees answered this question positively. The remaining 7% of the interviewed reported that innovating in any sphere would be financially demanding for them and they do not know whether their organisation survives, and therefore they do not deal with the issue of innovations at all. We presupposed from the aforementioned that even if not all 93% of managing employees, at least most of them would tend to engage in innovation implementation, however already the second question disconfirmed this presumption.

The second question was: "Have your organisation elaborated documents defining a mission of organisation, organisational strategy and objectives in the sphere of innovations?" We focused on finding out the existence, respectively absence of individual documents because if management is engaged in innovation support, this objective to innovate necessarily has to be defined in organisational strategy, and management has a direct impact on the organisational strategy creation. The research implied that approximately 85% of analysed organisations have a mission of organisation and organisational strategy in a written, respectively non-written form, however the objective of innovations itself was only defined in writing in 23% of them (Table 3).

Table 3. Number of organisations with elaborated mission, organisational strategy and objective of innovations

Elaborated documents	Yes, a document in a written form	Yes, in a non-written form	No
Mission of organisation	71%	13%	16%
Strategy of organisation	69%	18%	13%
Objective of innovations	23%	27%	50%

Source: Own research.

The given 23% only represent one fourth of organisations which answered positively to the first question on the importance of innovation, which is very few, as we do not consider definition of an objective of innovation itself to be significantly financially demanding. It mainly concerns management’s conviction, respectively realisation of the importance of the need to innovate.

3.1. The level of binding commitment of company management in innovations

This part provides a detailed description of created evaluation methods of the level of binding commitment of company management in innovations. Questions with possible answers, descriptions of levels of the binding commitment of company management in Innovations as well as a table on the grounds of which an analysing organisation can determine its bottlenecks within are provided.

Within the sphere of “Binding commitment of company management in innovations”, companies were divided into the following three groups:

Table 4. Questions analyzing the sphere of binding engagement of company management in innovations, with scoring evaluation

QUESTIONS AND ANSWER VARIANTS	Score
1. Does your company have an elaborated innovation strategy?	
a) yes, in written form	10
b) yes, in non-written form	5
c) no	0
2. Company employees perceive changes (in production, services, in the sphere of working potential formation):	
a) as a challenge	10
b) sometimes as a challenge, sometimes as a threat	5
c) as a threat	0

3. How does company management present its approach towards innovations?	
a) management declares its intention to advance through innovations in every turn	10
b) management approves of innovations, however it does not present the idea at all company levels	5
c) management does not present any support of pro-innovative employee behaviour in any way	0
4. How does company management encourage employees to come up with innovative solutions?	
a) management regularly organizes competitions in proposing innovative solutions in different spheres	10
b) management does not organize any competitions in innovative proposals, however supports eventual innovative solutions	5
c) management does not organize competitions in innovative proposals and does not support any eventual innovative solutions by employees	0
5. What is the behaviour of company management in case of aversion of employees upon innovation implementation?	
a) company management supports innovation implementation in whole management hierarchy, and is willing and able to support it even in case of aversion of employees	10
b) in case of aversion of employees upon innovation implementation, manager implementing the innovation is not supported by management	0

Source: Author.

In Table 5. there is Specification of the level of binding engagement of company management in innovation, with scorin evaluation, as a result of the research.

Table 5. Specification of the level of binding engagement of company management in innovations, with scoring evaluation

Level of an innovative industrial enterprise	Your result	Your level
Binding engagement of company management in innovations	50 – 40	A
	39 – 25	B
	24 - 0	C

Source: Author.

A. Top company management has clearly and comprehensibly defined an innovation strategy and particular requirements for employee tasks in writing. Future focus of the company is sufficiently known, strategic innovation objectives, target customers, definition against competition, communi-

cation strategy, etc. are defined in as particular form as possible. That suggests it is possible to further develop innovation character and subsequent requirements for employees, i.e. it is possible to specify with high probability what type of employees the company needs to achieve such strategic (or other) objectives and what work behaviour will be required from them. Conviction of the need to innovate commences on the side of managing employees, as they are decisive innovation bearers and it is only possible through them to convince other employees of the need to innovate. It is a very sensitive part of the whole innovation process, which is uncompromisingly required by top management in the whole management hierarchy. It practically means that the company has managers who are willing to innovate, able to actually enforce individual innovation steps, and implement them even against possible opposition.

- B. Company top management has defined an innovation strategy, however not in writing. Future focus of such a company is known, and strategic innovation objectives, target customers, etc. are partially defined. That suggests that it is possible to further develop innovation character and subsequent requirements for employees, i.e. it is possible to specify with certain probability what employees the company needs to achieve such objectives and what work behaviour will be required from them. Managing employees are innovation initiators, they are able to actually enforce individual innovation steps and implement them even against possible opposition, however the fact that their innovation strategy is in a non-written form creates room for deficiencies in objectives fulfilment, which is especially due to the fact that details of the original innovation vision vanish, as it is not supported by any document, which implies that managers have nothing to rely on at fulfilling partial objectives of the given innovation strategy. An advantage of such defined strategy is especially the fact that the company can prepare a binding written innovation strategy easier on its basis.
- C. Company top management has not defined a particular innovation strategy. Company innovates not sooner than on the grounds of a feeling of threat resulting from a change of either internal or external environment of the company. Requirements for employees are not defined in advance, and it is thus impossible to specify what employees such a company needs to successfully implement such innovation and what work behaviour will be required from them. Conviction of managing employees of a necessity to innovate is not obvious, considerable doubts and mistrust occur in problematic situations, and even dissociation from individual steps or the whole innovation concept arises, and it is therefore impossible to expect a positive acceptance by subordinate employees.

Table 6. Table revealing bottlenecks in the sphere of engagement of company management in innovations

No. of question / answer	1	2	3	4	5
very good	a	a	a	a	a
standard	b	b	b	b	
bad	c	c	c	c	b

Source: Author.

To reveal bottlenecks in the sphere of “Binding engagement of company management in innovations”, was created, from which it can be particularly specified which part of binding engagement of company management in innovations needs to be focused on in order to achieve a higher level in this sphere.

4. CONCLUSION

Increased need of flexibility and readiness for changes is a result of increasing variability in conditions under which companies operate. As flexibility of a company and its preparedness for changes is dependent on the flexibility and readiness for changes of people working for such a company, greater emphasis needs to be put on purposeful, effective, complex and sustainable human resources management in a company as well as on creation of a suitable organisational culture, which will support employees in achieving better performance on the one hand, and will be a reason why they continue working for their company on the other.

Basic precondition for organisations wanting to ensure sustainable development is constant development of their human potential, which represents the ability of organisations to generate new ideas, subsequently put into innovations, while they are also able to ensure the key part which is the implementation of these innovations itself.^{6,7} Deliberate creation and usage of hu-

⁶ Anna Remišová and Zuzana Búciová, „Measuring corporate social responsibility towards employees“, In *Journal for East European Management Studies*, Vol. 17, No. 3, 2012, p. 279.

⁷ Katarína Gubíniová and Gabriela Pajtinková-Bartáková, „Customer Experience Management as a New Source of Competitive Advantage for Companies“, In *The Proceedings of the 5th International Scientific Conference on Trade, International Business and Tourism „Application of Knowledge in Process of Business Dynamization in Central Europe“* Bratislava: Ekonóm, 2014, p. 166.

man potential is a precondition of building and development of strengths and competitive advantages of organisations.⁸

Priority source of effective operation and prosperity of each organisation is human potential. However, this statement cannot be understood in general, its validity lies in how it is ready for organisation tasks, what its education and culture, ability to cooperate, perception of social and ecological factors of environment etc. are.⁹ Systematic creation and usage of human potential is a precondition of building and development of strengths and competitive advantages of organisations.¹⁰ To make it reality, systemically framed management of human resources is necessary, orientating employees to achieve strategic goals and objectives of organisation.

We see justification of the given article in practice particularly in revealing irresponsible behaviour of organisations operating in Slovakia in directing and advancing. On the basis of our presentation of obtained results, organisation managements can compare their own present state within the given spheres to state that interviewed organisations declared, and subsequently consider options of its enhancement. We also consider as contribution the compilation of a block of questions in combination with the summary table, based on which organisations can find their bottlenecks in individual spheres. At the same time, we consider as necessary to continue in this research in order to improve, modify, enhance and develop individual approaches on the basis of new information obtained from interviewed organisations.

Sažetak:

OBVEZUJUĆA ULOGA MENADŽMENTA U INOVACIJAMA

Da bi organizacija mogla primjereno odgovoriti stalnim promjenama poslovnog okruženja, potrebni su menadžeri sposobni stvoriti kulturu organizacije koja će pokazati identitet organizacije u njenom okruženju. Obvezujuća uloga menadžmenta u inovacijama temelji se na pravilu da menadžmet organizacije jasno pokazuje usmjerenost ka inovativnosti kao cilju. Sudjelovanje menadžmenta u provođenju inovativnosti važno

⁸ Zdenko Stacho, Hana Urbancová and Katarína Stachová, „Organisational arrangement of human resources management in organisations operating in Slovakia and Czech Republic“, In Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis, Vol. 61, No. 7, 2013, p. 2789.

⁹ Zdenko Stacho and Renata Stasiak-Betlejewska, „Approach of organisations operating in Slovakia to employee performance evaluation“, In Economic Annals-XXI, Vol. 5-6, 2013, p. 86.

¹⁰ Emilie Franková, „Creativity and innovation supportive organizational culture“, In Business Development and European Comunit, University of Technology, Brno, 2003. p. 62.

je jer svaka promjena u organizaciji zahtijeva strogo profesionalnu i snažnu potporu. Na temelju iskustva konstatira se da je kombinacija profesionalne i snažne potpore i promocije projekta nužno potreban uvjet radi uspješnog uspostavljanja i održavanja inovativne organizacije. U ovom članku autori su fokusirani na teorijski i analitički pristup utvrđivanja djelovanja organizacija u Slovačkoj usmjerenih na obvezujuću ulogu menadžmenta u inovacijama.

Ključne riječi: inovacije, obvezujuća uloga menadžmenta, inovativna organizacija.

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