Organizacija

Organizacija je interdisciplinarna znanstvena revija, ki objavlja prispevke s področja organizacije, informatike in kadrovskega managementa. Primeri tematskih sklopov, ki jih pokriva revija, so:

- *teoretične osnove organizacijskega razvoja ter spreminjanja organizacijskih struktur in procesov*
- *novi organizacijski pristopi ter njihova uporaba*
- *organizacijski ukrepi za doseganje večje produktivnosti, ekonomičnosti in rentabilnosti poslovanja in proizvodnje*
- *management kakovosti*
- *kadrovanje in izobraževanje kadrov pri prestrukturiranju podjetij*
- *stimulativnost nagrajevanja v spremenjenih lastninskih razmerah*
- *prestrukturiranje organizacijskih in informacijskih sistemov*
- *načrtovanje, razvoj in uporaba informacijske tehnologije in informacijskih sistemov*
- *medorganizacijski sistemi, elektronsko poslovanje*
- *odločanje, podpora odločanju, direktorski informacijski sistemi*

Vsebina ni omejena na navedene tematske sklope. Še posebej želimo objavljati prispevke, ki obravnavajo nove in aktualne teme in dosežke razvoja na predmetnem področju revije, ter njihovo uvajanje in uporabo v organizacijski praksi.

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In Memoriam

Red. prof. dr. Jože Jesenko (1943-2009)

V spomin priljubljenemu profesorju in dolgoletnemu prodekanu za izobraževalno dejavnost

27. julija 2009 smo obnemeli ob novici o smrti red. prof. dr. Jožeta Jesenka. Izgubili smo odličnega pedagoga in avtorja številnih učbenikov. Študenti Fakultete za organizacijske vede so cenili in spoštovali njegov topel, človeški pristop pri izvedbi predavanj, vaj in izpitov. Čeravno je predaval dva ne najbolj priljubljena predmeta, je bil kot profesor in izpraševalec na izpitih zelo objektiven razsodnik. Red. prof. dr. Jože Jesenko je bil vedno pripravljen pomagati tudi magistrantom in doktorantom naše fakultete.

Zavedal se je pomena raziskovalnega dela. Njegov znanstveni opus je obsežen, saj zajema kar 31 monografij, upoštevajoč znanstvene in strokovne monografije ter univerzitetne in visokošolske učbenike, namenjene študentom Fakultete za organizacijske vede in Fakultete za varnostne vede. Poleg tega je objavil 73 znanstvenih prispevkov, bil urednik in sourednik mednarodnih znanstvenih edicij ter mentor ali somentor številnim študentom pri diplomskih delih dodiplomskega in podiplomskega študija. Mnogim od nas je pomagal pri statističnih obdelavah in interpretaciji empiričnih raziskav, tudi za članke, objavljene v najeminentnejših revijah iz baze SCI. Zadnjega, kjer je bil soavtor, smo objavili dva meseca pred njegovo smrtjo.

Njegovega opusa pa ne predstavljajo samo publikacije najvišjega znanstvenega ranga, pač pa je red. prof. dr. Jesenko ogromno prispeval k modernizaciji in posodabljanju študija in študijskih programov FOV.

Njegov izjemen občutek za pedagoško delo in strokovna usposobljenost sta botrovali, da je s svojo ekipo, ki je predano sledila njegovim zamislim, ter s kasnejšimi kadrovskimi dopolnitvami pripeljal bolonjske študijske programe do verifikacije in intenzivne pedagoške izvedbe. Konstruktivno in neposredno je vplival na vzpostavljanje in dvig visokošolskih standardov in normativov in tudi na pravila in zahteve za dodiplomski in podiplomski študij na Univerzi v Mariboru. Bil je med prvimi pobudniki dviga habilitacijskih kriterijev in njihove strokovne evalvacije. Zaradi svoje neodvisne strokovne drže je kot kredibilen član sodeloval v številnih komisijah in delovnih telesih Univerze v Mariboru.

Brez ljudi, kakršen je bil prof. dr. Jože Jesenko, Fakulteta za organizacijske vede danes zagotovo ne bi obstajala v taki obliki in obsegu. Prof. dr. Jesenko je bil v generaciji profesorjev, ki so, kot že omenjeno, postavili temelje študijskim programom, raziskovalnemu delu, mednarodnemu sodelovanju, skratka vsemu, kar se danes na Fakulteti za organizacijske vede dogaja. Vsem, ki so v težkih časih opravili to delo, mlajši priznavamo čast in smo jim neskončno hvaležni.

Prof. dr. Jože Jesenko je imel kot dolgoletni prodekan za izobraževalno dejavnost na fakulteti posebno mesto. V tej vlogi je bil še posebej priljubljen. Sodobne ideje in pravi občutek za soljudi sta prinesla številne pozitivne učinke, katerih rezultati bodo vidni za vedno. Neprecenljiv je njegov prispevek v času izgradnje stavbe fakultete. Prof. dr. Jože Jesenko je od vsega začetka podpiral in aktivno sodeloval pri uresničevanju ideje, da se za takratno VŠOD najdejo novi, primernejši prostori. Skupaj s takratnim dekanom prof. dr. Jožetom Florjančičem in ob pomoči drugih sodelavcev sta uresničila idejo o gradnji nove fakultetne zgradbe.

V vseh razvojnih obdobjih fakultete, od Visoke šole za organizacijo dela (VŠOD) do Fakultete za organizacijske vede (FOV), članice Univerze v Mariboru, je red. prof. dr. Jesenko dodal enega izmed pomembnejših kamnov v mozaiku današnje Fakultete za organizacijske vede in s tem tudi Univerze v Mariboru.

Že zelo zgodaj je spoznal trend razvoja visokošolskega izobraževanja. Prav po njegovi zaslugi je Fakulteta za organizacijske vede postala ena vodilnih izobraževalnih ustanov s področja poslovnih ved v Sloveniji.

Jožeta Jesenka se spominjamo tudi kot zelo srčnega človeka. Bil je izjemno vesten in predan sodelavec ter vedno preudaren prijatelj. Z grenkobo v srcu priznamo, da smo mu za vse, kar je dobrega storil, ostali marsikaj dolžni.

Red. prof. dr. Jožeta Jesenka bomo zaradi njegove neizmerne srčne topline, njegovega predanega dela ter vseh akademskih dosežkov za vedno ohranili v najlepšem spominu.

Red. prof. dr. Marko Ferjan
Red. prof. dr. Drago Vuk

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Analyzing the Process of Patent Submission with a Special Emphasis on the Phases of the Research Process – the Case of Slovenia

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This article presents some findings about the process of patenting of Slovenian and foreign researchers in scientific research. Based on the reviewed literature and with help of our conceptual model, we establish that the patenting process can be divided into three separate phases: knowledge detection phase, knowledge dissemination phase and knowledge transfer phase. During the process of researching and patenting, a variety of factors affect the results, which can be divided into two groups: internal and external factors. In Slovenia, patents are statistically significant for researchers working and exploring in the fields of natural science and engineering. Research results in the form of a patent largely depend on financial support and work experiences of individual researchers or research groups. The commercialization of a patent means a successful ending of the research process, as many positive benefits are expected.

Keywords: researchers' patenting activity and productivity, process of innovation – patenting process, patent driving forces and areas, academic entrepreneurship.

1 Introduction

The patenting activity of researchers is a relatively new topic in scientific research, with first publications of findings in the literature dating back to the late nineties. Most studies relate to American researchers and their research environment that substantially differs from the European environment in many respects (for instance, differences in software patenting (Ženko, 1999; Ženko, 2000); in Europe, conditions that determine inventiveness are set and dealt with more firmly than in USA (Bühler, 2009)). However, given the limited availability of theoretical frameworks, these findings will provide a basis for our model and hypotheses.

As the number of studies conducted in the European environment is surprisingly small, our theoretical model is in fact one of the pioneering studies of the field in Slovenia and the wider area of Europe. On the one hand, the literature that serves as our theoretical foundation and summarizes other experiences in the field is quite extensive, while on the other it is very limited. The subject of researchers' patenting activity is rather new and topical; it intertwines with studies in various subfields and thus causes discrepancies in theoretical bases. Reasons for such discrepancies lie in the wideness of the research area, which includes the following topics: forms of intellectual property rights (Davis, 2004), the patenting process (Erickson, 2003), innovation influence factors and patenting (Dai et al., 2005), relations between different actors participating in the production of new knowledge (Etzkowitz et al., 2000), the organization of institutions, transfer of knowledge to the economy (Etzkowitz, 2003; Dietz and Bozeman, 2005), forms and significance of knowledge transfer, relations between the public and private sectors and their cooperation (Geuna and Nesta, 2006; Giuri et al., 2007), and so on. Due to the newness of the subject, no research guidelines have so far been established. This explains considerable variation among starting points for examining, naming and defining individual variables, which results in confusion and brings additional issues to the research of the field.

It is a widely accepted fact that production capacities are increasingly based on the knowledge of natural science and technical knowledge. In order to obtain such knowledge, more and more companies approach faculties, universities and other public research institutes. Accordingly, the function and structure of higher education and research institutes has changed, and the latter now provide the foundation for facilitating knowledge transfer to new sources of industrial

innovation and following the mentioned trends (Etzkowitz, 2003). With the purpose of gaining economic benefits that arise from patenting activities, faculties and other education institutes are focusing on the areas of intellectual property rights, the transfer of knowledge and technology to practice, licensing, incubators and academic spin-offs. In consequence, the number of academic innovations that have immediate commercial potential is on the rise. University knowledge has therefore become a new source of industrial innovation (Chang et al., 2006; Hockaday, 2009).

According to the Slovenian Intellectual Property Office, patents are "granted to natural or legal persons for any inventions which are new, involve an inventive step and are susceptible of industrial application". An invention or technical solution is considered new if it does not form part of the state of the art, that is, if it was not made available to the public by means of an oral or written description, by use, or in any other way, before the date of filing of the patent application. An invention is considered as involving an inventive step if it is not obvious to an expert skilled in the art. Finally, an invention is susceptible of industrial application if it can be produced or used in any kind of industry, including agriculture (http://www.uil-sipo.si/, 2009).

With regard to the number of scientific publications and citations per million inhabitants as measured in 2003, Slovenia ranks in the very top of developed countries with 827 publications[1] (even before USA). However, one of its major problems is the lack of applied orientation in research. The scarcity of cooperation between researchers and the lack of practice orientation are directly reflected in the number of patent applications, as the number of patent applications indicates researchers' applied orientation. With regard to the number of patents (or the ratio between the number of publications and patents), Slovenia lags far behind developed countries (MVZT[2], 2005). The 2006 European Innovation Scoreboard report provides a comparative assessment of the innovation performance of EU member states using an innovation index. It classifies Slovenia in the third category group as an average innovator, thus placing it behind two groups of countries that represent innovation leaders and innovation followers (Parvan, 2007). The key research problem and the basis for our conceptual model is discovering reasons for such classification and establishing factors that affect the number of patent applications and their commercialization.

The principal purpose of this paper is to clarify, in the broadest sense, the role of patents and the factors of influence on researchers' patenting activity, and hence provide views on and guidance for improving the situation in the field. In this way and in combination with other measures, Slovenia will reduce the gap between its own patenting activity and that of other developed countries. Solutions to this problem should be sought on a large scale. Given the complexity, interconnectedness and wide scope of potential influence factors, our approach to the analysis is of a holistic nature.

2 Developing the model and key hypotheses

Recent research has noted a change in the role of universities and institutes. In the spirit of marketing, the latter are moving towards "entrepreneurial organizations" (Dai et al., 2005). According to Etzkowitz (2003), these changes can be partially attributed to a new competitive way of funding and the adjustment (expansion) in orientations (e.g. from teaching to research universities). As a consequence, institutes are exposed to external impacts that are unrelated to the academic environment, not only in terms of decisions on publishing or patenting, but also in terms of the entire research process – from the initial idea and research to dissemination and consequent implementation of results.

2.1 Research process phases

The research process begins by generating the research idea and continues with the phase of choosing and ensuring funding. Generally, financing sources depend on the nature of the research idea. In some cases, researchers are required to adjust research ideas to the funding demands. After the provision of resources, researchers devote their time and energy to generating knowledge and obtaining final results. The last research phase is knowledge diffusion, which presents research findings to the professional public. Thus, research findings gain in reputation at universities and in the wider society.

The decision on diffusing research findings relates to the form the scientist chooses for the presentation of research findings. The diverse options include various publications, lectures, appearances, presentations at conferences, business secrets, reports, demonstration projects and, last but not least, patents. Moreover, researchers can use different combinations of these methods simultaneously. The objective of diffusion involves maintaining the freedom of future actions, enhancing academic reputation, transferring science to society or obtaining future funding (Owen-Smith and Powell, 2001).

In order to illustrate theoretical findings more easily, a theoretical framework, i.e. **a conceptual model**, was designed based on the reviewed literature to serve the purpose of analysis and interpretation of factors that affect the number of patent applications. The model of societal influences on the research process developed by Dai et al. (2005) was used as a starting point and partially adapted (Figure 1). Since the chain encompasses numerous factors that impede or motivate researchers, from knowledge detection and dissemination to the application of newly created knowledge, factors must be divided into individual phases and differentiated according to their origin. Therefore, three phases were identified: knowledge detection phase, knowledge dissemination phase and knowledge transfer or application phase.

[1] The data on 827 publications per million inhabitants pertains to original scientific articles published in local and international journals in 2003 and does not include papers presented at local or international conferences (MVZT, 2005).
[2] Ministry of Higher Education, Science and Technology (Ministrstvo za visoko šolstvo, znanost in tehnologijo).

Hypothesis 1: The patenting process can be divided into three phases: knowledge detection phase, dissemination phase and knowledge transfer/application phase.

2.2 Importance of the research area

Morgan et al. (2001) performed a study on the patenting activity of U.S. researchers in the education and industry sectors. A typical week of the examined group included working in one or more technological areas. The patenting activity of researchers employed in biotechnology in the education sector amounted to 41.8%, a considerably greater share than that of the next area, sensor and signal processing with 23.2%. A noticeably different order was noted in the industry sector: advance materials were on the top, followed by microelectronics and semiprocessors, and sensor and signal processing, whereas biotechnology was only fifth, hence indicating a significant difference between patenting activities in the education sector and industry.

Conducted in six European Union countries, the 2003 European Patent Value survey (PatVal-EU) covered the most typical areas for patenting activity, as follows: the fields of Electrical engineering, Instruments, Chemicals and Pharmaceuticals, Process engineering and Mechanical engineering (Giuri et al., 2007). Furthermore, the Dietz and Bozeman study (2005) highlighted the research area as a statistically significant influence factor on patent productivity of U.S. scientists. Especially high patent rates were observed in relation to researchers from the fields of physics, mathematics, and engineering (chemical and electrical engineers). Among engineers, civil engineers had the lowest patent rates,

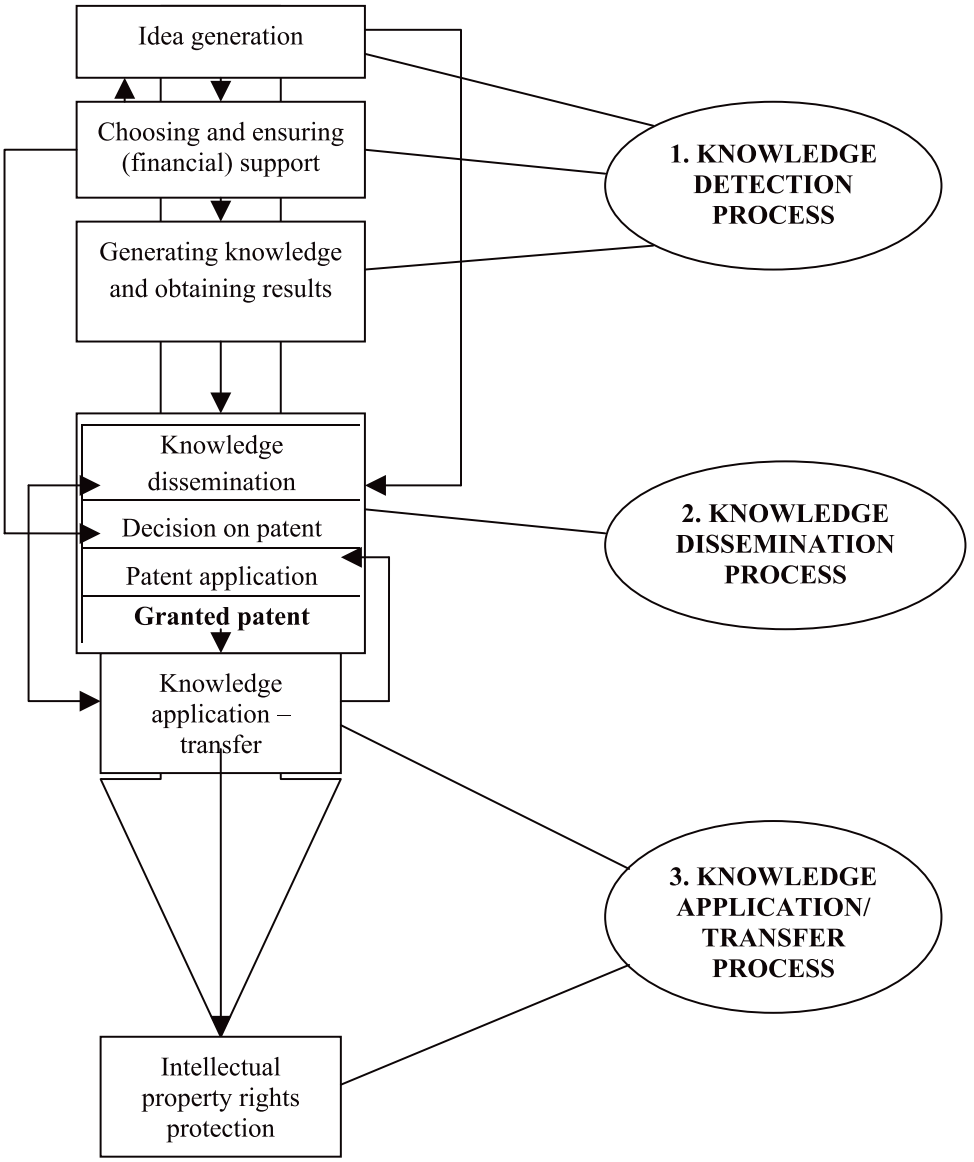

Figure 1: The conceptual theoretical model of researchers' patenting activity (by phases). Source: Own adaptation based on Dai et al. (2005).

while the lowest patent rates in researchers were attributed to biologists.

When comparing these findings to data on Slovenian researchers with at least one registered patent (Table 1), it can be established that the highest total number of patents is held by researchers in engineering (987), followed by natural and mathematical sciences (with 234 patents), biotechnical (69 patents) and medical sciences (34 patents), while other sciences add a total of 8 published patents (Cobiss, 2006). A similarly abnormal distribution is evident in terms of patenting productivity. Slovenian researchers are most productive in natural and mathematical sciences (each researcher has an average of 3.33 patents) and medical sciences (an average of 3.03 patents per researcher). Surprisingly, engineering does not follow until the third place, with researchers holding 2.32 patents on average. The SIPO (Slovenian Intellectual Property Office) runs a database of all applied for and granted patents in the Republic of Slovenia with many details about patents and data about inventors, applicants and owners of patent rights. When reviewing the database, it was also discovered that 54 cases over a period of 8 years (from 2000 to 2008) listed a university or its faculty member as a patent owner. Therefore, 54 patents that were entered in the database during the mentioned period are owned either by the University of Ljubljana or by the University of Maribor. Since most patent owners are the faculties of natural sciences and engineering, such as the faculty of mechanical engineering, the faculty of pharmacy, the faculty of electrical engineering, etc., it follows that in Slovenia, the research area is strongly linked with options for obtaining a patent.

There are many differences in how Slovenian universities regulate patent ownership and patent rights obtained during employment at the university. The only university with a related legal order is the University of Ljubljana, which has laid down the Rules on the Adoption of Innovations and Inventions. The University of Maribor refers to the rights specified in the Employment Related Industrial Property Rights Act, whereas the University of Primorska presently uses no regulation that would clearly define intellectual property or patent and invention rights obtained during employment.

Result interpretation should devote special attention to the productivity of researchers, as the latter varies considerably. The studies on the careers of researchers are founded on questions related to uneven (skewed) distribution of their productivity in the population of academic researchers (Dietz and Bozeman, 2005). As early as in 1928, Alfred Lotka noted that a minority of the population of researchers produces the majority of published scientific work. What is thus the reason why most authors produce only a few papers throughout their entire careers, while others manage to publish more than 600 articles? Based on the above, it can be presupposed that:

Hypothesis 2: The research area is a strong influence factor on researchers' patenting activity.

There is a number of factors that affect the knowledge diffusion decision in different ways throughout the entire research process. Firstly, the **choice of a research idea** itself **can prove to be crucial for future applied knowledge value**, as basic research generally leads to publication in scientific journals or conference demonstration papers, whereas the findings of application projects tend to be disseminated through patents, trademarks or other forms of commercial use. Secondly, **the manner of research funding** can have a great impact on knowledge value. The presentation of publicly funded research findings requires project reports or scientific articles as final products (Dai et al., 2005). In addition, the nature of research,

Table 1: Patenting activity of Slovenian researchers with at least one patent registered at the Slovenian Research Agency (ARRS) on 29/09/2006, by science. Source: Internal source COBISS, 2006.

SCIENCE	NUMBER OF RESEARCHERS	NUMBER OF PATENTS*	CURRENT APPLICATION NUMBER	RESEARCHER PRODUCTIVITY**
Natural and mathematical sciences	234	779	451	3.33
Engineering	426	987	443	2.32
Medical sciences	34	103	31	3.03
Biotechnical sciences	69	185	81	2.68
Social sciences	6	11	0	1.83
Humanities	0	0	0	0.00
Interdisciplinary research	0	0	0	0.00
Not allocated	2	3	0	1.5
TOTAL	**771**	**2068**	**1007**	**2.68**

Notes:
** patent classification and database run by the ARRS does not include information on European or Slovenian patents*
*** The productivity of researchers = number of patents / number of researchers*
**** The number of patents is larger than the number of applications, as the same patent is entered in the Cobiss database by more researchers who participated in patent creation. The applicant is usually only one, which explains the smaller number of applications.*

whether basic or applied, can affect the research outcome. In most cases, basic research derives from an interest of an individual researcher who is motivated by a "sacred spark" (Cole, Cole, 1973) and centres primarily on basic theoretical knowledge rather than on commercial applications. While basic research has always been typical of the academic sector, applied research has gained considerable importance in university research since 1970. The American National Research Foundation (1996) defines applied research as "research aimed at gaining knowledge or understanding to determine the means by which a specific, recognized need may be met". Solutions can come in the form of patents, trademarks, industry reports or demonstration projects.

Decisions on how to disseminate scientific research findings are much more complex than it may appear. Normally, patenting decisions are not reached at scientific research institutes. Similarly as in basic research, many researchers engaged in applied research use scientific publications as the main research output due to academic inertia. Even if they decide in favour of patenting, it is highly unlikely that this decision will be made at the beginning of the research process. Nonetheless, many research institutes do decide to patent their researchers' inventions in the final phase, and the fact remains that the number of patents is growing. In USA, the number of successful patent applications has increased from 517 in 1980 to 3289 in 1995 (Morgan et al., 2001). Furthermore, growth can also be observed in Slovenia (Table 2), where 53 patents were granted in 2001 and 69 in 2005. The total number of granted patents from 2001 to 2005 was 328. Although the number fluctuates, an upward trend is generally evident.

Regardless of the fact that the final decision on knowledge research and dissemination remains in the hands of researchers at universities and public research institutes (in terms of publications or patents), studies have shown (Dai et al., 2005) that researchers' decisions are affected both by characteristics of the university environment and the wider society, as well as by policies. Therefore, it can be established that patenting activity is indirectly or directly influenced by two main groups of factors: **internal** at the level of the researcher and **external** at the level of universities and the level of the wider environment (country). These factor influences play a role in all phases of the research and application process. Moreover, patenting activity also depends on the research area itself.

Hypothesis 3a: The factors in the research and patenting process can be divided into internal and external factors.

Hypothesis 3b: Internal factors on the personal level of researchers do not remain the same throughout the entire patenting process, but differ according to individual research process phases.

2.3 Diverse work experience and knowledge spillover

The majority of existing literature addresses the activity and development of researchers in the academia and researchers (engineers) in the industry separately (Dietz and Bozeman, 2005). In truth, researchers change jobs (or their primarily employer) frequently, either moving between the academic sphere, government and industry as full-time employees or working in several sectors at the same time. From the marketing perspective, economists (Jaffe et al., 1993) have termed the transfer of knowledge from one company to another as knowledge spillover. In neoclassical economic theory, spillovers are regarded as inefficient market performance, since the carriers of knowledge are believed to have difficulties retaining the benefits and content of discoveries. Nevertheless, when considered through the perspective of knowledge transfer and progress, spillovers are often perceived as effective. The human and social capital that a researcher carries from one job to another, and perhaps even from one sector to another, can provide constant knowledge for progress in solving new problems. The transfer of people from one organization to another, for instance, from industry to academia and vice versa, represents a foundation for knowledge transfer across organizations (Rogers, 1995). In this way, different knowledge networks are created and maintained throughout individual careers. With diverse work experience, both scientists and engineers can develop a closer network of personal contacts, which results in increased human and social capital and consequently lead to improved skills. These social networks thus enhance their access to people with key knowledge.

In relation to that, a study conducted by Morgan et al. (2001) among U.S. scientists and engineers (S&Es) confirmed that in the education sector, the patenting activity rate is somewhat higher for those with second jobs in the economy (5.7%) than for those without second jobs (4.3%). In contrast, patenting activity in the industry sector was lower for those with second jobs (8.7%) than for those without (10.2%). While second jobs of academics, such as consulting or involvement in start-ups and academic spin-offs, are likely to indicate their involvement in patenting activity, the S&Es working in the industry sector generally patent as an integral part of their primary jobs.

A similar study (Dietz and Bozeman, 2005) was performed among 1200 U.S. scientists and engineers (S&Es)

Table 2: Patenting activity of Slovenian researchers registered at the ARRS by year. Source: COBISS, 2006.

PATENTING ACTIVITY	2001	2002	2003	2004	2005	TOTAL
Patent applications*	19	38	29	33	44	163
Granted patents	53	47	79	80	69	328

**The number of granted patents is incomparably larger than the number of patent applications, as the Cobiss database enables duplicated patent applications with several researchers being able to claim the same patent.*

employed at faculties, government institutions and in the industry. Examining influence factors on the number of registered patents and scientific publications, the study revealed a strong statistically significant relationship between patent productivity and the number of years spent by S&Es in the industry. Each added percent of employment period measured in years spent by S&Es in the industry increased their average number of patents by 0.83 per year (while other variables remained constant). Drawing on these findings, it is expected that the frequency of scientists' involvement in the economy and their work experience in the economy will prove as two of the more significant influence factors on patenting activity.

Hypothesis 4: Diverse work experience of a researcher has a positive effect on his productivity and consequently on patenting activity.

2.4 Funding and the financial perspective

A changed manner of research funding is another factor that has sometimes led to changes in researchers' legal status with regard to transitioning between the academia and practice. For instance, French researchers have the option of spending a part of their working time in industry (Llerena et al., 2003, cited in Geuna and Nesta, 2006). This promotes the transfer of technology into practice and brings them further rewards. Moreover, up until 2002 German university researchers enjoyed the so-called professor's privilege that gave them complete ownership of university inventions while all innovation development costs were transferred to government (Czarnitzki et al., 2009). However, since the 2002 legislation changes, universities hold innovation ownership rights and researchers themselves bear part of the costs for innovation patenting (Kilger and Bartenbach, 2002, cited in Czarnitzki et al., 2009). Therefore, it can be presupposed that:

Hypothesis 5: The larger the share of own funding of patent applications by researchers, the lower their patenting activity.

Stephan and Levin (1992) attempted to integrate the work of various research traditions in order to establish findings about the effects on researchers' productivity. Useful value was emphasized as a major factor in productivity. According to their opinion, scientific problem solving is motivated by external rewards of recognition and prestige among researchers' peers as well as by gaining internal satisfaction. Stephan and Levin (1992) thus propose three groups of research productivity motivators (in terms of publications and patents) that are intertwined with age of researchers throughout their careers: a researcher's intrinsic satisfaction derived from scientific discovery, peer recognition and financial reward. The authors argue that these three motivators represent internal incentives for researchers, as such reward system motivates them to behave in socially positive ways. Consequently, researchers invest in their productivity only up to the point where further investments still prove to be profitable.

Before disclosing their inventions, researchers take account of the perspective of minimizing transaction costs, considering the potential benefits and costs of invention disclosure in the patent office of their institution (Chang et al., 2006). Tangible benefits of potential patents are reflected in the share of licensing income from royalties, whereas intangible benefits of granted patents can affect a researcher's career and future project application success. On the other hand, tangible costs are caused by the patent application and its maintenance, whereas intangible costs are evident in the time researchers must invest in updating and improving patents, which distracts them from their primary research.

It then follows that researchers behave rationally and optimize their time and resources so as to obtain greater benefits. Undoubtedly, monetary reward is regarded as one of the more significant benefits, i.e. financial benefits that stem from their work on registered patents. In their study on U.S. institutions and researchers, Lach and Schankerman (2003) discovered a positive and significant relationship between academic research and monetary reward for achievement. This implies that designing intellectual property rights in academic institutions has real impacts on the economic growth and productivity. The authors also found that the response to financial incentives is much stronger in private than in public universities.

Similar findings were reported by other scientists (Morgan et al., 2001). American researchers who were active in patenting earned more money with primary jobs and from all other sources than those who were not active. The income gap between those with patenting activity and those without was larger in the education sector than in industry, indicating that, on average, the S&Es in the education sector received higher premiums outside their primary jobs. In education, financial rewards for patenting activities complemented primary salaries of S&Es more than they did in industry, where researchers are expected to patent as a part of their primary duties. Furthermore, in the education sector, a relatively large difference between the average number of weekly working hours was also found between those with patenting activity and those without. The S&Es who were active in patenting worked an average of 51 hours per week in their primary job, whereas those who were not active worked an average of 45 hours per week. Drawing on these findings, it is expected that:

Hypothesis 6a: The financial motive is one of the highly significant motivators of researchers' patenting activity.

Hypothesis 6b: A successful commercialization of patents by researchers has a positive influence on their further patenting activity.

2.5 Review of previously established hypotheses and own findings

Figure 2, which is presented below, uses a diagram to summarize the hypotheses put forward in the paper and illustrate the groups of factors and other influences that play an important role in researchers' patenting activity. The first influence group includes internal factors that derive from the inside and are an integral part of researchers' behavioural nature. This mainly

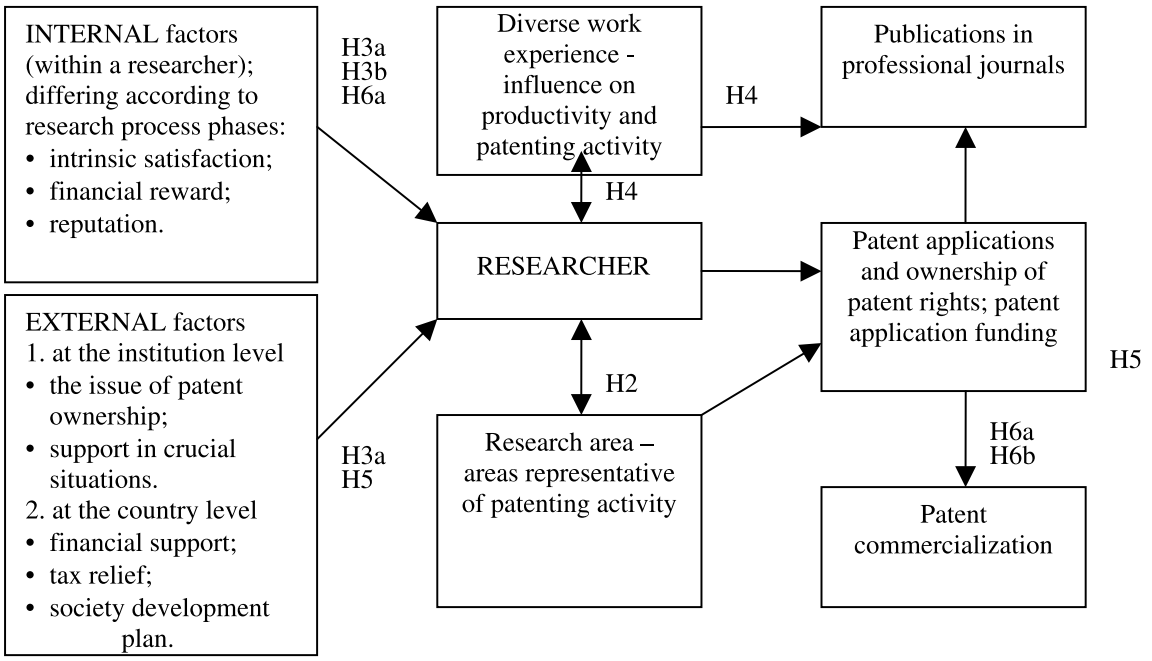

Figure 2: The influence of various factors on researchers' patenting activity. Source: Own conceptualization, 2009.

concerns the obstacles and motives facilitating or preventing increased patenting activity. The second significant group comprises external factors that arise from the environment, either in terms of institutions where researchers are employed or in terms of the country in which they operate. The research area is the next important factor of patenting activity, as some areas are statistically more patent productive than others. This indicates that there is a higher probability for patent creation in the areas that have already been characterized by greater patenting activity in the past, such as natural science and engineering. Furthermore, the researcher's work experience with different business and economic agents is essential for two important processes, namely knowledge diffusion and knowledge transfer. Such mode of operation enables researchers to gain more financial support and enhance work productivity. The entire research and discovery process ends with a patent application. In the final phase, the principal indicator of patenting activity is the number of patent applications by a researcher or research group. If the patent is not commercialized and no consequent transfer of knowledge into practice occurs, the entire research process either serves itself or its purpose hides somewhere else, for example, in the goal of publishing in research journals. To sum up, the path from idea to patent and its use in practice is long and exhaustive, and therefore inevitably requires the participation of different entities in the research process.

3 Discussion and conclusion

Understanding why some researchers are more active in patenting and applied research than others represents a foundation on which opportunities for growth and development of a society/country, in our case Slovenia, can be explored. The model (Figure 1) developed for the field of researchers' patenting activity serves as a basis for understanding the patenting process from the research idea to potential commercialization of generated and protected knowledge – in this case through a patent. Geuna and Nesta (2006) grouped positive consequences of academic patenting in a few common aspects that function as a set of expectations and assumptions, but are, unfortunately, presented without appropriate scientific and statistical support due to the newness of the field. Nevertheless, the expected positive effects of university patenting (and hence researchers' patenting activities) are: increased number of financial resources (as a result of increased licensing and royalties) available without limitations or control, possibly to develop new research areas or teaching opportunities; increased funding of contract research for further development of intellectual property rights into a final product; establishment of academic spin-off companies that are partially owned by universities; and faster commercialization of new inventions, which represents a benefit for the entire society and the institution that owns patented knowledge or intellectual property.

The schematic illustration of various influence factors (Figure 2) can be used to explain the past and current state of affairs in the field of patenting activity by analyzing and investigating certain issues in each phase of the patenting process (Figure 1) and providing solutions for further action. Moreover, we encourage all researchers to do additional research in the field of the patenting activity of Slovenian researchers by employing our conceptual model (Figure 1) or the influence factor diagram, and thus obtain findings and offer recommendations for regulating the policy of patenting and patenting promotion in Slovenia. It is vital that incentives are provided in the phase of research idea generation, as this can direct the society as a whole towards creating new knowledge.

In conclusion, Figure 2 serves as a basis for further theoretical development as well as for different empirical studies in the field of academic patenting activity. Similarly, the presented model of the patenting process and patenting activity by phases (Figure 1) can also provide a basis for further research. Being aware of limitations and options for upgrading the model, we are devoted to monitoring and studying the development of researchers' patenting activity abroad in order to create favourable conditions in Slovenia, foster a climate that will contribute to enhanced patenting activity of Slovenian researchers, and hence facilitate the development of the intellectual and economic sphere founded primarily on own knowledge and development. The knowledge society has never been as close as it is today.

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Analiza procesa patentiranja s poudarkom na fazah raziskovalnega procesa - primer Slovenije

Članek predstavlja ugotovitve glede procesa patentiranja slovenskih in tujih raziskovalcev v znanstveno-raziskovalni sferi. Na podlagi pregledane literature in s pomočjo modela ugotavljamo, da lahko proces patentiranja razdelimo v tri ločene faze, in sicer fazo odkrivanja znanja, fazo diseminacije znanja in fazo aplikacije/prenosa znanja. Na proces raziskovanja in posledično na patentiranje vplivajo različni dejavniki, ki smo jih razdelili na notranje in zunanje. V Sloveniji so patenti statistično značilni za tiste raziskovalce, ki izhajajo oziroma raziskujejo na naravoslovno-tehničnem področju. Rezultati raziskovanj v obliki patenta so v veliki meri odvisni od finančne podpore in delovnih izkušenj, tako posameznega raziskovalca, kot raziskovalne skupine. Komercializacija patenta je uspešen zaključek raziskovanj, od katere se pričakuje številne pozitivne koristi.

Ključne besede: patentna aktivnost raziskovalcev, proces inoviranja - faze patentiranja, produktivnost raziskovalcev, dejavniki in področja patentiranja, akademsko podjetništvo.

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Process Reengineering and Innovation of Remaking Soapsuds

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This article uses a business process renovation method to address an environmental protection problem. The presented case, studied in factories which remake crude vegetable oil (soapsuds remake), focuses on reengineering one of the business processes which is classified as an obligatory process. This process has to be performed to comply with the requirements of the existing ecology legislation. Therefore, it is reasonable to take a radical approach - business process reengineering. Soapsuds with oil remnants are a secondary product in the vegetable oil refining process. According to the legislation, secondary products as waste are not acceptable for the environment. Soapsuds remake as it is currently carried out produces technical fatty acids and, as a side product, calcium sulphate. Calcium sulphate is listed as special waste; therefore it must be deposited in a special waste landfill site. In the course of searching for a solution to this ecological problem, a new idea came up, namely that soapsuds are taken to the biogas plant. At the biogas plant, they can be decomposed into biogas, which is then used to generate electric energy, for heating or to supplement municipal gas. Thus, the reengineering of the process is upgraded into process innovation and environmental innovation. Using data obtained from the available literature, we managed to prove that process reengineering, which is simultaneously process innovation and ecological innovation, can be applied in practice. Side products resulting from the anaerobic digestion of soapsuds in the biogas plant comply better with the requirements of the Slovenian ecological legislation than those occurring in the process used up to now.

Key words: business process reengineering, process innovation, soapsuds remake, biogas plant, ecology

1 Introduction

The constant new demands of the market and fast technological development require that organisations increase value for the customer, cut costs and stay competitive. In addition, they have to comply with legislative requirements, in particular with the ecology legislation, which is becoming more and more stringent.

We are living in the age of globalization; therefore companies need to adjust to the new conditions. The efficiency of an organization is based on timely and efficient adjustment to market conditions, new product conditions, economic factors and the social environment. In the past, the main form of an organization was its structure, something which has not changed significantly over time. However, today it is a key process which is constantly changing. Here we have information about what goes on within a company (Vila, 2009).

Too wide a gap between the structure and processes results in an inefficient business system. The productivity and commercial success of an organization depend on its harmonization of key production factors: human resources, technology and organization of work.

Therefore, today major emphasis is placed on business process reengineering, which can gradually, continually or radically transform business processes.

Companies also endeavour to achieve a competitive advantage by investing into equipment, technology and development, with varying degrees of success. The reasons for technological changes in companies are usually a combination of the following factors (Frankel, 1990):

- market pressure to improve products and services;
- competitive pressure and competition on the market;
- the company's endeavours to increase production;
- scientific developments;
- moral factors, e.g. national pride, and
- coincidences (innovations and inventions, etc.)

The fact that society, social groups and individuals have to continually prove themselves by coming up with innovations and new products, which is not only very interesting, but also commercially viable on the commodities market. Therefore, in order to find a good idea, we need not only theoretical knowledge, but also experience and practice.

Ecology has played an increasingly important role in recent times. With regard to protect environment due to global environmental changes and, consequently, the ever stricter ecology legislation, we can conclude that today's market

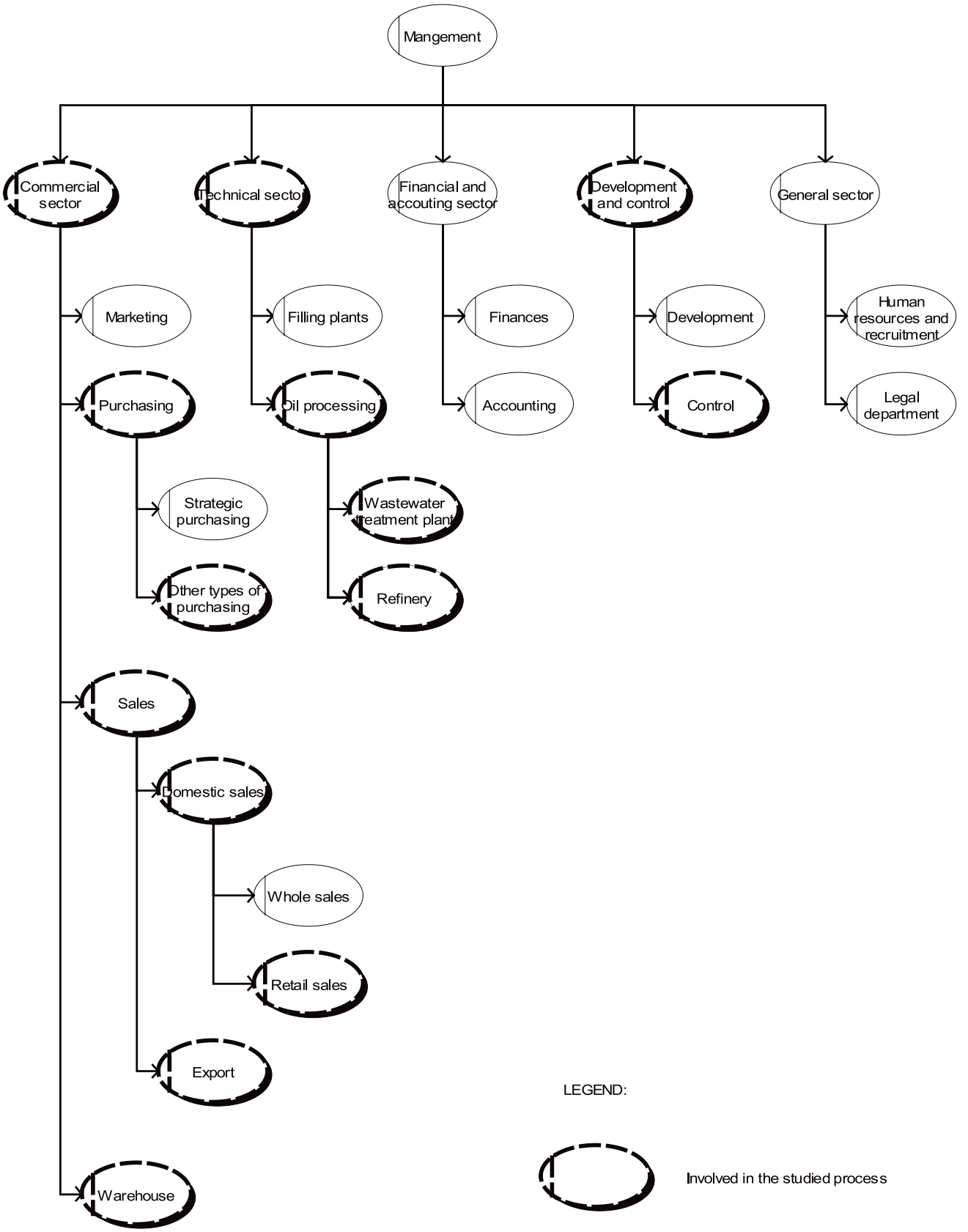

Figure 1: Organizational structure - model (Verbič, 2008).

economy has started to transform into an ecological market economy.

The sustainable development policy has changed the basic marketing approach, making environmental protection an important part of a marketing strategy (Vuk and Senegačnik, 2003). Ecology is thus an important marketing opportunity, an opportunity to ensure competitiveness, as well as a significant entrepreneurial challenge.

The theoretical findings mentioned in this article will be used with reengineering and innovating the obligatory process (soapsuds remake). Soapsuds are side product in vegetable oil processing (mostly sunflowerseed oil, rapeseed oil, soybean oil and various mixtures of these oils) so as to obtain refined vegetable oils or oils for technical purposes. Soapsuds are a waste material which is not acceptable for the environment, therefore it needs to be remake so as to comply with the requirements of the ecological legislation.

Since a company has to perform this process, its aim is to do so as cheaply as possible or perform it in a way which proves the most beneficial in terms of added value for the business system.

Business process reengineering provides such a possibility (Kern 2003, Kern 2008, IDS Scheer, 2004). In addition, there is the idea of transporting soapsuds to the biogas plant. The company would collect a sufficient amount of soapsuds and then dispatch them to the biogas plant. This would significantly shorten and simplify the process for the company.

For remaking soapsuds in the biogas plant, the effect of the anaerobic digestion of soapsuds on the operation of the biogas plant is important. Based on the information in the available literature, we will research the effect of soapsuds on the operation of the biogas plant and prove that products resulting from this anaerobic digestion are more acceptable for the environment.

2 Presentation of the current situation

The obligatory process of soapsuds remake takes place in companies which process vegetable oils into refined vegetable oils or oils for technical purposes. Mostly, these are sunflowerseed oil, rapeseed oil, soybean oil and mixtures of these oils. Soapsuds are a waste material which is not acceptable for the environment, therefore it needs to be remade into products which present less of an environmental pollution. Therefore, the soapsuds remake (as a secondary product) is listed as an obligatory process.

2.1 Organizational and human resources structure of the business system

In our research we studied several companies which remake soapsuds[1]. Companies whose main activity is vegetable oil processing are organized as limited liability companies (d.o.o.) or public limited companies (d.d.). In most cases, the organizational structure is hierarchical. This organizational structure within a company is presented in the organizational structure model given below (Figure 1).

As a rule, these companies employ a large number of people with less than secondary school/high school education and only a small percentage of people with university education (estimated 10%).

2.2 Business system processes

In business systems whose main activity is processing vegetable oils (but also in other business systems) several processes take place: management processes (with sub-processes: training, strategy, human resources recruitment, legal processes); commercial processes (with sub-processes: sales, purchasing, marketing, storage, transport); research and control; processing of crude oil into refined oil or oil for technical purposes (with sub-processes: filling plants, soapsuds remake, wastewater treatment, maintenance). The identification process – processing of crude vegetable oil – is at the same time a basic transformational process and a beneficial process which results in output, i.e. it brings added value to the business system (Verbič and Kern, 2008).

The processing of crude vegetable oil is continuous. One of the phases is neutralization of the oil, wherein by means of phosphoric (V) acid, H_3PO_4, non-hydratable phosphatides are removed (degumming of crude oil). With sodium hydroxide, NaOH, saturated and unsaturated free fatty acids are removed (neutralization of crude oil). These processes produce soapsuds (*aqueous soap solution*) as a secondary product. They are separated from the oil in a separation process based on various densities (oils are lighter than *aqueous soap solutions*). This process is necessary because free fatty acids decompose within oil and contribute to rancidity which causes rapid deterioration of the oil.

2.3 Detailed description of the researched process

Soapsuds remake (soap splitting), as presented in this article, is considered an obligatory process. It must be performed so as to comply with the ecology legislation.

Soap splitting is either a continuous process or a process which takes place in batches (batch soap splitting). In Slovenia, batch soap splitting is more common, therefore it is this process that will be described here (Verbič, 2008, Verbič and Kern, 2008).

An *aqueous soap solution is gathered in a special batch, in a room which is physically separated from other parts of the refinery (one or more batchs).* After the *batch* has been filled, the worker in charge starts with the process. The reaction takes place at a temperature of 80 – 90 ^{0}C. During intensive mixing, which takes place for 3 hours, concentrated sulphuric acid H_2SO_4 is added to the solution. This reaction reproduces technical fatty acids which separate from the solution (they are lighter than the *aqueous solution).* The techni-

[1] The data are generalized to keep business secrets. The problem in the article is studied without finding out business secrets.

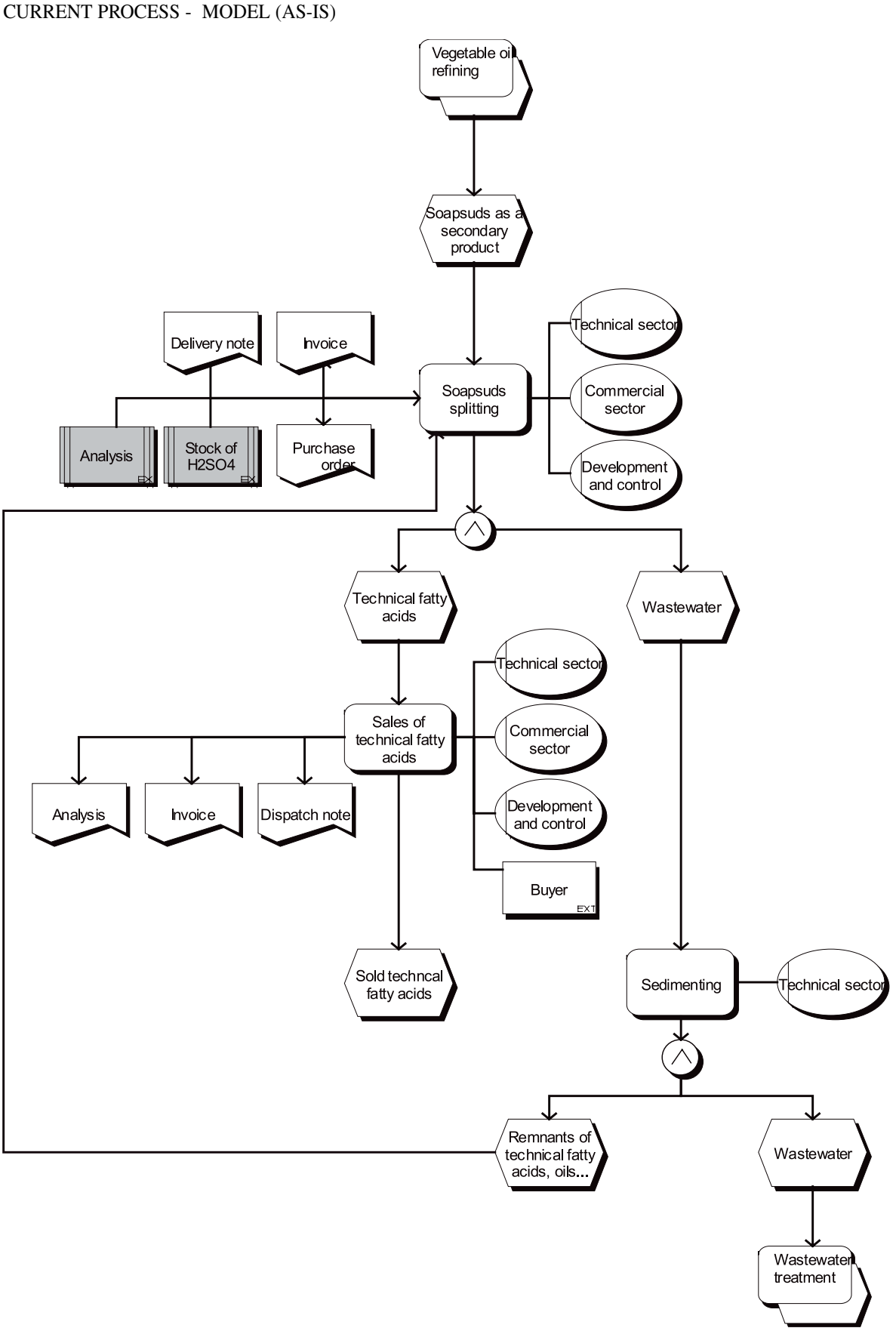

Figure 2: Soapsuds remake - model (Verbič, 2008).

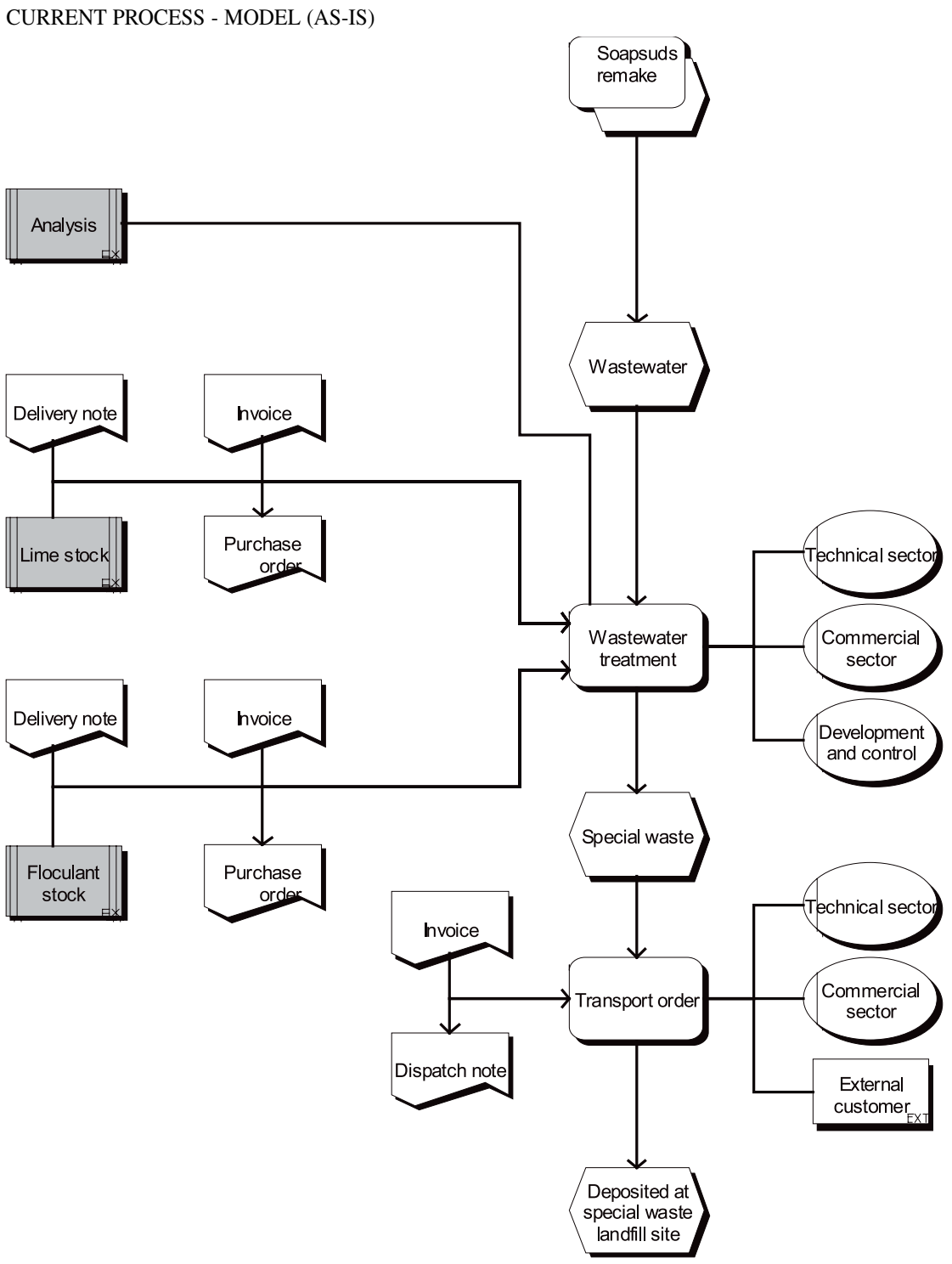

Figure 3: Soapsuds remake - model (wastewater treatment) (Verbič, 2008).

cal fatty acids are then filtered and washed with water (Swern, 1964). The laboratory takes a sample to test for any remnants of sulphuric acid and water in the technical fatty acids. The results of the laboratory analyses are recorded in the electronic analysis logbook. The refinery line manager and the worker in the room where the batch soap splitting takes place, have access to the electronic analysis logbook. If the results of the analysis comply with the production specifications, the worker pumps the technical fatty acids into a reservoir; if they do not, the process of washing, sedimenting and sampling is repeated. The refinery line manager makes an entry in the refinery work logbook (and in the electronic logbook) recording the amount of sulphuric acid used, which is kept in reservoirs.

The refinery line manager also monitors the stock of sulphuric acid (he/she records this data electronically and submits a purchase order via intranet to the Purchasing Department). The purchasing clerk completes the purchase. The refinery line manager takes delivery of the package of sulphuric acid, records the quantity in the electronic logbook, signs the delivery note and sends it to the Purchasing Department, wherein the procedure (after receipt of the invoice) is completed.

The refinery line manager also monitors the quantity of fatty acids in the reservoirs. When the amount is sufficient, the refinery line manager orders the sale of the technical fatty acids (for the cosmetic industry) to the Sales department clerk. The Sales department clerk completes the sales procedure. After a warehouse worker has pumped the technical fatty acids into a cistern vehicle, the head of the warehouse fills out the dispatch note (prepared by the Sales department clerk) with information about the quantity of technical fatty acids to be shipped and sends the dispatch note to the Sales department clerk. The laboratory clerk receives a written document with an analysis signed by the head of the laboratory and, together with the dispatch note and the invoice, submits them as accompanying documents (Verbič, 2008, Verbič and Kern, 2008).

The second part involves wastewater. The resulting wastewater - the aqueous solution of sodium sulphate (Na_2SO_4) and the remnants of sulphuric acid, soap, phosphates and neutral oil – the fatty phase, is piped into sedimentation chambers (where the remnants of the fatty phase are separated from the wastewater). From there, the fatty phase continues to the batch soap splitting, while the wastewater continues to the waste water treatment plant (Swern, 1964). Usually, companies have their own waste water treatment plants.

The aforementioned wastewater is collected in the equalisation pool of the waste water treatment plant. Sulphates are removed from the wastewater using lime. Solid calcium sulphate, $CaSO_4$, is precipitated (with the remnants of the substances listed above). It is removed from the wastewater by the addition of a floculant and transported to a special waste landfill site, as this waste still a special waste (Figure 6).

The procedure used to purchase lime and floculant is identical to the purchase of sulphuric acid, except that it is done by the line manager of the waste water treatment plants. The process of dispatching the calcium sulphate is completed by the Sales department clerk, who prepares the dispatch note and receives the invoice for transport and deposition (Verbič, 2008, Verbič and Kern, 2008).

Technical fatty acids are a product which brings added value, but also incurs costs during production: the cost of the sulphuric acid and lime, work costs, costs of transporting and depositing the calcium sulphate in the special waste landfill site, energy costs, investment into equipment, tax for pollution of the environment. The process of soapsuds remake is presented in the models given below (Figures 2 and 3).

2.4 Description of schedule for individual functions

The schedule of the process is given in the following table.

Table 1: The schedule of the process (Verbič, 2008).

	AWAITING EXECUTION	PREPARATION FOR EXECUTION	EXECUTION	FINALISATION
SOAP SPLITING	cca 8 hours until the batch is full	30 minutes	4 hours*	5 minutes
LABORATORY – ANALYSIS OF TFA	10 minutes	7 minutes	10 minutes	5 minutes
REPUMPING TFA INTO THE RESERVOIR	5 minutes	2 minutes	15 minutes	5 minutes
REPUMPING WATER INTO THE CLEANING PLANT	5 minutes	5 minutes	15 minutes	5 minutes
PURCHASE OF SULPHURIC ACID, LIME AND FLOCULANT	5 minutes	5 minutes	10 minutes	5 minutes
DELIVERY OF CHEMICALS	5 minutes	3 minutes	30 minutes	10 minutes
TFA SALES PROCEDURE	for the reservoir to be full	30 minutes	30 minutes	10 minutes
ANALYSIS OF TFA FROM THE COLLECTION RESERVOIR	10 minutes	7 minutes	10 minutes	10 minutes
PUMPING TFA INTO A CISTERN VEHICLE FOR TRANSPORT	10 minutes	7 minutes	25 minutes	7 minutes
FINAL PROCEDURE IN SALES DEPARTMENT	5 minutes	5 minutes	10 minutes	10 minutes
WASTEWATER TREATMENT		5 minutes	5 hours	15 minutes
TOTAL	55 minutes	1 hour 46 minutes	11 hours 25 minutes	1 hours 57 minutes

*NOTES: * 0.5 hour for heating, 3 hours for batch soap splitting and 0.5 hour for washing*

The times for the individual process stages are long, but they cannot be significantly shortened with the same chemical procedures (Verbič and Kern, 2008).

3 The analysis

3.1 Analysis of the process structure

The process itself is rather complicated, as it includes 19 workers (from the purchasing department, sales department, refinery, warehouse, cleaning plant and laboratory). As regards the number of people involved in the process, we took account of the fact that the batch soap splitting takes place during three shifts, whereas wastewater treatment during two shifts. The procedure is complicated and is performed in three organizational units and at three levels within the organizational units (Figure 1). The process itself should be simplified, i.e. it should involve fewer workers who would perform a greater number of consecutive tasks. There is no technical support for monitoring the quantity of chemicals and technical fatty acids in reservoirs. If this was available, the waiting and preparation time would be shortened however we cannot significantly shorten the technological time with the same kind of chemical procedures (Verbič and Kern, 2008).

3.2 Time analysis of the process

In terms of time, it takes around 16 hours to perform this process. It is impossible to significantly shorten the technological time for performing the process (which is the most time consuming) with the same kind of chemical procedures.

3.3 Analysis of influential factors

With regard to the ecological legislation currently applicable both in Slovenia and in the European Union, and the ecological policies of Slovenia and the European Union, both of which support sustainable development, it seems clear that environmental protection has become more of an important issue. We can expect that tax for pollution of the environment will increase, making it necessary to find solutions which will be financially more beneficial for the business system and will, at the same time, comply with the ever more stringent ecological legislation.

3.4 Comparative analysis

Business systems whose main activity is vegetable oil processing (through alkaline refining) are dealing with this problem in a similar manner. The difference lies in the fact that some of them opt for batch soap splitting, while others apply a continuous soap splitting, while wastewater is treated either in their own wastewater treatment plants or they pay for it to be treated in communal wastewater treatment plants.

4 Proposal for reengineering and innovation of the process

4.1 The process after reengineering and innovation

Since a company has to perform this process, its aim is to do as cheaply as possible or perform it in a way which proves the most beneficial in terms of added value to the business system.

Business process reengineering offers this possibility. While searching for a solution, it was proposed that soapsuds should no longer be remade, but taken to a biogas plant instead (Figure 7). At the biogas plant they can be decomposed into biogas, which is then used to generate electric energy, for heating or to supplement municipal gas. Thus, process reengineering is both process innovation and ecological innovation.

The scope of the process would be minimized, which also presents a change in the process on the first, second and third levels. It would no longer be necessary to perform laboratory analyses and purchase sulphuric acid. Consequently, the use of lime (currently, approximately 1 t is used to process 100 t of crude vegetable oil) and floculant would decrease. This means much less paperwork is required for this kind of task (sample analyses, purchase orders, delivery notes, etc.), fewer workers involved in the process (reduction from 19 to 3 workers) and less time needed to perform the tasks (cut from 16 hours 3 minutes to 3 hours 25 minutes).

The company would collect soapsuds using the existing reservoirs for technical fatty acids and for sulphuric acid. When a suitable amount of soapsuds is collected (25 t is the amount that can be transported in a cistern vehicle), the soapsuds would be transported from the company to the biogas plant. The warehouse worker would, following the order from the line manager of the warehouse, pump the soapsuds into the cistern vehicle, while the line manager of the refinery would handle the dispatch procedure. He prepares the dispatch note and signs it together with the head of the warehouse; the document is then submitted as an accompanying document. One copy is sent to the purchase department for information. The process is completed when the company receives the invoice for the procedure. This change would require additional training for the line manager of the refinery (Verbič and Kern, 2008). The model of the changed process is shown in Figure 4.

4.2 Organizational and human resources structure after the reengineering and innovation of the process

Innovation and process reengineering result in changes in the organizational structure, i.e. they decrease the number of organizational units involved in the process (Figure 5). The human resources system is also altered. The systematization of work positions would change, in particular systematization of the position handling the batch soap splitting - the worker would be able to perform other assignments (e.g. the work

PROCESS REENGINEERING - MODEL (TO BE)

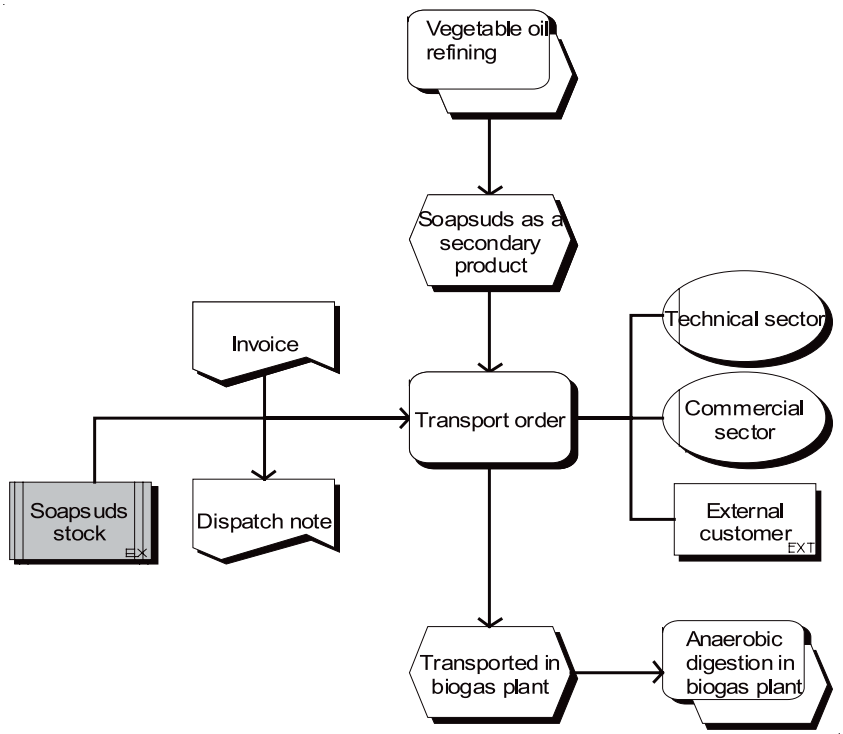

Figure 4: Soapsuds remake after process reengineering - model (Verbič, 2008).

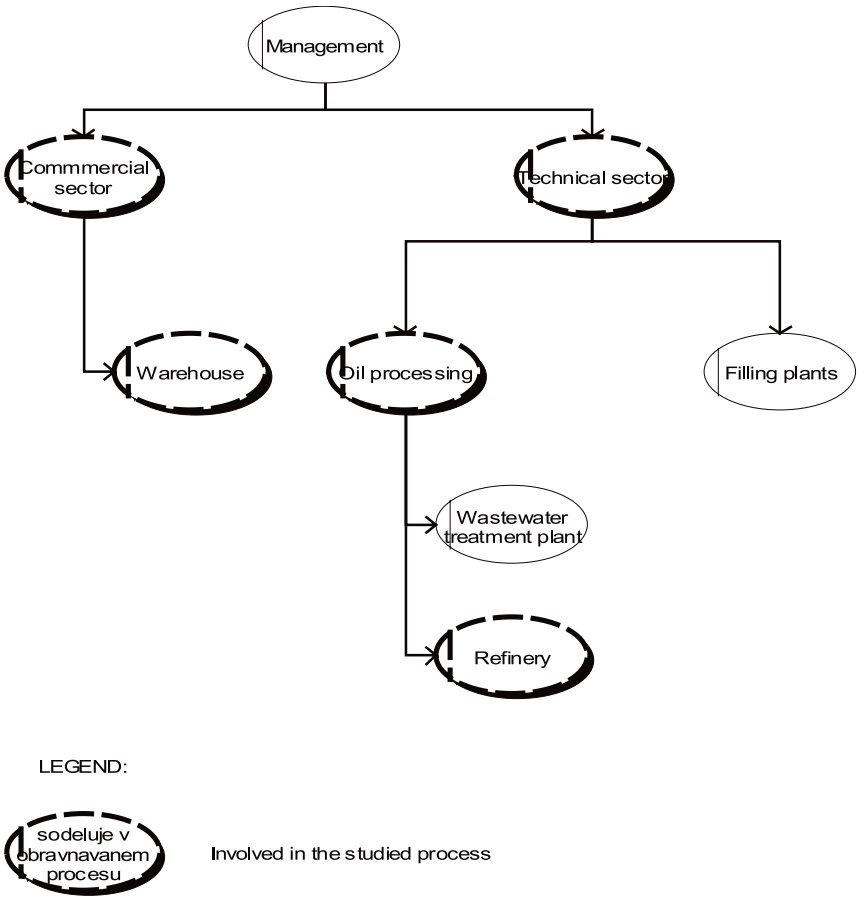

Figure 5:Organizational units involved in the reengineered process - model (Verbič, 2008).

of a stoker) in half the time. Systematization of work positions for the refinery line manager, purchasing department clerk and workers in the wastewater treatment plant would also change. The proposed changes require modification of the IT system. Therefore, it would be sensible to implement computer-supported measurement of the amount of soapsuds in the reservoirs. The level of soapsuds would be measured by means of an electronic level measuring device. The signal would be connected to the computer. This would enable the refinery line manager to check the amount of soapsuds at any time. This would additionally simplify the process (Verbič and Kern, 2008).

4.3 Schedule for individual functions after process reengineering and innovation

The schedule of individual functions after the change is as follows (Verbič and Kern, 2008):

It is clear that the reengineered and inovated process significantly cuts waiting, preparation and finalisation times, but in particular the time spent executing the process itself. Total time spent decreases from the estimated **16 hours 3 minutes to 3 hours 25 minutes.**

5 Estimated results of the anaerobic digestion of soapsuds in the biogas plant

In order to implement this reengineered and innovated process (which is also innovative in terms of ecological protection) in practice, it is important to know what effect the soapsuds will have on the operation of the biogas plant, as well as how the products resulting from the anaerobic digestion will affect the environment.

Drawing on information from the available literature, we will prove that soapsuds can actually be decomposed in a biogas plant and that the products (parameters) obtained from decomposition are more acceptable for the environment than products generated by the existing process.

Table 2: The schedule after process reengineering and innovation (Verbič, 2008).

	AWAITING EXECUTION	PREPARATION FOR EXECUTION	EXECUTION	FINALISATION
REPUMPING SOAPSUDS INTO THE RESERVOIR	5 minutes	10 minutes	15 minutes	10 minutes
SOAPSUDS SALES PROCEDURE	for the reservoir to be full	30 minutes	30 minutes	10 minutes
PUMPING TFA INTO A CISTERN VEHICLE FOR TRANSPORT	10 minutes	15 minutes	25 minutes	15 minutes
FINAL SALES PROCEDURE	5 minutes	5 minutes	10 minutes	10 minutes
TOTAL	20 minutes	1 hour	1 hours 20 minutes	45 minutes

We will describe the effect of the individual substances (parameters) which compose soapsuds on the operation of the biogas plant and, after decomposition, on the environment, both in terms of the pollution of water and soil. The effect will be shown by taking into consideration the concentration of these substances in soapsuds, but without considering the dilution which will most likely occur (depending on the composition of other substrates which are decomposed in the biogas plant). In a larger biogas plant many substrates (up to 250 t/day) are decomposed at the same time, not just soapsuds (Verbič, 2008).

5.1 Composition of soapsuds

We determined the composition of soapsuds on the basis of data obtained from the available literature and using calculations based on the data. We took into consideration the addition of sodium hydroxide NaOH and phosphorus (V) acid H_3PO_4 in the crude oil degumming and neutralization phase. Soapsuds as a secondary product of crude vegetable oil processing thus contain (Verbič, 2008):

- in addition to soap, obtained from free fatty acids with added NaOH and Na ions, it also contains
- phosphatides, phosphate (added phosphorus (V) acid) to transform non-hydratable into hydratable phosphatides), several other non-defined gums and
- remnants of neutral oil.

Data on the composition of soapsuds, expressed in % by weight (Rac, 1964):

- unsaponifiable matterss (mostly phosphatides) 0.34%
- neutral oil up to 6%
- soap approximately 13.66%
- water around 80% (depending how much water is used for washing oil when removing soap).

5.2 Total content of substances in soapsuds

When processing 100 t of crude vegetable oil, approximately 7 t of soapsuds are produced (depending how much water is

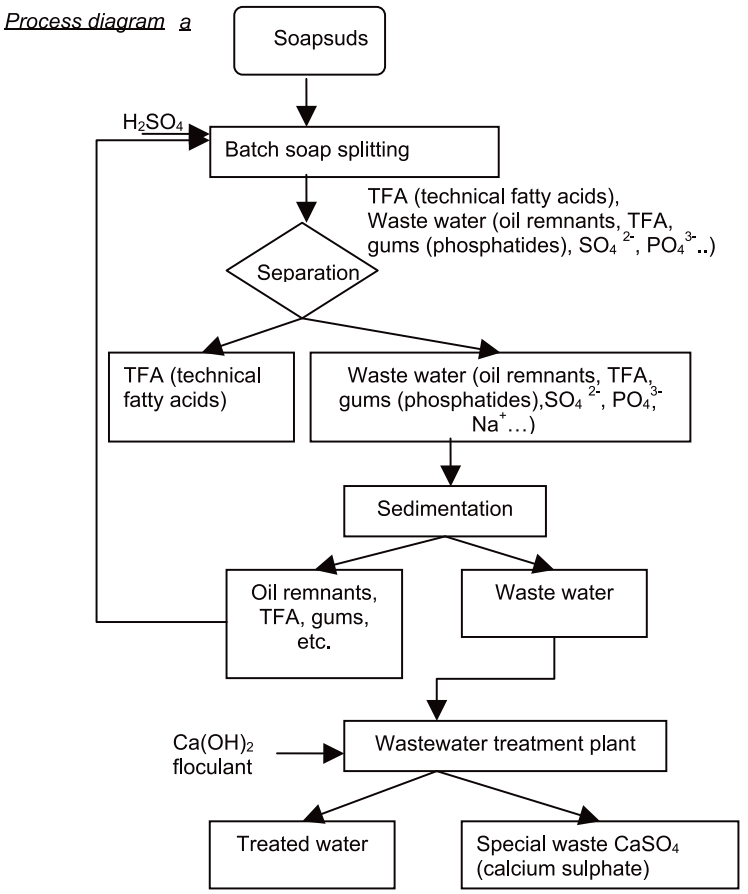

Figure 6:Scheme of batch soap splitting and wastewater treatment (Verbič, 2008).

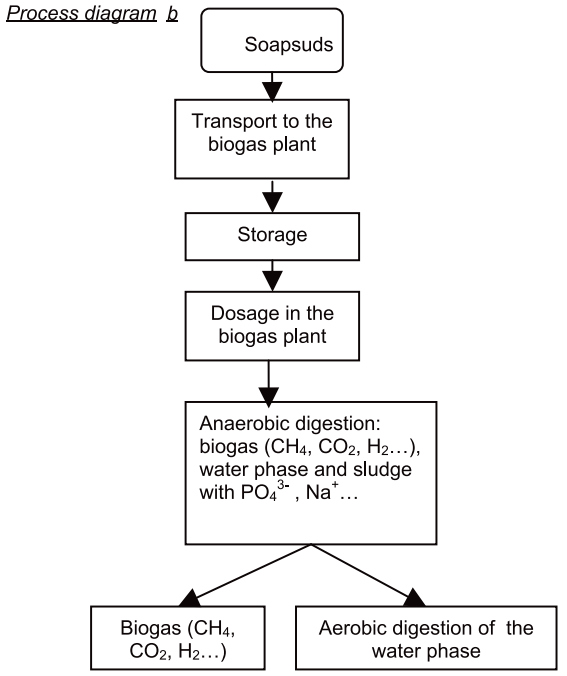

Figure 7:Scheme of anaerobic digestion of soapsuds in the biogas plant (Verbič, 2008).

used for washing oil) which, according to the calculations, contains (Gunstone et al, 1986, Verbič, 2000, Verbič, 2008):

Soap	1,000 kg
Sodium (in soap)	81.9 kg
Neutral oil	420 kg
Phosphatides	105 kg
Phosphorus in phosphatides	0.26 kg
Phosphorus (added H_3PO_4)	31.6 kg
Total phosphorus (added H_3PO_4 and phosphatides)	31.9 kg
Water	5443.4 kg

5.3 The biogas plant

In the biogas plant, decomposition of organic substances takes place under anaerobic conditions and as a result of the action of anaerobic microorganisms, which in an oxygen-free environment – i.e. anaerobic conditions – decompose organic materials into inorganic products (CO_2, H_2, H_2S, and ammonium - NH_3) and methane CH_4.

In the anaerobic process under optimum conditions the proportion of organic substances present can be reduced by 75%. The anaerobic digestion of organic substances can be shown with the following equation:

$$\text{Organic matter} \xrightarrow[\text{bacteria}]{\text{Anaerobic fermentation}} CH_4 + CO_2 + H_2 + H_2S + \text{new bacteria} + Q$$

From the equation we can see that, in the absence of oxygen, anaerobic fermentation bacteria decompose organic matter into the gaseous products CH_4 and CO_2, H_2 and that simultaneously a certain amount of new bacterial mass is produced with an equivalent amount of organic matter. Part of the organic matters is transformed into thermal energy Baras et all, 1979). On the one hand, we obtain biogas, while on the other we get a stable sludge which is easier to store than sludge from aerobic wastewater treatment plants. The resulting wastewater is usually sent in the aerobic wastewater treatment plants.

The anaerobic digestion is always only a part of the entire cleaning procedure (75% reduction of the organic matters), but with a well guided aerobic digestion we can reduce the organic matters by 95%. It is important that with anaerobic digestion high concentrations of organic materials in wastewater do not restrict operation, but for aerobic digestion high concentrations of organic materials in wastewater (BPK5 higher than 2000) are a limitation due to the speed of oxygen transfer from the gaseous to the liquid phase (Baras et al., 1979). The latest practical experience shows that it is possible to reduce the organic matters by up to 90% with a well guided anaerobic digestion.

The use of the anaerobic digestion is therefore wholly applicable when cleaning industrial sewage with organic matters when one or two of the following conditions are met (Baras et all, 1979) :

- high concentration of organic matter in water,
- high water temperature.

The organic compounds decompose (in wastewater) until CO_2 and methane are produced (desired products in the decomposition), as well as certain metabolites following this scheme (Figure 8) (Bischofsberger et al., 2005):

1. In hydrolysis, undissolved compounds are cracked into monomers by exoemnzymes (hydrolaze).

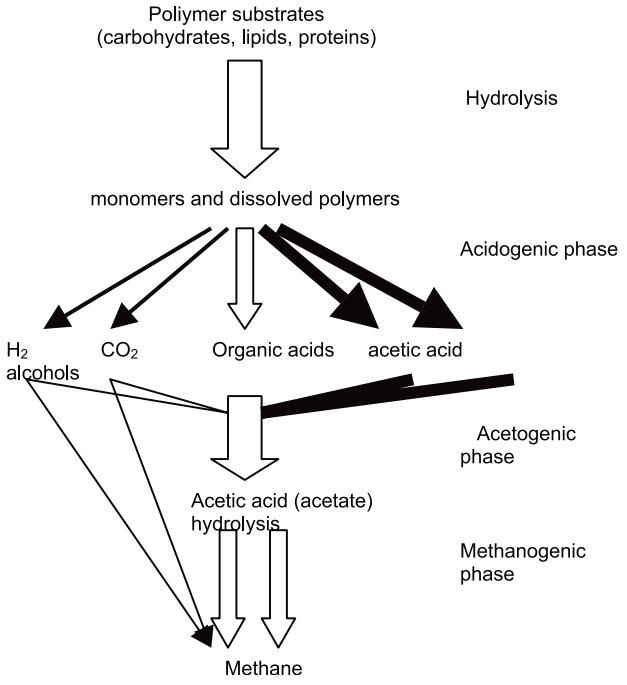

Figure 8:The anaerobic degradation of complex organic compounds (Bischofsberger et al., 2005).

2. The monomers (monosacharides, amino acids, fatty acids) formed in the hydrolytic phase are taken up by different facultative and obligatory anaerobic bacteria and are degraded in the second, the acidogenic phase, to short chain organic acids. Depending on the environment and the substrate, different products are produced: in the water phase these are mostly lower organic acids (formic, lactic, acetic, propionic and butyric acid) and alcohols (methanol, ethanol); in gaseous phase it is CO_2 and H_2. The drop in pH value is typical for the formation of acids due to the production of acids and metabolites with a strong odour (propionic, butyric acid, etc.)
3. Methane bacteria can use only acetic and formic acid, methanol, CO_2 and H_2 as the substrate. Higher organic acids (propionic, butyric, etc.) are transformed into acetic acid in the so-called acetogenic phase. Due to energy reasons, acetogenic bacteria have to live in a spatially tight symbiosis with methane bacteria (or sulphate reducers). The degradation of propionic or butyric acids into acetic acid can only take place if we constantly remove the product of the reaction - H_2, i.e. if we maintain a low partial hydrogen pressure.
4. The methanogenic phase (production of methane) takes place by means of methane bacteria under strictly anaerobic conditions. We can divide them into two types: the first type uses H_2, while the second reduces CO_2 into methane CH_4. Bacteria can gain relatively high levels of energy (135kJ/mol CH_4), grow relatively fast and are, in comparison with the second group, pH tolerant. The second group includes less types of bacteria; they produce methane from acetic acid. The amount of energy obtained in this reaction (31kJ/mol CH_4) is substantially lower than with the degradation of the above-listed substrates. Methane bacteria which degrade acetic acid (acetoclastic) are very important, because they produce approximately 2/3 of methane. These bacteria grow slowly, in comparison with the previous type and the constancy of the living conditions is very important. In most cases they determine the efficiency and stability of anaerobic digestion in biogas plants (Stafford et al., 1979).

5.4 Expected anaerobic digestion of soapsuds in the biogas plant

Working on the premise that practically all organic matter is decomposed in the biogas plant, and taking into consideration the data from available literature, we conclude that soapsuds will decompose in the biogas plant:

- After hydrolysis and other phases, oils are degraded into light volatile organic acids and further into biogas, which is composed of methane, and small amount of other gases (Figure 8);
- soap and phosphatides are transformed into light volatile organic acids and further into biogas (Figure 8).

In wastewater and sludge (biomass) the following environmentally important parameters remain: sodium or sodium ions, phosphorus or phosphorus ions, temperature and pH.

- Sodium or sodium ions are present as a remnant of the decomposition of soap and as a remnant of sodium hydroxide NaOH which was added in the crude oil neutralisation phase. The content of sodium per 7 t of soapsuds is 81.9 kg which means 11.7 mg/1000 mg. Sodium (NaOH, Na2CO3, NaHCO3) is important as a neutralization agent for balancing pH, because it enables us to solve the problem of precipitation which occurs if we use lime (CaO or Ca(OH)2) as a neutralization agent as soon as the solubility limit is reached, i.e. the solubility constant of CaCO3 is 4.96 x 10-9 (Carbon dioxide…). The discarded calcium carbonate frequently builds up in the anaerobic sludge due to its good sedimentary properties; partially, it leaves the cleaning system as an inorganic suspended load transport at the water outlet. Lime is used because it is cheap. According to Baras (1979) Na+ in the amount of 100 - 200 mg/l has a stimulatory effect on microorganisms in anaerobic digestion; only in higher concentrations, above 350 mg/l Na+, does it act as an inhibitor.
- Phosphor or phosphorus ions are present as a remnant of the decomposition of phosphatides and as a remnant of phosphoric (V) acid H3PO4 which was added in the crude oil degumming phase. The total content of phosphorus is 31.9 kg per 7 t of soapsuds, which is 4.6 mg/1000 mg. To an extent, phosphorus (PO4 3-) is used as a nutrient for bacterial growth (Nekrep, 2004).
- The water temperature is around between 33 – 40°C, assuming that we choose anaerobic digestion under the mesophilic operating conditions. According to Zupančič (2005), the anaerobic digestion takes place in three temperature ranges: the *psychrophilic digestion at temperatures between* 5 - 25°C*, the* mesophilic digestion *at temperatures between* 33 - 40°C, and the thermophilic digestion at temperatures of 50 – 60°C. Anaerobic digestion process rate of reactions incresaes at higher temperatures, therefore as regards wastewater treatment technology the mesophilic digestion and and the thermophilic digestion seem the most interesting; the temperatures *between* 5 - 25°C allows for extremely slow anaerobic digestion. Thermophilic digestion can be up to eight times faster and more efficient than mesophilic digestion. However, the reactors for anaerobic digestion which operate in the thermophile range are considered more unstable and require greater investment of energy, so they are less frequently used (Zupančič et al., 2005). Nekrep (2004) writes that methanogenic microorganisms which determine the speed, efficiency and operation of the biogas plant are adapted to a certain temperature. Even small variations in temperature cause a substantial decrease in activity. Therefore the temperature should be kept exactly within a range of +/- 1-2°C. Therefore, we can claim that the temperature really will be within the range described.
- As expected, pH values in the biogas plant is held between 6.6. and 8.0, because, according to Nekrep (2004), pH values out of 6.6. and 8.0 in an alkaline or acidic direction strongly limits the efficiency of the process. Therefore, the metabolism is affected directly and/or indirectly by changing the dissociation level of an entire species of metabolites. The range of stable methane production is

very narrow. If we want to achieve a stable anaerobic digestion process, we have to maintain this pH value.

5.5 Wastewater at the outlet

The Decree on the emission of substances and heat in the discharge of wastewater into waters and the public sewage system (Official Gazette of the Republic of Slovenia, no. 47/05 and 45/07) in Annex 1 and 2 determines limit parameters which must not be exceeded when discharging wastewater. For the above-mentioned soapsuds we can assume that the wastewater discharged from the biogas plant contains sodium ions and phosphates unless the phosphates are not partially or completely used up as a nutrient for bacterial growth. In terms of reference, the following parameters of permissible concentrations in the discharged water (in our case) were prescribed:

In our case, the sodium and phosphorus content in wastewater are shown as the total sodium and phosphorus content while taking into consideration that sodium and phosphorus remain in wastewater and sludge; phosphorus was not used as a nutrient for bacteria.

Following the assumption that all sodium and phosphorus remain in wastewater, and by taking into consideration the Decree on the emission of substances and heat in the discharge of wastewater into waters and the public sewage system (Official Gazette of the Republic of Slovenia, no. 47/05 and 45/07), wastewater at the outlet of the biogas plant does not contain substances which could have a negative impact on the environment, except for exceeding the maximum concentration limit of phosphorus in wastewater if the latter was to be discharged directly into waters. The above decree does not list the discharge of phosphorus into the public sewage system as a limiting parameter.

Table 3: Permissible concentrations in the discharged water (Verbič, 2008).

Parameter	Unit	Maximum permissible level of discharge into waters	Maximum permissible level of discharge into the public sewage system
Sodium		--	--
Phosphorus	mg/l	2	--
Temperature	°C	30	40
pH		6.5 – 9.0	6.5 – 9.5

Table 4: Concentrations in the discharged water (Verbič, 2008).

Parameter	Unit	Content at outlet
Sodium	mg/1000 mg	14.7
Phosphorus	mg/1000 mg	4.6
Temperature	°C	33 – 40
pH		6.6 - 8.0

Moreover, the decree does not define the maximum allowed concentration of sodium.

The pH and temperature are within the prescribed limits. An exception would be a possibly higher temperature if, at the biogas plant outlet, wastewater was discharged directly into waters. In practice, the wastewater at the outlet (prior to being discharged into waters or the public sewage system) is usually used to heat the incoming substrate for the biogas plant, which consequently means the wastewater is cooled and savings are made on heating the incoming substrate.

The data presented for sodium and phosphorus ions refer only to the amounts in 7 t of soapsuds (100 t of vegetable oil processed), but do not take into consideration any possible dilution in the biogas plant when, in a bigger biogas plant (1 MW of electrical energy generated per hour), different substrates are processed at the same time (up to 250 t) each day).

It is important to emphasise that, according to the data in the available literature, wastewater from the biogas plant is, as a rule, sent in the aerobic wastewater treatment plant, because complete wastewater treatment can only be performed in connection with subsequent aerobic digestion (Baras et al., 1979).

5.6 Sludge (biomass)

Sludge (biomass), which is also produced in the biogas plant, is essential for the operation of the plant. Only excess sludge is removed. When assessing the effect of sludge removed from

the biogas plant, our premise is the data regarding the amount of substances in sludge which are produced when 7 t of soapsuds are processed (per 100 t of crude vegetable oil).

The terms of reference for processing biodegradable waste into compost (Official Gazette of the Republic of Slovenia, no. 42/04) state in Article 4 that only biodegradable waste can be composted, as described in Annex 1 to these terms of reference. These substances include waste and sludge from wastewater treatment plants, with the exception of waste and sludge of animal origin and from slaughterhouses. Article 10 states that compost is suitable for use as a plant nutrient if, with regard to the percentage of undesired substances, microbiological requirements and content of hazardous substances, it complies with the requirements of the regulation on emissions into soil.

The decree on the limit input concentration values of hazardous substances and fertilisers in soil (Official Gazette of the Republic of Slovenia, no. 84/2005) in the first item of Article 2 defines emissions into soil or onto the soil as the discharge, dumping or storage of hazardous substances or fertilizers when sludge is emitted from wastewater treatment plants, compost or silt from riverbeds and lakes and when irrigating plants or fertilizing with manure or mineral fertilizers. The fifth item of Article 2 defines as hazardous the substances or groups of substances presented in table 1 of Annex 2 and in table 8 of Annex 3 of the same decree, which are emitted into soil by means of sludge from wastewater treatment plants, compost or silt, or when irrigating plants, and which due to their properties, quantity or density, negatively affect the use of the soil or the quality of the waters. In the sixth item of Article 2 fertilizers are defined as any kind of substances which contain nitrogen compounds or potassium and which, by emission into the soil, encourage the growth of plants. Fertilizers can be of animal or mineral origin, from sludge coming out of wastewater treatment plants, silt, and compost or in the form of fish remnants from fish farms.

In the Annexes of the above decree regarding the annual limit of input of dangerous substances, the maximum value of hazardous substances in sludge, silt or compost are defined. The products resulting from the decomposition of soapsuds, are not included, with exception of the following parameters:

Taking into consideration the terms of reference and regulations, all substances and all products resulting from the decomposition of soapsuds, even in the worst case scenario, will remain in the sludge. The data only refers to the amount of substances in 7 t of soapsuds (100 t of processed vegetable oil), without taking into consideration possible dilution when, in a bigger biogas plant (1 MW of electrical energy generated per hour), different substrates are processed at the same time (up to 250 t) each day. Therefore, we do not expect the sludge to present an environmental burden.

5.7 Effect of soapsuds on the operation of the biogas plant and the environment

With regard to the findings and, assuming that organic matters can decompose, we assume that soapsuds should not have a negative impact on the operation of the biogas plant, and that the products (parameters) resulting from decomposition are more acceptable for the environment than products occurring in the process used up to now.

When it comes to the anaerobic degradation of soapsuds in the biogas plant, we ought to mention several other advantages:

- Soapsuds do not contain nitrogen, sulphur or their compounds such as ammonium ions and hydrogen sulphide H2S. Although in lesser quantities sulphur and nitrogen are important for renewal of the biomass, according to several authors their compounds in certain concentrations, or products resulting from their degradation, may have a toxic effect on microorganisms in the anaerobic digestion process. Balancing their concentration so as to keep them below the toxic limit is difficult (Baras et al., 1979, 1979, Gray, 1992, Nekrep, 2004).
- Furthermore, soapsuds contain no heavy metals such as Cd, Cr, Cu, Pb, Ni, Zn, As, Fe, Mn, Hg, Ag, Al, Co, Mo, Se, Sn, which are, in low concentrations, important microelements. The majority of them are necessary for the renewal of the biomass as trace elements; however, they are toxic in higher concentrations (Deublein and Steinhauser, 2008).
- The advantage of the anaerobic digestion of soapsuds in the biogas plant lies also in the fact that soapsuds are composed of soap (water solution) which makes the hydrolysis phase unnecessary in the biogas plant, except when neutral oil is present. This shortens the degradation period.
- Moreover, soapsuds are composed of soap (esterized free fatty acids) and oils which are more beneficial for the composition of biogas than carbohydrates: Degradation of proteins and fats provides a higher amount of methane. (Eder and Schulz, 2006).

The final answer regarding the effect of soapsuds on the operation of biogas plants and on the pollution of environment can be obtained through practical testing with different incoming substrates in individual biogas plants.

Table 5: Annual maximum intake level of hazardous substances and fertilisers in soil (Verbič, 2008).

Parameter	Unit	Annual maximum intake level
Sodium (in irrigation water)	mg/l	70
Phosphorus as P_2O_5 (livestock manure)	kg/ha	120

5.8 The use of biogas

With the system for the anaerobic digestion of biodegradable waste we can reverse the trend of slowly accumulating waste materials and the rising cost of their removal. At the same time, we gain heat for heating and/or electrical energy which can be used on location or can be sold to customers (Burns, 2007). The literature also mentions a third option, i.e. gas processing (purification, compriming) and sending biogas to the gas network (due to the fluctuating volume and quality of biogas this would only be possible as an exception).

6 Conclusion

The obligatory process of soapsuds remake (soapsuds as a secondary product) is performed in companies which process vegetable oils. This process is necessary due to the requirements of the ecological legislation, as soapsuds are a waste material which is not acceptable for the environment.

The currently applicable obligatory process of soapsuds remake (batch soap splitting) produces technical fatty acids which are sold to the cosmetics industry, as well as wastewater which has to be sent in the aerobic wastewater treatment plant. This process produces another waste material, calcium sulphate, which has to be transported to a special waste landfill site.

The aim of this article was to present how it is possible to create this kind of process, apply it in practice or create it in a manner which proves to be the most beneficial in terms of added value for the business system.

Should this solution be applied, i.e. dispatching soapsuds, this solution would significantly help to cut waiting, preparation and finalisation times, as well as the amount of time taken by the process itself.

This means no more costs for chemicals, lower wages, no more depositing calcium sulphate in special waste landfills, using less electrical energy, less taxes for the environmental pollution and, finally, no more technical equipment for separating soapsuds. The latter is especially important for the new technological vegetable oil processing lines or in plants with old and worn out equipment.

This would result in changes to the organizational structure, the human resources system, systematization of work positions and the information system. It would be sensible to implement computer-managed measurement of the quantities of soapsuds in the reservoirs, which means the line manager of the refinery would be able to monitor the level of supply on a computer screen at any time. This would additionally simplify the process.

It is important to emphasize that innovation and process reengineering contribute towards sustainable development, since environmental care, due to global environmental changes and the ever more stringent ecological legislation, has become one of the ongoing tasks and priorities of the management.

The advantage of anaerobic digestion of soapsuds in the biogas plant lies also in the fact that soapsuds are composed of soap (water solution), which makes the hydrolysis phase unnecessary in the biogas plant, except when neutral oil is present. This shortens the degradation time. With the system for the anaerobic digestion of biodegradable waste we can reverse the trend of slowly accumulating waste materials and increasing costs for their removal. At the same time, we gain heat for heating and/or electrical energy which can be used on location or can be sold to customers.

Based on these findings, we can conclude that it is feasible to decomposed soapsuds in the biogas plant and that the decomposition of soapsuds has no negative impact on the operation of the biogas plant. In compliance with the requirements of the applicable ecological legislation, products (parameters) resulting from this decomposition present less pollution of the environment than the products occurring in the process currently in use.

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Prenova in inovacija procesa predelave milnice

V prispevku je za reševanje problema s področja varstva okolja uporabljen metodološki pristop prenove poslovnih procesov. V obravnavanem primeru (proces predelave milnice) v podjetjih, ki se ukvarjajo s predelavo rastlinskih olj, gre za prenovo poslovnega procesa, ki ga uvrščamo med obvezne procese. Ta proces moramo izvajati zaradi zakonodaje s področja ekologije. Zato je smiselno uporabiti radikalno obliko prenove procesa - reinženiring poslovnega procesa. Milnica nastane kot stranski produkt pri rafinaciji rastlinskih olj. Tak odpadek po zakonodaji ni sprejemljiv za okolje. Pri predelavi milnice, kot se v praksi izvaja sedaj, nastanejo tehnične maščobne kisline in stranski produkt sadra, ki vsebuje ostanke maščob. Stranski produkt spada med posebne odpadke, zato ga je potrebno odvažati na deponijo posebnih odpadkov.

Pri reševanju tega okoljskega problema je prišlo do ideje, da milnice ne bi več predelovali, pač pa jo odvažali na bioplinsko napravo, kjer se razkroji do bioplina. Bioplin se lahko uporabi za pridobivanje električne energije, ogrevanje ali dodajanje k mestnemu plinu. Prenova procesa je v tem primeru tudi inovacija procesa in inovacija s področja ekologije.

S pomočjo podatkov iz literature, smo dokazovali, da je prenovo in inovacijo procesa, ki je hkrati tudi inovacija s področja ekologije, v praksi dejansko možno izvajati in da razgradni produkti milnice ob upoštevanju okoljske zakonodaje v Sloveniji manj obremenjujejo okolje kot pri prvotno vodenem procesu.

Ključne besede - prenova poslovnega procesa, inovacija procesa, predelava milnice, bioplinska naprava, ekologija

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Public Financial Funds Efficiency Regarding the Development of Innovative Activities in Small and Medium-sized Enterprises: the Case of Slovenia

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In this article, the authors present a method of measuring the efficiency of use of national and European public funds for promoting action in companies, including the process from a draft idea to the placement of a product or service on market. The method of measuring has been done with a matrix system, through which we have shown the distribution of public funds between service brokers that offer services for the raising of the abilities to the companies. The matrix system includes the impact matrix of service brokers on innovation enablers. Based on the assembling matrix, we have composed efficiency measures, which can serve policyholders in guiding and controlling public funds.

Key words: Efficiency, public funds, matrix system, service, enabler, intermediary

1 Introduction

The article is the result of European project called IMPACT-SCAN[1], which has been carried out, by the following seven European regions: Lower Austria, Madrid, Bretagne, Limburg, Slovenia, Lower Silesia and Flanders.

The goal of the project was to develop a model that will enable effective monitoring of the consumption of public funds that are meant (intended) for development of innovative activity in small and medium-sized enterprises (SMEs). The regions have continually been reconciling work on the project and interchanging experiences. They set up a common framework of the model and then every region by itself developed details and an implementation of the model. This model is supposed to be used in regional policies to help to monitor and to redirect invested public financial means for development of innovative activity in such a way that their effects would be the greatest.

The core of the model are three matrices (M_1, M_2 and M_3) which are described in more detail in Section 2.

Matrix M_1 shows the distribution of means between intermediaries that are offering services to enterprises for developing their innovative activity and policy objectives. Matrix M_2 shows the distribution of means between the intermediaries and types of services that they are offering to enterprises. Matrix M_3 shows an impact of individual services on innovative enablers. The efficiency measure of invested means by individual services, which are offered by intermediaries, is conducted based on these matrices. Based on this measure, regional policyholders can direct or rearrange public means in such a way that they achieve the maximum effects of innovative growth in SMEs.

2 Description of Matrix M_1

As mentioned in the introduction, Matrix M_1 shows a distribution of public funds regarding the goals of policy between service intermediaries, which they offer to enterprises to maximize innovative ability. In Slovenia, we have divided the goals of policy into five categories as:

[1] www.impactscan.net. Project Management team: Uroš Stanič, Robert Rudolf, Vanja Rangus, Nataša Mršol; Expert team: Maja Bučar, Jože Jesenko, Aleš Mihelič; European programme: IMPACTSCAN, City of Ljubljana 2007.

1. Enhancement of the firms' capacity and an increase in the number of innovative firms.
2. Cooperation and networking addressed to technology and business issues.
3. Increase in availability of technology and make it accessible to SMEs
4. Development of international presence and activities of the regional firms, both through access to external markets and international cooperation
5. Support of the creation of new technology-based firms, from university environments.

We have divided intermediaries that offer individual services to enterprises into six categories:

1. Scientific and Technology parks
2. Service centers
3. RTD Institutions
4. Business associations
5. Economic development organizations
6. Administration.

We can write Matrix $M_1 = \left[m1_{ij}\right]_{6\times5}$ as shown in Table 1.

In Matrix $M_1 = \left[m1_{ij}\right]_{6\times5}$ symbol $m1_{ij}$ represents the elements of matrix and index 6 x 5 its dimension.

To fill this matrix, we have in particular used data from the state budget for different ministries, including the Ministry of Economy, the Ministry of Higher Education, Science and Technology, the Ministry of Defense, the Ministry of Labor, Family and Social Affairs.

The completed matrix for the years 2005 and 2006 in the case of Slovenia (www.impactscan.net) is shown in Table 1.

All the amounts in Matrix M_1 are in millions of euros, the sum of all elements of Matrix M_1 is equal to the used public financial means for accelerating (promoting) innovation in SMEs:

$$\sum_{j=1}^{6}\sum_{i=1}^{5} m1_{ij} = 69.96 \text{ mio euro.}$$

3 Description of Matrix M_2

Matrix M_2 shows the distribution of public financial means for the acceleration of innovative activity in SMEs according to the types of services that are being offered by individual intermediaries. We have divided the types of services into 10 categories:

1. Access to information
2. Advice
3. Technology services
4. Project management
5. Networking/Clustering
6. Human resources
7. Access to finance
8. Incubating services
9. Finance
10. Infrastructure.

Table.1: Matrix M_1

Policy Objectives ⇒ / **Intermediaries** ⇓	1.Enhancement of Innovation Capacity in companies (+human resources)	2.Business Network Cooperation	3. Increase technology availability & IT	4. Internationalization	5. Creation & support of NTBF	SUM
1. *Scientific and Technological Parks*	0.811	0.304	0	0	1.925	**3.04**
2. *Service centers*	6.987	0.919	3.678	0.368	2.758	**14.71**
3. RTD *institutions*	8.61	0	0	0	0	**8.61**
4. *Business Associations (Association Networks &Chambers of Commerce)*	2.991	4.625	0	3.294	0	**10.91**
5. *Economic - developmental organizations & funds*	9.89	0	0	0	0	**9.89**
6. Administration	17.1	3.192	0	0.456	2.052	**22.8**
SUM	**46.389**	**9.04**	**3.678**	**4.118**	**6.735**	**69.96**

Table 2: Matrix M_2

Services ⇒ / **Intermediaries** ⇓	1. Access to information	2. Advice	3. Technology	4. Project Management	5. Networking/	6. Human Resources	7. Access to Finance	8. Incubating Services	9. Finance	10. Infrastructure
1. *Scientific and Technological Parks*	0	0.118	0	0	0	0	0	0.183	0	0.699
2. *Service centers*	0.045	0.096	0.542	0	0.001	0.12	0	0	0	0.196
3. RTD *institutions*	0	0	1	0	0	0	0	0	0	0
4. *Business Associations (Association Networks &Chambers of Commerce)*	0.096	0.041	0.263	0.065	0.281	0.116	0	0	0	0.138
5. *Economic - developmental organizations & funds*	0	0	0	0	0	0	0.199	0	0.801	0
6. Administration (Public Finance)	0	0	0.114	0	0.013	0.74	0	0	0.099	0.034

Matrix $M_2 = \left[m2_{ij}\right]_{6\times10}$ is conducted in such a way that each row shows the portion of means that have been used by some intermediary for performing (implementing) certain services. That is also the reason the sum of every row in this matrix equals 1, that is $\sum_{j=1}^{10} m2_{ij} = 1$ for $i = 1, 2, \cdots 6$. (See the table 3.1)

To complete Matrix M_2 we have used a special questionnaire, which was filled by intermediaries and experts performed the final distribution. (http://www.svr.gov.si/filead-

Table 3: Matrix D

	1. *Scientific and Technological Parks*	2. *Service centers*	3. RTD *institutions*	4. *Business Associations (Association Networks &Chambers of Commerce)*	5. *Economic - developmental organizations & funds*	*6 Administration (Public Finance)*
1. *Scientific and Technological Parks*	**3.04**	**0**	**0**	**0**	**0**	**0**
2. *Service centers*	**0**	**14.71**	**0**	**0**	**0**	**0**
3. RTD *institutions*	**0**	**0**	**8.61**	**0**	**0**	**0**
4. *Business Associations (Association Networks &Chambers of Commerce)*	**0**	**0**	**0**	**10.91**	**0**	**0**
5. *Economic - developmental organizations & funds*	**0**	**0**	**0**	**0**	**9.89**	**0**
6. Administration (Public Finance)	**0**	**0**	**0**	**0**	**0**	**22.8**

min/srs.si/pageuploads/svet_za_konkurencnost) Matrix M_2 for Slovenia in the period dealt with is given in the Table 2.

As already mentioned, the sum of every row in this matrix equals 1. If we multiply matrix M_2 from left with diagonal matrix:

$$D = \left[d_{ij}\right]_{6\times 6} \quad \textit{Intermediaries} \text{ x } \textit{Intermediaries,}$$

which has sums on the diagonal elements, which intermediaries have used for performing individual services, we obtain Matrix M_2 expressed in sums:

$$M_{2v} = D \times M_2 .$$

In this case, the sum of every row represents a quantity of money that an intermediary has spent for performing of services in SMEs with an intention to increase innovative ability in them. Matrix D for Slovenia is shown in Table 3.

If we perform the indicated multiplication $M_{2v} = D \times M_2$, we obtain Matrix M_{2v} shown in table 4.

By multiplying the transposed Matrix M_1^T with Matrix M_2, we obtain a distribution of means by individual types of policies and types of services (Table 5). The elements of this matrix present the sums of public financial means that have been used for individual type of services with regard to type of policy; because of that, the sum of all elements of Matrix $M_1^T \times M_2$ equals a common sum of public means used to increase innovative abilities in SMEs, Therefore, we can write:

$$\sum_{j=1}^{6}\sum_{i=1}^{5} m1_{i,j} = \sum_{j=1}^{10}\sum_{i=1}^{5}\left(m1^T m2\right)_{i,j}$$

We must mention that distribution of means by types of services and goals of policy provided this way is not uniform, which means that we can obtain different distributions of means using equal sums. The sums by rows and columns, in contrast, are always the same, which is important for further use.

4 Description of Matrix M_3

Matrix M_3 presents the impact of the individual types of services that intermediaries are offering to enterprises, to innovation enablers in enterprises. We have divided innovation enablers into 10 categories (See detail in www.impactscan.net):

1. Strategy (Business strategy, Innovation strategy, Marketing strategy)
2. Structure & organization (How to structure the organization and decision-making process for innovation)
3. Innovation culture (How to create a company culture aimed at innovation)
4. Financial resources (The firm has strengthened its financing engineering /management)
5. Human resources (How to get the best out of entrepreneurs and employees)
6. Information & technology(How to get access to the right information, the right knowledge and competences and able to exploit them)
7. Idea Generation & creativity process (How to come up with new ideas)
8. Implementation of innovation (How to transfer innovation into ongoing business)
9. Marketing orientation & operation (How to find customers and open up new markets)
10. Exploitation of innovation (How to maximize profit from the innovation).

If we record the types of supporting innovation elements by rows, and types of services that are being offered by inter-

Table 4: Matrix M_{2v}

Services ⇒ / **Intermediaries** ⇓	1. Access to information	2. Advice	3. Technology	4. Project Management	5. Networking/	6. Human Resources	7. Access to Finance	8. Incubating Services	9. Finance	10. Infrastructure	SUM
1. *Scientific and Technological Parks*	0	0.36	0	0	0	0	0	0.556	0	2.124	**3.04**
2. *Service centers*	0.663	1.405	7.97	0	0.016	1.768	0	0	0	2.888	**14.71**
3. RTD *institutions*	0	0	8.61	0	0	0	0	0	0	0	**8.61**
4. *Business Associations (Association Networks &Chambers of Commerce)*	1.042	0.445	2.87	0.713	3.069	1.261	0	0	0	1.51	**10.91**
5. *Economic - developmental organizations & funds*	0	0	0	0	0	0	1.964	0	7.926	0	**9.89**
6. Administration (Public Finance)	0	0	2.591	0	0.296	16.873	0	0	2.259	0.781	**22.8**
SUM	**1.705**	**2.21**	**22.041**	**0.713**	**3.381**	**19.902**	**1.964**	**0.556**	**10.185**	**7.303**	**69.96**

Table 5: Distribution of means by individual types of policies and types of services

Services ⇒ / **Policy Objectives ⇓**	1 .Access to information	2. Advice	3. Technology	4. Project Management	5. Networking/	6. Human Resources	7. Access to Finance	8. Incubating Services	9. Finance	10. Infrastructure	SUM
1.Enhancement of Innovation Capacity in companies (+ human resources)	0.600 58	0.885 39	15.125 68	0.195 47	1.070 97	13.840 23	1.964	0.14833	9.6202 5	2.9381	**46.38 9**
2.Business Network Cooperation	0.483 15	0.312 42	2.0773 2	0.302 26	1.343 46	3.0072 4	0	0.0556	0.3162 6	1.14229	**9.04**
3. Increase technology availability & TT	0.165 77	0.351 3	1.9927 7	0	0.004	0.4420 6	0	0	0	0.7221	**3.678**
4. Internationalization	0.331 19	0.169 51	1.1177 3	0.215 27	0.932 93	0.7624 2	0	0	0.0451 8	0.54378	**4.118**
5. Creation & support of NTBF	0.124 31	0.491 39	1.7275	0	0.029 64	1.8500 5	0	0.35207	0.2033 1	1.95673	**6.735**
SUM	**1.705**	**2.21**	**22.041**	**0.713**	**3.381**	**19.902**	**1.964**	**0.556**	**10.185**	**7.303**	**69.96**

mediaries by columns, we could write Matrix M_3 as shown in Table 6.

This matrix is the most problematic, because we do not have accurate pointers and standards for measuring the impact of certain activities on supporting elements. To obtain an estimation of magnitude of impacts, we have decided that we will measure them on five-step scale, in which 0 means an insignificant impact of activity on the supporting element and 4 a very significant impact of activity on the supporting element. We have compiled a special questionnaire to request middle and small enterprises, which have used services of intermediaries to increase their innovative ability, to evaluate with marks from 0 to 4 the impact of an activity they have used on supporting elements. The questionnaire had some other questions, which we have not mentioned, because they are not important with regard to Matrix M_3.

We chose a sample of small and medium enterprises and sent them a questionnaire. We chose the sample by means of sorting the enterprises by their title and then we have chosen every tenth enterprise (see detail in www.impactscan.net).We have gathered the data in Microsoft Excel and processed them with the application SPSS and then recorded the average evaluations in Matrix M_3 shown in Table 6

5 Measure of efficiency

The sum of evaluations in a column in Matrix M_3 gives a common impact of the type of service on all supporting elements:

$$s_j = \sum_{i=1}^{10} m3_{i,j} \qquad j = 1,2,\cdots,10 .$$

The sum of elements of every column in Matrix $M_1^T \times M_2$ gives the sum of public means used for increasing the innovative ability in SME s:

$$v_j = \sum_{i=1}^{6} (m1^T m2)_{i,j} \qquad j = 1,2,\cdots,10 .$$

Quotient

$$q_j = \frac{s_j}{v_j} \qquad j = 1,2,\cdots,10 .$$

gives us the efficiency of the use of public means for every single service, which impacts on particular innovation enablers and, by that, does not increase innovative ability of enterprise. The bigger the quotient, the bigger the efficiency of use of means with an individual type of service.

The reality of this measure is questionable, since not all of supporting elements are equally important to increase the innovative abilities of enterprises. To negate this defect, we have established a group of experts, who have evaluated the importance of individual supporting elements with regard to their contribution to the innovative ability of enterprises on the scale from 1 to 100. Group of experts were selected from five innovative enterprises and every one estimated contribution for all enablers to increase innovative abilities of enterprise. The weights in the Table 7 are averages of these five estimations of u_i, for i=1, 2, …, 10:

We have multiplied with these weights the impacts of types of services on supporting elements. By that, we have weighted the importance of individual supporting elements. The common impact of individual services on all supporting elements is equal to:

$$s_j^* = \sum_{i=1}^{10} u_i \cdot m3_{i,j} \qquad j = 1,2,\cdots,10 .$$

Table 6: Matrix M_3

Services ⇒ / ***Enablers*** ⇓	1 .Access to information	2. Advice	3. Technology	4. Project Management	5. Networking/	6. Human Resources	7. Access to Finance	8. Incubating Services	9. Finance	10. Infrastructure	SUM
1. *Strategy*	3.1	3.1	3.3	2.5	2.6	2.9	3	0	2.9	2.5	25.9
2. *Structure & organization*	2.8	2.4	2	2.6	1.6	2.6	2.5	0	2.5	2	21
3. *Innovation culture*	2.6	3.1	3	3.1	2.5	2.8	2.9	0	3	2.3	25.3
4. *Financial resources*	2.8	2.6	3.1	3	3.1	2.3	3.3	0	2.8	2.5	25.4
5. Human resources	2.6	2.5	3	3.4	2.6	3.1	1.3	0	2.6	2.4	23.5
6. *Information & technology*	3.3	2.3	3.1	3.4	2.9	2.9	2.5	0	2.3	2.5	25
7. *Idea Generation & creativity process*	3.1	2.9	2.9	2.6	2.3	3.4	2.8	0	2.3	1.9	24
8. *Implementation of innovation*	2.9	2.8	2.8	2.4	2.4	2.5	3	0	2.5	2.4	23.5
9. *Market orientation & operation*	2.8	2.8	2.3	2.6	2.5	2.9	2.6	0	2.3	2.9	23.5
10. *Exploitation of innovation*	2.6	1.9	2.9	3	2.1	2.9	1.8	0	2.1	1.6	20.9
SUM	28.5	26.3	28.3	28.6	24.6	28.1	25.5	0	25.1	22.9	

Table 7: Weights

Enablers ⇓	**Weight** u_i
1. *Strategy*	52.333
2. *Structure & organization*	37.667
3. *Innovation culture*	48.667
4. *Financial resources*	41.333
5. Human resources	89
6. *Information & technology*	78
7. *Idea Generation & creativity process*	100
8. *Implementation of innovation*	78
9. *Market orientation & operation*	41.333
10. *Exploitation of innovation*	74.333

For simpler interpretation, we have normalized the quotients of efficiency of use of means (the use of means efficiency quotients) by individual types of services so, we have multiplied quotient of efficiency $\frac{s_j^*}{v_j}$ with $\frac{100}{S}$, where $S = \sum_{j=1}^{10} \frac{\sum_{i=1}^{10} u_i \cdot m3_{i,j}}{\sum_{i=1}^{5} \left(m1^T m2\right)_{i,j}}$ and obtained a formula for the measurement of efficiency of use of public means to increase innovative ability in SMEs:

$$q_j^* = \frac{100}{S} \cdot \frac{\sum_{i=1}^{10} u_i \cdot m3_{i,j}}{\sum_{i=1}^{6} \left(m1^T m2\right)_{i,j}} \qquad j = 1, 2, ..., 10 .$$

In the case of Slovenia within the studied period and based on collected and processed data, we obtained the following coefficients of efficiency of use of public means to increase innovative ability in enterprises by individual services, which are being offered by intermediaries of services:

These pointers enable holders of developmental policy in certain regions to distribute means by individual interme-

Table 8: Coefficients of efficiency

Services	1. Access to information	2. Advice	3. Technology	4. Project Management	5. Networking/	6. Human Resources	7. Access to Finance	8. Incubating Services	9. Finance	10. Infrastructure
Coefficients of efficiency	17.344	12.112	1.341	41.642	7.5	1.488	12.914	0	2.498	3.162

diaries, which offer different services that have an effect on innovation levers in such a way that they achieve the best use of public means and maximum effect, i.e. the greatest increase of innovative ability in small and medium enterprises.

6 Conclusion

The matrix system adopted in IMPACTSCAN was intended to provide a useful and simple instrument for the European regions, allowing them to analyze the effectiveness of the innovation services system depending on the regional policies and resources. It starts from the consideration of the public budget for regional innovation policies, for regional intermediaries and for the provided innovation supported services (input-oriented view of the supply side).

The actual impact of those services on the factors enabling the firms' innovation and the appreciation of them made by small and medium-sized enterprises is analyzed from the point of view of the services demand (impact-oriented view of the demand side) regional policy markers and stakeholders.

The definition of a set of ratios and indicators interlinking both sides – services supply and demand – will complete a system producing immediate results and be easily understood by the innovation agents of the region. It will also facilitate an easily implemented process for the comparison of innovation policies in different regions.

The crucial element for this system is the availability and coherence of data. That is the reason there are so many different methods of gathering of information that could be suitable for regions.

To ensure the long-term success of the presented model, the model should be used for the supervision of the use of public funds for increasing innovative abilities of enterprises.

For practical use of the model, we would have to establish a system of permanent gathering and processing data. On the other side, the government would have to establish a system of regulation of innovative improvement of enterprises.

One of the most problematic points in such system is the assessment of weights. Therefore, one suggestion for further research is to find more optimal way to assess these weights.

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Učinkovitost javnih finančnih sredstev pri razvoju inovativne dejavnosti v malih in srednjih podjetjih na primeru Slovenije

V članku smo avtorji prikazali postopek merjenja učinkovitosti izrabe javnih sredstev državnih in evropskih za pospeševanje inovativne dejavnosti v podjetjih od zasnove ideje do plasiranja izdelka ali storitve na trg. Sam postopek merjenja smo speljali z sistemom matrik s katerimi smo prikazali porazdelitev javnih sredstev med posredniki storitev, ki nudijo podjetjem za dvig njihove inovativne sposobnosti. Sistem matrik vključuje tudi matriko vpliva storitev posrednikov na podporne elemente inovativnosti. Na podlagi zgrajenih matrik smo zgradili mero učinkovitosti, ki lahko služi nosilcem politike za usmerjanje in nadzor nad javnimi sredstvi.

Ključne besede: Inovativnost, učinkovitost, javna sredstva, sistem matrik.

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An Overview of Models for Assessment of Organization Virtuality

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A virtual organization is a network of legally independent organizations and/or individuals that produce products and/or services based on a common business understanding. This new organization structure is posited as radical departure from the traditional, hierarchic, bureaucratic and co-located mode of organizing that dominated the twentieth century. In contrast, the characteristics of the new, virtual organization forms are seen to be dynamic, networked, distributed, digital, flexible, collaborative and innovative. The challenge, however, is to determine which organization as a subject employs virtual form and which not. The answer to this question is decidedly complex as most organizations have forms that are somewhere in between; therefore, it is usually only possible to determine how virtual one organization is on certain aspects. In the other words: what is the level of its virtuality? Several models for the assessment of organization virtuality have been developed by many different authors. The purpose of this paper is to investigate and present all the published models of virtual organization that are publicly available in the world literature. The strengths and weaknesses of all models found are presented, together with their mutual relations.

Key words: virtual organization assessment, virtual organization models, organization virtuality, virtuality assessment

1 Introduction

The virtual organization is a modern organizational construct that allows corporations to face new challenges in a hyper-competitive environment. It could be seen as the opposite of a traditional organization (Bavec, 2003). There are three main characteristics that separate one from the other. Virtual organizations do not have a physical presence but exist electronically on the internet; they are not constrained by legal definitions of types of companies; they are formed in an informal manner as an alliance of independent legal entities. As discovered by many researchers, virtual organizations are the form that many traditional organizations are transforming themselves into; some intentionally by reorganization and some spontaneously, driven by technology.

In this paper, the term virtual organization encompasses profit and non-profit virtual organizations when virtual enterprise, virtual corporation and virtual company belong to the profit virtual organizations. Virtual enterprise or virtual corporation is network of companies, virtual company is network of teams and virtual team is network of people. On the other hand, traditional organization is a business subject that could be a company, institute, institution or public institution (Vila, 1994) that applies traditional, hierarchic, bureaucratic and co-located mode of organizing.

Regarding their impact on the world, the virtual organization presents two different faces. One reveals an ability to enhance the efficiency and effectiveness of management and to achieve greater flexibility of action. The other shows the dissolution of traditional relationships in the course of realizing these desirable ends (Mowshowitz 2002). It is most clearly evident as an innovation in business management, especially within corporation and in e-Commerce. In short, the virtual organization is a disturbing agent of social change and thus provokes ambivalent responses.

A widespread, stereotypical image identifies a traditional organization with a physical place, where people work close to each other. In this ideal organization, working time is standard, relationships have a long-term orientation, and decision rights belong to the owners and are delegated along a univocal and well-defined hierarchy. Even culture is considered to be largely shared among members.

DeSanctis, Staudenmayer and Wang (1999) observe that organizational virtualization is a process affecting four aspects of organizational life:

1. *Space*; the space dimension refers to the extent of spatial dispersion of employees across different locations.
2. *Time*; the time dimension pertains to temporal dispersion; in other words, the degree to which employees operate asynchronously and the duration of relationships.
3. *Boundaries*; the boundary dimension refers to organizational dispersion: the degree to which organizational processes extend the boundary of the focal organization.
4. *Culture*; the culture dimension relates to cultural dispersion: the extent to which an organization consists of employees from different cultures.

Organization virtuality is, therefore, very well defined and understood. Its prerequisites are clear and all the aspects

intelligible. The challenge emerges when we want to observe a particular real-world organization and determine whether it is virtual or not. The emergence of all the presented models is actually the result of attempts to assess organization virtuality.

Some inconsistency in the use of specific terms may be found in the descriptions of different presented models. Those are left intentionally in order to keep the models authentic and not to modify original meaning.

2 The Switching Principle

The Switching Principle is the first assessment model of organization virtuality found in literature. The majority of the researchers agree that Mowshowitz invented the term and set the first definition of a virtual organization. According to Mowshowitz (1999), switching is the key feature of virtual organization. It is the assignment of a new satisfier to a given requirement. Theoretically, switching is warranted whenever an advantage can be gained by changing the assignment of a satisfier to a requirement. "Advantage" can mean lower cost, better quality, improved reliability of supply, etc. Switching calls for soft rather than hard wired connections between the parties in a transaction, and can be used effectively in a wide range of business activities from assembling products to structuring an entire enterprise.

It is perhaps easier to see how production or assembly tasks can be modeled in terms of switching, but the architecture of a business can be modeled in the same way. Take the case of a network of cooperating firms located in different places, an arrangement that is often equated with a virtual organization. Such networks may be established to enhance the business opportunities of individual members. The network arrangement helps member firms to join forces to form a consortium to bid on projects. A certain type of design or manufacturing project may be undertaken by consortium X at one time and by consortium Y at another time. "Switching" in this context means assigning a new subset of member firms to a project type. This switching mechanism is presented in Figure 1.

The possibility of switching undoubtedly adds to organization and managerial flexibility. The question is just how realistic it can be. Specifically, the basic idea of virtuality is that switching can be done relatively fast and without significant additional cost. Assigning a new satisfier to a requirement may cause changes in accounting systems and databases, necessitate the drawing up of contracts, etc. These are the direct costs of switching. There are also indirect costs that arise from management of a virtually-organized task. These indirect costs include the management resources dedicated to analyzing requirements and scanning the marketplace for satisfiers. It becomes difficult to implement all traditional risk analyses, so trust becomes an important decision factor. Switching can be effective only if satisfiers can be substituted with ease. This calls for weak human bonds between the parties to a business transaction.

From the Switching Principle model, it can be assumed that the level of virtuality correlates with the ability to implement the switching principle; i.e. virtuality is not an all-or-nothing-proposition. The essential defining characteristic is the virtually-organized task. Some tasks within an organization can be appropriately organized in a virtual way and others not. It is not a question of an organization being virtual or not being virtual, but rather the extent to which management makes use of switching as a tool.

As the Switching Principle is one of the first models of virtual organizations – if not actually the first, as it comes from the inventor of Virtual Organization expression – is logically somewhat under-defined. Although it focuses on a main critical characteristic of a virtual organization, it neglects some the other characteristics. Nevertheless, the Switching Principle has been implemented in most of the later models.

3 The Model of Business Networking

Klüber's (1998) model is a typical representative of models preferred by the IT experts as they see virtual organizations through implementation of Internet technologies like Electronic Commerce (e-Commerce), which is becoming widely understood in the business-to-consumer market due to earlier market awareness of success stories like Amazon.com. New challenges lie ahead in extending e-Commerce business models. One area is the extension of simple e-Commerce shop

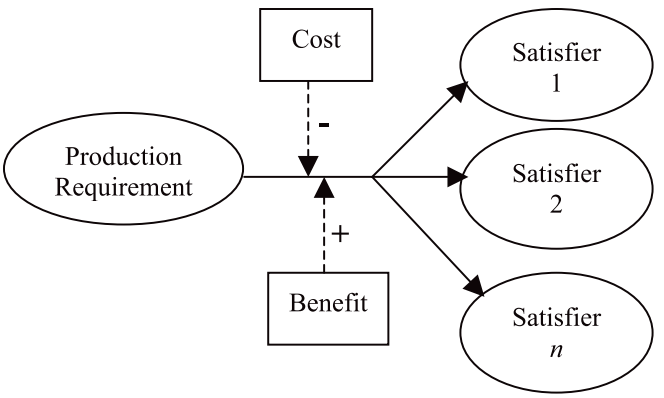

Figure 1: Virtual Switching Mechanism

solutions to offer more integrated e-Business solutions, including e-Services. While lacking the required capabilities within one company, networks and alliances are becoming an attractive means to achieve that. A prerequisite to reap potential benefits is to define an adequate business model that enables decision makers to decide upon these new opportunities. That is the Model of Business Networking.

This model is more general, but incorporates important features of virtual organizations that are highly relevant to management. The Model of Business Networking, as presented in Figure 2 has the following elements:

1. A *Business Bus* is a set of standards that supports the exchange of information, products and services among business partners. It is a logical space where (complex) services and products are flexibly and efficiently exchanged on previously established standards. Its purpose is to define a set of standards that enable easy connections. The standardized infrastructure of the internet is extended to exchanging business information, services and knowledge. The concept builds on the increasing availability of modular e-Services and standards for processes, data, and interfaces.
2. A *Business Port* is an application or service that gives the company the ability to interface with a large number of partners based on standards. Several solutions for Business Ports exist on the market (e.g. SAP Business Connector) and are expected to develop with the diffusion of XML-related standards. These applications or external services build the layer that manages different syntax and semantics based on the standards defined by the Business Bus. It can be seen as customized layer to connect the internal and external IT worlds with high levels of security, performance and service.
3. *E-Services* are Internet-based applications and services offered as individual products to solve a specific business need; they seamlessly integrate with the customer's (business or private) processes. They derive their value from digital value creation and may include physical elements and/or other e-Services. From the internal perspective of an e-Service provider, this includes the selection of standards of the Business Port and the provision of the e-Service.

According to the Model of Business Networking, Integrators and Aggregators are essential elements of networked and virtual organizations. They provide different business services: knowledge, coordination, processing, information and transaction services. They often behave without strict organizational boundaries between business partners. The Business Buses and the Business Ports describe inter-organizational relations and interfaces that mainly define the information structure of virtual organizations.

The level of implementation of the three elements of the Model of Business Networking as well as the presence of Integrators and Aggregators in the virtual organization processes can, therefore, be used for analyzing virtual organizations. However, care needs to be taken when applying this model for assessment of virtual organizations as it does not consider some of the crucial aspects of such organizations.

4 The TEMPLET Model

The TEMPLET model (Meister, 2000) is a purpose built tool that permits organizations to assess their capability to become a virtual enterprise. The guiding principles behind designing process were that the model should be:

1. simple, transparent and easy to change throughout the development process,
2. detailed enough to allow an organization to identify areas for improvement, and,
3. applicable to a variety of industries and organizations.

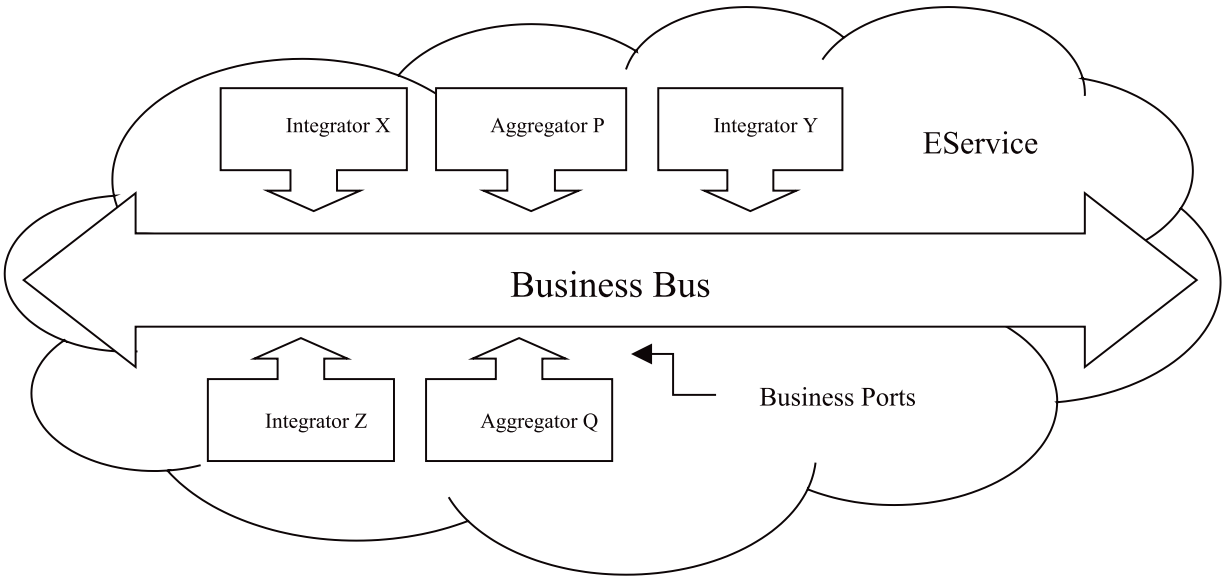

Figure 2: Business Networking Model

The TEMPLET model is a hierarchical model with four major elements: technology, information management, process and organizational.

1. *Technology capabilities* are the infrastructure capabilities required to exchange information with suppliers, partners, subcontractors and customers electronically.
2. *Information management capabilities* are the information representation capabilities required to interpret and manage the electronically exchanged information effectively.
3. *Process capabilities* are the maturity and adaptation levels of the business processes that are linked electronically in the collaboration.
4. *Organizational capabilities* are the flexibility and creativity of the people and organization participating in the electronically linked collaborative venture.

An organization's virtual enterprise capability is a function of those four elementary capabilities. The model is not simply additive in that extremely high capability for one element does not compensate for low capability in another. Indeed, one of the aims of the TEMPLET model is to highlight those areas of competence where an organization needs to develop. The organization's ability to transform virtuality capability into success would be moderated by factors such as industry norms, rate of technological change and other macro-organizational factors. Figure 3 illustrates these relationships:

The development of the TEMPLET (Total Environment for Managing Product, Life-cycle information and the Enterprise's people, processes and Technology) model was undertaken by TEMPLET Inc., an independent organization, based in Canada. The model focuses on virtual enterprises only. In contrary to the other models, the TEMPLET model evaluates organization's capability to become virtual organization. The model assumes that an organization's virtual enterprise capability partially predicts the likelihood of virtual enterprise success.

5 The Three Dimensional Model: virt. cube

According to Scholz (2000), the development of virtual corporations can be perceived as a complex move along three axes:

1. Core Differentiation,
2. Soft Integration,
3. Virtual Realization.

This theoretically-derived conceptualization leads to the virt.cube model (Figure 4) which shows the existence of various types of virtual organizations.

1. *Core Differentiation* is a characteristic of the virtual organization, described by the other authors as Core Competencies (Bleecker 1994; Bavec 2002). Scholz labeled the first dimension of his model "core differentiation" to indicate that not every attempt to differentiate automatically leads to a core competence. If a company splits into smaller parts and if these parts do not gain markets for their products and services, this kind of differentiation does not serve to move into the direction of becoming a virtual company, because the company remains unattractive for virtual partners. In short, core differentiation is a task for strategy and business policy. Taking the current state of organization theory, this task can be solved by analyzing the product mix and concentrating on selected parts.

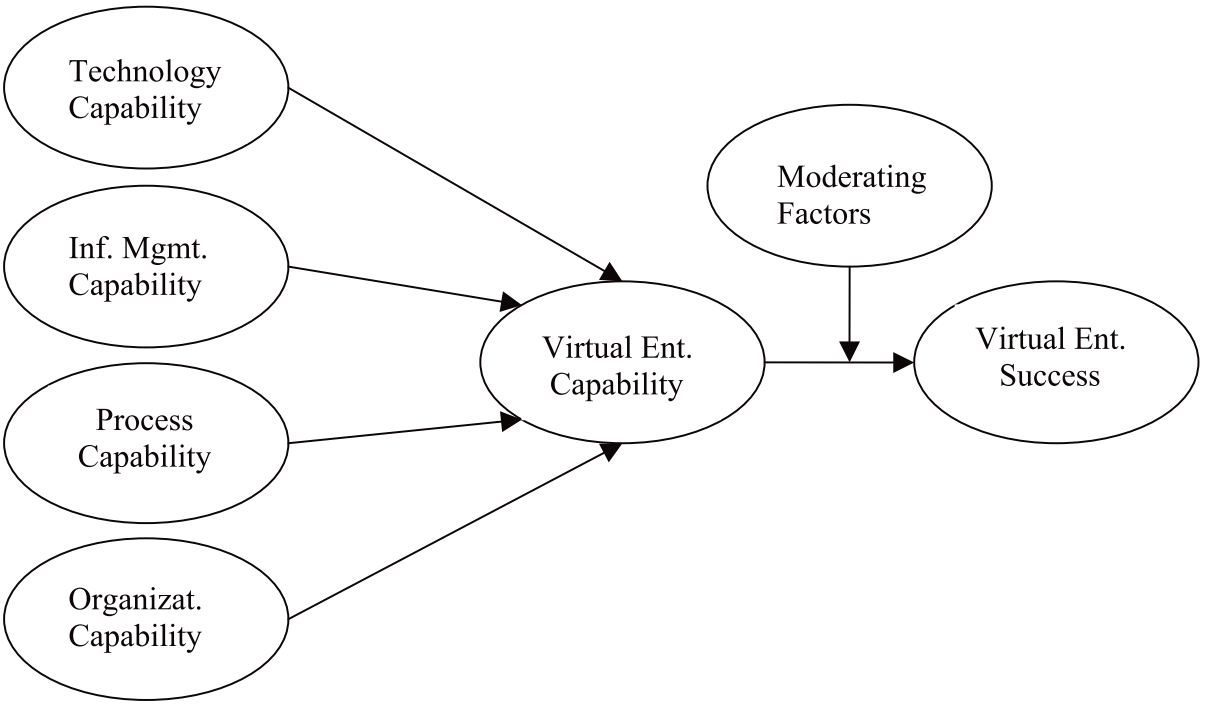

Figure 3: Relationship between the TEMPLET model and virtual organization success

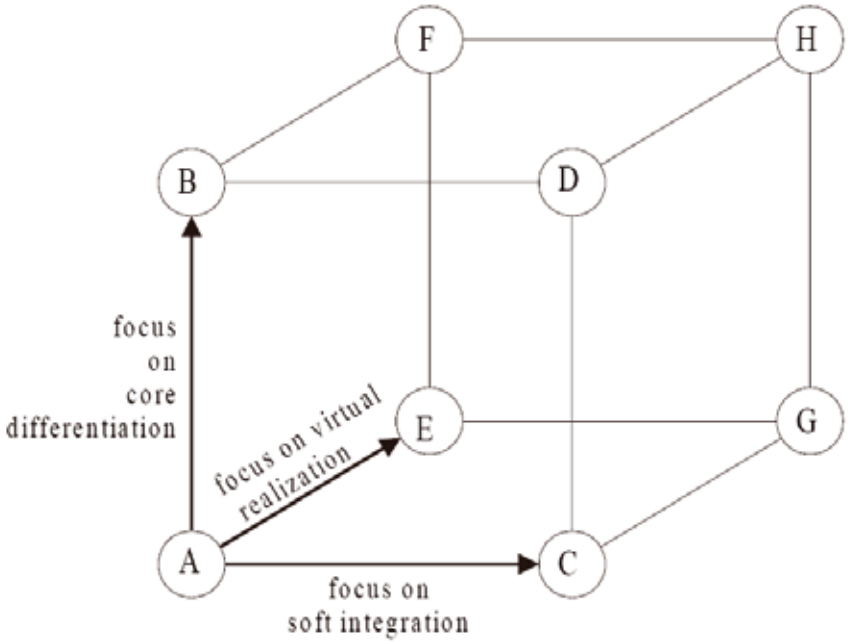

Figure 4: The virt.cube

2. *Soft Integration* is about executing the task of integration. Scholz refers to four promising concepts:
   a. Co-Destiny,
   b. Shared Vision and Shared Goals,
   c. Fairness and Trust,
   d. Culture of Virtuality.

   However none of these mechanisms of integration is structural; they all cover "soft" factors. Dealing with them and bringing them into managerial form is the real challenge.
3. *Virtual Realization* as a technological dimension. Information Technology is the dominant way to accomplish both the core differentiation and the soft integration and, in this way, serves to realize modular system building. Therefore, virtual corporations are strongly linked with IT and particularly with the concepts of virtual reality and cyberspace.

Obviously, the models exhibit more and more characteristics of a virtual organization as they evolve and as virtual organizations actually begin to appear in a real-world. Again, this model is missing some crucial elements of a virtual organization like *Switching*, and does not sufficiently emphasize the importance of the standardization of IT tools.

6 Modeling with Radar Chart

Bavec (2002) presented a case study, an assessment of a government agency. He selected the Customs Administration of Slovenia and attempted to determine whether the agency implemented any features of Virtual Organization. For assessment, he tried to use the Switching Principle and the Model of Business Networking, but he was not satisfied with the result. The models actually confirmed that the agency clearly demonstrates features of contemporary organizations with an efficient utilization of the Internet and even more hidden elements of virtual organization, but he wanted to perform further analysis. In the absence of proven methodologies and indicators for the assessment of organization virtuality, he selected seven basic characteristics of virtual organizations proposed by Mertens et al. (1998):

1. Boundary Crossing,
2. *Complementary Core Competencies,*
3. *Geographical Dispersion,*
4. *Changing Participants,*
5. *Participants Equality,*
6. *Electronic Communication,*
7. *Sharing of Knowledge*.

Bavec ranked each characteristic from 1 to 100 and plotted them on a Radar Chart (Figure 5). The result is a clear visual interpretation of the seven selected aspects of virtual organization. The level of virtuality could be read at a first glance. The problem with this model is that it does not define how to assess each individual characteristic and how to measure the attained levels. Therefore, each researcher could obtain different results when using same input parameters. There are a few crucial elements missing, including the prerequisites for the existence of a virtual organization, like Switching, e-Commerce and standardization of IT tools.

7 The Organizational Relational Model

The Organizational Relational Model was proposed by Migliarese and Ferioli in 2005. They suggest that the organi-

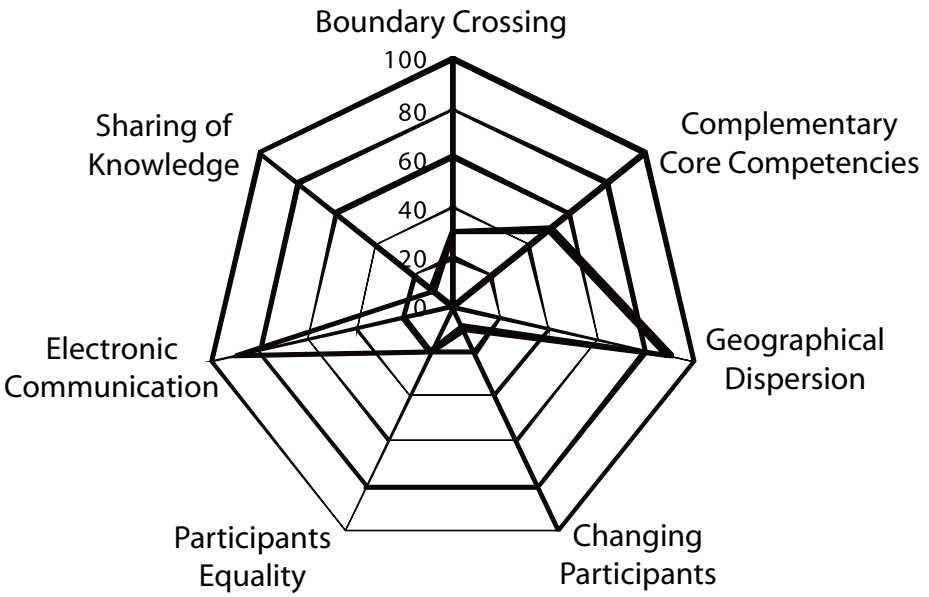

Figure 5: Virtuality assessment with Radar Chart

zational relationships can be described through four axes (Figure 6):

1. The *Tools* supporting relationships: inter-personal contacts (periodic meetings, personnel rotation etc.); group management techniques; IT instruments, etc.
2. The *Goals* shared by organizational actors: for instance, in a client-supplier relationship, the two actors collaborate to achieve quality improvements or to accomplish a common project; without this shared goal, the relationship becomes a simple market exchange;
3. The *Rules* regulating the behavior of actors within the relationship: relational norms define the accepted behavior. They can be tacit or explicit;
4. The *Cultural Background* associated with the relationship: the common assumption reduces the need for negotiation and information exchange (Organizational Culture).

The impact of virtualization on Organizational Relationships can be considered with reference to each of the four axes of the model (Table 1):

1. In virtual organizations, new *Tools* for communication or exchange of information are introduced. These tools are the channels through which new and different relationships can be developed. Compared with tools in traditional organizations, they support relationships which are much more flexible.
2. The structure of interests changes when relationships are perceived as brief and members belong to different organizations/individuals. Members' working lives are no longer tied to the destiny of the organization. Authority cannot be used as a means to align *Goals* as in traditional organizations. Goals must be carefully negotiated in order

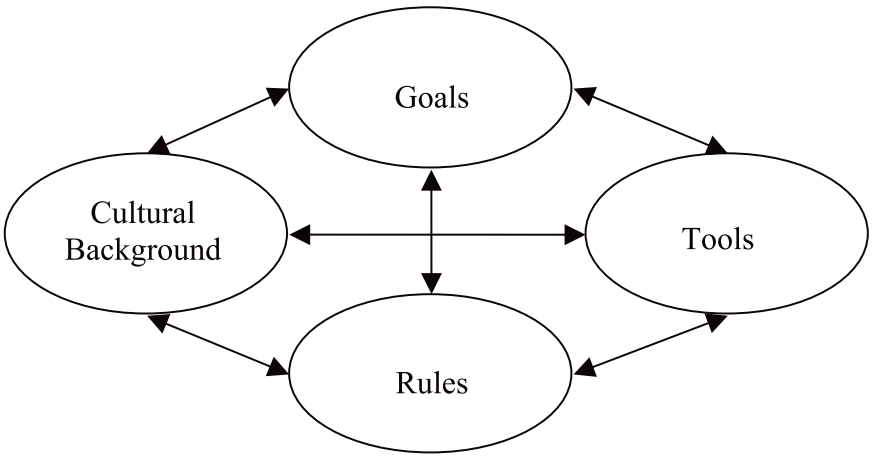

Figure 6: The four axes of the Organizational Relational Model

Table 1: Ideal types of organizational relationships in traditional and virtual organizations

	Traditional Organization	***Virtual Organization***
Tools	Rigid	Flexible
Goals	Imposed	Negotiated
Rules	Institutionalized	Ad Hoc
Cultural Background	Homogenous	Heterogeneous

to consider all the relevant and legitimate interests and to avoid future conflict.

3. A new system of *Rules* has to be developed by a set of partners who do not know each other. In traditional organizations, rules are developed through a long process of trial and error, during which members adjust to each other. In virtual organizations, an ad hoc system of rules must be developed and made operative, with reduced possibilities of making experiments.
4. Different *Cultural Backgrounds* have to be mixed. Languages, cognitive schemes and values compatibility must be evaluated when the virtual organization is formed and their interaction has to be managed throughout its lifecycle.

The Organizational Relational Model is very well defined and indicates crucial elements of a virtual organization. It only lacks a few more elements and an instrument to measure each individual characteristic.

8 The ISSAAC Model of Virtual Organization

While developing his model of virtual organization, Travica (2008) followed an idea that the model should be:

1. Able to determine which organization is virtual and which is not,
2. Able to assess the breadth and depth of virtualization,
3. Accompanied by clearly stated assumptions and definitions,
4. Suitable for guiding research and explaining the core aspects of any virtual organization form.

He selected six basic characteristic of virtual organization, similar to Bavec, only with different attributes that seem more sophisticated. He called his model ISSAAC after the initial letters of its six dimensions: Interoperability, Special Product, Switching, Anchoring, Aggregation, and Cybernization. Based on case studies the author conducted, this depiction of the model shows the possible direction of relationships (as shown in Figure 7), a detail that was absent in author's previous publications of the model.

1. *Interoperability* refers to the synchronization of operations with partners involved in a virtual organization. This includes the domains of communication and co-operation. The technological basis of Interoperability was generated with cross-platform computing, system inter-connectivity and open source software. All that clearly indicates all the elements of the Model of Business Networking.
2. *Special Product* refers to non-standard characteristics of the goods or services, delivered by individual members or jointly. Travica believes that deliverables of virtual organizations differ from mass-produced ones in being customized, specially ordered, niche-fitting, rapidly developed, or based on a unique combination of competences (Complementary Core Competencies in Bavec's model) and that Special Product reflects the end-purpose of a virtual organization and sets it apart from the network organization, routine outsourcing and distributed teams. Following the principle that any system is defined by the type of its output, Special Product can be considered a filtering condition in the preliminary identification in a group of observed organizations.
3. *Switching* refers to an organization's or individual's alternating of their membership in different virtual organizations according to Mowshowitz (2003), as described in The Switching Principle.
4. *Anchoring* focuses on the relationship between the technological condition and organizational strategy, management, organization of work, organizational values and practices, and political aspects. Even if information and communications systems are open to collaboration with external partners, virtualization is unlikely unfold if these have no appropriate match in the organizational conditions that would facilitate interoperability, aggregation, and switching. In other words, an organization with underdeveloped Anchoring is unlikely to become more virtualized in other respects.
5. *Aggregation* refers to networking electronically with other organizations and individuals to form a virtual organization. While this dimension reflects the network character, the term "aggregation" is preferred in order to signify a looser coupling between organization members. One facet of Aggregation is the flexibility of organizational boundaries.
6. *Cybernization* refers to an organization's functioning in the space that is created by information systems and electronic information flows. Cybernization reflects the necessary role of information and communication systems. This dimension helps to explain the relationship between the virtual organization and the network organization. A network organization that has moved most of its business processes into cyberspace or that relies importantly on electronic linking can be qualified as a virtual organiza-

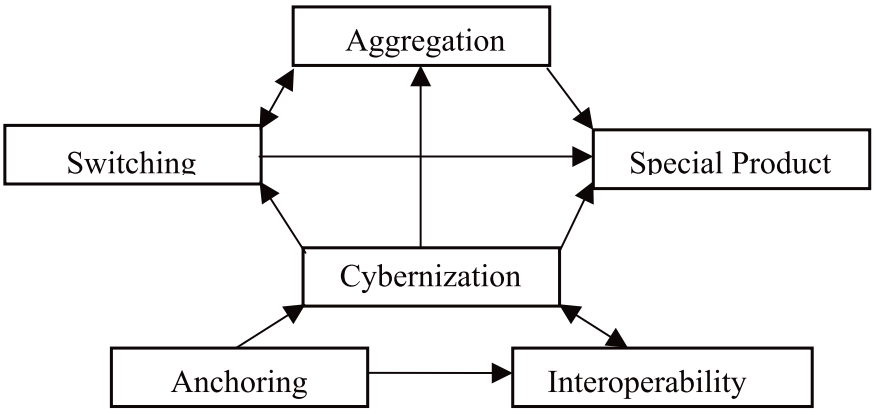

Figure 7: The ISSAAC Model of Virtual Organization

tion. Conversely, a network organization that predominantly rests on processes conducted in physical space and on physical links remains in the category of network organization.

This model successfully defines the major attributes of a virtual organization, but unfortunately does not provide a clear response to first two goals set by the author. Nor has it defined how to assess each individual characteristic or how to measure the levels, as with the ISAAC model.

9 Comparison, analysis and recommendations for practice

Table 2 compares main parameters of the models presented. The comparison analysis leads to the following conclusions and recommendations for practice:

1. Any presented model could be used for assessment of organization virtuality,

Table 2: Comparison of the models

Model	Focus	Strengths	Weaknesses	Recommendations for practice
The Switching Principle	Switching only	Simple and straightforward	Very basic and difficult to use for assessment	Practical for simple virtual / non virtual classification
The Model of Business Networking	Information technology implementation	Practical for IT experts	Neglecting all other aspects	Useful for IT oriented companies that want to improve virtuality
The TEMPLET Model	Virtual capabilities	Simple and transparent, but detailed enough	Emphasis on technology only	Applicable to improve tech. aspects of virtuality
The Three Dimensional Model: virt.cube	Visual conceptualization	Visualization	Missing crucial elements	Difficult to use in practice and uncertain
Modeling with Radar Chart	Assessment of individual characteristics	Well specified and defined with visual representation	Missing classification and interpretation of the results	Recommended for detailed assessment, classification needs to be added
The Organizational Relational Model	Organizational relationships	Well defined, indicates crucial elements	Missing some elements, under defined measurement	Difficult to use for assessment in practice
The ISSAAC Model of Virtual Organization	Individual characteristics and their relationships	Properly defined elements with relationships	Missing classification, no visual representation	Thorough and practical, visual representation or classification needs to be added

2. Different models should be used for different purposes, based on recommendations,
3. All presented models could experience further enhancement,
4. It is reasonable to develop a new model that would comprehend the findings of this paper and bring new value,
5. The new model should include best features of presented models,
6. The new model should contain classification and interpretation of the results,
7. The new model should provide clear visual representation,
8. The new model should be practical and suitable for research. It should contain all necessary elements to deliver repeatable results.

10 Conclusion and further research

Far from being heralds of the End of Organization, virtual organizations seem to be extremely complex systems where organizational aspects play, more than ever, a critical role.

Virtualization can be understood as a process driven by advances in information and communication technology, but even more by changes in the competitive environment. These changes involve both resources and competitors and can be summarized as an overall increase in market turbulence. Organizations need to become more flexible and rapid in reacting to threats and opportunities. The main feature of virtual organizations, then, is the use of technological and organizational tools to relax some traditional constraints on their activities and to allow dynamic partnerships. The intention of the models shown in this paper is to identify those constraints in order to assist particular organizations in eliminating them and to present ways to improve their virtuality and thus flexibility and competitiveness.

This paper is a background for the ongoing research that attempts to develop a new model for assessment of organization virtuality. The model should take into account all the benefits of presented models and in addition complement their inability to deliver reproducible final result itself – the level or organization virtuality. The leading design principles of the emerging model are the ability to clearly identify virtual organizations and to precisely define the levels of their virtuality. The model should include clear graphical representation of the levels attained by the individual aspect of virtuality and an organization as a whole.

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Pregled modelov za oceno virtualnosti organizacij

Virtualna organizacija je mreža neodvisnih organizacij in / ali posameznikov, ki proizvajajo izdelke in / ali storitve in temeljijo na skupnem medsebojnem poslovnem razumevanju. Ta nova organizacijska struktura je postavljena kot popolno nasprotje tradicionalnemu, hierarhičnemu, birokratskemu in enolokacijskemu načinu organiziranja, ki je prevladoval v dvajsetem stoletju. Model virtualne organizacije ima tako naslednje karakteristike: dinamičnost, omreženost, geografsko razpršenost, digitaliziranost, prožnost, sodelovanje in inovativnost. To je razumljivo, toda izziv je ugotoviti, katera organizacija kot subjekt uporablja virtualni model in katera ne. Odgovor na to vprašanje je še bolj zapleten, saj ima večina organizacij nekašen vmesni model, zato je običajno možno le oceniti, koliko in po katerih kriterijih je določena organizacija virtualna. Z drugimi besedami, kakšna je njena stopnja virtualnosti. V literaturi obstaja več modelov za oceno virtualnosti organizacije, ki so jih razvili različni avtorji. Namen tega prispevka je, da razišče in predstavi vse objavljene modele za oceno virtualnosti organizacije, ki jih je moč najti v svetovni literaturi. Predstavljene so prednosti in slabosti posameznih modelov ter njihova medsebojna povezava.

Ključne besede: ocenjevanje virtualnih organizacij, modeli virtualnih organizacij, virtualnost organizacije, ocena virtualnosti

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A Successful CRM Implementation Project in a Service Company: Case Study

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Customer relationship management - CRM implementations increased rapidly in Slovenia in the last few years, following the trends elsewhere. Studies reporting how the implementation project goes on before, between and after the implementation are scarce. We offer a thorough case study analysis of the CRM implementation with a positive outcome in a Slovene service company. Case study demonstrates that CRM implementation is a holistic and complex concept, which means that it is not merely an integration of new information technology, but everything that happens around the business processes changes. We recommend that the company has already established a process approach and the orientation toward customers. Study showed the need for efficient leadership, acquirement of resources and CRM strategy implementation control; trust to the software solution shouldn't be self-understood. Through implemented analytical CRM company can improve the relationship with customers, achieve larger information sharing between employees and accept better strategic decisions.

Key words: customer relationship management implementation, customer focus, process approach, quality, customer information, communication, marketing, service company, Slovenia

1 Introduction

Organizations nowadays compete on a global market. It is impossible to avoid free transfer of goods with the help of protection laws and different obstacles in modern times; customers have a wide choice, that's why they became more sensitive, demanding, and they are looking for new and better products. Elements for organizational competitive advantage on such market can be very different: certification ISO 9000, costs, delivery speed, time needed from the new product/service development to its market delivery, newest technology, CRM implementation. In saturated markets organizations cannot freely decide, with which customers they would like to establish a business relationship; the valuable customer in particular selects the business partners himself (Heinrich, 2005).

The effectiveness of business is very dependent of the culture (interests, values, and motives), organizational health (team work, loyalty, learning, knowledge management) and way of dealing with customers. Establishing healthy culture and achieving values is connected with the degree of order and with the ways how organization treats the customer. As a consequence, CRM has risen to the agenda of many organisational strategies. Fundamentally however, CRM systems can be viewed as information systems aimed at enabling organisations to realise a customer focus.

Organizations have to deal with this kind of problems for years now. Experiences confirm that it is very difficult to enter the area of relationship management without well organized data base, in which all data concerning businesses of organization with its consumers are contained. Data base serves as a lever for integration of applications and data, from which information are summarized for different types of CRM solutions. Solutions for analytical CRM draw information from data base for the use of analyzing the demographic information about customers, history, profitability and behaviour of singular customer. Solutions for the operational CRM benefit the relationship with customers through every possible communication channel.

This paper is organized as follows: first we consider the concept of the CRM, present some definitions of CRM systems, as they are displayed in the literature, and review the CRM implementation studies. Following this, a single descriptive case study analysis of the selection and implementation of a CRM system inside a service company is reported. This leads into the conclusions of the study and recommendations for further research of CRM implementation efforts. Basic question of the paper is concerning the strategies of CRM implementation that have to be decided before, between, and after the CRM implementation. Secondly, does the CRM implementation represent the basis for improvement of relationship with customers, better information deployment of employees and better strategic decisions making. Main goal of the study is to contribute to the larger successfulness of organizations that decide for the CRM implementation, and to point out to the problems that could appear during the implementation.

2 Literature review

The term CRM emerged in the information technology vendor community and practitioner community in the mid-1990s (Payne and Frow, 2005), thus Light (2001) says that it evolved from business processes such as relationship marketing and the increased emphasis on improved customer retention through the effective management of customer relationships.

We found two main views of CRM: the stream that descript the CRM as the utilisation of customer-related information or knowledge to deliver relevant products or services to consumers (e.g. Levine 2000), and another that emphasized that CRM is technologically oriented (e.g. Sandoe, Corbitt and Boykin 2001). Bull (2003) demonstrated that CRM is a complex combination of business and technological determinants. A broader definition of CRM considers it a holistic process of acquiring, retaining and growing consumers (Strauss, El-Ansary and Frost, 2003). Parvatiyar and Sheth (2000) yet defined CRM as a philosophy, a comprehensive strategy and the process of acquiring, retaining and partnering with selective consumers to create superior value for the company and the consumer.

For the purpose of this paper, we offer the following definition: CRM is a new concept, characteristically centred to the customer and not to the product. Relationship is more important as the characteristics of product or service, offer is made regarding to the demands of relationship (and not regarding to what the organization can produce), and competences important for the successful CRM process are emphasized. Following this definition, we charted a short overview of different approaches in defining the CRM concept.

Kincaid (2003) defined CRM as "the strategic use of information, processes, technology, and people to manage the customer's relationship with your company (marketing, sales, services, and support) across the whole customer life cycle". Choy et al. (2003) suggest that CRM is an information industry term for methodologies, software, and usually internet capabilities that help an enterprise manage customer relationships in an organized way. It focuses on leveraging and exploiting interactions with the customer to maximize customer satisfaction, ensure return business, and ultimately enhance customer profitability. But in practice, managers often perceive CRM from different standpoint, for example, CRM is a part of marketing efforts, customer service, particular software and technology, or even a process and strategy.

Ramaseshan et al. (2006) described operationally CRM as the process for achieving a continuing dialogue with customers, across all available touch points, through differentially tailored treatment, based on the expected response from each customer to available marketing initiatives, such that the contribution from each customer to overall profitability of the company is maximized. "CRM is the strategic process of selecting the customers a firm can most profitably serve and of shaping the interactions between a company and these customers with the goal of optimizing the current and future value of the customers for the company" (Kumar and Reinartz, 2006).

CRM is a combination of people, processes and technology that seeks to understand a company's customers and it is an integrated approach to managing relationships by focusing on customer retention and relationship development (Chen and Popovich, 2003). According to Chao et al. (2007), CRM has been identified as one of the greatest technological contributions to companies in the 21st century and this technology surged into the market rapidly. More and more companies are supposed to apply CRM to improve efficiency of operation and gain competitive advantage.

Chang et al. (2002) report that given the rapid growth of e-business applications and the increasing need to sell to and support customers through the web, CRM provides a focal point for all customer-facing activities. They also propose a model to help the selection of CRM products and the evaluation of CRM vendors. In the literature terms CRM and relationship marketing are used almost interchangeably (Parvatiyar and Sheth, 2000). Gummesson (2002) defines relationship marketing as "marketing based on relationships, networks and interaction, recognizing that marketing is embedded in the total management of the networks of the selling organization, the market and society. It is directed to long term win-win relationships with individual customers, and value is jointly created between the parties involved."

In practice, CRM system is often integrated with other decision support systems across all functional areas, such as enterprise resource planning system, executive information systems, supply chain management systems, and product life-cycle management systems. Organizations are able to create better management information in terms of planning, acquiring, and controlling across all channels, have superior products and services which leads to larger revenues and profits, and improves quality and the rapid response to customers' needs (Anderson, 2006). Girishankar (2000) suggests to the organizations that they should adopt a holistic approach that places CRM at the heart of the organization with customer orientated business processes and the integration of CRM systems.

Based on past related literature Sin, Tse and Yim (2005) identified four dimensions of CRM, tested the measuring scale using confirmatory factor analyses on data from a mail survey of 215 Hong Kong financial firms:

- key customer focus (customer-centric marketing, key customer lifetime value identification, personalization, interactive co-creation marketing)
- CRM organization (organizational structure, organization-wide commitment of resources, human resources management),
- knowledge management (knowledge learning and generation, knowledge dissemination and sharing, knowledge responsiveness), and
- technology-based CRM.

Kevork and Vrechpoulos (2009) made an interesting study in which they reviewed the literature on CRM to obtain a comprehensive framework of mutually exclusive CRM research areas and sub-areas free of all potentially disruptive factors (plethora of CRM definitions, personal judgements, etc.) through keyword expressions analysis. In their framework, they defined nine research areas – disciplines, research areas that are mutually exclusive:

- Overall CRM/e-CRM,
- E-Business/e-commerce,
- Marketing/relationship marketing,

- Information systems,
- Knowledge management,
- E-Technology-CRM software,
- Management-supply chain management/TQM,
- CRM attributes related to customer intentions,
- CRM: culture-environment-ethics.

Many management specialists embraced the still vague notion of CRM across multiple channels and interaction points as the "next big thing", and rushed its implementation despite the lack of a clear definition, vision, and set of best practices, as well as without understanding of the enormity and complexity of organizational restructuring required for a successful CRM implementation (Kotorov, 2003). Harvey (2001) cited Gartner's report that 65 per cent of CRM implementations result in failure. Most CRM systems are used to improve customer-facing operations.

Rowley (2002) argues with Harvey that 80 per cent of CRM implementations fail, she reports the scepticism among academics about the viability of interpreting customer data in such a way that it generates useful insights into customer behaviour. Bolton (2004) agrees with these arguments, stating that many of the early CRM implementations seem to have failed. Beasty (2007) reports that while the days of messy CRM experiences like integration flameouts and legacy system nightmares have receded for the most part, myriad company systems housing variations of duplicated, incorrect, and/or unusable customer data still frustrate organizations of all sizes. Customer data integration (CDI), however, is succeeding where CRM has failed, and is helping to make good on CRM's promise. CDI's value to CRM lies not only in its matching and standardization capabilities, but in its capacity to then propagate updated customer data back out to companies systems, transforming aged data quality practices from one-way roads into multidirectional highways.

One study of 202 CRM projects found that only 30.7 per cent of the organisations said that they had achieved improvements in the way they sell to and service customers (Dickie, 2000). Moreover, a recent and broader survey estimates that 70 per cent of companies will ultimately fail (Giga, 2001). The Giga survey revealed that: companies generally underestimate the complexities of CRM, lack clear business objectives and tend to invest inadequately in the provision of CRM software. While the findings by Giga highlight a fairly gloomy scenario, it is clear that not all organisations are facing failure.

Another study is supported by a case study of CRM systems in a major Japanese bank, authors examined CRM strategy, strategic changes resulting from CRM implementation, implementation priorities for the banks and the factors indicating the performance after CRM implementation (Gupta and Shukla, 2002). The study revealed that CRM remains a viable proposition to improve services of bank customers. Light (2001) used a case study research to analyse some of the issues associated with organizational experiences of CRM packaged software. A misfit of packaged software with organizational requirements is reported and the three organizations in the study pined organizational success on IT-based systems to varying degrees.

Curry and Kholou (2004) present a self-assessment tool which organizations can use to evaluate their use of CRM. Three organizations have made CRM central to their business, but their conceivement, prioritizing and management of it, is different. They have in common a successful corporate prioritizing of the marriage of the organization activities and customer needs. All three organizations acquired and retained the valued customers' revenue stream for as long as possible, which is the ultimate aim, over time but have done so in a variety of ways.

Zineldin (2006) proposed a research model (5Qs) to measure satisfaction and loyalty, to examine and develop a better understanding between quality, CRM and customer loyalty which might lead to companies' competitiveness. The study confirms that the impact of CRM on customer loyalty is real and so are the problems for certain organizations in terms for successful implementation. Satisfied customers are not always loyal customers, they can repeat orders, and also buy from competitors in the future. The relative value of the product and services in respect of the price must be taken into account when assessing customer satisfaction. Organizations should move towards the application of customer value management, methodologies and tools.

The recapitulation of different definitions of CRM shows, that there is no widely accepted definition of CRM, although it is an important business approach. We can summarize that two main views of CRM (the utilisation of customer-related information or knowledge to deliver relevant products or services to consumers, and CRM as technologically oriented) are very extreme and that most of authors understand CRM as some combination of both. The definitions are predominantly built in dependence of the implementation issues that are treated in papers.

3 CRM implementation

CRM implementation begins with the strategic decision to change or improve business processes in the organization, and to invest into an improved information system. Top management support and systematic introduction of the project manager are of essential significance. Project manager has to know the external and internal environment of the organization. This means that project manager has to know the customers, their demands and anticipations, opportunities and threats on the market, strengths and weaknesses inside the organization, and that must have the ability to impose him. Project manager is a contact person between the software solution supplier and employees, who supervises the project, coordinates the education, motivates and project manager is notifying employees in which development phase is the project, e.g. which are the tasks in the next development phase of CRM introduction; project manager must have the overview of entire project (Pinto and Slevin, 1987). Project manager is also responsible for the final CRM implementation.

Smith (2006) says that we must learn from past project failures, to strategically understand CRM. These failures include: over stressing the funcionality of CRM; not having a front-to-back CRM solution for customers (this includes employee education on the benefits of CRM solutions and procedures on front line follow-up); and not having the corporate culture to support the implementation of CRM.

We should continually monitor customer satisfaction and behavior and measure successes with benchmarking, without expectations of immediate profits, these should help to ensure that the processes continue to evolve in the best method. Xu and Walton (2005) made a study examining the implementation of CRM systems in practice with a focus on its strategic application, i.e. to gain customer knowledge, and to explore the ways of embracing CRM technology for strategic customer information provision. They stress that implemented CRM systems by many organizations are dominated by operational appilications – contact centres, sales and marketing solutions with limited operational customer knowledge gained from the current CRM application. The analytical power of CRM has not yet been adequately perceived by many companies. It is suggested that CRM systems should enhance not only an organization's ability to interact, attract and build one-to-one relationships with customers but also the ability to gain customer knowledge.

Many factors played a role in the transition to a CRM-driven business model, but the most important step forward was the conceptualization of CRM as a strategy rater than a solution. This realization allowed first CRM projects to be elevated from departmental level projects to corporate level projects and, second, to secure the involvement and commitment of the members of the senior executive team, without whose support, CRM projects fail (Kotorov, 2003).

Mitussis, O'Malley and Patterson (2006) found in the study that the implementation of CRM has not been unproblematic. In the mass market, any synthesis of relationship, sincerity and the other presumed CRM outcomes must be enabled by the technology. Unfortunatelly, because so many interactions between a company and its customers occur, most need to be automated and/or scripted. Process therefore become inflexible and out of control of the customer facing staff. In order to have a succesful CRM implementation, management must make sure that they have done research in both the industry's best practices and the adaptation capability to their organization in the new application. The following are the recommended key steps to a succesful CRM strategy (Crocket and Reed, 2003):

- Strategic context. The organization should understand how CRM fits into the context of the company's overall business strategy.
- Capabilities assessment. The assessment is to be done to confirm the company's current CRM capabilities.
- Business case development. The company needs a good reason to implement CRM other than new technology fever.
- Implementation plan creation. Create and execute a plan, which clearly defines how to achieve the goal and execute it.

Lipka (2006) describes twelve step process for rolling out CRM where each phase builds up on previous phases: allign your attitude; define your products and services; define products/service and ownership; define customer ownership; know and study your customer; manage your channels; define your process; integrate your channels; think value proposition; measure results from the customer's perspective; think investment, and; refine and improve.

Lindgreen (2004) researched in a case study the design, implementation and monitoring of a CRM programme on a largest publisher of business-related materials in Scandinavia. The case illustrates the good points of the project, it made the importance of CRM visible to everyone within the organization, that problems can be created because of the lack of financial resources or the managerial support and finally, they state that only after because an external consulting firm was brought in, the publisher succeeded in implementing the project.

Bohling et al. (2006) made a survey of the CRM implementation related experiences of 101 U.S.A. based companies and identified factors associated with successful CRM implementation. Osarenkhoe and Bennani (2007) used a case study of CRM implementation at a large Swedish firm. Results show that implementing sustainable CRM strategy requires the endorsement by and commitment from top management, systematic cross-functional communication, and mandatory customer loyalty training programmes for all employees. Manhattan is just one of the many examples of diverse companies highlighted by Newell (2000) that have applied CRM methods and experienced success. It is clear that there is still a need for further empirical studies of CRM however, only a few are available.

Mguyen, Sherif and Newby (2007) discuss different strategies for successful CRM implementation. They suggest that the CRM implementation in consumer goods industry is a should-be-done step. This is because CRM is important for industries that have close contact with end customers but have lesser value to industries that are further away from the end customers. Possible failures in implementing CRM are due to the lack of knowledge and research, lack of project management skills, lack of commitment from the executive management, etc.

A Gartner research survey (Zimmer, 2006) found that more than half of the organizations who have implemented CRM have difficulties after implementation. There are two principal reasons why CRM failed to fulfil the expectations: the disconnection of CRM vision and execution; and the rising standard for CRM excellence. Bull (2003) discusses problems of the CRM implementation on a case study in a UK manufacturing company; some of the troubles were caused by the lack of knowledge pertaining to the concept of CRM, bad choice in sourcing CRM software, impossibility of integration with other companies applications, the selection of the project team whose members were selected at random.

Heinrich (2005) addressed the following questions in an empirical analysis: what is the difference between relationship processes and purely product-oriented processes, the definition of relationship and why a customer is willing to establish and maintain a relationship. In his findings he says that relationship-oriented activities complement present product-oriented processes. In contrast to this we derive purely relationship-oriented processes as well, such us the customer recovery process. Such processes do not target product sales any more than rather the sustainability of relationship in particular to valuable customers. The case study showed that a total implementation of each required value (commitment, involvement, contractual incentive & control mechanisms, specific investment, trust, monetary premium & sanctioning)

is criticaly important. The type of the customer determines the significant values as well as the relationship activities and processes, but a deduction in the sense of a complete specification of all possible activites becomes very difficult.

As Chen and Popovich (2003) wrote, CRM implementations and the internet effect importance offer great research possibilies. Some of important research questions they raise are: what are the roles of suppliers and supplychain partners in CRM, how does e-CRM strategies affect brick and mortar companies, what business processes, integration challenges and organization structures are common throughout succesful implementations? That's why we present a case study of a path to the succesful CRM implementation.

Henneberg (2006) declared CRM to be a well-researched concept in the area of marketing theory. Since the 1990s the use of relational marketing approaches in consumer markets has found many managerial applications. However, the implementation considerations of CRM remained under-researched from a conceptual perspective, especially as implementation of many CRM projects are perceived as providing limited success. By using an exploratory, qualitative, research design, principally based on a Delphi methodology, his study highlights some crucial aspects of CRM implementation. Two clear CRM implementation foci can be distinguished: a dominant "hard" implementation of CRM (focussing on analytics, centralisation, and campaign management) and a "soft" implementation of CRM (focussing on decentralised customer experience management at the touch point level). Further analysis of the "hard" implementation model shows that companies using this path often have only a vague strategic understanding of the CRM project in place before they define the process and technical requirements.

Summarizing available CRM implementation research, it can be deducted that for a successful CRM implementation to reach an important competitive advantage, companies management has to: study industry's best practices; udnerstand how CRM fits into the context of the general business strategy of the company; assess current CRM capabilites; find a good reason why to implement CRM; create and execute a plan, in which should be defined how to achieve the goal and how to execute the plan.

4 Research method

Yin (1994) defined a case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident. Our case study illustrates a Slovenia-based service company's experiences with its CRM

Table 1: Case study methodology

The Research Phase:	
Library and Internet research	Literature review about CRM implementation. We reviewed what has been written before, and read relevant articles about our case. We found out that there is an existing problem that needs to be solved.
The Analysis Phase:	
Putting all the information in one place	We collected large amount of information from our employees and our software supplier through interviews, ways of CRM usage in practice were evidenced, records of technical mistakes that were reported from employees were established, software supplier efficiency of education was evidenced, as the efficiency of project manager education. Then we arranged all this information so that the situation at the case site is understandable to our readers.
Assigning sections of material to both authors	Both authors tried to figure out what is really important, what has been happening, and what a case reader should know in order to understand the situation.
Formulating the case problem in few sentences	Once we were satisfied with the way we had defined the problem we wanted our readers to make think about, break the problem down into all of its parts. Basic research question of this study was concerning the strategies that have to be decided before, between, and after the CRM implementation. Secondly, does the CRM implementation represent the basis for improvement of relationship with customers, better information deployment of employees and better strategic decisions.
Main goal of the case study	Main goal of the research was to contribute to the success of CRM implementation in organizations, and to point out to the problems that could appear.
Writing the Case Study:	
	We described the problem we wanted the reader to solve.
	We organized the sections of the case.

implementation. In the table 1 we presented the case study methodology.

Study data were collected and analyzed one year after the active use of the system. Through the study, interviews with employees were conducted (Sanolabor, 2006d), ways of CRM usage in practice were evidenced, record of technical mistakes (Sanolabor, 2006b) that were reported from employees was conducted, software supplier efficiency of education was evidenced (Sanolabor, 2006e), as the efficiency of project manager education (Sanolabor, 2006c). Interviews were carried out with marketing and sales director, area directors, product managers, sales personnel, and IT caretakers. In addition numerous project meetings (Sanolabor, 2006d) and briefings were attended in line with Silverman (1998) who states that researchers should focus on what people do, in addition to what they say they do. Project portfolio (Vodušek, 2006) was opened, specifications of demands were appointed and record of technical mistakes or problems was collected. Contemporary, interviews with software supplier were done. Their purpose was constant checking of delivered in practice; does the claimed activity work or not.

5 CRM case study

The case study was conducted throughout 2007 and raises specific issues of one company's experience of CRM. Certain findings will help companies, which are about to take the decision to adopt CRM, or that are on half-way to implement it, with large problems. Case study will also contribute to further discussion and to the research of similar problems.

Sanolabor is a joint-stock company. The company is engaged with wholesale, retail, marketing and distribution activities, it is specialised for health care and laboratory products comprehensively. It supplies health institutions, scientific institutions and industry; with more than 55-years long tradition on this field. Business relationships are being kept with more than 500 manufacturers and suppliers. It follows the development and progress of science at home and abroad. Highly specialized and trained specialists (pharmacists, chemists, economists, commercialists, medical nurses, health and dentist technicians) replenish their knowledge with constant education. For the provision of quality services company acquired ISO 9000 certificate of quality. Sanolabor is a Slovene medium enterprise, with functional organizational structure and emphasis on processes, which take place outside functions. Communications within management levels and departments are perceived as excellent and the company claims to have strong organisational co-operation with low levels of staff turnover. Sanolabor meets increased global competition and loss of important business opportunities with key accounts. A strategic decision was taken that the company has to respond faster to market changes, systematically monitor them and introduce team work. In front of these efforts stands customer, to which all the activities are subordinated. Sanolabor decided that the best solution would be to explore the case for adopting CRM.

Seven years ago Sanolabor introduced a sort of travel reports, offers for customers, which we cannot nominate CRM. All the technology was based on Microsoft Excel. That's why the system was very unstable and after five years it didn't store the data anymore. New solution was not ready and also the culture wasn't the right one, so employees didn't write reports for half of year, customer information were not monitored, as weren't the offers and all of the communication with customers. That's why in the beginning of CRM implementation it was difficult to explain the employees, why the company has to introduce CRM system and what's there to gain by doing so. One of the main reasons for this was of course the instability of the old system and the upgrading of previous activities. Bright point with all these was that the employees in marketing and sales had at least a little knowledge pertaining to the concept of CRM. Marketing and sales director also new this concept well, as he was the father of system seven years ago. CRM project officially started when a smaller project team was constituted (Sanolabor, 2006a), which nominated area director from marketing and sales, as the contents manager, and IT caretaker as technical support. The entire responsibility for the project was on the area director. They were asked to acquire some knowledge of CRM. The official start of the project begins on the January 2006, the financial budget has been approved and the dead line of the project was expected at the end of 2006.

The project team's first decision was to source a CRM packaged software solution and they entered into negotiations with three software vendors. Sanolabor demand was that the new CRM should offer the possibilities the old one did, and that some of the parameters should be improved (Sanolabor 2006a). After negotiations and demonstrations at the company, a vendor was selected and a package chosen. Vendor could provide a range of additional services including installation and minor configurations. Supplier started to check up the old system, its characteristics, to which extent and in which ways the employees used it, and what its weaknesses were. They promised that they would deliver a solution adequate to the requests and that it does not represent a problem (Sanolabor 2006d). Pertinent knowledge about the possibilities of CRM area director from marketing and sales or IT caretaker didn't have. The IT caretaker lacked expertise to sufficiently perform the necessary evaluation of the business requirements and was primarily concerned and focussed on the technical issues pertaining to the strategic issues in CRM implementation software (Sanolabor 2006b).

Later on project team grew to more employees that were responsible for business process change, migration activity, testing, implementation and the initial maintenance of the software system. They have got a beta version for testing and they had to test it between regular working times and report any mistakes or changes to the project manager. Because of increased work load and changes that were expected to come after the CRM implementation, they were disinterested for testing, the motivation was low.

Planned schedule for the implementation was also inappropriate; from May till October 2006, when employees mostly leave for vacations and the remaining ones have to do some extra work anyhow. Data migration from old CRM to the new one was postponed until the first training or introduction to employees, which happened in July 2006 (Sanolabor, 2006e). During the testing members of the project team never saw the

final version of the software solution, because supplier always upgraded it with given demands. These are some of problems, which were noticed in the implementation phases and that prove CRM is a complex process, which demands the right approach i.e. a great amount over the CRM solution supplier.

Training of employees followed, where they were grouped in three teams, fourteen to each team. It was executed on the old computers in the Sanolabor. First problems to arise were the lack of computers capacity to support the software solution, they were very slow, training was conducted unprofessionally, and time for training was too short. The largest problem was that project manager didn't see the final version of CRM solution and she didn't know what's going to be the programme of training. They trusted too much to the software supplier and that was the biggest weakness. What happened during the training was (Sanolabor, 2006e):

- company's demands were badly fulfilled (e.g. market opportunities and offers application didn't perform, because it wasn't prepared at all, complaints management lacked important parameters, travel reports and meetings performed partially, …),
- first contact with employees was negative,
- groups were to large,
- computers didn't work or worked too slowly,
- available time was too short – 45 minutes,
- directions for use were useless,
- unprofessional training performance, …

Reasons were obvious, trust in software supplier was exaggerated, and project manager didn't perform well the controlling task, inappropriate time for introduction, badly performed testing. Data migration moved to the beginning of October 2006, when all demands and repeated training of employees should be carried out. In August 2006 the activities for demands fulfilment and repeated testing were accomplished. Project manager checked in practice if single claims were complying with such level that training could be done, she gave exact instructions, which contents should be transferred from software supplier to employees, checked if both parties understand each other, she explained to employees the exact purpose of training and motivated them to cooperate, groups were smaller: max. seven employees, they had available three hours, computers supported CRM solution, instructions were improved. In September 2006 an employee training was executed, it was done in the computer class of supplier. Bad experiences from the past were considered. Result was importantly different as on the first training, effective execution of training and positive approach of all employees could be sensed.

After certain corrections were done, company confronted data migration in October 2006 from old CRM to the new one and started with its employment. Due to all the problems, this activity was performed three month later as planned.

After implementing the CRM system, problems began to occur at the operational level (reclamations evidence was incomplete, print of demands was inconsistent with demands, communication between product managers was hindered) and analytical level (reports did not present contents regarding certain filters, other reports were impossible to obtain, …). Because of the previous experience company had with the use of system inside Microsoft Outlook, they wanted to use new software solution in the same way. Supplier had to supply an interface between CRM software and Microsoft Outlook. Purpose was to install the interface on all of the 60 working stations automatically, but it happened that the basic Microsoft system crashed down. Companies or suppliers technical support did not anticipate instability, which could result from such operation. It caused additional costs to the company; buying new licences and provisional support with installation of new programmes on all working stations.

Regarding the operating CRM, the next issue involved changing business processes to align with the CRM system. Sanolabor had the advantage that they already had the process understanding and were customer centred, despite functional structure in the organization. Because the new CRM was based on a relational base, which demands more data to be imported, employees needed precise instructions regarding single business processes. Target training and written instructions through single business processes were proposed by area directors in marketing and sales. These instructions are:

- Instructions for the planning of meetings / activities and reporting in CRM (Sanolabor, 2007c),
- Instructions for input and treatment of market opportunities in CRM (Sanolabor, 2007a),
- Instructions for input and updating of companies data and contacts in CRM (Sanolabor, 2007b).

CRM implementation was monitored for four months; project manager systematically reported mistakes to the supplier and checked their performance (Sanolabor, 2006b). All users were acknowledged in details with technical instructions for the work with CRM programme (Žmauc, 2006).

An important activity of project manager was to monitor the changes that happened in practice. Experience taught that it can not be trusted to the suppliers on a blind base that everything works out perfect.

Company decided to develop analytical CRM for the needs of leadership, activity monitoring of employees, better informing, improvement of relations with customers and better strategic decisions. It gave the answers to employees, why company decided to upgrade CRM. These are the starting-points for the implementation; why should a company decide for a CRM. Based on our experience, we could conclude that analytical CRM should include: monthly reports about a customer, daily reports about visiting customers, number and value of given offers, report to which organizations company gives offers and how much of them, degree of customers satisfaction, time percentage of product managers visits to customers, and general report about activities done at customer. With the help of these reports employees became more informed, e.g. what are the needs of customer, what are their organizational changes and consequently better strategic decisions. All this can influence on the improvement of the general relationship with customers. Information is of crucial importance when deciding how to deal with customers. Training for the use of these reports is permanently performed on team meetings (Sanolabor, 2006d). This is also a way to motivate employees that CRM is a useful system, which allows the company to direct correctly their work with customers, to inform them better, and make better strategic decisions; where and how to handle with singular

customer. CRM became stable in March 2007, when the project officially closed.

6 Discussion

The case study highlights the similarities and differences between the theory and practice of implementing effective CRM system. For Sanolabor CRM methodology became an important developmental activity, which contemporary changes its customer focus. Further findings of this case study highlight that the role and knowledge of the project manager is very important. Every activity has to be planned, the outcomes in practice should be monitored and the actual performance controlled. It takes a lot of time, but this is the only way to assure the success of any project. Software solution supplier cannot be blindly trusted.

Most Sanolabor competition does not use CRM yet, they have tables made inside Microsoft Excel, mostly to collect data about customers. That's why the decision of Sanolabor was timely and good one. Case study accentuates that it is good for the company if it has already a process approach established and a customer centred view. It could be the influence of ISO 9000 quality certificate, which has these demands written. Project manager and IT caretaker have to get more knowledge about the system and ascertain themselves what does the supplier promises in the frames of company's demands, before the CRM implementation begins. During the CRM implementation constant monitoring of done and informing of employees about the problems are necessary. After the implementation the motivation of employees has to be stimulated, so they are encouraged to use the system and to foster a firm culture of customer centeredness and process approach. All these can be achieved introducing the practice value of CRM to employees.

There are lessons to be learnt from Galbreath and Rogers (1999) in terms of the adverse consequences of not creating a vision or strategic direction for the project. The project management success factors framework of Pinto and Slevin (1987) may also have been useful in helping to overcome the inexperience in terms of project management, the strategic issues in CRM implementation failure to address project ownership issues and the need to recognise the problems in organisational communication. It is emphasized the need for true professional help and learning through previous experiences.

Sanolabor considered the experiences from the first unsuccessful employees' CRM training with their further introduction of the system, at trainings and consultations. Regarding all the problems accompanying the implementation, strategic decision of Sanolabor proved to be right. The research also shows that vendor claims that CRM can be rapidly and effectively implemented are highly misleading. Sanolabor case proves it too.

The case supports the theory by Girishankar (2000) that CRM is a holistic and complex strategy and also supports Light's (2001) view that CRM involves business process change and IT integration; we could say that Sanolabor accomplished success in both areas. As Kotorov (2003) said, companies that have adopted the strategic approach began to cooperate with CRM vendors to overcome the problems architecturally and technologically. Today the tipical CRM architecture includes a central metadata repository and tools that synchronize the ad hoc changes made in departmental datamarts (not only data is updated, but rules about the data).

7 Conclusion

Case study results show some positive experiences with the final CRM implementation, despite high percentage of failures in CRM implementation, shown in literature. But we cannot forget the problems, which were presented in this paper during all the phases and successfully resolved. This case study was conducted because of the relative lack of CRM empirical studies, particularly within this business sector. The modest contribution has identified and analysed some of the approaches and theories relating to CRM and CRM project implementation.

Basic goal of the study was achieved, namely to contribute to larger successfulness in the organizations when implementing the CRM and to warn them about problems that could arise. When changes occur, 100 % support from the top management is compulsory; organizational culture must have incorporated the inclination to accept changes. Additionally, study showed the need for effective leadership, resources acquirement, monitoring the CRM strategy realizing.

Analytical CRM allows to the company to improve relationships with customers, better informing of employees, and better strategic decisions. Sanolabor case is a study of CRM implementation, from which other companies could learn. It is an interesting case of what are the matters to be careful about before, during and after the CRM implementation and what changes are necessary for it. If the organizational culture supports changes, company has more chances to successfully implement CRM system. The implementation approach needs to be carefully planned, with appropriate emphasis on user adoption strategies. Further research should be directed to studies with accentuated positive approach on the way to improve process of CRM implementation and not to negative connotations of failures in CRM implementation.

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Projekt uspešne implementacije CRM v storitveni organizaciji: študija primera

V Sloveniji kot tudi v ostalih državah je število uvedb CRM-ja v zadnjih letih zelo naraslo. Raziskav, kako poteka uvedba, na kaj mora biti podjetje pozorno pred, med in po uvedbi je na voljo samo nekaj. Ta prispevek nudi natančno analizo primera CRM uvedbe z pozitivnim izidom v slovenskem storitvenem podjetju. Primer prikazuje, da je uvedba CRM-ja holističen in kompleksen koncept, kar pomeni, da to ni samo integracija nove informacijske tehnologije, ampak se vse dogaja okrog sprememb poslovnih procesov. Prispevek poudarja, da je pred uvedbo dobro, da ima podjetje že vzpostavljen procesni pristop ter osredotočenost na kupce. Dodatno je raziskava pokazala potrebo po učinkovitem vodenju, pridobivanju virov ter nadzorovanju uresničevanja CRM strategije; zaupanja do dobavitelja informacijske rešitve ni.
Podjetje pa lahko izboljša delo s kupci, doseže večjo informiranost zaposlenih ter sprejema boljše strateške odločitve preko vzpostavljenega analitičnega CRM-ja.

Ključne besede: uvajanje ravnanja odnosov s kupci, osredotočenost na kupce, procesni pristop, kakovost, informiranost o kupcih, komunikacija, trženje, storitveno podjetje, Slovenija

Analiza regulacije trga mobilnih komunikacij iz vidika korelacij med storitvami

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Namen članka je odgovoriti na vprašanje ali je le regulacije zaključevanja klicev na trgu mobilnih komunikacij dovolj za rešitev konkurenčnega problema na vsakem geografskem trgu ter posledično zagotavlja popolno konkurenco na trgu. Evropska komisija je v svojih najnovejših priporočil priporočila definiranje in analizo le trga zaključevanja klicev v posamično mobilno omrežje. Članek bo na podlagi matematičnih korelacij med zaključevanjem in posredovanjem klicev ter korelacij glede na tržni delež podal katere elemente je potrebno dodatno analizirati in upoštevati pri regulaciji trga mobilnih komunikacij. Članek bo definiral meje pri katerih je potrebno izvesti dodatne analize ter definiranje dodatnega trga, ki ga ni v trenutno veljavnih priporočilih Evropske komisije. Analize in ugotovitve v tem članku dokazujejo, da samo analiza priporočenih trgov s strani Evropske komisije ne zadostujejo za učinkovito regulacijo trga mobilnih komunikacij.

Ključne besede: trgi elektronskih komunikacij, regulacija, evropska komisija, zaključevanje klicev, posredovanje klicev.

1 Uvod

Mobilna omrežja doživljajo nenehen razvoj. V večino EU držav so tržni deleži že enakomerno porazdeljeni in se večinoma regulacija dogaja le na cenah in pogojih za zaključitev klicev v posamičnem omrežju. Zaključeni klic je klic, ki ga posamezni operater zaključi znotraj svojega omrežja, generiran s strani njegovega uporabnika ali pa uporabnika drugega operaterja. Ceno določi operater znotraj omrežja katerega se klic zaključi. Enakomerno porazdeljeni tržni deleži pa pomenijo, da so razlike med tržnimi deleži zadosti majhne, da izrivanje konkurence pri postavljanju maloprodajnih cen ni mogoče. V praksi enakomernost porazdeljenosti tržnih deležev meri indeks HHI, ki je izračunan na podlagi vsote kvadratov tržnih deležev posameznih operaterjev na trgu. V večini EU držav ima vodilni največji operater tržni delež pod 50%, kar je tudi dodatni pokazatelj o enakomerno porazdeljenih tržnih deležih. Evropska komisija je ob koncu leta 2007 definirala nove priporočene trge elektronskih komunikacij ter na področju mobilnih komunikacij določila le trg zaključevanja klicev v posamična mobilna omrežja. Trge elektronskih komunikacij je komisija določila na podlagi zamenljivosti ponudbe in povpraševanja ter ovir za vstop na trg (Commission of the European Communities 2007: 2). Evropska komisija je v tem priporočilu definirala naslednje trge elektronskih komunikacij: maloprodajni trg dostopa do javnega telefonskega omrežja na fiksni lokaciji, ter medoperaterske trge: posredovanje klicev v javnem telefonskem omrežju na fiksni lokaciji, zaključevanje klicev v posamičnih javnih telefonskih omrežjih na fiksni lokaciji, dostop do (fizične) omrežne infrastrukture (vključno s sodostopom ali razvezanim dostopom) na fiksni lokaciji, širokopasovni dostop, dostopovni deli zakupljenih vodov ne glede na tehnologijo, ki zagotavlja zakupljeno ali dodeljeno zmogljivost, ter zaključevanje govornih klicev v posamičnih javnih mobilnih telefonskih omrežjih. Na podlagi ugotovitve o obstoju posameznih trgov morajo nato regulatorni organi v posameznih članicah analizirati te trge in ugotoviti ali obstaja operater, ki se lahko obnaša neodvisno od konkurentov in kupcev storitev (i.e. operater s pomembno tržno močjo). V primeru ugotovitve, da obstaja tak operater s pomembno tržno močjo, mu je potrebno predpisati ustrezne ukrepe za odpravo nekonkurenčnosti na trgu. Ukrepi so sledeči: obveznost preglednosti, enakega obravnavanja ter stroškovne regulacije cen. APEK slovenski regulator pa v izdanem splošnem aktu (APEK 2008: 2) že dopušča možnost regulacije trgov, ki niso bili navedeni v najnovejših priporočilih evropske komisije. V svoji zadnjih analizah pa te usmeritve tudi potrdi. Trgi priporočeni za analizo konkurenčnosti v tem aktu, izdanem s strani APEK-a, so dejansko v skladu s starejšim priporočilom evropske komisije (Commission of the European Communities 2002: 2). Evropska komisija je v svojih priporočilih, glede na starejša priporočila iz leta 2002, izpustila dva trga na področju mobilnih komunikacij in sicer vzpostavitev in posredovanje klicev ter trg mednarodnega sledenja. Oba trga sta bila definirana kot medoperaterska trga. Trga vključujeta klice, ki jih mobilni operater, na katerem gostuje posamezen operater, nudi ostalim operaterjem. Zaradi realnega pokazatelja moči pa vključuje tudi klice lastnih uporabnikov. Ostaja pa pri definici-

ji trga zaključevanja klicev, ki je dejansko trg, kjer se operater obnaša kot monopolist in lahko postavlja pogoje neodvisno od uporabnikov in konkurentov. Trg vključuje klice, ki končajo v omrežju posameznega operaterja. V primeru večjih razhajanj v tržnih deležih se lahko operaterji obnašajo neodvisno od konkurentov ter z zelo nizkimi cenami v lastnem mnogo večjem omrežju izrivajo konkurenco na trgu. V slednjem primeru le regulacija zaključevanja klicev verjetno ni zadostna. Evropska komisija že v svojih zgodnjih analizah (European Commission Guidelines 2002: 22) ugotavlja, da ima več operaterjev mobilnih komunikacij preko najetega frekvenčnega prostora dostop do končnih strank, za razliko od fiksnih operaterjev, in je iz tega vidika zagotovljena večja stopnja konkurence. Vendar za oceno popolne konkurenčnosti ter zadostnega pogoja regulacije trga le preko zaključevanja klicev je potrebno pogledati še dva pokazatelja na trgu in to sta predvsem razlika v tržnih deležih ter seveda nivo penetracije na trgu, ki močno vplivata na možna obnašanja operaterjev. Članek bo na podlagi sintez ugotovljenih dejstev odgovoril na vprašanje kako je potrebno izvajati regulacijo mobilnih komunikacij predvsem v primeru ugotovitve, da trenutna priporočila evropske komisije niso dovolj. Analiza bo na podlagi sintez dejstev podala zbir elementov, ki ji mora regulator trga dodatno upoštevati ter na podlagi tega izvesti regulacijo trga in predpisati ukrepe za učinkovito regulacijo slednjega. Ugotovitev oz. rezultate analize v tem prispevku mora regulator nujno upoštevati, če želi doseči maksimalne ugodnosti za uporabnike, potrošnike, nivo konkurence ter investitorje. Osnovna ugotovitev temelji na dejstvu ali in kdaj je potrebno poleg zaključevanja klicev upoštevati pri regulaciji tudi sam izvor oz. posredovanje klicev, torej obeh elementov, ki predstavljata stroškovno osnovo za ponudbo storitve klica oz. komunikacije v mobilnih omrežjih. Posredovan klic je klic, ki izvira v določenem omrežju (na podlagi zahteve uporabnika, ki se nahaja v tem omrežju) in ga nato operater posreduje do končnega uporabnika znotraj svojega omrežja ali pa ga posreduje v drugo omrežje, odvisno od naročniškega razmerja oz. lokacije klicanega uporabnika.

2 Metodologija izračuna tržnega deleža posameznega operaterja

V praksi in teoriji se srečujemo z veliko načini izračuna tržnih deležev posameznih operaterjev. Tržni deleži je eden od ključnih elementov pokazateljev stanja in razmerja moči med posameznimi operaterji in zelo pomembno vplivajo na način regulacije. V omrežju posameznega operaterja se vzpostavljajo oz. posredujejo in zaključujejo govorni klici ter podatkovni promet. Trenutno predstavljajo daleč največji del prihodkov za operaterje mobilnih komunikacij še vedno govorni klici, katerih količino merimo v časovnih minutah. Za ponazoritev, klic ki sproži posamezni končni uporabnik, ki je priključen oz se nahaja znotraj pokritosti posameznega omrežja, se lahko zaključi v istem omrežju ali pa preko medoperaterske medomrežne povezave (teh je lahko več) prenese v neko drugo omrežje in tam zaključi.

Tržni delež izračunamo na več načinov in sicer glede na število uporabnikov, glede na količino zaključenih ter glede na količino posredovanih minut.

Metodološko je najbolj primeren prikaz tržnega deleža glede na količino zaključenih minut v omrežju, saj število uporabnikov ne prikaže celotne slike. Uporabniki uporabljajo in plačujejo za mobilno telefonijo različne zneske in samo število ne prikaže dejanske ekonomske moči posameznega operaterja.

Tržni delež pri posredovanju klicev vključuje klice, ki jih zaračuna operater s svojim omrežjem, ter klice, ki jih zaračunavajo operaterji, ki gostujejo v tem omrežju. Tržni delež izračunan na podlagi posredovanja klicev in zaključevanja ne odstopata bistveno, vendar tržni delež izračunan na podlagi posredovanja klicev ne vključuje vidika povpraševanja po posameznem omrežju. Tržni delež izračunan na podlagi zaključenih minut pa vključuje vse vidike, saj izraža tudi zaželjenost posameznega omrežja iz strani končnih uporabnikov, ki kličejo v različna omrežja, kjer se klic zaključi. Tržni delež se izračuna glede na količino oz. število zaključenih minut in ne vrednostno, saj je sama cena zaključevanja klicev regulirana in izračunana na podlagi razmerja med potrebno investicijo in količino zaključenih minut.

Tržni delež izračunan na podlagi zaključenih minut torej upošteva le operaterje z lastnim omrežjem in izključuje operaterje, ki gostujejo v tem omrežju. Slednji klica na tem segmentu ne morejo sprejeti, saj ne razpolagajo z lastnim omrežjem. Operaterji, ki le gostujejo v omrežju, ne postavljajo pogojev na trgu in dejansko na podlagi medoperaterske ponudbe s strani operaterja z omrežjem le pospešujejo prodajo na tem omrežju. Operater z omrežjem se na podlagi sinenergije lahko odloči, da bo zaradi pospešitve prodaje sklenil medoperatersko pogodbo z drugim podjetjem oz. operaterjem brez lastnega dostopovnega omrežja. Vendar operaterji, ki gostujejo, ne vplivajo na povpraševanje po omrežju na katerem gostujejo. Zaključimo lahko, da je dejansko pravilni pokazatelj moči na širšem trgu mobilnih komunikacij le tržni delež izračunan na podlagi zaključenih minut v omrežju na določenem geografskem področju. Količina zaključenih minut v omrežju, bodisi sproženih s strani končnih uporabnikov v istem omrežu ali pa prenesenih preko medoperaterskih medomrežnih povezav iz strani končnih uporabnikov drugih omrežij, je dejansko položaj tržne moči posameznega operaterja. Na podlagi izbire pravilne metodologije pri izračunu tržnega deleža posameznega operaterja se nato ugotovi dejansko stanje na trgu ter možnosti izrivanja konkurence. Odstopanja tržnih deležev pa se izračuna, da se seštejejo vsote kvadratov tržnih deležev v procentih (indeks HHI). Če bi izračunali tržni delež na podlagi števila uporabnikov ali posredovanih klicev v omrežju, t.i. klicev ki jih posamezni operater posreduje za svoje končne uporabnike ali operaterje, ki gostujejo v njegovem omrežju, bi dobili izkrivljeno sliko o stanju na trg mobilnih komunikacij.

3 Ugotovitve na podlagi trenutne prakse in analiza regulacije mobilnih komunikacij

Trenutno je torej praksa v EU, da je cena zaključevanja klicev, ki si jo zaračunajo operaterji, edini element oz. instrument pri regulaciji trga mobilnih komunikacij. Če pogledamo storitve, klici torej predstavljajo še vedno daleč največji prihodek od

vseh storitev mobilne telefonije. Tudi v primeru konvergence storitev so cene mobilne telefonije, zaradi visokih cen, glavni element pri izbiri ponudnika. To pomeni, da lahko storitve mobilne telefonije obravnavamo ločeno od ostalih storitev. Glavni element odločitve uporabnika pri izbiri operaterja mobilne telefonije pa so še vedno cene in kvaliteta govornih klicev, saj je uporaba podatkovnega prometa glede na količino govornih klicev praktično zanemarljiva.

Strošek zaključevanja klica je prisoten pri vseh vrstah klicev, pri klicu v omrežju, kjer klic najprej izvira, potuje do določene komutacijske točke v omrežju in se nato zaključi, ter tudi pri klicu iz omrežja (tu strošek zaključevanja predstavlja zaključevanje klicev v drugem omrežju). Večino klicev v omrežju se zaključi znotraj mobilnega omrežja in le majhen del gre v fiksna omrežja (APEK 2009: 33). Torej lahko zaključimo, da je zaključevanje klica zelo pomemben element pri regulaciji trga. Tudi v primeru gostovanja v tujem omrežju se mora klic zaključiti v omrežju. Zaključevanje klica je monopolna storitev posameznega operaterja, saj se lahko klic zaključi le preko operaterja, na katerega je priključen prejemnik klica.

Obstaja relacija med tržnim deležem, ki ga ima operater na trgu, in regulirano ceno zaključevanja klica v primeru, da je cena izračunana na podlagi stroškovnih modelov (trenutnih stroškov, LRIC modeli …) (ERG 2005: 8-23). Natančnega izračuna stroškovno naravnane cene zaključevanja klicev ne moremo izračunati, saj se vseh podatkov operaterja dejansko v praksi ne da preveriti. Vsekakor pa obstaja premosorazmerna relacija med tržnim deležem in stroškovno izračunano ceno zaključevanja klica. Velik del stroškov investicije je fiksen ob postavitvi omrežja in le manjši del je variabilen ob dograjevanju omrežja (Skupina Telekoma Slovenije 2007: 144). Stroškovna cena se izračuna na podlagi investicije v realno bodisi optimalno izgrajeno omrežje ter se nato ta strošek deli s količinami zaključenih minut v omrežju, katere so dejanski pokazatelj tržnega deleža, kar sem že navedel v drugem poglavju. Stroškovno izračunana cena zaključevanja klica je visoka pri operaterjih z majhnim tržnim deležem, medtem ko pri operaterjih z visokim tržim deležem dobimo nizko vrednost.

Če predpostavimo model, kjer nudijo storitve operaterji mobilnih komunikacij, mora biti omogočena migracija naročnikov iz enega omrežja v drugega. Premija za migracijo, ki jo mora plačati naročnik, je odvisna od potencialnih vezav naročnikov in od potencialnih škarij cen, katere lahko povzroči večji operater, ki dosega različne donose pri različnih vrstah klicev. To pomeni, da morajo koristi pokriti dodatne stroške zaradi potencialne vezave naročnikov ter omogočiti manjšim operaterjem, da lahko ponudijo konkurenčen klicni splet. Premija migracije je sorazmerna razliki med skupno ceno posredovanja in zaključevanja klicev v večjem omrežju ter ceni zaključevanja v večje omrežje. Torej če želimo doseči migracijo naročnikov, mora biti razlika v ceni med posredovanjem in zaključevanjem klicev v večjem omrežju naproti zaključevanju klicev v tem omrežju za druge operaterje vsaj enaka dodatnim stroškom prehoda, saj se v večjem omrežju zaključi proporcionalno več klicev kot v manjših. Manjša omrežja so vezana na cene zaključevanja klicev v večja omrežja, saj lahko konkurirajo le, če so stroški pri zaključitvi v večja omrežja zadosti nizki naproti stroški celotnega klica znotraj večjega omrežja. Klicni splet je sestavljen iz klica v omrežju (X+Z), kjer je X cena vzpostavitve in posredovanja klica ter Z strošek zaključitve klica znotraj omrežja ter iz klica iz omrežja v druga omrežja (X+Zn), kjer je X strošek vzpostavitve in posredovanja klica v enem omrežju ter Zn strošek zaključitve klica v drugem omrežju.

Potrebno je obravnavati klice v omrežju ter klice v druga omrežja (večinoma se klici, ki izvirajo v mobilnih omrežij zaključujejo v drugih mobilnih omrežjih in ne v fiksnih) ter zaključevanje klicev v omrežje. Pri zaključevanju klicev v omrežje ima posamezni operater dejansko monopol (Stumpf, Strube 2003: 44). Večina evropskih regulatorjev članic EU se je odločila, da bo v mobilnih omrežij regulirala le ceno zaključevanja klicev na podlagi stroškovnih modelov. Leta 2006 (ERG 2006: 6-8) se je le ena evropska država odločila za ukrep nediskriminacije na trgu vzpostavitve in posredovanja klicev v mobilnih omrežjih, ki dejansko pomeni da mora operater nuditi enake pogoje za svoje uporabnike, kot za ostale operaterje. Noben regulator pa ni predpisal stroškovne regulacije na podlagi stroškovnih modelov. Evropska komisija se je v najnovejših priporočil odločila in priporočila regulatorjem le definiranje trga zaključevanja klicev v posamična mobilna omrežja in s tem regulacijo le slednjega. Večina evropskih regulatorjev se je odločila za stroškovno regulacijo cen zaključevanja klicev ter s tem sledila priporočilom EU. Po najnovejših podatkih se te cene zelo razlikujejo po državah, kljub dejstvu, da se v vseh državah uporablja enaka tehnologija. Razmerje med najvišjo in najnižjo ceno je kar 1:9 (ERG 2008: 1). Vendar ali je lahko ta metoda regulacije le zaključevanja klicev vedno učinkovita? Članek bo potrdil oziroma ovrgel navedeno tezo.

4 Teoretična analiza elementov učinkovite regulacije

Donos na kapital, ki ga operater dosega pri klicih, mora upravičevati investicijo v omrežje. Letne donose je potrebno diskontirati s faktorjem zahtevanimi povprečnimi letnimi donosi s strani investitorja.

Operater se odloči za vstop na trg v primeru, da je:

$$m_1 + m_2 \frac{1}{q} + m_3 \frac{1}{q^2} + m_4 \frac{1}{q^4} + ... \geq I \ ,$$

kjer je $q = 1 + WACC/100$

Kjer je m – pričakovani donos v naslednjih letih, q – zahtevan oz. pričakovan letni donos na investicijo skozi časovno obdobje, I – je začetna investicija v izgradnjo omrežja z upoštevanjem tudi variabilnih stroškov pri porastu prometa v omrežja. Investicija vključuje tako kapitalski vložek (ang. CAPEX) kot operativne stroške (ang. OPEX), saj gre v začetni fazi za enkratni znesek. V primeru nadgradenj omrežja, pa se potrebne investicije diskontirajo s faktorjem q na sedanjo vrednost. Potrebne nadgradnje se izvajajo glede na potrebe v odvisnosti od zasedenosti omrežja. V izrazu je torej upoštevana celotna investicija. WACC pa tehtani povprečni stroški kapitala izračunan na podlagi pričakovanega donosa bodisi izračunan na podlagi vsote sledečega razmerja (ERG 2005: 24-28):

$$WACC = \frac{R_e * E}{D + E} + \frac{R_d * D}{D + E}$$

Kjer je:

E – vrednost lastniškega kapitala

D – vrednost dolžniškega kapitala (najeta posojila družbe)

R_d – strošek dolžniškega kapitala (povprečna vrednost obresti od najetih kreditov)

R_e – strošek lastniškega kapitala in se izračuna na podlagi seštevka obresti pri netveganih investicijah ter zmnožka med tveganjem regulirane družbe glede na razmere na trgu in tržno premijo:

$$R_e = R_f + \beta_e * P_m$$

R_f – obresti pri netveganih investicijah,

β_e – tveganje regulirane družbe glede na tveganje na celotnem trgu,

P_m – tržna premija

Na področju mobilnih komunikacij lahko vrednost strošek kapitala ocenimo v višini 15%.

Donos je potrebno preko diskontiranja s faktorjem q prevesti na sedanjo vrednost. Pričakuje pa se tudi, da bo donos nominalno z leti naraščal. Za lažji prikaz predpostavimo, da bo donos skozi leta naraščal linearno s faktorjem k. Torej lahko zgornjo neenačbo poenostavimo v:

$$m_1 * \frac{1 - (\frac{k}{q})^n}{1 - \frac{k}{q}} \geq I$$

kjer je n – število let v katerih se bo uporabljala tehnologija v katero je investiral operater.

Torej seštevek posameznih donosov diskontiranih s faktorjem zahtevanega donosa mora biti večji ali vsaj enak potrebni investiciji. Vsota geometrijske vrste je končna, saj naj bi se zahtevala povrnitev investicije v doglednem času zaradi hitro spreminjajoče tehnologije. Ocenjuje se, da bi se morala investicija v mobilnih komunikacijah povrniti ob uspešnem poslovanju nekje v 5 letih. Glede na to, da naj bi bili vstopni stroški za vse operaterje približno enaki, se mora omogočiti skozi obdobje približno enaka marža na cene klicev, če želijo operaterji dolgoročno uspešno delovati na trgu. Operater, ki prvi vstopi na trg in osvoji določen tržni delež, lahko poskuša ob odsotnosti regulacije omejiti konkurenco s postavljanjem nizkih cen klicev za svoje uporabnike v lastnem omrežju naproti visokim cenam klicev v druga konkurenčna omrežja, ter cenam zaključevanja klicev v lastno omrežje za druge operaterje. Stroškovni način regulacije le cene zaključevanja klicev bi pomenil, da so cene zaključevanja klicev v majhna omrežja, zaradi majhne količine minut visoke, v omrežja večjega operaterja pa nizke. Če reguliramo le ta element v primeru velikih razlik v tržnih deležih oz. visoki vrednosti HHI (izračunan na podlagi vsote kvadratov tržnih deležev) in ne upoštevamo korelacije med ceno posredovanja klicev in ceno zaključevanja klicev, lahko privedemo trg v situacijo kjer se operaterji ne obnašajo konkurenčno. Večji operaterji s postavljanjem nizkih cen v njihovem omrežju naproti cenam zaključevanja klicev v njihova omrežja, ki so sicer večinoma regulirana, cenovno izrivajo manjše operaterje. Maržo za povrnitev investicije pa dobijo na podlagi kljub regulaciji še vedno visokih cen zaključevanja klicev ter klicev v druga omrežja in dodatnih storitev, ki jih nudijo svojim naročnikom in drugim operaterjem (recimo gostovanja drugim večinoma mednarodnim operaterjem v lastnem omrežju). Potrebno je tudi upoštevati dejstvo, da regulacija sama vedno vpliva na trg z zamikom, saj vedno nastopa s časovnim zamikom glede na ugotovljeno stanje na trgu. Stroški na enoto so za večje operaterje bistveno nižji kot za manjše, zaradi razmerja med fiksnimi in variabilnimi stroški, ki so v korist prvih. Stroškovno naravnana cena zaključevanja klicev dejansko le prepreči previsoke cene iz drugih fiksnih omrežij v mobilna omrežja, ne rešuje pa konkurenčnega problema znotraj mobilnih omrežij. Torej na podlagi katerih razlik v tržnih deležih lahko začnemo s stroškovno regulacijo le zaključevanja klicev ob neupoštevanju korelacije med posredovanjem in zaključevanjem klica? Absolutna razmerja med tržnimi deleži trenutno težko podam, saj so odvisna od višine investicij v omrežje, od stopnje oz. nivoja penetracije (meri se v številu uporabnikov mobilne telefonije na 100 prebivalcev), števila operaterjev ter učinkovitosti regulacije. Nadalje bom podal izračune na podlagi katerih se določi pravilni način regulacije z upoštevanjem in regulacijo cen posredovanja in zaključevanja klicev ali le z upoštevanjem cen in regulacijo cen zaključevanja klicev v posamično mobilno omrežje.

Razliko v ceni med zaključevanjem klica in posredovanjem klica izračunamo na podlagi stroškovne razlike med stroški posredovanja in stroški zaključevanja ob neupoštevanju elementov omrežja, ki ne sodelujejo pri posredovanju klicev (elementi iskanja naročnika v omrežju). Ocena razlike se giblje v višini okoli 10% vrednosti cene zaključevanja klica. Stroški zaključevanja klicev so torej večji. Točen izračun se naredi na podlagi računovodskih podatkov, kjer se oceni procentualni delež elementa v komutacijskem centru za iskanje uporabnika v omrežju naproti vsem stroškom pri zaključevanju klica. Vrednost regulirane razlike med ceno zaključevanja in ceno posredovanja se lahko predpiše tudi kot vrednostno kapico, torej predpišemo maksimalno odstopanje od izračunane vrednosti na podlagi računovodskih podatkov.

Obstaja torej premosorazmerna korelacija med tržnim deležem in stroškovno izračunano ceno zaključevanja klicev (e.g. izračuna se, da stroške omrežja, ki se nanašajo na elemente potrebne za zaključitev klica, delimo z zaključenimi minutami). Tržni delež posameznega operaterja pa je tudi premosorazmeren s številom klicev, ki se zaključijo v lastnem omrežju, naproti ostalim klicem (e.g. v druga omrežja). To tudi pomeni identičen standardni odklon v vseh primerih. Slednji se izračuna na podlagi korena vsote kvadratov razlik od aritmetične sredine deljeno s številom obravnavanih operaterjev. Manjši operater večino klicev zaključi v večjem omrežju, večji

operater pa v lastnem omrežju. Sam sistem regulacije mora omogočiti možnost relativno enakih donosov za vse operaterje, torej:

$$m_n * \frac{1-(\frac{k_n}{q_n})^n}{1-\frac{k_n}{q_n}} \cong m_m * \frac{1-(\frac{k_m}{q_m})^{n-m}}{1-\frac{k_m}{q_m}} \cong m_t * \frac{1-(\frac{k_t}{q_t})^{n-m-t}}{1-\frac{k_t}{q_t}}$$

kjer so m_n, m_m in m_t donosi v prvem letu poslovanja za posamezne operaterje. Faktorja k in q sta specifična za vsakega operaterja. Faktor k naj bi pri operaterjih, ki so vstopili na trg, hitreje naraščal, saj imajo na razpolago manj let za povrnitev investicije. Regulacija mora omogočiti vsem enake možnosti na trgu. Predvideti je potrebno, da bodo v primeru, da se pojavi na trgu proizvajalcev nova tehnologija, morali vsi operaterji praktično istočasno zamenjati to tehnologijo če bodo hoteli obstati na trgu. Vrednost n oziroma časovna uporabnost tehnologije se ocenjuje na 15 let, medtem ko m in t pomenita različne indekse, saj operaterji vstopajo na trg z zamikom. Parametri m, n in t so torej parametri vstopa na trg.

Operater bo imel ob vstopu na trg možnost pričakovanega donosa na klice, če želi pridobiti naročnike le v primeru možnosti postavitve cene klicev v večje omrežje, ki je nižja od cene klicev znotraj omrežja velikega in dominantnega operaterja. Torej je potrebno pri večjem operaterju dejansko izvajati stroškovno regulacijo kot dopustno razliko med ceno posredovanja klicev, ki jih večji operater nudi samemu sebi, in ceno zaključevanja klicev, ki jo nudi samemu sebi oz. svojim uporabnikom in ostalim operaterjem. Ta regulacija se izvaja dokler se operater ne obnaša konkurenčno, torej dokler dosega bistveno različne marže pri različnih vrstah klicev. Bistveno različne marže pomeni večja odstopanja, ki v konkurenčnem svetu ne morejo presegati vrednosti 10%. Iz tega vidika bi morale nove članice, ki se pridružujejo EU, na podlagi podane analize glede na doseganje donosov pri različnih vrstah klicev, ugotoviti ali je potrebna še dodatna definicija trga vzpostavitve in posredovanja klicev ter na podlagi tega določitev operaterja s pomembno močjo in določitev ustreznih ukrepov (transparentnost, nediskriminacija ter stroškovna regulacija). Konkurenca na trgu mora biti čim večja z namenom, da se operaterji obnašajo racionalno ter investirajo v razvoj. Investicije v razvoj pa so možna le, če so pričakovanja po donosih zadosti visoka. V primeru, da bi bil na trgu le en operater, bi se seveda obnašal preveč lagodno in tudi ne bi imel interesa po razvoju omrežju, saj mu trenutni monopolni donosi omogočajo popolnoma neodvisno obnašanje. Torej se periodično zagotovi maksimalni donos panoge, če so zahtevani donosi (diskontni faktorji) tem višji in so torej najvišji povprečni donosi po posameznih operaterjih.

5 Temelji za ocenitev maksimalnih koristi regulacije

Kot sem že večkrat poudaril, predstavljajo največji problem pri izrivanju konkurence nizke cene klicev v večjem omrežju za lastne uporabnike naproti visokim cenam zaključevanja klicev, ki jih postavlja največji operater za druge operaterje v njegovo omrežje. Te nizke cene operater, ki diktira pogoje na trgu, kompenzira preko višjih postavljenih cen v druga omrežja ter ostalih storitev (e.g. gostovanja v njegovem omrežju za druge operaterje). Slednje so bistveno večje od njegovih operaterskih stroškov. Celotni stroški uporabnika pri posameznem operaterju so sestavljeni iz deleža stroškov v omrežju naproti deležu stroškov za klice iz omrežja in so:

$$P_1 * T_r + P_n * (1 - T_r),$$

Kjer je T_r – delež klicev znotraj omrežja in 1- T_r – delež klicev v druga omrežja, P_1 - povprečna cena klicev v lastnem omrežju, P_n - pa je povprečna cena klicev v druga omrežja. Povprečna cena v lastnem omrežju se izračuna na podlagi prihodkov v omrežju deljeno s količino minut, ki izvira in se zaključi znotraj omrežja. Povprečna cena klicev iz omrežja pa na podlagi prihodkov klicev iz omrežja deljeno z številom minut, ki izvirajo v dotičnem omrežju in se ne zaključijo znotraj omrežja.

Na trgu je torej potrebno doseči maksimizacijo učinka nizkih cen za uporabnike ter čim višjih donosov za investitorje, torej maksimalno razmerje donos naproti stroškom za uporabnike.

Skupni stroški, ki jih morajo plačati uporabniki v sistemu N operaterjev v določenem časovnem obdobju, so torej:

Št. klicanih minut v sistemu vseh omrežjih* $\sum_{i=1}^{N}(P_1 * T_r + P_n * (1 - T_r))$ kjer sta P_1, P_n in T_r različna za različne operaterje, N – je število operaterjev na trgu

Torej je potrebno iskati maksimizacijo razmerja :

$$\lim_{n\to\infty} \frac{\sum_{i=1}^{N} m_n * \frac{1-(\frac{k_n}{q_n})^n}{1-\frac{k_n}{q_n}}}{št.klicanih\_\min ut\_na\_leto * (\sum_{i=1}^{n}(\sum_{i=1}^{N} P_1 * T_r + P_n * (1 - T_r)))_1}$$

Kjer spodnji del ulomka predstavlja seštevek stroškov vseh klicev, N je število operaterjev, ki so trenutno na trgu, n pa število let v obravnavanem obdobju oziroma časovno uporabnost tehnologije. Zgornji del predstavlja seštevek zahtevanih donosov vseh operaterjev, kjer je m_n, k_n in q_n različen za različne operaterje. Za sistem treh operaterjev bi bil zgornji del ulomka sledeč:

$$\frac{m_n * \frac{1-(\frac{k_n}{q_n})^n}{1-\frac{k_n}{q_n}} + m_m * \frac{1-(\frac{k_m}{q_m})^{n-m}}{1-\frac{k_m}{q_m}} + m_t * \frac{1-(\frac{k_t}{q_t})^{n-m-t}}{1-\frac{k_t}{q_t}}}{}$$

Kjer spremenljivki n, m in t predstavljajo letni časovni element vstopa na trg, saj operaterji vstopajo na trg v različnih časovnih intervalih.

Torej maksimalno razmerje nastopi v primeru velikih in čimbolj enakomernih donosov skozi obdobja ter čim nižjih cen (stroškov) za uporabnike. Regulacija same razlike med posredovanjem klicev in zaključevanjem klicev je v začetni fazi

razvoja trga zelo pomembna, saj je potrebno zagotoviti dovolj konkurenčno okolje. Izrivanje konkurence s strani ekonomsko gledano največjega operaterja pa bi povzročilo na dolgi rok vse bolj monopolni položaj slednjega in neučinkovitost regulacije ter posledično nizko vrednost ulomka. Ker so cene za uporabnike in donosi na trgu korelirani med seboj, višje cene pomenijo dejansko večje donose. Za maksimizacijo razmerja je potrebno izračunati odvod funkcije ter ga izenačiti z 0, preko drugega odvoda funkcije pa pogledati ali gre za maksimum ali za minimum. Nas vsekakor zanima maksimalno razmerje. Najbolj zanimiva je spremenljivka T_r, ki je dejansko pokazatelj tržnega deleža, saj pokaže koliko minut se zaključi znotraj posameznega omrežja. Spremenljivka se nahaja v spodnjem delu ulomka in je vrednost celotnega ulomka višja, čim bolj je vrednost T_r enaka za vse operaterje, torej čim bolj je okolje konkurenčno. Dogajanje pa je potrebno pogledati na dolgi rok. Učinkovitost regulacije se namreč pokaže na dolgi rok. Regulacija mora omogočiti razvoj preko čim večjih investicij na trgu ter na drugi strani čim večje ugodnosti za uporabnike v sistemu.

Kaj torej pomeni učinkovita regulacija? Osnovo za čim večje zgornje razmerja predstavljajo seveda zelo visoke cene zaključevanja klicev, kar dejansko ščiti investicije v mobilna omrežja. Vsi klici se morajo zaključiti v omrežju, zato je zelo pomembno, da so medoperaterske cene zaključevanja klicev zadosti visoke. Po drugi strani pa, da so zagotovljene koristi uporabnikov in s tem čim nižja vrednost imenovalca v zgornjem ulomku, pa je seveda najboljše, da so te cene stroškovno naravnane z upoštevanjem zahtevanega donosa na investicijo v omrežje. Da ne pride do monopolizacije na trgu in izrivanja konkurence, je potrebno v začetni fazi analizirati tudi razliko med zaključevanjem in posredovanjem klica. Če je slednja prevelika in seveda bistveno presega stroškovno upravičenost (pri zaključevanju klicev nastopa logični element za iskanje naročnika v omrežju), je potrebno izvesti stroškovno regulacijo in predpisati največjo dovoljeno razliko ter posledično tudi nediskriminatorno obravnavanje klicev iz strani največjega operaterja (enaki pogoji za operaterje, kot za lastne uporabnike). Ekonomsko gledano: največji operater bi lahko izrival konkurenco z nizkimi cenami klicev v omrežju, ter s tem nudil lastnim uporabnikom zelo nizke cene posredovanja klicev v svojem omrežju, ter s tem v primeru bistveno višjih cen zaključevanja klicev za druge operaterje onemogočal potencialno možnost migracije naročnikov. Eden od pokazateljev te politike so tudi precej različni donosi po posameznih operaterjih in s tem se tudi posamezni seštevki v števcu preveč razlikujejo, kar znižuje vrednost ulomka (1). Z upoštevanjem zgoraj navedenih ukrepov je na dolgi rok zagotovljena največja limitirana vrednost zgornjega ulomka (1) in s tem maksimalne koristi za udeležence na trgu.

Na podlagi dostopnih podatkov s strani EU (ERG 2008: 1) je ugotovljeno, da se cene zaključevanje klicev v mobilna omrežja z razvojem trga znižujejo, saj operaterji z dograjevanjem omrežja ponujajo tudi nove, predvsem podatkovne storitve (stroški na enoto padajo, saj so začetni fiksni stroški največji). To pomeni, da se bodo s časom zniževale tudi cene za uporabnike, zlasti če bo na trgu čim več operaterjev, kar pa lahko zagotovimo le z učinkovito regulacijo in s tem maksimalno vrednost ulomka (1). Učinkovita regulacija pa tudi pomeni, da se operaterji globalno širijo, saj se s tem tudi nižajo stroški na enoto, pozitivni učinki pa se kažejo tudi v poenotenju pogojev med posameznimi geografskimi trgi znotraj EU. Širitev pospešuje tudi globalizacija. Enotna regulacija bo tudi omogočila, da ne bo več razlik med posameznimi trgi znotraj EU in da bo prevladoval enoten EU trg, kjer bo nastopala množica operaterjev. S tem se bo povečala konkurenčnost ter zaradi učinkov ekonomije obsega bodo padle tudi cene za uporabnike. Zaradi večjega števila klicev v celotnem mobilnem omrežju bodo donosi za operaterje višji. Vrednost razmerja (1) pa bo seveda maksimalna.

6 Praktični prikaz obstoja meja med obema metodama regulacije

Evropska komisija je za področje mobilnih komunikacij v najnovejših priporočilih definirala le trg zaključevanja klicev za posamezne geografske trge. Na podlagi ugotovitev v tem članku lahko sklepam, da v primeru izrazitega monopolnega položaja v panogi (izrazite razlike v tržnih deležih ter različne donose glede na vrste klicev) bi bilo potrebno izvesti tudi regulacijo vzpostavitve in posredovanja klicev oz. definiranje trgov v skladu s starimi priporočili, kjer sta definirana tako trg vzpostavitve in posredovanja, kot trg zaključevanja klicev v posamična mobilna omrežja. Maloprodajni trg se vključi v medoperaterski trg vzpostavitve in posredovanja klicev kot posredovanje samemu sebi oz. svojim uporabnikom in iz tega vidika je potrebno naložiti operaterju, ki izriva konkurenco vsaj ukrep enakega obravnavanja drugih operaterjev naproti lastnim uporabnikom. Slednjega se nato dopolni s stroškovno regulacijo dopustne razlike med ceno posredovanja in zaključevanja klicev. Posredovanje klicev sicer večina operaterjev ne nudi drugim operaterjem (razen virtualnim operaterjem).

Na koncu podajam še izkustveni izračun pri katerem standardnem odklonu in vrednosti HHI ni več nujno potrebna regulacija obeh elementov posredovanja kot zaključevanja klicev. Vsekakor lahko postavimo model treh operaterjev z visoko penetracijo trga (nad 80%) ter z nizko vezavo naročnikov na operaterja (zakonsko je praksa, da je maksimalna višina vezave 1 leto), ki je najpogostejši v EU praksi. Vrednosti tržnih deležev morajo biti take, da je seštevek tržnih deležev manjših operaterjev vsaj približno enak tržnemu deležu večjega operaterja. Odstopanje ne sme biti večje od 50%. Slednje pomeni, da če se večji operater obnaša neodvisno, se lahko manjša dva dogovorita za skupni nastop proti večjemu z učinkovitim odgovorom na njegovo cenovno politiko. Istočasno razlika v tržnih deležih med manjšima operaterjema ne sem biti prevelika. Vsekakor ne sme biti eden operater več kot dvakrat večji od najmanjšega, da ne pride do dogovarjanja med večjima operaterjema. Na podlagi tega izračunamo vrednost standardnega odklona in indeksa HHI. Če označimo z X največjega operaterja, Y drugega po vrstnem redu glede na tržni delež in Z najmanjšega operaterja, moramo izpolniti naslednji pogoj glede velikosti tržnih deležev:

$$X \leq 1{,}5 * (Y + Z)$$

$$Y \leq 2 * Z, ter$$

$$X + Y + Z = 100\%$$

Če ponazorimo s številkami, dobimo mejne vrednosti pri katerih regulacija obeh elementov posredovanja in zaključevanja klicev ni več potrebna. Če rešimo zgornje neenačbe, nastopijo minimalne vrednosti oz. mejne vrednosti pri naslednjih tržnih deležih 13, 33%, 26,67% in 60%. Torej če zaokrožimo gre za tržne deleže **13%, 27% ter 60%.** V primeru, če je tržni delež največjega operaterja pod 60% in drugi največji ni več kot dvakrat večji od najmanjšega, regulacija obeh elementov ni več potrebna.

Vrednost standardnega odklona tržnih deležev (izražen v %) ne sme biti višja od 19,6 oz. 20, vrednost HHI (izraženo v %) pa ne 4489 oz. 4500. V praksi pa tudi vrednosti do 5000 niso kritične. Nad temi vrednosti pa obstaja verjetnost, da bo posamezen operater dosegal bistveno različne donose po posameznih vrstah klicev in se lahko obnašal neodvisno od konkurentov in uporabnikov. Vrednost ulomka (1) pa bo v tem primeru relativno nizka ter nadaljnja prihodkovna rast trga ogrožena. Upoštevati je potrebno tudi situacijo, ko imata dva operaterja prevladujoč položaj skupaj in dosegata bistveno različne donose pri posameznih vrstah storitev ter obstaja sum dogovarjanja. Najpogostejši pokazatelj je tudi tržni delež, ki je v primeru dogovarjanja približno enak za oba operaterja in se ne spreminja skozi obravnavano obdobje. Tržni delež teh dveh operaterjev je tudi večkratnik tržnega deleža operaterja, ki je najbližji zasledovalec. V tem primeru je potrebno oba operaterja obravnavati kot enega, saj se s skupnim nastopom obnašata neodvisno ter jima je potrebno naložiti enake ukrepe za zagotovitev konkurenčnosti na trgu.

7 Zaključek

Članek je podal osnovne ugotovitve ter potrdil osnovno tezo o potrebi po regulaciji posredovanja klicev ter definiranje trga vzpostavitve in posredovanja klicev, ki mora ostati predmet regulacije v mobilnih omrežjih. Ovira za vstop na trg mobilne telefonije so visoke in povezane z velikimi investicijami. Zato je potrebno definirati trge in na teh trgih naložiti ukrepe za izboljšanje stanja konkurenčnosti na trgu. Članek je pokazal in dokazal, da sama priporočila Evropske komisije vedno niso dovolj za učinkovito regulacijo mobilnih komunikacij, predvsem na geografskih trgih kjer so še vedno izrazita odstopanja v tržnih deležih (vrednosti standardnega odklona in HHI indeksa nad dovoljeno vrednostjo). Potrebna je še vedno temeljita analiza stanja mobilnih komunikacij na posameznih geografskih trgih ter na teh trgih izvesti učinkovito regulacijo. V primeru izrazitih razlik v donosih pri posameznih vrstah klicev ter izrazitih razlikah v tržnih deležih je potrebno izvesti metodo treh kriterijev (zamenljivost ponudbe in povpraševanja ter ovir za vstop na trg) ter ugotoviti obstoj trga vzpostavitve in posredovanja klicev, ter posledično ali obstaja operater, ki se obnaša neodvisno od konkurentov, uporabnikov in potrošnikov. Učinkovita regulacija se potem izvaja na podlagi dovoljene stroškovne razlike med stroški posredovanja in zaključevanja klicev. Ta praksa bi morala veljati predvsem pri novih članicah, ki bodo vstopala v Unijo ter obstoječih, kjer so velike razlike v tržnih deležih ter s tem visoke vrednosti standardnega odklona in HHI indeksa. Neupoštevanju ugotovitev v tem članku v tem primeru ovira nadaljnji razvoj mobilnih komunikacij.

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končanem študiju se je januarja 1996 zaposlil v Telekomu Slovenije, kjer je opravljal različna dela, vodil tudi večje število projektov na področju telekomunikacij predvsem medoperaterskega poslovanja. V letih 1999-2002 je bil zaposlen kot svetovalec in vodja oddelka za poslovanje z mednarodnimi operaterji. Ob delu je leta 2000 tudi končal magistrski študij poslovodenja in organizacije, smer za finance na Ekonomski Fakulteti Univerze v Ljubljani. Leta 2002 se je zaposlil v Agenciji za pošto in elektronske komunikacije kjer je opravljal različna dela na področju telekomunikacij, bil član mednarodnih delovnih skupin, sodeloval in strokovno vodil procese notifikacij pred evropsko komisijo ter opravil več predavanj na konferencah in v sklopu mednarodnih delovnih skupin. Je tudi soavtor večjega števila študij na temo regulacije trga elektronskih komunikacij ter je bil član strokovne skupine v sklopu procesa WWI (Vega) proti R Sloveniji. Trenutno je zaposlen v družbi DARS d.d. kjer vodi projekte razvoja in optimizacije obcestne inteligentne infrastrukture. Nadaljuje tudi z doktorskim študijem.

Vpliv dinamike velikih podjetij na dinamiko malih podjetij in sivo ekonomijo v panogi lesarstva

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Opravljena raziskava ugotavlja vpliv dinamike velikih podjetij v panogi lesarstva na dinamiko malih podjetij in delež sive ekonomije v panogi. V kvantitativni raziskavi uporabljeni podatki temeljijo na izbranem vzorcu malih in velikih podjetij v panogi lesarstva v Sloveniji. Raziskava je ob pomoči izbranih analitičnih metod pokazala sorazmerno majhen vpliv dinamike in velikostne strukture velikih podjetij na dinamiko malih podjetij v panogi lesarstva. Pomemben vpliv pa izkazuje dinamika velikih podjetij v panogi lesarstva na delež sive ekonomije v panogi. Na osnovi rezultatov opravljene raziskave so predlagane nekatere rešitve problemov. Predlagane rešitve temeljijo na ureditvi državnega regulatornega sistema na način, ki ne bo omejeval formalnega sektorja, ter na pozitivnih zgledih države, ki bodo spodbujali gospodarno ravnanje. Nadalje je pomembno omogočanje enostavnejše pridobitve potrebnega finančnega kapitala za mala podjetja ob sprejemljivih jamstvih in stroških financiranja ter uvedbi dodatne neformalne oblike izobraževanja, ki bi temeljila na pridobivanju temeljnih poslovnih znanj.

Ključne besede: podjetja, dinamika podjetij, podjetništvo, siva ekonomija, panoga lesarstva, Slovenija.

1 Uvod

Raziskava se nanaša na področje obnašanja podjetij in podjetništva ter znotraj tega obravnava ožje znanstveno področje, ki se nanaša na dinamiko in dejavnike nastajanja in umiranja podjetij ter sivo ekonomijo. Temelj raziskave so ekonomska teoretična spoznanja in empirične analize o obnašanju podjetij in podjetništvu ter o dejavnikih, ki vplivajo na nastajanje in umiranje podjetij ter na sivo ekonomijo. Cilj raziskave je ugotoviti, na kakšen način in v kolikšni meri spreminjanje števila in pomena velikih podjetij v panogi lesarstva vpliva na dinamiko nastajanja novih malih podjetij, na morebitne izstope malih podjetij v panogi ter na sivo ekonomijo v panogi lesarstva.

Prvi del raziskave temelji na osnovnih teoretičnih in empiričnih spoznanjih o obnašanju podjetij, ki so povzeta po avtorjih, ki to obravnavajo za zahodna tržna gospodarstva in za tranzicijska ter nastajajoča tržna gospodarstva (na primer Geroski in Machin 1993; Machin in Van-Reenen 1993; Bojnec 1998, 2000; Develaar 1991; Klepper 1999). V nadaljevanju raziskava temelji na teoretičnih in empiričnih izhodiščih, ki obravnavajo dejavnike nastajanja in umiranja podjetij in so bila razvita predvsem za zahodna tržna gospodarstva (na primer Antoncic 2007; García-Morales et al. 2006; Kraus in Schwarz 2007; Smith et al. 2007; Baily et al. 2004, Audretsch 2006, Faisal et al. 2007), kot tudi na rezultatih empiričnih raziskav za slovensko gospodarstvo (na primer Bojnec in Xavier 2004, 2005, 2007; Rebernik et al. 2006; Kocjančič in Bojnec 2007). V drugem, empiričnem delu naloge so obdelani rezultati opravljene raziskave, kjer je kot vir uporabljen vzorec malih in velikih slovenskih podjetij, ki delujejo v panogi lesarstva v Sloveniji. Na koncu podajamo sklepne ugotovitve in nekatere predloge.

2 Teoretična izhodišča dinamike podjetij in sive ekonomije

2.1 Dejavniki dinamike velikih podjetij

Različne raziskave, ki proučujejo dinamiko vstopov in izstopov podjetij, poročajo o visoki stopnji korelacije med dinamiko vstopov in izstopov podjetij, ki pa se deloma razlikuje v odvisnosti od panoge, ki je predmet proučevanja. Stopnja korelacije je podobna kot pri dinamiki vstopov in izstopov podjetij glede na življenjski cikel, v katerem se podjetja nahajajo. Empirične študije, ki proučujejo makroekonomsko okolje v smislu poslovnih zmogljivostih, kažejo, da je dinamika nastajanja in umiranja podjetij povezana s spremembami v makroekonomskem okolju, v katerem proučevana podjetja delujejo (Hudson 1986; Robson 1996). Dinamika izstopov podjetij se povečuje, če se povečuje finančna nestabilnost v skladu s hipotezo o življenjskem ciklu podjetja. Tako dinamika nastajanja kot dinamika umiranja podjetij pa se spreminja glede na stop-

njo finančne stabilnosti tako nominalno kot realno. Ekonomski cikel, opredeljen z makroekonomskimi spremenljivkami, kot so stopnja povpraševanja, stopnja nezaposlenosti in rast stopnje ponudbe, vpliva na stopnjo dobičkonosnosti (Geroski in Machin 1993; Machin in Van-Reenen 1993; Geroski et al. 1997), ki posledično vpliva na dinamiko vstopov in izstopov podjetij. Raziskave potrjujejo vpliv sprememb v makroekonomskem okolju na dinamiko nastajanja in umiranja podjetij (Higson et al. 2002, 2004).

Rast trga in tehnološke spremembe so glavni dejavniki, ki vplivajo na strukturo proizvodnje in distribucije. Stopnja rasti se odraža v dinamiki vstopov in izstopov podjetij ter njihovi velikostni strukturi (Dunne et al. 1988). Velika podjetja, ki vlagajo več sredstev v raziskave in razvoj (R&R), in podjetja, ki imajo uspešnejše R&R projekte, kažejo težnjo rasti, ki je dodatno spodbujena z izstopi manj učinkovitih podjetij (Klepper 1999). Življenjski cikel se skozi povpraševanje in neposredne investicije odraža v mednarodni migraciji delovno intenzivnih panog. Teorija življenjskega cikla, ki temelji na povpraševanju in neposrednih investicijah temelji na dveh domnevah. Prvič, da se povpraševanje po novih izdelkih ustvarja v razvitih industrijskih državah in se nato razširi na področja manj razvitih držav. Drugič, da se z zrelostjo v smislu življenjskega cikla manj vlaga v tehnološki razvoj in inovacije, kar se odraža v razvojnem ciklu na način, da se nove industrije začenjajo v visoko industrijskih državah, kjer obstajajo povpraševanje ter tehnološki in znanstveni viri. S povečevanjem povpraševanja na manj razvitih trgih proizvodnja postane standardizirana, kar omogoča selitev proizvodnje v manj razvite države s cenejšo delovno silo. Razvite industrijske države začenjajo proizvode uvažati iz držav s cenejšo delovno silo (Vernon 1966).

2.2 Dejavniki dinamike malih podjetij

Na dinamiko nastajanja ali prenehanja delovanja nekega gospodarskega subjekta vpliva množica različnih dejavnikov, med katerimi so dejavniki tako ekonomskega kot neekonomskega značaja (Antončič 2007; García-Morales et al. 2006; Kraus in Schwarz 2007; Smith et al. 2007). Oportunitetni stroški kapitala, dostop do kapitala, donosnost kapitala, obravnava usposobljene delovne sile, managementa in tržnih kanalov, vplivi lokalnih oblasti so samo nekateri od dejavnikov, ki vplivajo na odločitev o ustanovitvi ali prenehanju delovanja podjetja (Bojnec in Xavier 2004, Baily et al. 2004, Audretsch 2006, Faisal et al. 2007). Močan vpliv na ekonomsko upravičenost poslovnih podjemov in na s tem povezano dinamiko podjetij imata denarna in proračunska politika, ki z obrestnimi merami, davki in javnimi izdatki vplivata na donosnost kapitala (Li et al. 2007). Socialni partnerji in sindikati prav tako vplivajo na dinamiko nastajanja in umiranja podjetij z določanjem minimalnih in zajamčenih plač, saj dvigujejo točko preloma na raven, kjer so določena podjetja prisiljena prenehati s poslovanjem in se umakniti s trga.

Raziskava dejavnikov nastajanja in umiranja podjetij v predelovalnem sektorju gospodarstva v Sloveniji, ki sta jo opravila Bojnec in Xavier (2004) za obdobje 1994–2000 kaže, da na dinamiko vstopov in izstopov slovenskih podjetij pomembno vplivajo dejavniki, kot so tehnološke ovire, vrsta lastništva podjetja, izvozna orientacija, tuji konkurenčni pritiski in panožne značilnosti. Raziskava kaže, da delovno intenzivne panoge izkazujejo večjo stopnjo vstopov novih podjetij. Ta podjetja zaradi nizkega vstopnega kapitala izkazujejo boljšo stopnjo donosnosti, zaradi česar je mogoče zaznati manjši delež izstopov teh podjetij. Podjetja z večjim deležem zasebnega lastništva izkazujejo večji delež izstopov zaradi stečaja. Izvozno usmerjena podjetja izkazujejo manjši delež izstopov podjetij, hkrati pa tudi manjši delež nastajanja novih podjetij. Neučinkovita domača podjetja so izrinjena s trga zaradi ponudbe tujega blaga boljše kakovosti. Panoge z visoko koncentracijo podjetij, izkazujejo večji delež izstopov neučinkovitih podjetij kot panoge, v katerih je koncentracija podjetij manjša (Bojnec in Xavier 2004, 2005, 2007).

Raziskava dejavnikov dinamike malih podjetij v panogi lesarstva v Sloveniji, ki sta jo opravila Kocjančič in Bojnec (2007) kaže, da na odločitev o ustanovitvi podjetja vplivajo predvsem dejavniki okolja malih podjetij in dejavniki vloge podjetnika. Med dejavniki okolja podjetja imajo največji vpliv dejavniki, kot so delež prodaje, sposobnost financiranja tekočega poslovanja in plačilna nedisciplina. Med dejavniki vloge podjetnika pa največji vpliv izkazujejo dejavniki sposobnost zaznavanja poslovnih priložnosti, sposobnost vodenja podjetja in motivacija podjetnika. Na odločitev o izstopu ali prenehanju poslovanja podjetja izkazujejo največji vpliv dejavniki okolja podjetja in v nekoliko manjši meri dejavniki vloge podjetnika.

2.3 Dejavniki sive ekonomije

Slovenija je v študijah o sivi ekonomiji redko zajeta. Še največkrat je omenjena v raziskavah sive ekonomije v tranzicijskih državah ali pridruženih članicah EU. Rezultati raziskav se običajno razlikujejo zaradi uporabljenih različnih definicij in metodologij, kar pogosto onemogoča njihovo primerljivost. Raziskava, ki sta jo opravila Schneider in Enste (2003), navaja 22,6% delež bruto družbenega proizvoda, ustvarjenega v sivi ekonomiji v Sloveniji v obdobju 1990–1993, 23,9% v obdobju 1994–1995 in 26,7% v obdobju 2000–2001, pri čemer sta upoštevala vse tiste ekonomske aktivnosti, ki so administrativno urejene in bi bile normalno obdavčene. Ocena deleža sive ekonomije v Sloveniji v letu 2003, ki jo je opravila Evropska komisija, znaša okrog 17% ustvarjenega bruto družbenega proizvoda (European Commission 2004). Primerjava nedavnih ocen deleža sive ekonomije v Sloveniji s preteklimi ocenami kaže na upadanje deleža ekonomskih aktivnosti, ki delujejo v neformalnem sektorju, kar kaže na konec obdobja tranzicije, na učinkovitejše in stabilnejše makroekonomsko okolje, na liberalnejšo zakonodajo in tržno ekonomijo (Nastav in Bojnec 2007).

Internacionalizacija gospodarstva in povečevanje konkurenčnih pritiskov po eni strani spodbujajo fleksibilnost in inovativnost malih podjetij, po drugi strani pa lahko vplivajo na slabše poslovne rezultate predvsem manj učinkovitih malih podjetij. V takih pogojih so posamezniki prisiljeni iskati alternativne vire dohodkov, kar po eni strani vpliva na dinamiko nastajanja novih, učinkovitejših malih podjetij, po drugi strani pa povečuje delež dejavnosti, ki delujejo v neformalnem sektorju gospodarstva (Nastav in Bojnec 2008). Po mnenju Evropske komisije in OECD (European Commission 2004,

OECD 2002) obstaja neposredna odvisnost med malimi podjetji, predvsem tistimi, v katerih je zaposlen lastnik sam, in sivo ekonomijo. Trditev temelji na dejstvu, da so mala podjetja fleksibilnejša, se laže izogibajo neprijazni zakonodaji in administraciji in zato laže prikrijejo del svoje dejavnosti, ki jo izvajajo v obliki sive ekonomije.

Razmerje med stopnjo nezaposlenosti in dinamiko nastajanja novih podjetij predvsem z namenom samozaposlitve ima lahko tako pozitivne učinke na dinamiko vstopov kot tudi obratno (Audretsch et al. 2005). Prvič, nezaposleni posamezniki so pripravljeni ustanoviti lastno podjetje v primeru nizkih oportunitetnih stroškov samozaposlitve. Drugič, visoka stopnja nezaposlenosti ima za posledico večji delež dejavnosti, ki se izvajajo v sivi ekonomiji, kar je povezano z nizko stopnjo dinamike nastajanja novih podjetij kot posledico gospodarstva v depresiji. Pozitivni vplivi sive ekonomije se kažejo predvsem v zmanjševanju socialnih napetosti, po drugi strani pa je siva ekonomija svojevrsten inkubator novih podjetij, ko posamezniki prerastejo okvir delovanja v tem neformalnem sektorju gospodarstva in ustanovijo nova mala podjetja. Negativni vplivi se izkazujejo predvsem na področju manj pobranih dajatev in manjši konkurenčnosti podjetij, ki delujejo v formalnem sektorju gospodarstva (Nastav 2009).

3 Metodologija in uporabljeni podatki

Cilj raziskave je z izbranimi analitičnimi metodami ugotoviti, na kakšen način in v kolikšni meri spreminjanje števila in pomena velikih podjetij v panogi lesarstva vpliva na dinamiko nastajanja novih malih podjetij, na morebitne izstope malih podjetij v panogi ter na sivo ekonomijo. Ugotoviti tudi želimo, v kolikšni meri in na kakšen način dinamika vstopov in izstopov malih podjetij vpliva na gospodarske kazalnike uspešnosti, dobičkonosnost sredstev in dobičkonosnost kapitala v panogi lesarstva. Dobljene empirične rezultate raziskave primerjamo s podobnimi raziskavami v literaturi in izvedemo implikacije za podjetniške odločitve na ravni podjetja in za potrebe ekonomske politike.

Za zbiranje podatkov v izbranem vzorcu podjetij je uporabljen anketni vprašalnik, ki je sestavljen iz kratkih, pretežno zaprtih vprašanj. Možnost izbire odgovorov temelji na obliki, ki je znana kot Likertova lestvica (Easterby-Smith, Thorpe in Lowe 2005). Anketiranci obkrožijo enega od petih odgovorov, ki kažejo intenzivnost strinjanja ali nestrinjanja z začetno izjavo v naslednji obliki (Likertova lestvica): sploh ne vpliva – 1, ne vpliva – 2, neodločen – 3, vpliva – 4, zelo vpliva – 5. Zbiranje podatkov s pomočjo anketnega vprašalnika je bilo izvedeno po pošti s priloženim spremnim dopisom in anketnim vprašalnikom, v tretjem četrtletju leta 2008 in delno v začetku leta 2009.

V anketo je bilo vključenih slabih 21% populacije malih podjetij ter samostojnih podjetnikov, ki delujejo v panogi lesarstva, kar pomeni približno 700 podjetij ter celotna populacija velikih podjetij v panogi. Vrnjenih je bilo 168 izpolnjenih anketnih vprašalnikov. Statistična populacija, ki smo jo opazovali za namene raziskave, po podatkih statističnega urada Republike Slovenije za leto 2007 zajema 3.324 mikro in malih podjetij ter 18 velikih podjetij, ki delujejo v panogi lesarstva v Sloveniji. Za namene vzorčenja je pri izbiri v vzorec zajetih statističnih enot uporabljena metoda verjetnostnega vzorčenja, kar pomeni, da je imelo vsako podjetje v proučevani populaciji enako možnost, da je izbrano v vzorec. Metoda enostavnega naključnega vzorčenja je bila izbrana zaradi njene primernosti pri vzorčenju v velikih populacijah. Vzorčenje je potekalo na način, da je bilo v populaciji podjetij, kot so navedena v izbranih zbirkah podatkov, naključno ročno izbrano vsako četrto podjetje, ki je ustrezalo pogoju statistične populacije. Interval je bil izbran tako, da smo število članov populacije delili s številom vzorčnih enot.

V okviru raziskave so z namenom zbiranja in obdelave podatkov uporabljene raziskovalne metode opisne statistike in multivariatna faktorska analiza. Majhna družba je družba, ki izpolnjuje dve od naslednjih meril: povprečno število delavcev v poslovnem letu ne presega 50, čisti prihodki od prodaje ne presegajo 7.300.000 evrov in vrednost aktive ne presega 3.650.000 evrov. Velika družba je družba, ki izpolnjuje naslednja merila: povprečno število delavcev v poslovnem letu presega 250, čisti prihodki od prodaje presegajo 29.200.000 evrov in vrednost aktive presega 14.600.000 evrov (ZGD 2006, 55. člen).

Temeljna teza raziskave je, da obstaja neposredna povezanost med spreminjanjem števila in pomena velikih podjetij v panogi lesarstva in dinamiko nastajanja in umiranja malih podjetij v panogi ter med spreminjanjem deleža sive ekonomije v panogi in ekonomsko uspešnostjo v panogi.

Temeljna teza temelji na naslednjih podtezah:

- zmanjševanje števila velikih podjetij vpliva na povečano dinamiko vstopov in izstopov malih podjetij v panogi lesarstva;
- povečana dinamika vstopov povečuje konkurenčne pritiske, je negativno povezana z ekonomsko uspešnostjo panoge lesarstva in je pozitivno povezana z izstopi malih podjetij v panogi lesarstva; hkrati je povečana dinamika podjetij pozitivno povezana z ekonomsko uspešnostjo rastočih podjetij, ki so preživela povečane konkurenčne pritiske v panogi lesarstva;
- zmanjševanje števila velikih podjetij v panogi povečuje delež sive ekonomije v panogi lesarstva.

Temeljna teza raziskave je testirana s pomočjo za ta namen postavljenih hipotez in raziskovalnih vprašanj. Raziskava temelji na zbiranju informacij s pomočjo anketnega vprašalnika, ki je omogočil pridobitev informacij za testiranje hipotez. Pridobljeni odgovori na raziskovalna vprašanja so testirani s pomočjo statističnega testa za določitev odvisnosti oziroma neodvisnosti določenih spremenljivk, njegovi rezultati pa omogočajo, da se temeljna teza potrdi ali zavrže.

4 Struktura in dinamika malih podjetij v panogi lesarstva

Raziskava temelji na teoretičnih in empiričnih izhodiščih, ki obravnavajo dejavnike nastajanja in umiranja podjetij in so bila razvita predvsem za zahodna tržna gospodarstva, kot tudi na rezultatih empiričnih raziskav za slovensko gospodarstvo (na primer Rebernik et al. 2006 Bojnec in Xavier 2004, 2005, 2007). Prav tako je poudarek na raziskavah o strukturi in dina-

Tabela 1: Populacija podjetij v panogi lesarstva v Sloveniji, 2007

	Število podjetij		Število oseb, ki delajo	
Standardna klasifikacija dejavnosti (SKD)	DD20	DN36	DD20	DN36
Mikro podjetje (0 – 9 zaposlenih)	1.520	1.568	3.030	3.139
Malo podjetje (10 – 49 zaposlenih)	119	117	2.326	2.524
Skupaj mikro in mala podjetja	1.639	1.685	5.356	5.663
Velika podjetja (več kot 250 zaposlenih)	6	12	3.385	5.212
Skupaj opazovana populacija	1.645	1.697	8.741	10.875

Opomba: DD20 – obdelava in predelava lesa
DN36 – proizvodnja pohištva in druge predelovalne dejavnosti
Vir: SURS 2008 (SI-stat).

miki malih podjetij (na primer European Commission 2002, IMAD 2004).

V raziskavi nastopajo kot statistična populacija vsa mikro in mala podjetja, ki delujejo v panogi lesarstva in po standardni klasifikaciji dejavnosti (SKD) spadajo v podskupino DD20 – obdelava in predelava lesa, ter skupino DN36 - proizvodnja pohištva in druge predelovalne dejavnosti (tabela 1).

4.1 Vpliv zmanjševanja števila velikih podjetij na dinamiko malih podjetij

Na podlagi opravljene analize, ki temelji na rezultatih opravljene ankete lahko sodimo, da je vpliv zmanjševanja števila velikih podjetij na dinamiko nastajanja malih podjetij v panogi lesarstva sorazmerno šibak oziroma po mnenju respondentov le v manjši meri vpliva na dinamiko nastajanja in umiranja malih podjetij v panogi lesarstva (slika 1).

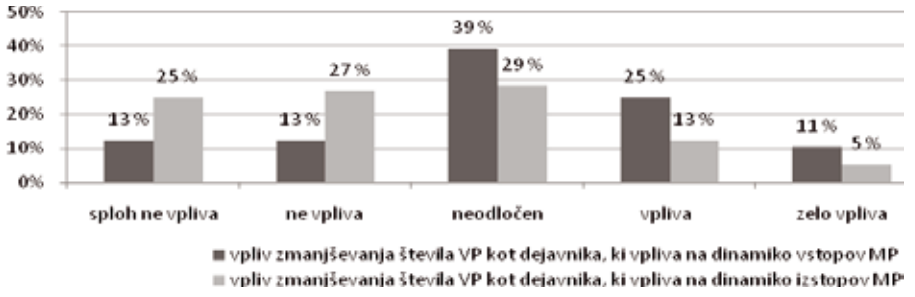
Rahlo večji vpliv izkazuje sicer vpliv zmanjševanja števila velikih podjetij na dinamiko nastajanja malih podjetij v panogi, se pa vrednosti v odgovorih bistveno ne razlikujejo, zato lahko posplošimo razlago tako na dinamiko nastajanja kot na dinamiko umiranja malih podjetij v panogi lesarstva. Povprečna vrednosti pri posameznih dejavnikih se giblje v razponu od 3,00 do 3,09 (neodločen na ocenjevalni lestvici 1–5).

Vpliv novih malih podjetij na ponudbo novih proizvodov

Ugotavljanje vpliva pozitivne dinamike nastajanja novih malih podjetij v panogi lesarstva v Sloveniji na ponudbo novih proizvodov ali storitev zajema štiri dejavnike, ki pojasnjujejo, v kolikšni meri se poveča ponudba obstoječih ali novih proizvodov in storitev ob uporabi obstoječih ali novih prodajnih kanalov. Analiza kaže največji vpliv pozitivne dinamike novih malih podjetij na večjo količino ponudbe obstoječih proizvodov s povprečno vrednostjo odgovorov 3,29 (neodločen do blag vpliv na ocenjevalni lestvici 1–5). Glede na dejstvo, da je razpon povprečnih vrednosti posameznih dejavnikov med 3,09 in 3,29, pa lahko sklepamo, da se nekoliko povečata tako ponudba obstoječih, izpopolnjenih kot ponudba novih proizvodov. Na podlagi tega lahko sklepamo, da so se velika podjetja v delovno intenzivnih panogah, kamor spada tudi panoga lesarstva, prisiljena zaradi ekonomskih razlogov umakniti s trga ali vsaj zmanjšati povprečno velikost podjetij, medtem pa nastale tržne vrzeli zapolnijo obstoječa in nova mala podjetja, ki delujejo predvsem na področjih, ki jih je zaradi narave lokalne naravnanosti, logističnih in drugih vzrokov težko preseliti v države s cenejšo delovno silo.

4.2 Vpliv zmanjševanja velikostne strukture velikih podjetij na dinamiko malih podjetij

Na podlagi opravljene analize, ki temelji na rezultatih opravljene ankete, lahko sodimo, da je vpliv zmanjševanja velikostne



Slika 1: Frekvenčna porazdelitev vpliva zmanjševanja števila velikih podjetij na dinamiko malih podjetij v panogi lesarstva

strukture velikih podjetij na dinamiko nastajanja malih podjetij v panogi lesarstva šibak oziroma po mnenju respondentov bistveno ne vpliva na dinamiko nastajanja in umiranja malih podjetij v panogi lesarstva. Vpliv na dinamiko vstopov izkazuje povprečno vrednost 2,88 in standardni odklon 1,15 ocene, vpliv na dinamiko izstopov pa povprečno vrednost 2,40 (ne vpliva na ocenjevalni lestvici 1–5) s standardnim odklonom 1,11 ocene.

Dejavniki odločitve o ustanovitvi malega podjetja

Dejavniki odločitve za nastanek večjega števila malih podjetij v panogi lesarstva zajemajo tri temeljne dejavnike, ki se nanašajo na reševanje ekonomsko-socialnega statusa posameznika, podjetniški izziv in možnost boljšega zaslužka (tabela 2). Analiza dejavnikov, ki vplivajo na odločitev za ustanovitev novega malega podjetja v panogi, kaže, da izbrani dejavniki izkazujejo pomemben vpliv na dinamiko nastajanja novih malih podjetij v panogi lesarstva. Najmočnejši vpliv izkazuje dejavnik možnost boljšega zaslužka, sledi mu dejavnik reševanje ekonomsko-socialnega statusa posameznika in dejavnik podjetniški izziv.

Po raziskavi, ki jo je opravil Statistični urad Republike Slovenije (tabela 3), se med najpogostejšimi razlogi za ustanovitev podjetja pojavljajo pričakovanje boljšega zaslužka, želja po izzivih, biti sam svoj gospod in izogniti se brezposelnosti. Na podlagi teh dejstev lahko zaključimo, da se dejavniki, ki vplivajo na odločitev o ustanovitvi novih malih podjetij v panogi lesarstva v Sloveniji, bistveno ne razlikujejo od dejavnikov, ki izkazujejo pomemben vpliv na odločitev o ustanovitvi podjetja v ostalih panogah v Sloveniji.

Dejavniki, ki otežujejo odločitev o ustanovitvi malega podjetja

Dejavniki, ki v največji meri ovirajo odločitev o ustanovitvi novega malega podjetja, so vpliv pomanjkanja poslovnih

Tabela 2: Dejavniki odločitve za nastanek večjega števila novih malih podjetij v panogi lesarstva (Likertova lestvica 1–5)

Dejavniki	N	Povprečna vrednost	Modus	Mediana	Standardni Odklon
Reševanje ekonomsko-socialnega statusa	165	3,62	4	4,00	1,090
Podjetniški izziv	165	3,56	4	4,00	0,872
Možnost boljšega zaslužka	165	3,85	4	4,00	0,964

Opomba: N=število opazovanj. Oznaka stališč: 1 – zelo nepomembno; 2 – nepomembno; 3 – neodločen; 4 – po membno; 5 – zelo pomembno

Tabela 3: Najpogostejši razlogi slovenskih podjetnikov za ustanovitev podjetja (SURS 2006)

Vrstni red	Najpogostejši razlogi	Delež izbranih odgovorov
1.	Pričakovanje boljšega zaslužka	73 %
2.	Želja po izzivih	69 %
3.	Biti sam svoj gospod	66 %
4.	Izognitev nezaposlenosti	58 %

Vir: SURS 2006, dejavniki poslovne uspešnosti novonastalih podjetij brez predhodnika, nastalih v letu 2002, ki so v letu 2005 še poslovala.

Tabela 4: Dejavniki, ki otežujejo odločitev o ustanovitvi malih podjetij v panogi lesarstva (Likertova lestvica 1–5)

Dejavniki	N	Povprečna vrednost	Modus	Mediana	Standardni Odklon
Pomanjkanje poslovnih znanj	150	2,92	3	3,00	1,201
Pomanjkanje strokovnih znanj	150	2,68	3	3,00	1,143
Pomanjkanje ustanovnega kapitala	153	4,06	5	4,00	0,982
Obstoječa konkurenca v panogi	153	2,86	2	3,00	1,089
Konkurenca sive ekonomije	153	3,35	4	4,00	1,238
Tuja uvozna konkurenca					

Opomba: N=število opazovanj. Oznaka stališč: 1 – zelo nepomembno; 2 – nepomembno; 3 – neodločen; 4 – pomembno; 5 – zelo pomembno

in strokovnih znanj, pomanjkanje ustanovnega kapitala, vpliv obstoječe konkurence, vpliv konkurence sive ekonomije in vpliv tuje uvozne konkurence (tabela 4). Analiza kaže zelo pomemben vpliv dejavnika pomanjkanje ustanovnega kapitala in pomemben vpliv dejavnika konkurence sive ekonomije kot oviro pri določitvi za ustanovitev malega podjetja. Ostali dejavniki izkazujejo manjši vpliv, in sicer od vrednosti nepomembno do neodločen.

Vpliv konkurence malih podjetij na kazalce uspešnosti

Analiza vpliva večjega števila novih malih podjetij v panogi lesarstva v Sloveniji na stopnjo konkurence in kazalce uspešnosti v panogi zajema pet dejavnikov. Zajeti so vplivi povečanega števila novih malih podjetij na stopnjo dodane vrednosti, stopnjo zaposlenosti, stopnjo dodane vrednosti na zaposlenega, stopnjo konkurence in stopnjo ekonomske uspešnosti rastočih preživelih podjetij (tabela 5). Analiza izbranih dejavnikov, kaže neodločen do pomemben vpliv povečanega števila novih malih podjetij v panogi. Največji vpliv izkazuje dejavnik ekonomske uspešnosti rastočih preživelih podjetij, sledi pa mu dejavnik dodane vrednosti na zaposlenega.

4.3 Regresijska analiza

Predmet regresijske je analiza odvisnosti števila malih podjetij (ST_MP) v panogi lesarstva od števila velikih podjetij (ST_VP) in števila zaposlenih v velikih podjetjih (ZAP_VP),

Za namene regresijske analize so uporabljeni podatki povprečnega števila velikih podjetij, povprečnega števila malih podjetij in povprečnega števila zaposlenih v velikih podjetjih v posameznem letu za obdobje 1989- 2007 v skupini DD20 in DN36 (SKD).

Vir podatkov: SURS 2009 (SI-Stat), Slovenija, 1989–2007.

Regresijska enačba:

$ST\_MP``=a+b_1*ST\_VP+b_2*ZAP\_VP$

Ocena regresijske funkcije:

ST_MP``=5257,385+134,672*ST_VP-0,477*ZAP_VP

Na podlagi rezultatov regresijske analize ocenjujemo, da se število malih podjetij v panogi lesarstva v povprečju poveča za 135, če se število velikih podjetij v panogi poveča za 1. Iz navedenega lahko, glede na razpoložljive podatke, sklepamo, da se število malih podjetij v panogi lesarstva povečuje, če se povečuje število velikih podjetij v panogi. Ker gre za istosmerno odvisnost lahko sklepamo, da se tako število velikih podjetij kot malih podjetij v panogi lesarstva povečuje v obdobju panožne in gospodarske ekspanzije in obratno.

Hkrati ocenjujemo, da se število malih podjetij v panogi lesarstva v povprečju poveča za 0,48, če se število zaposlenih v velikih podjetij v panogi zmanjša za 1. Iz navedenega lahko sklepamo, da se število malih podjetij v panogi lesarstva povečuje, ko se zmanjšuje število zaposlenih v velikih podjetjih. Sklepati je, da se času gospodarske ekspanzije povečuje povpraševanje po delovni sili tako v velikih kot malih podjetjih. Posledica tega dejstva je, da določeno število zaposlenih v velikih podjetjih v panogi prepozna podjetniško priložnost, ki izhaja iz povečanega povpraševanja na trgu in se zato odloči zapustiti delovno mesto v velikem podjetju in ustanoviti lastno malo podjetje, hkrati pa velika podjetja v teh obdobjih težko zapolnijo iz tega razloga sproščena delovna mesta.

4.4 Multivariatna faktorska analiza dejavnikov dinamike malih podjetij

S pomočjo multivariatne faktorske analize smo poskušali ugotoviti, ali obstajajo določeni skupni dejavniki (faktorji), s katerimi je mogoče pojasniti razlike v dinamiki malih podjetij. Vpliv na dinamiko malih podjetij smo merili s povprečnimi vrednostmi odgovorov izbranih dejavnikov.

Na podlagi korelacijske matrike smo ugotovili, da je povezanost med povprečnimi vrednostmi odgovorov posameznih dejavnikov relativno šibka. Največja je sicer odvisnost med povprečnimi vrednostmi odgovorov za dejavnike: vpliv donosnosti kapitala na investicijska vlaganja in vpliv dodane vrednosti na zaposlenega na vlaganja v tehnološko opremo. Glede na vrednosti v korelacijski matriki je bil postavljen faktorski model z dvema skupnima faktorjem, s katerima je mogoče

Tabela 5: Vpliv konkurence malih podjetij na kazalce uspešnosti v panogi lesarstva (Likertova lestvica 1–5)

Dejavniki	N	Povprečna vrednost	Modus	Mediana	Standardni Odklon
Vpliv večjega števila MP na stopnjo dodane vrednosti v panogi	156	3,06	3	3,00	1,011
Vpliv večjega števila MP na stopnjo zaposlenosti	156	3,29	4	3,50	0,990
Vpliv večjega števila MP na stopnjo dodane vrednosti na zaposlenega DV/Z	156	3,38	4	3,50	1,062
Vpliv večjega števila MP na konkurenco in stopnjo donosnosti kapitala	168	3,23	4	3,00	0,966
Vpliv večjega števila MP na ekonomsko uspešnost rastočih preživelih podjetij	168	3,41	4	4,00	1,017

Opomba: N=število opazovanj. MP=mala podjetja. DV=dodana vrednost. Z=zaposleni
Oznaka stališč: 1 – sploh ne vpliva; 2 – ne vpliva; 3 – neodločen; 4 – vpliva; 5 – zelo vpliva

Tabela 6: Delež pojasnjene variabilnosti dejavnikov dinamike malih podjetij

	Začetne vrednosti			Končne vrednosti po rotaciji		
Dejavnik	skupaj	delež variance	delež skupaj	skupaj	delež variance	delež skupaj
1	5,132	24,440	24,440	4,495	21,406	21,406
2	3,568	16,992	41,432	2,986	14,221	35,628
3	2,129	10,138	51,569			
4	1,884	8,973	60,543			
5	1,362	6,487	67,029			
:	:	:	:			
21	0,410	0,197	100,000			

Opomba: Metode ocenjevanja: metoda glavnih osi in metoda največjega verjetja.

pojasniti nekaj manj kot polovico skupne variabilnosti dinamike malih podjetij.

Za oceno komunalitet smo uporabili metodo glavnih osi ter metodo največjega verjetja. Na podlagi ocen komunalitet je bilo mogoče ugotoviti najvišje deleže pojasnjene variance s skupnima faktorjema pri dejavnikih vpliv večjega števila malih podjetij na stopnjo dodane vrednosti na zaposlenega in možnost boljšega zaslužka. Z dvema skupnima faktorjema lahko pojasnimo slabih 42 % celotne variabilnosti v vzorcu (tabela 6). Faktorske uteži smo ocenili s poševnokotno in pravokotno rotacijo.

Ocena faktorskih uteži na prvem skupnem faktorju pokaže najvišje uteži pri dejavnikih stopnja dodane vrednosti na zaposlenega, konkurenca, stopnja donosnosti kapitala in stopnja zaposlenosti, ki so predvsem dejavniki ekonomske narave, zato prvi skupni faktor označimo kot vlogo dejavnikov ekonomske narave na dinamiko malih podjetij. Ocena faktorskih uteži na drugem skupnem faktorju pokaže najvišje uteži pri dejavnikih vpliv zmanjševanja števila velikih podjetij na dinamiko vstopov malih podjetij in vpliv zmanjševanja povprečne velikosti velikih podjetij na dinamiko vstopov malih podjetij, ki so predvsem dejavniki vpliva dinamike velikih podjetij na dinamiko malih podjetij, zato drugi skupni faktor označimo kot vlogo spreminjanja števila in velikostne strukture velikih podjetij.

5 Dinamika malih podjetij in sive ekonomije v panogi lesarstva

Raziskava analizira vpliv spreminjanja števila in velikostne strukture velikih podjetij v panogi lesarstva v Sloveniji na delež sive ekonomije in vzroke za delovanje v sivi ekonomiji v izbrani panogi. Temelj raziskave so osnovna teoretična in empirična spoznanja, ki temeljijo na avtorjih, ki obravnavajo področje sive ekonomije v svetu in v Sloveniji (na primer Smith 1994; Feige 1990, 1999; Fleming et al. 2000; Schneider et al. 2002, 2003; Bojnec in Xavier 2004, 2005, 2007; Nastav in Bojnec 2007a, 2007b, 2008)**.** V zadnjem obdobju se zaradi slabih gospodarskih rezultatov, ki jih dosega panoga lesarstva v Slovenji, spreminja število in velikostna struktura velikih podjetij v panogi, kar ima za posledico zmanjševanje števila zaposlenih v tem sektorju gospodarstva. Del presežne delovne sile, ki se pojavlja kot posledica spreminjanja števila in velikostne strukture velikih podjetij v panogi lesarstva, se deloma zaradi nezmožnosti zaposlitve in deloma zaradi pričakovanja boljšega zaslužka odloči za sivo ekonomijo, kar vpliva na dinamiko vstopov in izstopov malih podjetij v panogi. Siva ekonomija s svojo ponudbo povečuje konkurenčne pritiske na trgu ponudbe v panogi lesarstva, kar zmanjšuje donosnost panoge in s tem vpliva na povečano dinamiko izstopov manj učinkovitih malih podjetij v panogi.

5.1 Vpliv dinamike velikih podjetij na delež sive ekonomije

Vpliv zmanjševanja števila velikih podjetij na delež sive ekonomije v panogi lesarstva, na podlagi opravljene analize, izkazuje sorazmerno močan pozitiven vpliv na delež sive ekonomije v panogi (vrednost 3,89 na Liketrovi lestvici). Zmanjševanje števila velikih podjetij v panogi lesarstva pomembno vpliva na povečevanje deleža sive ekonomije v panogi.

Vpliv zmanjševanja velikostne strukture velikih podjetij na delež sive ekonomije v panogi lesarstva, na podlagi opravljene analize, izkazuje sorazmerno močan pozitiven vpliv na povečanje deleža sive ekonomije v panogi (vrednost 3,82 na Liketrovi lestvici). Predhodni sklep lahko dopolnimo z ugotovitvijo, da na visok delež sive ekonomije v panogi vpliva tako dinamika zmanjševanja števila kot zmanjševanja velikostne strukture velikih podjetij v panogi.

Analiza vpliva cena dela v strukturi dodane vrednosti na zaposlenega v primerjavi z ostalim gospodarstvom na delež sive ekonomije v panogi in dinamiko izstopov malih podjetij v panogi, izkazuje pomemben vpliv cene dela na dinamiko deleža sive ekonomije (3,85 na Likertovi lestvici) in nekoliko manjši vpliv na dinamiko izstopov. Na podlagi analize anketnih podatkov lahko sklenemo, da oba izbrana dejavnika vplivata na dinamiko deleža sive ekonomije v panogi in na s tem povezano dinamiko malih podjetij .

Vpliv sive ekonomije s svojo ponudbo proizvodov in storitev izkazuje zmerno pomemben vpliv na konkurenčnost malih podjetij v panogi (vrednost je 3,65 na Likertovi lestvici). Siva ekonomija s svojo ponudbo torej zmerno pomembno vpliva na zmanjševanje konkurenčnosti malih podjetij v panogi lesarstva, ki delujejo v formalnem sektorju gospodarstva.

Tabela 7: Dejavnik odločitve za delovanje v sivi ekonomiji (Likertova lestvica 1–5)

Dejavniki	N	Povprečna vrednost	Modus	Mediana	Standardni Odklon
Stopnja dodane vrednosti na zaposlenega (DV/Z)	162	3,61	4	4,00	0,954
Nizka dodana vrednost	159	3,60	4	4,00	0,835
Pomanjkanje ustanovnega kapitala	162	3,30	4	3,00	0,918
Stopnja konkurence v panogi	159	3,23	3	3,00	0,885
Višina davkov in prispevkov	162	3,96	4	4,00	0,905
Davčni predpisi	159	3,91	4	4,00	0.786
Možnost za večji zaslužek	162	3,93	4	4,00	0,962
Nizka moralnost ljudi	159	3,58	4	4,00	1,021
Pomanjkanje ustreznih delovnih mest	156	3,06	3	3,00	1,120

Opomba: N=število opazovanj. DV=dodana vrednost, Z=zaposleni. Oznaka stališč: 1 – sploh ne vpliva; 2 – ne vpliva; 3 – neodločen; 4 – vpliva; 5 – zelo vpliva

5.2 Dejavniki in siva ekonomija v panogi lesarstva

Dejavniki sive ekonomije v panogi lesarstva

Analiza dejavnikov odločitve za delovanje v sivi ekonomiji zajema devet najpomembnejših dejavnikov (tabela 7). Najmočnejši vpliv za delovanje v sivi ekonomij izkazujejo dejavniki višina davkov in prispevkov, možnost za boljši zaslužek in davčni predpisi. Najnižji vpliv pa izkazujejo dejavniki pomanjkanje ustanovnega kapitala, stopnja konkurence v panogi in pomanjkanje ustreznih delovnih mest.

Dinamika in delež sive ekonomije v panogi lesarstva

Analiza dinamike in deleža sive ekonomije v panogi lesarstva zajema gibanje deleža sive ekonomije v panogi in oceno deleža sive ekonomije v panogi lesarstva. Ocena dinamike gibanja deleža sive ekonomije, ki temelji na oceni respondentov, izkazuje, da delež sive ekonomije ostaja nespremenjen oziroma se rahlo povečuje. Analiza ocene deleža sive ekonomije v panogi lesarstva po oceni respondentov znaša slabih 22% (tabela 8). Z ocenjenim deležem sive ekonomije, ki znaša slabih 22%, je povsem primerljiva z deležem sive ekonomije ostalega gospodarstva.

5.3 Multivariatna faktorska analiza dejavnikov dinamike sive ekonomije

S pomočjo multivariatne faktorske analize smo poskušali ugotoviti, ali obstajajo določeni skupni dejavniki (faktorji), s katerimi je mogoče pojasniti razlike v deležu sive ekonomije v panogi lesarstva v Sloveniji.

Na podlagi korelacijske matrike smo ugotovili, da je povezanost med povprečnimi vrednostmi odgovorov posameznih dejavnikov relativno šibka. Srednja do visoka je odvisnost med povprečnimi vrednostmi odgovorov za dejavnike: vpliv

Tabela 8: Deleža sive ekonomije v panogi lesarstva

Dejavniki	N	Povprečna vrednost	Modus	Mediana	Standardni odklon
Delež sive ekonomije	165	21,73	30	22,00	9,936

Tabela 9: Delež pojasnjene variabilnosti dejavnikov deleža sive ekonomije

	Začetne vrednosti			Končne vrednosti po rotaciji		
Dejavniki	skupaj	delež variance	delež skupaj	skupaj	delež variance	delež skupaj
1	4,176	29,826	29,826	3,680	26,282	26,282
2	2,133	15,234	45,060	1,792	12,803	39,086
3	1,444	10,316	55,377			
4	1,194	8,531	63,907			
5	0,947	6,763	70,670			
:	:	:	:			
14	0,107	0,762	100,000			

Opomba: Metode ocenjevanja: metoda glavnih osi in metoda največjega verjetja.

zmanjševanja velikostne strukture velikih podjetij na delež sive ekonomije in vpliv zmanjševanja števila velikih podjetij na delež sive ekonomije v panogi. Glede na vrednosti v korelacijski matriki je bil postavljen faktorski model z dvema skupnima faktorjem, s katerima je mogoče pojasniti nekaj manj kot polovico skupne variabilnosti deleža sive ekonomije v panogi. Za oceno komunalitet smo uporabili metodo glavnih osi ter metodo največjega verjetja. Na podlagi ocen komunalitet je bilo mogoče ugotoviti najvišje deleže pojasnjene variance s skupnima faktorjema pri dejavnikih vpliv davčnih predpisov in vpliv zmanjševanja velikostne strukture velikih podjetij na delež sive ekonomije v panogi. Z dvema skupnima faktorjema lahko pojasnimo dobrih 45% celotne variabilnosti v vzorcu (tabela 9).

Faktorske uteži smo skušali oceniti s poševnokotno in pravokotno rotacijo. Ne glede na izbrano vrsto rotacije se ocene uteži niso bistveno razlikovale. Ocena faktorskih uteži na prvem skupnem faktorju pokaže najvišje uteži pri dejavnikih vpliv konkurence na delež sive ekonomije, vpliv zmanjševanja velikostne strukture velikih podjetij na delež sive ekonomije in vpliv zmanjševanja števila velikih podjetij na delež sive ekonomije, zato prvi skupni faktor označimo kot vlogo splošnih dejavnikov okolja podjetja na delež sive ekonomije v panogi. Ocena faktorskih uteži na drugem skupnem faktorju pokaže najvišje uteži pri dejavnikih vpliv davčnih predpisov na delež sive ekonomije, vpliv višine davkov in predpisov na delež sive ekonomije in možnost večjega zaslužka, ki so predvsem dejavniki, na katere vpliva država s svojo politiko, zato drugi skupni faktor poimenujemo kot vlogo države na delež sive ekonomije v panogi lesarstva.

6 Sklep

Pregled najpomembnejših ugotovitev raziskave pokaže, da dinamika zmanjševanja števila in velikostne strukture velikih podjetij v panogi lesarstva izkazuje zmeren do nepomemben vpliv na dinamiko malih podjetij v panogi. Najpomembnejši dejavniki, ki vplivajo na odločitev za ustanovitev novega podjetja v panogi lesarstva v Sloveniji, so možnost boljšega zaslužka in reševanje ekonomsko-socialnega statusa posameznika, kar je v skladu z rezultati predhodnih raziskav opravljenih v slovenskem gospodarstvu (SURS 2006, Rebernik et al. 2006). Najpomembnejši dejavniki, ki predstavljajo oviro odločitvi za ustanovitev novega podjetja, pa so pomanjkanje ustanovnega kapitala in konkurenca sive ekonomije.

Večji pomemben vpliv izkazuje zmanjševanje števila in velikostne strukture velikih podjetij v panogi lesarstva na povečevanje deleža sive ekonomije v panogi. Najpomembnejši dejavniki odločitve za delovanje v sivi ekonomiji na podlagi opravljene raziskave so višina davkov in prispevkov, možnost za boljši zaslužek in davčni predpisi, ki vsi skupaj vplivajo na povečevanje deleža sive ekonomije v panogi. Ocenjeni delež sive ekonomije v panogi lesarstva znaša 21,7%, kar je več kot znaša povprečje v predelovalnem sektorju gospodarstva (Nastav 2009).

Analiza določenih skupnih dejavnikov (faktorjev) dinamike malih podjetij v panogi lesarstva je pokazala vpliv dejavnikov, ki smo jih poimenovali kot vlogo dejavnikov ekonomskega značaja in vlogo spreminjanja števila in velikostne strukture velikih podjetij v panogi lesarstva. Analiza določenih skupnih dejavnikov, ki vplivajo na delež sive ekonomije v panogi lesarstva, je pokazala vpliv dejavnikov, ki smo jih poimenovali kot vlogo splošnih dejavnikov okolja podjetja na delež sive ekonomije in vlogo države na delež sive ekonomije v panogi.

Kot temeljne rešitve v smislu zmanjševanja deleža sive ekonomije in pospeševanja dinamike nastajanja malih podjetij v panogi lesarstva lahko navedemo predvsem ureditev regulatornega sistema, ki dela formalni sektor nezanimiv, na način, ki ga ne bo omejeval, možnosti pridobivanja potrebnega finančnega kapitala ob sprejemljivih jamstvih in stroških financiranja ter zagotavljanje oblik krajšega neformalnega izobraževanja, ki bi potencialnim podjetnikom omogočalo pridobitev temeljnih poslovnih znanj, potrebnih za zagon in vodenje novih malih podjetij. Država naj bi s pozitivnimi zgledi in gospodarnim ravnanjem poskrbela za zglede, ki bodo spodbujali podjetništvo in prispevali k odločitvi za ustanovitev podjetja.

Raziskava je v nasprotju s postavljenimi hipotezami, da zmanjševanje števila in velikostne strukture velikih podjetij v panogi lesarstva v večji meri vpliva na dinamiko vstopov novih malih podjetij, pokazala dokaj majhen do nepomemben vpliv zmanjševanja števila in velikostne strukture velikih podjetij v panogi lesarstva na dinamiko malih podjetij v panogi. V nasprotju s to ugotovitvijo pa raziskava pokaže pomemben vpliv zmanjševanja števila in velikostne strukture velikih podjetij na povečevanje deleža sive ekonomije v panogi.

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Jože Kocjančič je doktorski študent na Fakulteti za management Koper pri Univerzi na Primorskem. Njegovo raziskovalno delo temelji predvsem na proučevanju dinamike malih podjetij in sive ekonomije, ki se pretežno nanaša na ožje področje panoge lesarstva. V letu 2007 je prejel priznanje za najboljšo magistrsko nalogo Fakultete za management Koper. Zaposlen je kot svetovalec v podjetju, ki deluje v panogi lesarstva.

Štefan Bojnec je redni profesor za ekonomijo in znanstveni svetnik ter prodekan za znanstveno raziskovalno delo študentov na Fakulteti za management Koper pri Univerzi na Primorskem. Njegova bibliografija obsega več kot 600 bibliografskih enot, od tega okrog 110 izvirnih znanstvenih člankov v znanstvenih revijah. V letu 2008 je prejel Zlato plaketo Univerze na Primorskem in državno Zoisovo priznanje za pomembne dosežke na področju ekonomije.

Mitja Ruzzier, Tine Nagy, Robert Ravnihar

Analyzing the Process of Patent Submission with a Special Emphasis on the Phases of the Research Process – the Case of Slovenia

This article presents some findings about the process of patenting of Slovenian and foreign researchers in scientific research. Based on the reviewed literature and with help of our conceptual model, we establish that the patenting process can be divided into three separate phases: knowledge detection phase, knowledge dissemination phase and knowledge transfer phase. During the process of researching and patenting, a variety of factors affect the results, which can be divided into two groups: internal and external factors. In Slovenia, patents are statistically significant for researchers working and exploring in the fields of natural science and engineering. Research results in the form of a patent largely depend on financial support and work experiences of individual researchers or research groups. The commercialization of a patent means a successful ending of the research process, as many positive benefits are expected.

Key words: researchers' patenting activity and productivity, process of innovation – patenting process, patent driving forces and areas, academic entrepreneurship.

Andreja Verbič, Tomaž Kern, Drago Vuk

Process Reengineering and Innovation of Remaking Soapsuds

This article uses a business process renovation method to address an environmental protection problem. The presented case, studied in factories which remake crude vegetable oil (soapsuds remake), focuses on reengineering one of the business processes which is classified as an obligatory process. This process has to be performed to comply with the requirements of the existing ecology legislation. Therefore, it is reasonable to take a radical approach - business process reengineering. Soapsuds with oil remnants are a secondary product in the vegetable oil refining process. According to the legislation, secondary products as waste are not acceptable for the environment. Soapsuds remake as it is currently carried out produces technical fatty acids and, as a side product, calcium sulphate. Calcium sulphate is listed as special waste; therefore it must be deposited in a special waste landfill site.

In the course of searching for a solution to this ecological problem, a new idea came up, namely that soapsuds are taken to the biogas plant. At the biogas plant, they can be decomposed into biogas, which is then used to generate electric energy, for heating or to supplement municipal gas. Thus, the reengineering of the process is upgraded into process innovation and environmental innovation. Using data obtained from the available literature, we managed to prove that process reengineering, which is simultaneously process innovation and ecological innovation, can be applied in practice. Side products resulting from the anaerobic digestion of soapsuds in the biogas plant comply better with the requirements of the Slovenian ecological legislation than those occurring in the process used up to now.

Key words: business process reengineering, process innovation, soapsuds remake, biogas plant, ecology

Jože Jesenko, Uroš Stanič, Robert Rudolf, Vanja Rangus, Nataša Meršol

Public Financial Funds Efficiency Regarding the Development of Innovative Activities in Small and Medium-sized Enterprises: the Case of Slovenia

In this article, the authors present a method of measuring the efficiency of use of national and European public funds for promoting action in companies, including the process from a draft idea to the placement of a product or service on market. The method of measuring has been done with a matrix system, through which we have shown the distribution of public funds between service brokers that offer services for the raising of the abilities to the companies. The matrix system includes the impact matrix of service brokers on innovation enablers. Based on the assembling matrix, we have composed efficiency measures, which can serve policyholders in guiding and controlling public funds.

Key words: Efficiency, public funds, matrix system, service, enabler, intermediary

Peter Veber

An Overview of Models for Assessment of Organization Virtuality

A virtual organization is a network of legally independent organizations and/or individuals that produce products and/or services based on a common business understanding. This new organization structure is posited as radical departure from the traditional, hierarchic, bureaucratic and co-located mode of organizing that dominated the twentieth century. In contrast, the characteristics of the new, virtual organization forms are seen to be dynamic, networked, distributed, digital, flexible, collaborative and innovative. The challenge, however, is to determine which organization as a subject employs virtual form and which not. The answer to this question is decidedly complex as most organizations have forms that are somewhere in between; therefore, it is usually only possible to determine how virtual one organization is on certain aspects. In the other words: what is the level of its virtuality? Several models for the assessment of organization virtuality have been developed by many different authors. The purpose of this paper is to investigate and present all the published models of virtual organization that are publicly available in the world literature. The strengths and weaknesses of all models found are presented, together with their mutual relations.

Key words: virtual organization assessment, virtual organization models, organization virtuality, virtuality assessment

Franka Piskar, Armand Faganel

A Successful CRM Implementation Project in a Service Company: Case Study

Customer relationship management - CRM implementations increased rapidly in Slovenia in the last few years, following the trends elsewhere. Studies reporting how the implementation project goes on before, between and after the implementation are scarce. We offer a thorough case study analysis of the CRM implementation with a positive outcome in a Slovene service company. Case study demonstrates that CRM implementation is a holistic and complex concept, which means that it is not merely an integration of new information technology, but everything that happens around the business processes changes. We recommend that the company has already established a process approach and the orientation toward customers. Study showed the need for efficient leadership, acquirement of resources and CRM strategy implementation control; trust to the software solution shouldn't be self-understood. Through implemented analytical CRM company can improve the relationship with customers, achieve larger information sharing between employees and accept better strategic decisions.

Key words: customer relationship management implementation, customer focus, process approach, quality, customer information, communication, marketing, service company, Slovenia

Andrej Mihevc

Regulation of the Mobile Communications Markets from the Perspective of Co-relation Between Services

The aim of this article is to answer the question if regulation of call termination in mobile market is sufficient for effective regulation and to ensure the effective competition. The article will analyse the possibility to follow European Commission recommendations without additional market analyses. EC recommends analysing only the market for call termination on each individual mobile network to ensure the efficient competition on the whole mobile market. EC defines, based on demand and supply substitution and obstacles to enter the market, new 7 electronic communications markets and only one on the mobile market. National Regulatory Authorities mostly just follow the recommendation. The article defines which additional elements need to be taken into consideration and when to ensure the effective competition, based on co-relation between the services of termination and origination and its mathematical co-relation to market share. The article defines the border between the regulation, which can only follow EC recommendation and regulation of additional market definitions. Analysis and findings of the article show that because of correlations on the market is impossible to ensure an effective competition, just with the definition of mobile market for call termination on individual network on each geographical market.

Key words: electronic communications market, regulation, European Commission, call termination, call origination

Jože Kocjančič, Štefan Bojnec

The Impact of Dynamics in Large Enterprises on the Dynamics of Small Enterprises and the Shadow Economy in the Wood Industry

The paper analyses the impact of the dynamics of the large enterprises in the wood industry on the dynamics of small enterprises and the shadow economy in this industry. We use the unique firm-level survey data for the sample of small enterprises in the wood industry in Slovenia. We find relatively a small impact of the dynamics and size structure of the large enterprises on the dynamics of small enterprises in the wood industry. The important impact is found for the dynamics of the large enterprises on the shadow economy in the wood industry. The empirical results imply implications for the regulatory system to provide a proper institutional enabling framework for the formal sector, a proper financial system for financing at acceptable assurance and costs, and an informal education schemes to provide basic business knowledge and good practices.

Key words: enterprises, enterprise dynamics, entrepreneurship, shadow economy, wood industry, Slovenia.

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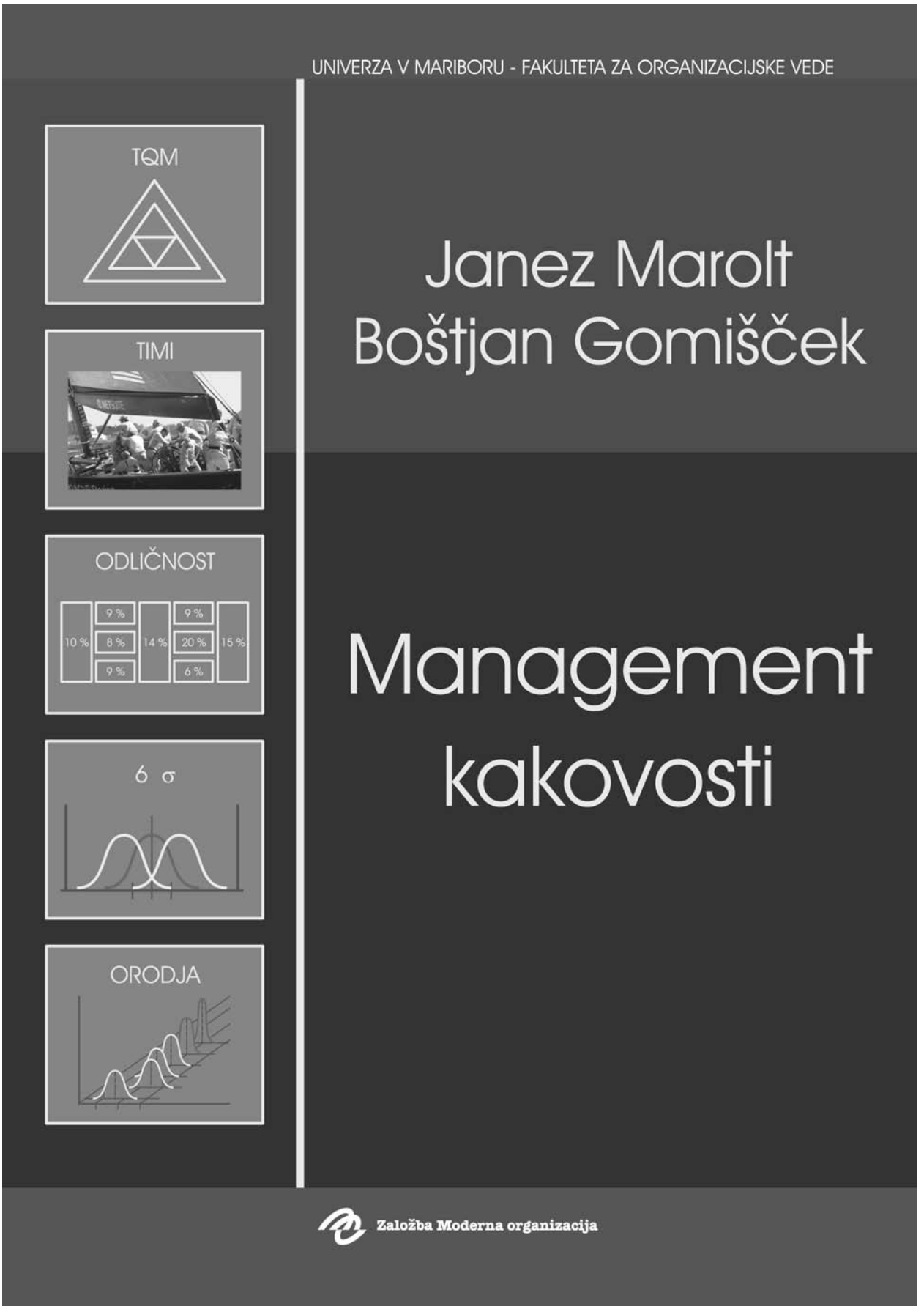
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Članek naj bo razčlenjen v oštevilčena poglavja. Naslovi članka, poglavij in podpoglavij naj bodo napisani z malimi črkami, da so razvidne kratice. Povzetek naj na kratko opredeli temo, ki jo obravnava prispevek, predvsem pa naj na kratko, jasno in čimbolj preprosto povzame poglavitne rezultate, zaključke, ugotovitve..., prispevka. Splošne ugotovitve in misli ne sodijo v povzetek; uvrstite jih v uvod. Povzetek je namenjen predvsem bralcem, ki listajo po reviji (ali pregledujejo izbrane povzetke iz baza podatkov) z namenom, da rezultate Vašega članka uporabijo pri svojem delu, na primer v raziskavi, pri pisanju diplome, magisterija, doktorata, … Na osnovi povzetka naj bi bralec presodil, ali se mu splača prebrati (ali kopirati, natisniti, …) cel članek. Povzetek zato ne sme biti neke vrste »preduvod«.

Povzetek, naslov članka in ključne besede naj bodo tudi prevedene v angleščino.

Slike in tabele v elektronski obliki vključite kar v besedilo. Besedilu so lahko priložene slike in/ali tabele na papirju v obliki pripravljeni za preslikavo. V tem primeru naj bo vsaka slika na posebnem listu, oštevilčene naj bodo z arabskimi številkami, v besedilu naj bo označeno, kam približno je treba uvrstiti sliko: na tem mestu naj bo številka slike/tabele in njen podnapis. Slike bomo praviloma pomanjšali in jih vstavili v članek. Upoštevajte, da morajo biti oznake in besedila na vseh slikah dovolj velika, da bodo čitljiva tudi pri velikosti slike, kot bo objavljena v reviji. Vse slike naj bodo črno-bele z belim ozadjem; barvnih slik ne moremo objaviti.

Pri sklicevanju na literaturo med besedilom navedite le priimek prvega avtorja, oziroma prvega in drugega (glej vzorec), letnico izdaje, lahko tudi stran. Popolni bibliografski podatki naj bodo v seznamu literature in/ali virov na koncu prispevka, urejeni po abecednem redu (prvih) avtorjev, literatura istega avtorja pa po kronološkem redu izida; če navajate dve ali več del nekega avtorja oziroma avtorjev, ki so izšla v istem letu, uporabite črkovno oznako pri letnici, na primer 2003a, 2003b, ... V seznamu literature in/ali virov ne navajajte del, ki jih ne omenjate v besedilu članka. Ne uporabljajte opomb za citiranje; eventualne opombe, ki naj bodo kratke, navedite na dnu strani. Označite jih z arabskimi številkami.

V seznamu lahko ločite literaturo (članki v revijah, knjige, zborniki konferenc, doktorske disertacije, …) in vire (dokumenti, zakoni, standardi, interni viri, …). Pri citiranju literature uporabite enega naslednjih načinov, ki so prikazani na naslednjih primerih:

- "... v nasprotju z (Novak in Vajda, 1996:123) raziskava (Wilkinson et al., 2001:234) nakazuje, da ..."
- "... kot poročata Smith (2003) in Jankowski (2004) metodo uporabljajo za ..."
- "... kot ugotavljajo nekateri drugi avtorji (Zima 1999; Novak in Vajda, 1996; Wilkinson et al., 1993), številna podjetja ....".

Bibliografske podatke v seznamu literature navajajte na "harvardski način", kot to kažejo vzorci v nadaljevanju:

Članek v reviji:

- Novak, A. & Vajda, B.M. (1996). Effect of surface runoff water on quality measurement, *European Journal of Information Systems*, 31(4): 31 - 39.
  Zraven letnika v oklepaju navedite številko v letniku le, če se vsaka številka začne s stranjo 1. Če revija nima letnika, lahko navedete mesec ali drugo ustrezno oznako, na primer Poletje 1999.

Članek v elektronski reviji:

- Lynch T. & Szorenyi Z. (2005). Dilemmas surrounding information technology education in developing countries, *The Electronic Journual of Information Systems in Developing Countries*, 21(4): 1-16, dosegljivo na: http://www.ejisdc.org (22.8.2005).

Knjiga:

- Smith, S.I. (2003). *Interpreting Information Systems in Organizations, Elsevier Publishing, New York.*

Poglavje v knjigi:

- Zupan, N. & Leskovar, R. (2002). Pričakovanja v zvezi z elektronskim poslovanjem v malih organizacijah. *Organizacija in management – izbrana poglavja.* Uredila: Florjančič J.,& Paape, B. Kranj: Založba Moderna organizacija.

Referat objavljen v zborniku konference:

- Wilkinson, K.J., Kumar, R. & Kumar, S. (2001). We can do better: integrating theories of novel organizations, *Proceedings of the Twelfth European Conference on Information Systems.* Uredil: Johnson, M. Bled 12-14 Jun. 2001. Berlin: Springer Verlag,

Diploma, magisterij ali doktorat:

- Zima, B. (1999). Analiza potrebnih znanj diplomiranih informatikov v Sloveniji, magistrsko delo, Univerza v Mariboru, Fakulteta za organizacijske vede.

Poročila, interni dokumenti, zakoni:

- ACM (1994) ACM SIGCHI Curricula for Human-Computer Interaction, The Association for Computing Machinery, New York.
- Zakon o elektronskem poslovanju in elektronskem podpisu (ZEPEP), Ur.l. RS, št. 57/2000, 30/2001

Pri internetnih virih / literaturi naj bo poleg (eventualnega avtorja in) naslova besedila naveden tudi internetni naslov vira (URL) in datum dostopa do dokumenta.

- Banka Slovenije, Basel II – Nov kapitalski sporazum, dosegljivo na: http://www.bsi.si/html/basel2/default.htm (6.4.2005).

V literaturi ne navajajte internetnih naslovov (URL) brez drugih podatkov. Lahko pa se nanje sklicujete v besedilu ali v opombah na dnu strani. Podrobnejša navodila glede citiranja in navajanja literature so na http://versita.com/science/business/organizacija/authors/.

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