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CONTENTS

POSTMODERNISM AND ECONOMIC THEORY

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Abstract:. *As any other theory that necessarily follows society development, postmodernist theory has developed in accordance with emerging circumstances. The conditions of contemporary global economic reality and the crisis of the contemporary economic science justify postmodernist challenges in economic theory and methodology. The challenges which postmodernists face represent a search for a compromise between the narrative knowledge and the knowledge of mathematical exactness in economics. Postmodernism is entangled with numerous discrepancies that depict observed discrepant reality. However, discrepancies for postmodernists are the result of various experiences and interpretation of reality.*

Keywords*: postmodernism, economic methodology, relativism, pluralism, skepticism.*

Introduction

Most of us were born and live in a contemporary era. Perhaps in some other occasion we would prefer to use the term "modern" era, but there is concern that some of our experts in the development of the present society will reproach and correct us - we live in a *postmodern era*.

From the viewpoint of a economist, nowadays, not much of postmodern is totally clear. It seems like the secrets of economic life are much more clear when they are considered backwards, from the findings of neoclassical, Keynesian, Marxian economics and all back to Adam Smith and his "invisible hand". Yet, the real paradox is that in neither of these times we were not living and being *homo economicus* but precisely in this postmodern era, or how it has been called by Colanders (2000) economic point of view "New millennium economics". What is postmodernism? How and in what way this latest era will influence the development of economic science, and what is its prospects? A major challenge lies in front of every economist who takes up this topic.

The Phenomena of Postmodernism in "Touchable" Economy

Information era, the rise and collapse of stock markets, electronic commerce, the Internet, more and more frequent occurrence of English terms in Serbian speech, such as branding, consulting, marketing, web site, e-mail, "cool" consumption, virtual online studying, mergers, acquisitions... clearly indicate that the entire modern society is transformed, and with it the economic science has been necessary changing itself. It could be said that there are no a generally accepted set of principles and methodological framework of economic ontology, and that is, perhaps, the key reason for slight stagnation of economic science in recent decades. "The vision must be in the heart of theoretical economic epochs; it is the point of gravity, central theoretical structure which increases the explanatory power of the economy" (Jakšić 2009, 2). When thinking up the postmoderna, an economist is facing with the difficulties that lie in its inability to penetrate into the core of new phenomena which he/she is aware of, but he/she does not have the tools, appropriate instrumentation, to set about their treatment. First of all, he/she misses the vision of the scientific problem. The vision of the scientific problem as „a preanalytical act" (Schumpeter) is a basis for making difference among economic theories. Being a specific metaphysical act not undergoing logical proving, the vision is conditioned by socially-economical circumstances and needs. For Marx, the scientific vision was the law of the economic movement of the capitalistic society, for neoclassical economics it was partial and general balance of the economic system, and for Keynes it was the balance of the capitalistic system under conditions of underemployment.

The ruling mainstream in economics has its vision - a balance. Its analysis is based largely on methodological individualism. The individual is viewed as a *homo economicus*, who has all the necessary information and driven with his/her rational behavior makes decisions to maximize benefit. This mainstream is not questionable, we are just trying to find its connection with the postmodernism - whether "postmodern individual" has all the necessary information? Society of today is often called the "information society", yet paradoxically enough, most information should not be believed, as being more of a contribution to the manipulative image-making of those in power, than to the advancement of knowledge. We are increasingly facing with the phenomenon of the so-called asymmetrical information. Entire new economic branches develop and profit on these grounds (consulting, brokerage firms). Information is no longer just a tool, but the final product. The whole range of intangible, to the eye invisible products have been recognized. We should ask ourselves, if the mentioned information really is a postmodern product, which is its value, i.e., economic calculus?

A century ago, people got rich at railroads, from steel and oil. John Rockfeller (1838-1937), the founder of the oil company „Standard Oil", got rich for over 200 billion dollars. Today, these are people from the area of information technology. The wealth of Bill Gates, the owner of the company „Microsoft", is

estimated for about 40 billion dollars. These technologies are changing the world. Information trade makes Internet transactions done without the real money. This fact actually does influence the overall monetary and fiscal politics of one country. Virtual money, unlike traditional money, does not function as the means of payment and accumulation. It represents different forms of security, i.e., financial instruments, effective up to that level where they can be converted into a real money through the banking system. Information trade is significantly different from previous types of trade, so it is being questioned whether our up-to-now understanding of economic laws is still offering the reliable model of making out what really is happening, or better to say, it is being questioned whether information trade well illustrates that economic laws are clear and generally accepted.

The time of postmodern era has brought new relations between individual and social understanding of values. The focus of postmodern society moves to individual, more members of society identify themselves as consumers rather than producers. The products are still the same, but the vision of it becomes extremely subjective, relative. How to explain the fact that the brand (sign, symbol, label) got so much in importance, that the "rational consumer" (e.g. female) is ready, at the time of seasonal discounts, to spend the last money on buying 14th bag by the price which is still far ahead of the real value, just because it is "Gucci"? Therefore, the name itself is a product that is consumed. This name is a symbol of power and success.

Visuelisation of goods is best recognised through brand expansion. There are too many uniformed products, so brand creating becomes the most efficient means for today's most deficient resource of contemporary economy - invading the new markets and gaining the consumers. Today, brending (forming and breaking in of the brand) represents a special sphere of professional and economic activity, whose virtual value overcomes the value of the real active usage for the production of the product itself. For example, it is estimated that the value of the brand „Coca-Cola" is around 70 billion dollars which is 1,5 times more that the value of the total assets of the company. If the virtual value significantly overcomes the real value, created in construction agencies and labs, then it is completely clear how and from where the expansion of commercial industry and commercial business were created. In economically developed countries, 1,5 to 2 times more money was spent on commercials during the 1999s than it was spent on research and making of new products, so that is how GDP increasing rate was overcome.[1]

Many postmodernists believe that "we live in a society of the image, primarily concerned with the production and the consumption of mere "simulacra" (copy without original) (Butler 2007, 113). Mass media have "the power of seduction", commercial in postmodern society is highly personalized and very

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[1] Author's conclusions based on: *The Economist* , (2005) jan 1-7, p .48, 72; (2006) jan 21-27, p. 38, july 1-7, p. 65; (2008) jan 26, feb 1, p. 39.

concerned with the wishes of individuals, increasing their freedom of choice, as Lipovetsky (2000) extensively discussed in his book "Paradoxical Happiness". In consumer markets where it is so difficult to distinguish between products, a creative brand image, a small illusion that creates emotion and desire, makes difference and sells the product. It is a matter of so slight differences. Baudrillard concludes that advertising is not the one who leads consumers, advertising by itself is the subject of consumption. We do not consume products, but a relation itself in which every desire can turn into a product that can be purchased from (Lošonc 1989, 2259). "Goods have obtained the status of a symbolic object, while the act of shopping turns into a symbolic term of lifestyle, which, on the other hand, becomes the subject of continuous media presentation" (Jašović 2005, 122).

Typical, crucial postmodern phenomenon that has brought a new dimension in the sphere of business is certainly the Internet. We all know what the Internet is, maybe some of you are using it right now, reading this paper "online", or maybe you had previously "downloaded it", anyway the point is the same. The way of globalization has been "paved" with the development of the Internet which destroys all geographical barriers, creating less workload for the process of globalization itself. The Internet has developed into a medium, in fact the Internet united all global media (television, radio, newspapers) in one place, thus providing an enormous amount of data and information that can be accessed from almost any point on the planet. Alongside the focus moves from producing goods to providing information services. Today, the enormous wealth is created or lost every day, not by buying or selling goods, but with financial transaction made by people who sit in front of their computers from which they receive information (Butler 2007, 118). The whole world has become depersonalized, people are held together more by electronic contact and virtual social networks (facebook, twitter), than real personal social connections. The Internet shopping has become a new trend, so the meeting of buyer and seller is no longer necessary. And how does the payment work? Very simply, virtually. Even the money in a contemporary interpretation, became the "information". This is meant to electronic money (e-money) which replaces cash and purchases goods and services by the computer, using commercial computer networks and business banking networks (e-banking). That money cannot be touched, it is a set of numerical systems that exist in computer memory, so postmodern customer, in accordance with his/her "casual style" of shopping, does not have to trouble a lot, because he/she is only one "click" away from the desired products. This type of money is often called "smart money" because it is information that can be programmed. Who would know, perhaps eventually that "smart money" could "think" in the name of the customer, by keeping records of their needs and desires, and finally independently perform purchase, even without using that single "click".

Virtualisation of the goods value and their companies would not be possible without money virtualisation. Virtual money enabled expansion of virtual purchasing capability of a great number of customers and investors. Expences for

goods purchasing and securities have started crossing the limits of the given and realistically made income. If we add to this the fact that together with this there is an increase of cheap and insecured credits, gigantic market of derivates-securities that should minimize the credit risks, became the reality. Researches have shown that the value of securities was 300 trillion $ in 2009, which is ten times more than GDP of the USA and the EU together (Epping 2009, 161). That is why the crisis from 2008 (its causes and consequences) is explained by a huge mass of virtual money and securities by economic analysts and statesmen.

Postmodernism and Economic Methodology

It can be concluded from the previous that it is very difficult for science to cover all phenomena that rule the postmodernism. Difficulties of scientific reflections of postmoderna come from two reasons: parallel existence of modern values - modern and postmodern values, and absence of postmodern phenomena, since we are dealing with déjà vu in postmoderna (Zarić 1994, 185). Economic ontology is the basis of economic knowledge. As a meta-theory it is a learning about presentation on scientific-economic theories.

Contemporary literature is trying to find differences in economic ontologies. For example, it is thought that the basis of classics is productive production, and basis of neoclassic is trade exchange. In the classical version, human labor (abstract) is the basis of the value of goods, and it is objectively connected to the sphere of the material production and productivity. For neoclassical theory the value (price) is derived from exchange relations and subjective estimations of economic subjects, so the behavior of economic subjects and their selection takes the central position in economic analysis and research. But, here, we are not speaking about simple moving from the sphere of production to the sphere of expenditure, from the law of forming the offer to the law of demand, we are speaking about a shift to the new system and structure of the economic world new system of scientific categories, built on other starting principles and causal relations among them. It is possible that, having these facts on mind, representatives of postmoderna intercede the applying of "rhetorical" methodological conception. "Postmodernism has always been completely rhetorical", says Deirdre McCloskey in one of his works (Deirdre McCloskey 2001, 120). Representatives of the "rhetorical" method see their ideals in Greek sophists. According to their philosophy, man is the measure of all things, the truth is not important, it does not exist, it is conviction that matters. Economic theory is practically more and more becoming the instrument of conviction, and not the instrument of proof.

McCloskey and Klamer (1989) have come to the conclusion that it is not possible to analyze the economic theory by using traditional methods of philosophy science and that attention should be focused on those rhetorical methods which are used by economists in their scientific practice (primarily discussion). Rhetorical

method essentially is a method of *logical persuasion of the correctness, i.e., of higher value of one theory over another*. In the journal "Rethinking Marxism" (1989) these two scientists, in a very atypical manner, indicated the importance of discussion and dialogue in the economic debates, especially if they are driven among representatives of various schools and movements of economic thought.

In this concept, we can already notice a *descriptive character of the methodology, methodological pluralism, relativism, social constructivism.* Pluralism in their nontraditional methodology McCloskey and Klamer considered as primary virtue. In doing so, they do not advocate a rejection of modernist science as such, but rejection of ruling, generally accepted methodological standards, which use leads to a usurpation not only of the truth, but also of the ability to get to it. An alternative model, proposed by McCloskey and Klamer, sees science as the free marketplace of ideas where scientists and philosophers, who have passed the "sophistic" school, are competing who will better "sell" their goods. In their opinion, this is exactly the kind of democracy that should be in the field of economic methodology. The stronger side of rhetorical concept is that the rhetorical ways are actually being used in science activities, and that the economic theory, in fact, often is used as an instrument of persuasion, not of proof.

However, no matter how useful rhetorical economic-methodology can be, it should be noted that the descriptiveness of "rhetoric methodology" is too radical. The methodology should not only describe the various ways of scientific activity, but also make an effort in clarifying different forms of scientific theories, the conjuncture impact on the logic of theories development and theorists activities, not just to engage in collection of facts. P. Otmahov came to the characteristic conclusion which is mentioned in his work devoted to the McCloskey and Klamer concept: we have to understand why some rhetorical ways are convincing, and some are not. In other words, it is necessary to go with further analysis of scientific practice, which within the rhetorical economic methodology concept is often neglected (Болдырев 2006, 66).

Many postmodernists have been identified as "epistemological pluralists". They are good at criticism, very radical, but it seems like they do not have a formed objective observation. Yet, despite all criticism, they took the first major step of postmodernism breakthrough in the general field of economic theory, as well as bridging between so many different intellectual traditions.

Relativism is Our Destiny

"Simplifying to the extreme, I define *postmodern* as incredulity toward *metanarratives*," says in his book "The Postmodern Condition", a famous French postmodernists Lyotard (2008). Simply put, postmodernists do not fit into the "big stories", they express skepticism toward all total, comprehensive explanations. The universal truth is impossible. *Relativism is our destiny* (Butler 2008, 19).

Postmodernists are great skeptics, they believe only in multicultural *pluralism* and *relativism*. It could be said that the problem of relativism is the most important problem which is presented by them, but not completely resolved. Is there an undeniable truth in the economy knowledge, or does it depends on the ethnic and cultural diversity of nations and epochs, the nature of the used empirical data, political and ideological circumstances and, finally, the scientific tradition in which its originated? That has always been the central question of all disputes considering the science method.

Aiming at defending the position of neoclassicism, Milton Fridman thinks that one theory could not be judged by the realism of its assumptions but by its effectiveness in predicting. This attitude is found in his work "The Methodology of Positive Economics" (1953), which is considered the most famous work from the field of methodology and it is worth mentioning that this work caused great controversy and numerous criticisms.

Lawrence Boland, a famous methodologist, wrote a work „A Critique of Fridman's Critics" (1979) and in it he says that Fridman's methodology can be characterized as instrumentalism, which is one type of philosophical attitude. As a matter of fact, one of the key questions in methodology of science is estimation and selection of a theory. It is actually a very important issue since there are a few explanations of some phenomena, i.e., explanations of those phenomena can be found in several theories. There is a need to partially estimate or estimate several theories at the same time which makes one researching program, since there are different theories that differently explain some phenomena. This way, rational selection or estimation of theories becomes one of the key questions of scientific methodology and the philosophy of science.

Starting points in selection and estimation of theories are: *apriorism, conventionalism and instrumentalism* (Caldwell 1980, 367). Apriorism suggests that the subject of estimation is a concrete theory and it points out the principle of the theory veracity, and the appearance of wrong theories connects with mistakes in concluding, when the wrong conclusions are made from apriori veracious premises or assumptions. Instrumentalism starts from the assumption that theories are instruments, and that the subject is estimation of several theories. Conventionalism allows existence of a large number of theories relating to the same set of phenomena, but we cannot determine which theory is veracious, i.e., which theory has the higher level of priority.

Instrumentalism claims the best thing is to consider theories as types of instruments. Looking at them the suggested way makes the instruments more or less adequate depending on the problem (Caldwell 1980, 367). Joan Robinson would say that different theories are like a tool box. Theories (tools) have a certain usage. There is no universal theory explaining different spheres in different times, and there is also no tool that can be applied everywhere and anywhere. Unlike this, conventionalism points out organizational function of theories: theory construction

is done in order to organize complex of facts into a coherent whole. According to Agassi, theories are "mathematical systems serving as partitions for storing empirical information" (Agassi 1963, 506). From this perspective, theories again are not veracious or unveracious, but they are set for now as conventionally veracious, according to a consensus within the wider scientific community. Among the other characteristics of instrumental approach, we can abstract the following (Caldwell 1980, 367-368):

- Predicative capability is the most important characteristic of theories
- The main objective of science is to create theories that offer right predictions on phenomena
- Checking theories is done by comparing their predictions with empirical practice
- Theories should not be checked on the basis of realism of their assumptions, they are not discussable and are checked only indirectly.

Boland (1979) thinks that Fridman's methodology unites elements of instrumentalism and conventionalism. However, the most controversial attitude of Fridman is that the purpose of the science is prediction, so the reality of assumptions is not important, and it is a firm mark of instrumentalism. Controversies are about the quality of prediction, and especially about the question of existing of very restrictive assumptions upon which the theories are derived. At the very beginning we should start from the assumption that the argumentation which does not connect validity of economic theory with descriptive "realism" of its premises, but with the reliability of its predictions, is actually very grounded. Firstly, Fridman's concept is based on the rules of formal logics (veracious premises are not a necessary condition for producing the veracious conclusions), so their argument is interpreted as recognizing of logics asymmetry between the truth and the lie. Then, if the existence of two different but equally legitimate aims of the scientific research is accepted, the discussion between supporters and those who are against Fridman's attitude become the argument between two opposite views: the one that claims that the science should offer theories that predict and the other that claims that the science should produce theories which explain well (Manić 1979, 98).

While Boland thinks that the importance of instrumentalism should not be diminished and that Fridman's attitude should not be questioned, many economists deny starting positions of instrumentalism. During the 1940s philosophers of science rejected the idea that the prediction is the only aim of the science. Even the positivistic philosophers, such as Carl Hempel (Caldwell 1980, 369), claimed that the explanation is the primary aim of the science, so the instrumentalistic approach becomes significantly weakened. But, if the science is searching for the theories that have both the power of prediction and explanation, then those theories which only have the power of prediction will not be satisfactory, which relativizes the opinion that theories are only the instruments of predictions.

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Among the critics of instrumentalism it is important to mention Imre Lakatos, Karl Popper, Herber Simon and others. Lakatos points out that, opposite to instrumentalism, a philosopher realist is aware of the fact that his theory can be false, but he is still ready to risk and search for the real, veracious theory. The realist will support only those theories for which he thinks are veracious, which exactly means that they are "conventionally veracious", and so we come to the point that realism itself contains certain elements of conventionalism. Instrumentalists refuse such interpretation of realism, which Lakatos (1970, 95) sees as a big mistake. He says that they are not capable of realizing that some facts can be veracious even though they are not proven, and some can be false even they are allegedly proven and that there are also those that are at the same time false and approximately veracious. "Potential orientation to predictions completely neglects the aspect of successfulness the theory offers. Out of these reasons, instrumentalism absolutely ignores possible mistakes that can happen during the procedure of prediction. Besides, if the prediction is false, instrumentalism concludes that such a theory has a limited appliance in that very situation" (Manić 1979, 24).

Karl Poper rejects instrumentalism primarily because it influences scientists to give up searching for the truth. Poper thinks that focusing of instrumentalists on the level of prediction successfulness, leads the authors to choose statistical correlation over causal explanation, especially if the first one creates pre-conditions for successful predictions. Finally, Poper (1963, 113-114) thinks that accepting instrumentalism excludes refutation in science: a theory which is neither false nor veracious can be considered inadequate, but cannot be refuted. It is important to point out H. Simon as one of the biggest critics of Fridman's instrumentalism. The thesis on irrelevance of realism assumptions which Fridman illustrates by saying that Gallileo neglected the existence of the air resistance while formulating the law of gravitation, Simon defines as the wrong interpretation of history (Simon 1992, 37). He does not deny that Gallileo formulated the law in its simplified form, but says that his followers paid attention to limited conditions while testing the law. Newton, for example, inserted the weighs of the same size into the cork of the balls so that the air resistance was the same when he tested the law with the help of different weights pendulla. That is why the theory of approximation does not support the principle of unrealism, which means that unrealism basically does not have virtues, so in some cases it can be "fatal" according to Simon (1992, 37).

So, the economic theory is becoming more and more relative. Even the ruling mainstream can conditionally be classified into: theories that continue to develop a research program originated from the model of general balance; theories that use concepts of informational imperfection and in generally about the various failures of the market; new-institutional theory which are fully or partially accepted neoclassical methodology and extended it to the analysis of social institutions. Contemporary Marxism is in crisis, there came to a separation: some Marxists are drawn to the neoclassical methods, others remains fully committed to a dialectical

tradition. Keynesianism is also reviewed: Post-Keynesians believe that the original theory of Keynes has been vulgarized and it has to be renewed (Болдырев 2006, 72).

Postmodernism has emerged as a response to modernism in which core is a metaphor of the machine which implies the search for secure knowledge that is reliable and evidence-based. But not only that! Postmodern tendencies in economic methodology are reaction to relativized and fragmented state of economic theory. The existence of different schools and movements of the economic thought in the future can go into two directions: the first, to close within their own limits and oppose each other, and the other one, to begin the process of their permeating and dissolution of the ruling mainstream itself, i.e., of the dominating neoclassical economic paradigm.

Risk of science relativization is real, even to the point that threatens to undermine long been built prestige of economic theory and its social importance. Most of the postmodern phenomena economy realizes, but does not know how to explain them, so they have been attributed to the current situation, like rule exceptions. But when those exceptions become more common than the rule itself, it is time to ask ourselves whether these exceptions are the new rules. Perhaps it is time for updates of the old, or maybe they need a radical change?

Conclusion

In general, the attitudes of modernists warn on great difficulties in scientific perception of those phenomena that we immanently classify into postmodern situation. It is often said, with a reason, that looking at postmoderna from the angle of only one science - economics, means thinking its own boundaries. That is why the thinkings of philosophical articulations of postmoderna in the field of sociology, ethics, even the whole culture are equally inspiring, so the economic science is in the phase when the interdisciplinary approach is needed more than ever.

Advocating for new conception of economic methodology where there is domination of methodological pluralism, relativism, instrumentalism and social constructivism, postmodernists do not deny the ruling of neoclassical methodology. On the contrary, advocating for "rhetorical" methodological apparatus where *the power of conviction in the correctness of the theory dominates, and not the power of proof*, postmodernism represents one secret apology of neoclassical economic science. Having this on mind, it is all right to conclude that postmodernism does not have the intention to criticize and reject traditional (modern) economic methodology. Its basic message and scientific validity is advocating for rejection of "totalitarism" of methodological standards, because it leads to usurpation of the truth, and not only the truth but the capability of acquiring new knowledge. The alternative is, according to them, to observe science as a free market of ideas, where after passing the sophistic learning, theorists show who will sell their own products better.

Postmodernists are favoring the real democracy in the sphere of economic methodology, and are against aristocratically-conservative scientific modernism.

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POSTMODERNIZAM I EKONOMSKA TEORIJA

Rezime: Kao i svaka teorija, koja nužno prati razvoj društva, i postmodernistička teorija se razvijala u skladu sa novonastalim okolnostima. Stanje savremene globalne ekonomske stvarnosti i kriza savremene ekonomske nauke opravdavaju postmodernističke izazove u ekonomskoj teoriji i metodologiji. Izazovi su traganje postmodernista za kompromisom između narativnog znanja i znanja matematske egzaktnosti u ekonomiji. Postmodernizam je protkan brojnim protivrečnostima koje su izraz protivrečne realnosti koja se posmatra. Međutim, ono što je za postmoderniste karakteristično je to da protivrečnosti u ekonomiji ne posmatraju kao nešto što nastaje samo po sebi. Naprotiv, one su za njih rezultat različitog doživljavanja i tumačenja stvarnosti.

Ključne reči: postmodernizam, ekonomska metodologija, relativizam, pluralizam, skepsa.

INTERNAL CONTROL AND ENTERPRISE RISK MANAGEMENT – FROM TRADICIONAL TO REVISED COSO MODEL

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Abstract: In achieving their business activities enterprises are constantly exposed to risk. One of the most important mechanisms for risk reduction is internal control as a set of policies and procedures established by management in order to realize enterprise's objectives. In this paper, we point out development of new paradigm of internal control – risk based internal control. Therefore, we start from revised COSO model which not represents only addition of traditional risk mangement model but enables timely identification, management and monitoring enterprise's risk in contemporary business environment. Adequately designed and implemented system of internal control which is based on risk is in function of achieving objectives related to effectiveness and efficiency of enterprise, reliability of financial reporting and compliance with appropriate regulations.

Keywords: internal control, risk, Risk Management, Traditional COSO model of internal control, revised COSO model of internal control, provisions – sections 302 and 404 of SOX

Introduction

Enterprises are open and dynamic economic systems. Exercising constant interaction with the environment, enterprises are constantly changing and developing. The complexity of the environment, as well as the complexity of the relations between the environment and the enterprise itself affect the appearance of uncertainty and risk in business. In this regard, as a response to the risk, certain control systems have developed in order to successfully manage a business enterprise and achieve its goals, respectively.

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One of the most important mechanisms for reducing risk is, of course, internal control. A special emphasis of its importance was realized by designing the COSO model according to which internal control provides security for the fulfillment of the goals of an enterprise by establishing and implementing appropriate policies and procedures. In doing so, defining of separate elements of internal control - *risk assessment* indicates that the risk management, primarily through its identification and analysis, is a significant part of internal control. Thus, the internal control is the basis of successful resistance of the enterprise to the unfavorable consequences.

However, despite the fact that risk management has always been an integral part of internal control, development of a new concept of risk management, particularly the scandals that have afflicted the world's largest enterprises, as well as their causes, created the need for risk to be at its center. In particular, there is a change of priorities in the sense that the establishing of an adequate risk management system of an enterprise is a precondition of its success, and the internal control based on risk is one of the most important mechanisms in the process. Accordingly, the paper first makes reference to the need and importance of enterprise risk management and then points to the internal control/traditional and revised COSO model/as an important instrument for achieving the goals of an enterprise related to the effectiveness and efficiency of business, reliability of financial reporting and compliance with applicable regulations.

1. The Need and Importance of Enterprise Risk Management

It is known that enterprises are constantly exposed to risk during their development. In addition, although the risk usually has a negative connotation in the sense that it implies damage or loss as a result of certain behaviors or events, it can also be viewed as an opportunity to benefit and achieve success in business. Accordingly, Risk Management Standard defines risk as "a combination of the probability of an event and its consequences" (A Risk Management Standard 2002, 2) where it is important to note that those consequences can be both negative and positive.

The fact that the risk presumes the possibility of events whose outcome is not possible to estimate with the appropriate probability, initially caused the development of aversion of the enterprises towards risk. Namely, in the past, enterprises were often inclined to avoid risk, that is, taking measures that were aimed at protecting the business from a variety of losses or damages, regardless of the level of exposure to risk. This way of business management resulted in the failure of numerous opportunities to increase value, for enterprises that are focused solely on the avoiding of the risk can maintain business continuity, but cannot advance. Growth and development can be achieved only by those enterprises that manage the risk adequately, that is, enterprises which tend to familiarize with the

nature of risks that occur in the environment and the enterprise itself, holders of these risks and their intensity. It follows that the way to efficient business management is facing with the risk, that is, the existence of awareness that proper risk management contributes not only to preserving, but also to creating additional value for the enterprise. Bearing the former in mind, avoidance of risk in the late 40s and early 50s of the last century was replaced by a new comprehensive concept of risk management.

Risk management is a logical and disciplined approach to future uncertainties which begins with its assessment, when an enterprise tries to consider the possible consequences of threats and opportunities (by identifying, measuring of the risk and prioritization), followed by making decisions about managing the perceived consequences (Sarens, Beeld 2006, 65). As such, it has become a widely accepted concept because it assumes the most appropriate way of dealing with the challenges the enterprise is exposed to. Minimizing the negative consequences of the adverse events or exploitation of opportunities that can result in increasing of the enterprises value is the basic premise on which this concept is based. Certainly, the primary objective of enterprise risk management is expressed in the maximization of the added value of the enterprise. From this primary objective, other, specific objectives are derived and they are reflected in: long-term maintenance of the enterprise in the market, revenue stability, continued growth, social responsibility and others.

The originally developed concept of risk management, or the so-called traditional approach, implied assigning responsibilities for identifying, managing and controlling risks at the level of certain business functions. That implied the isolated risk management of certain departments, with which the fact that risks can be, and are, in fact connected to each other, and that even, apparently less pronounced and significant risks have the potential to cause great damage in interaction with certain events, has been ignored. This approach to risk management, known as the "silo" approach, became ineffective in the contemporary business conditions. For these reasons, in the mid-90s of the twentieth century, a new concept developed, known as the Enterprise Risk Management (ERM)[1]. ERM represents the result of the improvement of the traditional approach, that is, it is about "the discipline by which an organization in any industry assesses, controls, exploits, finances, and monitors risks from all sources from the purpose of increasing the organization's short and long-term value to its stakeholders" (Overview of Enterprise Risk Management 2003, 8). The Institute of Internal Auditors under the ERM implies "structured, consistent and continuous process across the whole organization for identifying, assessing, deciding on responses to and reporting on opportunities and threats that affect the

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[1] In addition to the mentioned term, while reviewing of the relevant literature the following can be found: Integrated Risk Management, Holistic risk management and others.

achievement of its objectives" (The Institute of Internal Auditors 2009, 2). In addition, a comparative overview of the characteristics of the "old" and the "new" approach to the risk management is given in the form of a table.

Table 1 Risk Management vs Enterprise Risk Management

Traditional Risk Management	**Enterprise Risk Management**
Risk as individual hazards	Risk viewed in context of business strategy
Risk identification & assessment	Risk portfolio development
Focus on discrete risks	Focus on critical risks
Risk mitigation	Risk optimization
Risk limits	Risk strategy
Risks with no owners	Defined risk responsibilities
Haphazard risk quantification	Monitoring & measurement of risks
"Risk is not my responsibility"	"Risk is everyone's responsibility"

Source: (Olson, Wu Dash 2007, 5)

Considering the above presented characteristics of the concept of ERM a conclusion can be drawn that it is a process which provides greater transparency of all risks with which the enterprises is faced and their impact on the achievement of the goals of an enterprise, which also provides an adequate foundation for the planning and decision-making process. Therefore, the concept of ERM is reasonably considered to be "a new paradigm in risk management" (Simkins, Ramirez 2008, 581).

2. Internal Control as an Instrument of Support for Enterprise Risk Management

Internal control is rightly considered essential prerequisite for a successful business. Historically, the concept of internal control is tied to the domain of accounting and it included measures for the protection of corporate assets and provided assurances about the accuracy of accounting records. However, over time, with the development of enterprises, the scope of internal control is spreading outside the accounting function, so today internal control is viewed as "set of policies and procedures established by the management with the aim of assurance that particular goals will be fulfilled" (Andrić, Krsmanović 2004, 226). Bearing in mind that internal control is an indispensable element of an effective enterprise management, it is logical that the interest in ensuring its development and increasing its efficiency has always been present.

The importance of internal control for the success of an enterprise conditioned the design of various models or the so-called framework for internal control. One of the most authoritative models which indicates a good internal control practice is the COSO model, defined by the Committee of Sponsoring Organizations[2]. Specifically, the joint cooperation of Sponsoring Organizations[3] with the intention of developing a framework that will provide guidelines for designing and implementing systems of internal control has led to the publication of the COSO model in 1992, and its amendments in 1994, titled Internal Control - Integrated Framework. Such internal control model successfully passed the test of adequate design and effective implementation of the internal control system.

According to this model, internal control is defined "as process effected by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories (Committee of Sponsoring Organizations of the Treadway Commision 1994, 3):

- Effectiveness and efficiency of operations,
- Reliability of financial reporting,
- Compliance with applicable laws and regulations".

Bearing in mind that this is a continuous process which is the responsibility of all employees in the company, internal control is considered a mechanism with a powerful antidote to the risks; a mechanism which minimizes all the surprises that the enterprises may encounter. According to the COSO framework, the elements of internal control are: control environment, risk assessment, control activities, information and communication systems and monitoring. Each of the elements has an important impact on the effective risk management, that is to say, they provide an effective reduction of the potential negative consequences on the one hand and increase the possibility of exploiting the opportunities, on the other. In addition, a successful implementation of internal control and the achievement of its objectives are conditioned by the characteristics of the individual, interrelated, elements that appear in the form of a cube (Figure 1):

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[2] The Sponsor Organizations involved in this Committee are: American Institute of Chartered Public Accountants, American Association of Accountants, The Institute of Internal Auditors, Institute of Management Accountants and The International Association of Financial Directors.

[3] Joint cooperation of the sponsoring organizations established in 1985 was primarily aimed at the voluntary funding of the National commission for malicious financial reporting it. The purpose of the formation of this committee is to discern the causes of malicious financial reporting and to provide recommendations for enterprises and their auditors in preventing and detecting fraud. In 1987, the Commission issued a report which, aside from the recommendations to reduce the causes of malicious financial reporting, recommended further joint cooperation of the sponsoring organization so as to develop a framework of internal control.

Figure 1 COSO internal control model
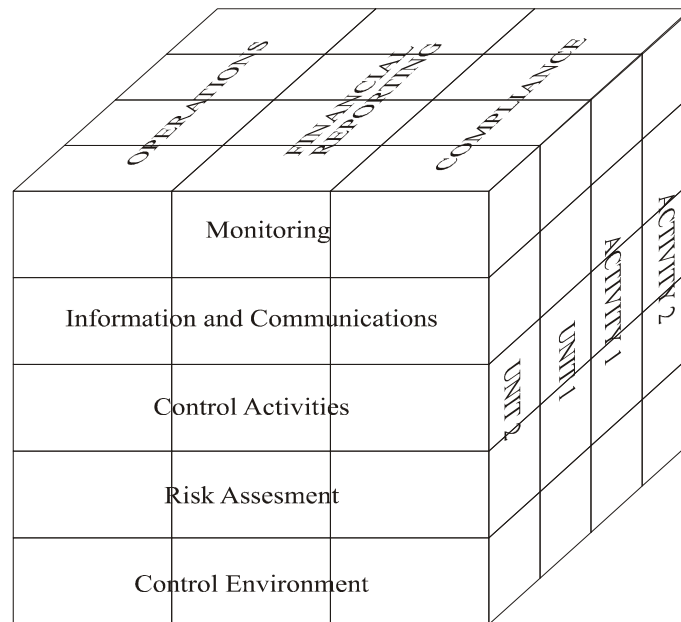
The **control environment** represents the basis of the overall system of internal control, respectively, it represents the "atmosphere in which members of the organization carry out their control activities and responsibilities" (Godwin, Alderman 2010, 91). Determined by the history and the culture of the enterprise, the control environment is influenced by many factors (management style, skills, experience and ethical values of the employees, etc.), thus directly determining the efficiency of other components of internal control.

Risk assessment involves identifying and analyzing risks. Risk identification is an iterative process that is often integrated into the planning process, and represents the first step towards reducing and managing the risk (Knechel et al 2007, 231). In addition, the choice of methods of risk identification is less important than the careful consideration of factors that may cause exposure and increase risk. After their identification, the management of the enterprise is expected to assess the exposure to the given risks, determine their acceptable level, and then define a strategy and the activities of their management in order to maintain the desired risk level.

Control activities include policies and procedures that are conducted in order to identify and prevent the occurrence of risks that could jeopardize the achievement of the company goals. Control activities include three primary functions that must be separated and adequately supervised (Hayes, Schilder 2002, 236): authorization (granting the right to initiate certain activities), protection

(physical control of the means) and recording (documenting of the evidence of the activities performed). In doing so, control activities have a preventive role in terms of reducing the likelihood of risk occurrence, and the role of reducing the negative consequences of the risks to which the enterprise has already been exposed.

Information and communication system is adapted to the specific needs of the enterprise. So, to make appropriate decisions, in addition to the information related to the company itself, it is important to provide information about the external events, activities and conditions. Communicating information must exist on all levels of the enterprise, and between the levels in order to adequately understand the role of the employees in the system of internal control.

Monitoring and evaluation of internal control in order to improve the quality and performance of procedures that it covers. Specifically, monitoring is "supervising or independent verification of the functioning of the internal control system in order to find possibilities for improvement" (Andric, Krsmanovic 2004, 232). Monitoring activities are conducted through the ongoing monitoring (by performing the ordinary activities by managers and supervisors) and the periodic evaluation of internal control based on assessment of risk and the effectiveness of internal control during the ongoing monitoring. Monitoring has long been the responsibility of internal auditors, however, according to the COSO model, monitoring represents an important element of internal control.

Designing and implementing of the internal control in accordance with the presented model provides the effectiveness of internal control system. By providing high quality of the business processes, the contribution in achieving the objectives, the protection of corporate assets, ensuring optimum use of resources, preventing and detecting errors etc., internal control presupposes not only a prerequisite of successful business enterprises, but also an instrument with a significant role in managing the risks the company is already exposed to.

However, at a time when there is a special emphasis on the importance of the concept of ERM, especially in the times of scandals of many multinational companies, it has been noted that internal control, although significant, plays only a supportive role in the process of risk management. Namely, although risk assessment is separately defined element of internal control, it is not emphasized enough in relation to the other components. In this sense, promoting the role of internal control in risk management, and respectively, establishing a system of internal control based on risk, appears as a necessity.

3. Scope of the Provisions of the SOX Act in Providing Guidance f or the Adequate Shaping of the Internal Control Based on Risk

It is known that the end of the last and the beginning of this century was marked by the collapse of numerous multinational companies such as Enron,

WorlCom, Tyco, HealthSouth and others. Intentional and pre-designed manipulation of the financial statements are the reasons for these financial scandals. Increased risk of malicious financial reporting indicated that the first line of defense against accounting fraud, i.e. the system of internal control, had major flaws. For these reasons, the need to restore customers' trust in the information contained in financial reports focused attention on the internal control over financial reporting.

Thus, in 2002. the U.S. passed a federal law - the Sarbanes-Oxley Act or just SOX, which has placed new demands on managers and boards of all public accounting enterprises. The provisions of this law primarily aimed at establishing an efficient system of corporate governance. In this regard, attention is drawn to the need for proper design and functioning of the internal control over financial reporting. Provisions which specifically regulate the internal control over financial reporting are contained in sections: 302 – Corporate responsibility for financial reports and 404 – Management assessment of internal controls.

When it comes to section 302, it should be noted that it emphasizes the responsibility of companies' management, particularly the responsibility of the General Manager and the Head of Finance, in the area of critical review of final statements intended for the enterprise stakeholders, as well as in the area of critical review of significant transactions, and then, based on that, they provide assurances that the information fairly represent financial position and the performance of an enterprise, in all materially significant respects. Furthermore, management is responsible for the establishment and proper functioning of internal control within each of the possible sources of information necessary for the preparation of financial statements. Aside from providing reliable and complete information, internal control system should enable the timely flow of information with and objective reporting during the period for which the statements are prepared. In this part of the law, management is expected, among other things, to assess the effectiveness of existing internal controls 90 days before reporting. Such a request is certainly one of the most important and demands from the management of the enterprise to identify, understand and evaluate internal control weaknesses, which may compromise the reliability of the information. Furthermore, based on such an evaluation, the following needs to be disclosed to the external auditors and the audit committee (Sarbanes-Oxley Act 2002, 33):

- "all significant deficiencies in the design or operation of internal controls which could adversely affect the issuer's ability to record, process, summarize, and report financial data and have identified for the issuer's auditors any material weaknesses in internal controls; and
- any fraud, whether or not material, that involves management or other employees who have a significant role in the issuer's internal controls" .

In this way, the law emphasizes that any timely recognition, certification and disclosure of internal control weaknesses, as well as any possible embezzlements, by

the employees who have a significant role in its implementation, contribute to finding ways and possibilities for their elimination. In addition, it is important to emphasize whether changes (corrective actions), made after the assessment of internal control were aimed at eliminating the weaknesses[4].

Then, the Section 404 deals with the assessment of the effectiveness of internal control system. Namely, this part of the law requires that a set of annual financial statements should also include the report on internal controls in which the following should be integrated (Sarbanes-Oxley Act 2002,44):

- "stated responsibility of management for establishing and maintaining an adequate internal control structure and procedures for financial reporting; and
- realized assessment, as of the end of the most recent fiscal year of the issuer, of the effectiveness of the internal control structure and procedures of the issuer for financial reporting" .

Request for formal reporting on the effectiveness of internal control by the management appears as a novelty. In addition, the SEC requires that this report, aside from the conclusion on the effectiveness of the internal control which explicitly indicates whether the control is effective and whether all material weaknesses have been identified, contains the statement on the framework used to assess the effectiveness of internal control (Agami, 2006 33). The Commission does not oblige companies to use a particular framework but recommends COSO as the "appropriate framework" (Securities and Exchange Commission 2006, 6). On the other hand, it is noted that the COSO framework identifies components and objectives of effective internal control but does not provide instructions which the managers should follow when evaluating the effectiveness of internal control over financial reporting. For these reasons, the Committee of Sponsoring Organizations published guidelines in June 2006, titled: "Internal Control over Financial Reporting - Recommendations for Smaller Public Enterprises". More accurately, the guidelines were issued in three parts:

- The first part "Executive Summary" provides a short overview of the guidelines for the boards of directors and middle level management of the enterprise (www.coso.org/ documents /SB_Executive_Summary.pdf),
- The second part of the "Guidance" provides a general overview of the internal control over financial reporting in small enterprises, including a description of the characteristics of the enterprise and their impact on the internal control, challenges with which small enterprises are faced and how

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[4] An example of a good praxis is the Catalina Marketing company. In the Wall Street Journal in 2004, the company revealed the shortcomings of its internal control in four areas: the structure and design of the process of reporting, inadequate and inefficient policy of transaction documenting, inadequate design of policies and procedures related to the accounting coverage of transactions and control environment. After that, the company stated 13 specific ways to improve internal control (Farthe, Gramling, 2005, 27).

management can use the Framework (www.easyfinance.com.cn / Download / Doc / Volume% 20II%20Guidance.pdf) and

- The third part, "Evaluation Tools", includes the illustration of instruments that managers can use in the evaluation of internal control over financial reporting. Use of these instruments also allows determination of adequate application of the principles contained in the guidelines (www.bestofmanagement.com/admin/upLoad/2008112858330517.pdf).

These documents, in the opinion of the Committee, should help managers in the better understanding of the COSO framework and applying it in the evaluation of the effectiveness of internal control over financial reporting.

In addition to improving internal control systems, the importance of adequate assessment of its functioning by the management is also important because the law further requires that the external auditor forms an opinion on the assessment. Certainly, the auditor will express: a positive opinion if they do not find any material deficiencies of the internal control or whether they identify the same deficiencies that the management pointed out; then, a negative opinion if they identify the deficiencies that the management did not indicate, and refrain from opinion if the management in any way limited the ability of auditors to evaluate the assessment of internal control performed by the management. In addition, according to the provisions of Section 404, external auditors are further required to perform an independent evaluation of its effectiveness.

Requirements set by the Sarbanes-Oxley Act undoubtedly contribute to the improving of the reliability of financial reporting. Despite many difficulties in their implementation in the business, which primarily relate to the material and human resources, many enterprises today show significant improvement of the structure and process of documenting of the items in the daybook; improvement in the activities which prevent abuse, improvement of the documenting of control and the process of its evaluation, improvement in the defining of the control process throughout the organization, including the crucial relationship between these processes of control and risk and encourage a return to fundamental basic controls (segregation of duties, periodic compliance of accounts and authorization of processes) (Campbell et al 2006, 20).

The achieved improvements of the reliability of the financial reporting system logically open up a question of the ability to integrate the provisions of SOX Act and the key principles of the concept of ERM. However, given the agents of the establishing and key features of the concept of ERM on the one hand, and the agents of the establishing and the requirements of the provisions of the SOX Act on the other, it was fairly easy to notice certain difficulties. More specifically, the attention of the law is focused on the internal control over financial reporting which at the same time, degrades the other dimensions of internal control in the risk management of an enterprise. For these reasons, the law is often being criticized for considering a definition of risk which is too narrow, reducing it solely

to the risk of compromising the quality of financial reporting process. On the other hand, the concept of ERM includes all categories of risk (financial, business, strategic, risk of abuse, etc.), and, respectively, aims at perceiving of the overall risks that companies face to ensure its proper management.

It is true that some companies have made some efforts towards integrating the provisions of the law and the principles of the concept of ERM, however, their experiences, according to Roth, have proved to be a myth rather than reality. Namely, it is considered a myth that the application of the process and instruments regulated by section 404 of the law can be extended to the concept or ERM (Roth 2007, 4), and respectively, if companies implement all five elements of the internal control system to achieve reliability of financial reporting, then there should be no problem in applying the same processes and tools for achieving other goals of ERM. However, although this assumption seems logical, the reason for the inability to connect provisions of the section 404 and ERM concept was reflected in the fact that the law regulations are not so much focused on the risk as much on the assessment of controls of the financial reporting process. In addition, the omission of a clear interpretation of the law directed the attention of regulatory bodies to provide adequate guidance for the assessment of internal control, respectively, for documenting and testing control procedures by which the risk-based approach has been neglected.

Also, it could not be accepted as a reality that the enterprises which have adopted the concept of ERM were able to integrate the provisions of the law with relative ease, because the approach of incorporating the provisions of the law was not based on risk. Also, the use of ERM implied that the enterprise would go into more detail regarding the internal control over financial reporting in relation to other controls in the enterprise. For these reasons, a separate definition of the agents of conducting of the provisions of the law and the concept of ERM are the most common examples in the enterprises.

Although conclusion can be drawn from the aforementioned that there are certain limitations regarding the integration of the law and the concept of ERM, there are realistic opportunities to make a step forward because it is a fact that the law increased the public interest in risk management, including raising awareness about the risks and controls.

4. From Enterprise Risk Management Support to the Construction of the Concept of Internal Control Based on Risk

The development of the concept of ERM and the directing of the potential of internal control towards the provisions of SOX, only to reduce the risk of malicious financial reporting, conditioned a kind of a necessity for redesigning the system of internal control. Namely, taking the awareness about the importance of

risk management to a higher level would require the establishment of an adequate risk management process that will include internal control, and will not be its component. Thus, in 2001 the Committee on Sponsoring Organizations initiated the project in September 2004, which resulted in publishing of the document - Enterprise Risk Management - Integrated Framework, aimed to meet the aforementioned requirements. The establishment of the framework was not driven by the intention to replace the COSO framework from 1992, but rather to upgrade it. Therefore, the framework from 2004 is considered to be the revised version of the previous one.

Recognizing the importance of risk management, the Committee on Sponsoring Organizations in 2004 gives a broader definition by marking the enterprise risk management as "process, effected by an entity's board of directors, management and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives" (Enterprise Risk Management - Integrated Framework in 2004, 2).

According to the revised framework, the system of internal control, in addition to the five elements defined in the previous model (control environment, risk assessment, control activities, information, communication and monitoring), consists of: (Committee of Sponsoring Organization of the Treadway Commission 2004, 32)

- setting the goals (business goals exist before the management can identify potential events that may affect their achievement. Thereby, the process of enterprise risk management should ensure that the management is in a position to establish a set of goals consistent with the mission of the enterprise and in accordance with the acceptable levels of risk),
- events identification (implies that all events of internal or external nature which may affect the achievement of the enterprise goals must be identified, and it is important to distinguish between risks and opportunities. Identified opportunities should be diverted to the process of setting goals) and
- response to the risks (management of an enterprise decides on avoidance, acceptance, exploitation or reducing of the risk and runs activities in order to establish its reduction to acceptable levels).

At the first glance, the addition of these elements seems as a marginal change on the grounds that they all could be considered sub-elements of risk assessment components. However, the Commission emphasizes that the COSO from 2004 represents a strong model of the risk management process in which the dominant role is the one of internal control.

Also, the framework from 2004 expands the list of the enterprise goals. In addition to achieving efficiency and effectiveness in doing business, reliability of

financial reporting and compliance with applicable laws and regulations, the framework emphasizes the proper design of the ERM concept which is a key factor in meeting the goals of an enterprise.

Interdependence of the extended list of elements of internal control and the objectives can be represented as follows. (Figure 2):

Figure 2 COSO ERM

Application of the model presented at the front, provides not only the improvement of internal control in the enterprise, but also provides a step toward a more complete enterprise risk management process (balancing of the acceptable risk levels and the set enterprise strategy, improving of decision-making process connected to the response to the identified risks, etc.). This is reaffirmed by the data of the research which was conducted in October 2005 by the Institute of Internal Auditors referring to the degree of implementation of ERM in accordance with the COSO guidelines. Results of the research which involved 7200 enterprises are given in Table 2.

From the table above, it can be seen that, just a year after defining the framework, even 48.2% of surveyed enterprises accepted or were in the process of accepting of this model, while 31.8% considered the possibility of its application in their enterprise.

Table 2 ERM Status

The organization has not considered ERM	13%
The organization adopted ERM several years ago, and the infrastructure is mature	6,1%
The organization has recently adopted ERM and implementation is relatively mature	5,5%
The organization has recently adopted ERM but implementation is not fully complete	14,7%
The organization is in the process of implementing ERM	21,9%
The organization is currently considering the relevance of ERM for its enterprise	31,8%
The organization has rejected ERM concept	1,4%
Other	5,0%
Response not provided by participant	0,6%

Source: (Gramling, Myers 2006, 54)

Of course, despite numerous benefits the model provides, there are certain limitations. The limitations could be assigned mainly to the human factor in the sense of the poorly conducted assessment during the decision-making process, irreverence to the regulations, the low degree of diligence, and subsequently the fact that when making decisions about accepting, reducing or eliminating the risks, it is necessary to examine the relation between the benefits and the costs.

Otherwise , as noted, the Framework from 2004 represents a complement of the previous COSO model. However, some fundamental differences could be noticed among these documents. In particular, unlike the Framework from 1992 which sees the internal control as a critical factor for the achievement of the company goals, the Framework from 2004 gives credit for the achievement of the goals to the appropriate enterprise risk management. Therefore, enterprise risk management process takes precedence, this process determines the success of the enterprise, while the internal control has a dominant role in this process. Also, even though all employees in the company take responsibility for risk management (managers of some departments, financial officers, internal auditors and others), Framework from 2004 especially emphasizes the importance of the function of the head of the department of risk whose primary responsibility is to establish and manage the system for identifying, managing and monitoring of the risk throughout the enterprise.

Conclusion

The enterprises are constantly changing and developing in the modern conditions of doing business. The complexity of the relationship between the

enterprise and the environment conditions the possibility of an event whose outcome is not possible to be estimated with a corresponding probability. The ability to prevent the events, actions or missed chances from adversely affecting the business, or, to use these events to increase value, is indubitably one of the main determinants of business success. The mechanism that significantly contributes to the increasing of the effectiveness of risk management process is internal control.

The importance of internal control for the performance of the enterprise caused the formation of a variety of models - internal control frameworks. One of the most famous is certainly the COSO internal control model, established in 1992 and amended by the Committee of Sponsoring Organizations in 1994.According to this model, internal control is a process which involves boards of directors, management and other employees in order to provide reasonable assurance of the effective management of the enterprise. Revised COSO model was developed in 2004 based on the provisions of the Sarbanes - Oxley Act. Provisions contained in the sections 302 and 404 are setting new requirements to the management and the external auditors, concerning the establishment, maintenance, efficient functioning and evaluation of the effectiveness of internal control. Revised COSO model expands the definition of risk and refers to the attitude that the effective risk management contributes to increasing of the value of the enterprise, and that the system of internal control is an integral part of the process. Adequately designed and implemented system of internal control is considered an indispensable instrument for the enterprise risk management.

Internal control is expected to promptly detect and warn of the existence of certain risks, to regularly and thoroughly evaluate the nature and extent of the risk to which the enterprise is exposed, to provide a recommendation for resistance to the adverse consequences, or, respectively, a recommendation for exploitation of the perceived opportunities.

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INTERNA KONTROLA I UPRAVLJANJE RIZIKOM PREDUZEĆA – OD TRADICIONALNOG DO REVIDIRANOG COSO MODELA

Rezime: U ostvarivanju svoje poslovne aktivnosti preduzeća su neprestano izložena riziku. Jedan od značajnih mehanizama za smanjenje rizika je interna kontrola, kao skup politika i procedura koje menadžment uspostavlja radi realizacije ciljeva preduzeća. U radu se ukazuje na razvoj nove paradigme interne kontrole – interne kontrole bazirane na riziku. Pri tome, polazi se od revidiranog COSO modela koji ne samo da predstavlja dopunu tradicionalnog modela upravljanja rizikom, već i omogućava pravovremeno identifikovanje, upravljanje i praćenje rizika preduzeća u savremenom poslovnom ambijentu. Adekvatno dizajniran i implementiran sistem interne kontrole koji se bazira na riziku, u funkciji je ostvarivanja ciljeva vezanih za efektivnost i efikasnost poslovanja preduzeća, pouzdanost finansijskog izveštavanja i usklađenost sa odgovarajućom normativnom regulativom.

Ključne reči: interna kontrola, rizik, upravljanje rizikom, tradicionalni COSO model interne kontrole, revidirani COSO model interne kontrole, odredbe-odeljci 302 i 404 SOX zakona

THE CONCEPT OF NATIONAL INNOVATION SYSTEM AND ECONOMY'S COMPETITIVENESS

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Abstract: The competitiveness of a country depends on the innovativeness of its economy. One of the key innovativeness determinants of the economy is the country's innovation system that denotes the network of public and private institutions, whose activities and interactions determine the creation, import, continual enhancement and diffusion of innovation as considered in general terms. On the other side, the enhancement of innovation capacity of a country implies an important premise of establishing and functioning of national innovation system.

Keywords: innovation, innovation capacity of an economy, national innovation system

Introduction

The concept of national systems of innovation represents a very useful analytical category in the study of complex issues of economic progress of particular countries over the past twenty years. Also, it has been proven to be a very important analytical instrument in the interpretation of phenomenon called economic catching-up of technologically and economically leading economies (the U.S. and Japan, mostly) by countries on the rise (South Korea and other "small Asian tigers") during the nineties of the previous century in the most propulsive sectors of the economy.

In the economic literature the catching up phenomenon of technologically advanced countries (USA and Japan) has been particularly studied by the manufacturers in the area of semiconductors and consumer electronics from South Korea and Taiwan. The economic growth of Japan in the seventies of the twentieth

century has been often explained by the achievements in creation of a national innovation system. A similar analogy was used in explaining the economic success of South Korea and other "East Asian Tigers" in the time of the last decade of the previous century (Stuart 2006).

The question arises about the key causes of our country's stagnation of innovation in comparison to innovation-advanced countries. It is understandable that this is an extremely complex issue and it is not possible to find simple answers. Nevertheless, we believe that good information on this issue can be found in the Report on the global innovation of countries that gives INSEAD organization. Using the latest information in this document, a comparative review of the value of innovation inputs for the U.S., Japan, South Korea and Serbia is given.

The aim of this paper is to: a) provide a closer explanation of the concept national system of innovation and its direct relationship with the innovation potential of the country, b) show the areas of most visible lagging of Serbian innovation inputs behind the innovation leading countries, and c) confirm the position in which innovation is a key determinant of competitiveness of the economically leading countries in the world. In this context, the paper first gives a little more detailed explanation of the national system of innovation concept, with special emphasis on its evolutionary character. Then, based on the latest data from The Global Innovation Index is given a comparative overview of innovation input values for the three observed countries in this paper from the group of most innovative economies in the world, on the one side, and Serbia on the other. A comparative analysis of global competitiveness index and especially 9th (technological readiness) and 12th pillar (innovation) is conducted, for 25 most competitive economies, as well as positioning the United States, Japan and South Korea compared to other countries from the group of most innovative economies in the world. It also provides a comparative view of 5th 9th and 12th pillar of the U.S., Japan and South Korea. Finally, we conducted a cluster analysis, which enabled "reduction" of countries on a smaller number of similar groups (classes).

The Theory of National Systems of Innovation

The theory of national systems of innovation in economic science emerged in the second half of the ninth decade of the previous century. It is mostly related to the English economist Christopher Freeman and his paper *Technology Policy and Economic Policy: Lessons from Japan* (Freeman 1987). In a relatively short time this concept made a strong influence on the design and practical implementation of innovation policy as an increasingly important component of development management not only of market leading, but also of fast developing countries in the world.

Its theoretical shape, national systems of innovation concept gained in the works of Swedish economist Ake Lundvall (Lundvall et al. in 2002, 214) and

professor of Columbia University in the United States, Richard Nelson, published during the nineties of twentieth century (Nelson 1993, 3). From that time until today, the national systems of innovation concept attracted the attention of policy makers in many countries while exhibiting the undeniable practical relevance (Cvetanović et al. in 2011, 19).

Given the number of studies conducted and the general popularity of the concept, it would be logical to assume that there is a generally accepted definition of a national innovation system. Surprisingly, the generally accepted explanation of this term does not exist. This is largely a consequence of the complexity and diversity of the elements of which is composed concept (Lundvall 1992, 12).

The concept of national system of innovation contains a large number of very different and mutually permeating elements. Its contribution to the economic growth of particular countries is function of many factors, such as the success of enterprise technology strategies, character of mutual relations of firms, the role of the public sector in general and especially in supporting research and development activities, the willingness of financial institutions to support research and development of technology, expertise of research institutions etc. (Lundvall 1992, 13). The interaction between these units may be technical, commercial, legal and social, since their goal is the undisturbed conduction and research activities funding (Niosi et al. in 1993, 212).

Applicability of this way determined content such as national systems of innovation depends on the perspective from which to observe. A certain number of researchers argue that the state is the most important element in most national systems of innovation as it is funding and conducting the dominant part of the research and development activities in the country (Niosi et al. in 1993, 212). Other authors point out that although the state plays a central role in the functioning of national systems of innovation; its efficacy depends largely on the success of companies in developing new technologies and market implementation of product and service innovations. Because, companies are the subjects that are making competitive market advantage through innovations. Their approach to innovations is very wide (new product design, new manufacturing process, a new approach to the market, a new way of training). Innovations often include well known ideas, but those that were not extensively used. Innovations always include investments in skills and knowledge, as well as in physical assets and brand reputation (Porter 2008, 167-168). The state can organize all types of research, and innovation support programs, but the companies are responsible for their technological and commercial success.

The concept of national systems of innovation has become an unavoidable conceptual design of many international organizations such as OECD, UNCTAD's, and many entities of the European Union (Lundvall 2002, 214). The growing interest in this concept is present especially in rapidly developing countries of Asia and also in a number of Latin American countries (Lundvall 2002, 214).

The reason for growing interest of economists and people in power for the concept national systems of innovation has undoubtedly been a great success of Japanese manufacturers in high-tech industries during the late seventies of the twentieth century. As the sales of Japanese products in the European market accelerated, raised were the inevitable questions about the identification of the dominant factors of this phenomenon. A key factor in the success of Japanese companies in the European market at that time was winning the production in areas of rapid technological change, such as electronics (Nelson 1993, 3). This led to the American model of generating innovations loses the attraction, while the Japanese became the role model for many countries (Nelson 1993, 16-17).

While the rapid economic growth of Japan in the seventies and eighties of the previous century has put a pressure on the American model of innovation, economic prosperity of South Korea and other "small Asian Tigers" (Singapore, Hong Kong) during the nineties, marked the end of American dominance. Seen from today's perspective, it appears that the pessimism about the economic and technological position of the United States at the time was overemphasized. However, there are good reasons for the growing pessimism about the economic and technological impact of the U.S. during the seventies of the twentieth century. Declining productivity and relatively low innovativeness of U.S. companies led many economists to realize that the root of this problem is in the orientation of American corporations to maximize short-term financial goals that were bad for the development of technology and innovation generation. The fear that if something is not done, the United States will cede forever its technological leadership to Japan has become a phenomenon present in the leading economy of capitalist world.

During the nineties of the previous century, however, the U.S. innovation system has experienced an unexpected renaissance, while the Japanese significantly lost on its superiority. To this reversal came partly due to the change of prevailing economic climate in these countries. After seemingly successful years in the second half of the ninth decade of the twentieth century, when Japan recorded an average economic growth rate of about 5.5% during the nineties, the country fell into a long period of economic stagnation. In contrast, the U.S. has experienced a general economic recovery in the early nineties, and then the spectacular technological and economic development in the second half of the last decades of the previous millennium. The repeated success of the United States is reflected in a growing leadership in the field of new technologies (biotechnology, computers, software), and in a dramatic production and technological restructuring of the traditional manufacturing sectors, which were affected during the eighties of the twentieth century (Berggren, Nomura 1997, 23). This change at the top has led to very different views about the extent to which the U.S. technologically revitalized itself and the pace with which Japan has stagnated. The long debate on this subject almost did not bring any benefits. In addition to obscuring the real situation between the two countries, has made even the bigger picture very unclear.

Unlike the eighties of the twentieth century, when the focus was almost exclusively in the U.S. and Japan, during the last years the focus has shifted to South Korea and East Asian countries mentioned above. The economic boom of the Asian countries did the pressure on the U.S. and Japan, especially in sectors where producers from these countries were in technologically superior position (the area of semiconductors, primarily). The technological and commercial successes of companies from these countries have challenged the view that the American or Japanese national systems of innovation are elusively superior to the same in other countries. Moreover, because of the change in position in the field of technological innovation, the U.S. and Japanese innovation systems could not be any longer considered as role models that other countries want to emulate. This fact has inevitably raised to the surface issues of key success factors in South Korea and other "small Asian tigers" in an extremely dynamic and competitive sectors, as well as how come that Western Europe could not even come close to them.

Production of LCD and LED television sets is an example of industry where in a relatively short period of time the position of highly industrialized countries (Japan and the United States, primarily) has significantly worsened in the world market as a result of losing the technological supremacy in the global market. This was obviously a qualitative turn that can be marked as the beginning of the era in which companies from the West in the highest percentage will be in the dependent position of technological advancement of South Korean and Taiwanese companies in the semiconductor area and multiple productions that relies on it. Some believe that East Asian firms are dominant in this area; among other things because they understood much better the importance of the cumulative nature of technological changes in comparison with companies from Western countries.

Evolutionary Character of the Concept

Although it might seem unusual, the concept of national systems of innovation is not in any way fashionable. According to Freeman, the concept of national systems of innovation in rudimentary form can be found in the book "National System of Political Economy" by Friedrich List published back in 1841. Moreover, Freeman believes that List could give his work the name "National Systems of Innovation", as the author of the work pointed to a number of factors that are important for the economic development of the country (investment, institutional development, import of foreign technology, education and training) as well as the quality of the many connections that exist between them. Lists main concern was how will Germany overcome its economic backwardness, and through which instruments and measures of economic and development policies will economically and technologically reach and surpass England, as a leading industrial nation in the first half of the nineteenth century? As Freeman explained, for the strategy represented by List, it is necessary not only to protect the young

industry, but also the actual implementation of a large number of different policies designed in a manner that enables economic growth and industrialization of Germany. Most of these policies were about learning new technologies at the time, and their application in industrial production. The most important feature of this approach was the need for a proactive role of the state. List realized the interdependence of innovations and economic development of the country, concluding that the activities associated with economic development and construction of industrial and technological capacity needed to be coordinated by the state (Freeman, Soete 1997, 295). When we compare Freeman analysis of the Japanese innovation system to what is represented by List for Germany in the 19th century, the similarities are more than obvious. Two factors which are particularly emphasized are the long-term policies aimed at development of the innovation capacity of the economy, on the one hand and the necessity of proactive role of the state, on the other.

While analyzing the role of government in the postwar economic success of Japan, usually emphasized is the role of the Ministry of International Trade and Industry (MITI). Freeman, however, indicates how the MITI had functions that were not particularly appreciated at that time which were later proven to be extremely useful. Among other things, it was its well-established system of technological forecasts, state aid in the promotion of technology with the greatest long-term potential in the global market, assistance provided to companies in the implementation of necessary infrastructure investments. Another specificity of the Japanese innovation system, according to Freeman, was the MITI long-lasting relationship with Japanese companies and its comprehensive support for the development of cooperation between firms, banks and educational institutions (Freeman, Soete 1997, 334-336).

Impact on Other Concepts of Innovation Systems

Freeman's original approach enabled the development of three other important concepts that continue to emphasize the importance of technological changes in the modern sense. In short, we have these concepts in mind:

- Technological system
- Regional system of innovation and
- Sectoral system of innovation

Technological system was developed in the late nineties of the twentieth century. In short the concept includes a network or networks of actors that mutually interact within a particular technological area, within a particular institutional infrastructure, in order of creation, use and diffusion of technology. Some of the technologies that have been analyzed using this approach represent the concept of automated factory, technology of new materials and pharmaceutical industry (Edquist ed. in 1997, 6).

The second is the concept of regional system of innovation. It is a network of actors and institutions in the public and private sectors at the local level, whose activities and interactions are generating, importing, modifying and spreading the new technologies. In economic terms it has been proven to be a far more useful in comparison with the concept of technological systems. In the globalization context it has become necessary to understand the importance of location. Why are some regions such as Silicon Valley in California more innovative and commercially more dynamic than others? What are the similarities and differences between regions? And how are the regional systems of innovation linked to national systems of innovation? In essence, the concept seeks to explain how and to what extent the institutional environment of the region supports or hinders innovations.

The third and last is the sectoral system of innovation that Freeman and Soete described as one of the fields in the new millennium (Freeman, Soete 1997, 295). Basis for this position are clear. Innovation environment differs significantly from sector to sector. In certain industries, large firms play a dominant role and are responsible for the high percentage of innovations, for example in the chemical industry. However, this dominance is not present in other industries such as telecommunications and software (Malerba 2004).

Generally speaking, sectoral systems of innovation can be defined as a group of new and established products for specific use and the group of economic subjects who mutually interact in the market and outside of it in order of design, production and sales of these products. Sectoral systems have a base of knowledge, technology, input information, and existing and potential demand (Malerba 2002, 250). Sectors in time are going through the process of changes and transformations. There are also huge differences between sectors in the size, structure, strategy and organization of companies, speed and direction of technological change, and in the relationships between the actors. The advantage of the approach is that it provides significant insight into the ways in which the industry of new technologies transform over time. The concept also focuses on the elements of change such as strategies and learning of the firm.

These studies accentuate the importance of differences between countries, as well as the specific elements that are essential to the overall efficacy of national systems of innovation. However, there is neither a comparative analysis that would illustrate how the differences between national systems of innovation can affect the performance of different countries in an important industry. This is a big gap in the literature dedicated to the innovation economy.

Comparison of the national systems of innovation effects is not an easy process. Indicators that are commonly used to compare performance of different national systems of innovation are height of research ratio (proportion of expenditure on research and technology development in national income), number of patents granted, the share of new-technology products in international trade, and the share of new products (Lundvall 1992, 6). However, none of these approaches

has proved to be satisfactory. The two important issues according to Lundvall regarding the movement of research coefficient are that they do not show what the final product is, on the one hand, and the fact that it represents only one of the many sides of the innovation process as a whole, on the other. Given these shortcomings, there is a need for finding more comprehensive methods for successful comparison of the national systems of innovation. The task is of extremely complex nature and there is no consensus on methods that are needed for the most accurate and reliable comparison. More appropriate method would be to focus on sectoral levels. The advantage of this approach is that the efficiency and condition of any national system of innovation can be easily measured through fluctuations in market share. Although it is, as the previous approaches, far from perfect, its advantage is the possibility to be used simultaneously with the classification of those national systems of innovation that we define as *myopic* systems and those that we define as *dynamic* systems (Patel, Pavitt 1994). What separates these two systems from each other is how they relate to the technological activities. In myopic national systems of innovation, investments in technological activities are treated as common investments. When making decisions about common investments they are usually perceived in the short term. The main criterion for evaluation of projects is the rate of return on investments, payback period, which is usually three years, and maturity of the market. Due to the nature of investments in technological activities, this type of investments involves the acceptance of a high degree of risk and uncertainty. However, when the assessments are done by using the criteria for assessing the effectiveness of conventional investment projects, they can look unattractive. This type of structure of national systems of innovation makes them *passive* learning systems. In contrast, the dynamic national systems of innovation technological activities are treated completely differently from the conventional investment projects. Investments in technological development are in the true sense of long-term nature. Risk, uncertainty of the market, and high levels of investment are the backbone of this approach. Therefore, it is much easier to follow the certain technological trajectories than it is usually the case. Investing in early generations of a technology is often and quickly followed by programs of investments when the technology begins to mature. This ensures that the learning process lasts without interruptions and helps to create a vital technological competence. Dynamic systems have the structure of *active* learning systems (Freeman, 2002, 200).

The Success of South Korea

After the outbreak of the Asian financial crisis in the late nineties, South Korea has focused its resources on research and development activities in the areas of basic technologies. Special attention was paid to the policy of effective transfer of knowledge from universities to industry. During the nineties of the last century was brought a large number of plans for technological development in certain

areas, where by its importance stands out the development strategy of science and technology in the country by the name "VISION 2025," as well as the establishment of state agency for science, technology and innovation. Today, the Ministry of Economy combines the activities of all major public institutions in research and development. South Korea leads the group of 15 most innovative economies, and is also a parent country of two multinational corporations Samsung and LG that are engaged in the production of electronic equipment, which belong to the top of the economic and technological power (Mroczkowski, 2012). The key technologies are LCD and LED.

Display technology based on liquid crystals (Liquid Crystal Display - LCD) is one of the methods used in the making of flat-screen TV. Liquid crystals do not produce light, a light source (bulb) behind the panel sends light through the display. The display consists of two polarized, transparent panels between which is set a solution of liquid crystals. Electrical current that is passing through the liquid makes crystals to stick together so the light could not pass through them. Each crystal acts like a cap, lid, which either passes the light through or blocks it. The scheme of transparent and dark crystals creates a picture. LCD technology is used in direct-view TVs and also in TVs with the back and front projection. Local Dimming Technology (LED) creates images that perfectly match the original. It enhances color contrast using LED technology instead of fluorescent lamps with cold cathode tubes. This technology responds to what is happening on the screen and allows for a dark area in the picture the backlight to be put off. The result is pure and true black color and a TV with more efficient energy consumption.

Since the country lacks natural resources and abundant labor force, its domestic market is limited. Therefore, its export industries are the key in the acceleration of economic development. In order for the economy of the country to continue to grow there is not much of a choice, the country needs to improve the capacity of the economy based on knowledge. It must reduce the investments in development of ICT and direct its efforts towards the development of bio and nanotechnology, where the results of research and development activities will directly confront to the results of the U.S., Japan and the EU. Some believe that if the South Korea reaches a primary position in the areas of nanotechnology, the country would become a leader by the national income, earlier in 2025, but not later than 2050. (Sachs 2006).

The Innovation Economy and Its Basic Determinants

The innovativeness of the economy follows the Global Innovation Index, which was designed by the Confederation of Indian Industry, INSEAD (The Business School for the World) and Canon India. In short, this index is based on indicators related to innovation inputs and innovation outputs. Innovation inputs are classified into five groups: institutions, human capital and research, infrastructure, market sophistication and business sophistication. Innovation inputs

determines the benefits of environmental aspects that are necessary to stimulate the innovations. Countries are ranked by the index value of innovation. Using the metric of the Global Innovation Index Table 1 gives data for the global index of innovations of three analyzed economies (USA, Japan, South Korea) and Serbia. The idea is to show in which part of innovation inputs Serbia has the most visible lagging behind the countries innovation leaders, and therefore emphasizes the scope of the overall policy of development.

Table 1 - Factors of Global Innovativeness of USA, Japan, South Korea and Serbia
(The Data for 2011)

Country	Institutions	Human Capacity	ICT & Uptake of Infrastructure	Market Sophistication	Business Sophistication	Globl Innovation Index
USA	86,48	57,37	44,63	70,91	54,82	55,57
Japan	83,79	53,7	45,35	57,93	55,92	50,32
Korea	77,44	59,9	48,18	61,79	49,84	53,68
Serbia	63,17	40,33	24,46	34,18	33,33	36,31

Source: The Global Innovation Index 2011, Accelerating Growth and Development, INSEAD.

The data contained in Table 1 illustrate the large lagging behind of Serbia related to the countries innovative leaders of all five groups of innovation inputs (institutions, human capital and research, infrastructure, market sophistication and business sophistication). The lagging of Serbia is particularly pronounced in the most innovative economies in the area of market sophistication as one of the five determinants of the global innovativeness.

Table 2 gives values for the five innovation inputs of the countries innovation leaders in the European Union. Lagging of Serbia is obvious to the EU27 average in all innovative inputs, and as in the example above it is most pronounced in the parameters related to the market sophistication.

Table 2 - Factors of Global Innovation Index of the European Union
(The Data for 2011)

Country	Institutions	Human Capacity	ICT & Uptake of Infrastructure	Market Sophistication	Business Sophistication	Global Innovation Index
Luxs.	88.33	56.55	43.29	57.47	74.04	52.65
Finland	89.17	66.46	47.98	56.06	63.87	57.5
Denmark	94.24	60.17	45.9	64.48	58.07	56.96
Nederlend	87.46	47.6	43.6	61.81	61.64	56.31
U.Kingdom	86.37	56.06	43.65	74.44	57.78	55.96
Germany	83.47	57.54	43.25	59.33	51.61	54.89
Irland	91.22	57.78	39.5	65.31	73.85	54.1
Sweden	87.27	63.27	51.66	58.93	63.13	62.12
EU 27	80.98	50.76	38.55	51.76	49.35	47.21
Sebia	63,17	40,33	24,46	34,18	33,33	36,31

Source: The Global Innovation Index 2011, Accelerating Growth and Development, INSEAD..

Economy Competitiveness

The question arises: whether and in which way the quality of national systems of innovation affects the country's competitiveness in the global market? In order to get the answer to this question, it is necessary to start from the way in which the modern conditions quantify the economy competitiveness.

Global competitiveness index is now considered as the best and most comprehensive indicator of the competitiveness of the country knowing that the same quantifies macro and micro starters of competitiveness. Factors that are influencing the productivity and competitiveness of the country are grouped by the global competitiveness index into the next twelve pillars:

    I.   Institutions
    II.   Infrastructure
    III.   Macroeconomic environment
    IV.   Health and primary education
    V.   Higher education and training
    VI.   Goods market efficiency
    VII. Labor market efficiency
   VIII. Financial market development
    IX.   Technological readiness
    X.   Market size
    XI.   Business sophistication
    XII. Innovation.

Each of the above named pillars makes effect on the economy competitiveness on their own, and also in interaction with other pillars. Factors are measured using the so-called "Hard data" (the rate of inflation, the number of internet users, life expectancy, etc.) and the so-called "Soft data" (the opinion poll result of executive officers that is conducted each year by the World Economic Forum, where the current state of important social and economic phenomena - corruption, trust in the system institutions are quantified by values from 1 to 7).

The importance of certain factors of competitiveness depends on the level of economic development in which is a country. For a country that is in the initial stage of development (factor driven stage), crucial are the competitiveness factors such as institutions, infrastructure, macroeconomic environment, health and primary education.

For a more mature phase of development, factors such as higher education and training, goods market efficiency, labor market efficiency, financial market development, technological readiness, and market size become the most important for efficiency. Finally, in the third phase of competitiveness of the primary importance for economic development are business sophistication and innovation.

Depending on the phase in which the economy of a country is, the factors are classified into three groups and given different weights when calculating the Global Competitiveness Index.

Table 3 - Weights for the Formulation of Global Competitiveness Index

	Factor driven stage	Efficiency driven stage	Innovation driven stage
Basic factors	60%	40%	20%
Factors for efficiency	35%	50%	50%
Factors for innovation	5%	10%	30%

Source: Global Competitiveness, World Economic Forum, 2011.

Three before mentioned countries in 2012 belonged to the group of twenty-five the most competitive economies, the U.S. was ranked fifth; Japan was in ninth and South Korea in the twenty-fourth place (Appendix 1). As it can be seen from the Figure 1, the value of Global Competitiveness Index for twenty-five most competitive economies almost coincides with the value of 12th pillar, which says about the innovativeness of their economies.

**Figure 1: Comparison of GCI and 12th Pillar
- Innovativeness, for the First 25 Economies Ranked by GCI**
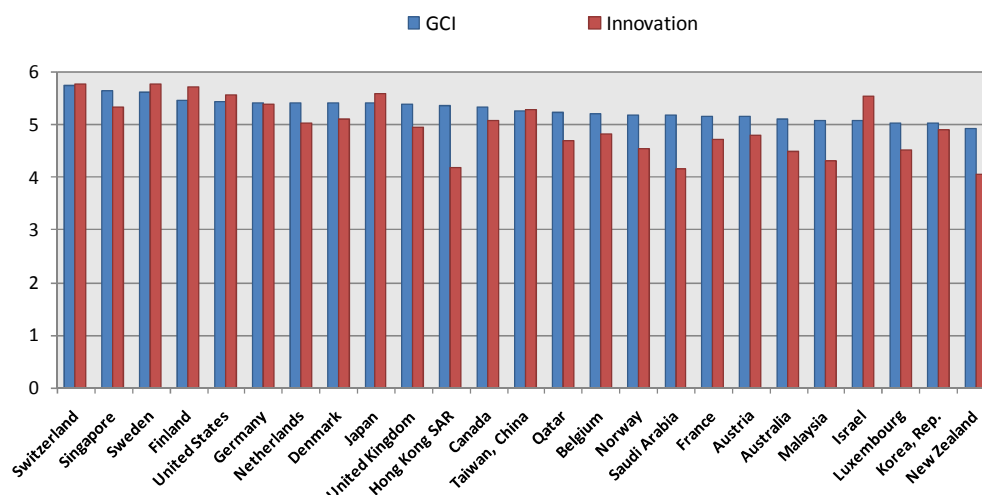
Graphic representation in Figure 2 of the relation between Global Competitiveness Index and its ninth pillar *Technological Readiness*, with the size of balloon, illustrates the relative *Innovativeness* relation of the top 25 economies ranked by GCI. It is noticeable that Japan and the U.S. have the most similar position based on all three displayed parameters (Global Innovation Index,

Technological Readiness, and Innovation). On the other hand, in relation to them, South Korea has a much weaker innovation and competitiveness index, and a slightly stronger technological readiness.

**Figure 2: The Relation of Global Competitiveness Index
and its Ninth Pillar Technological Readiness**
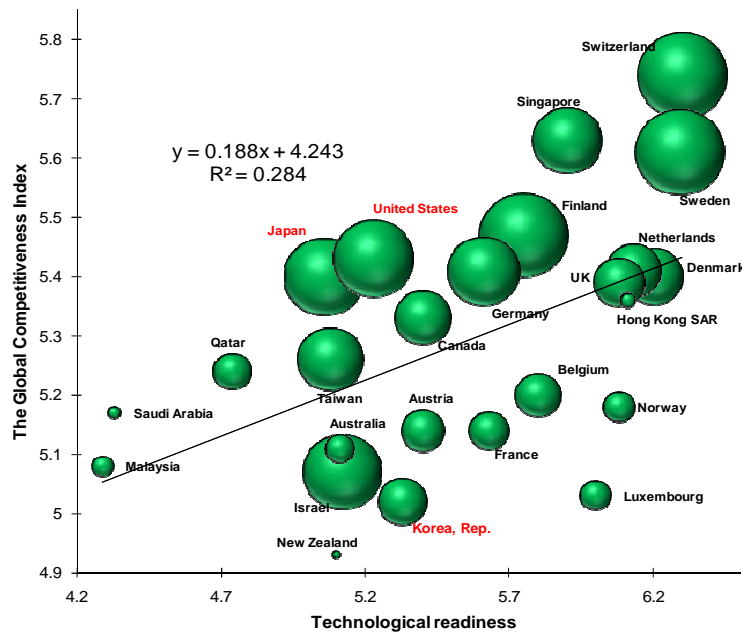
Figure 3: Comparison Display of the 12th Pillar - Innovation and Belonging Indicators
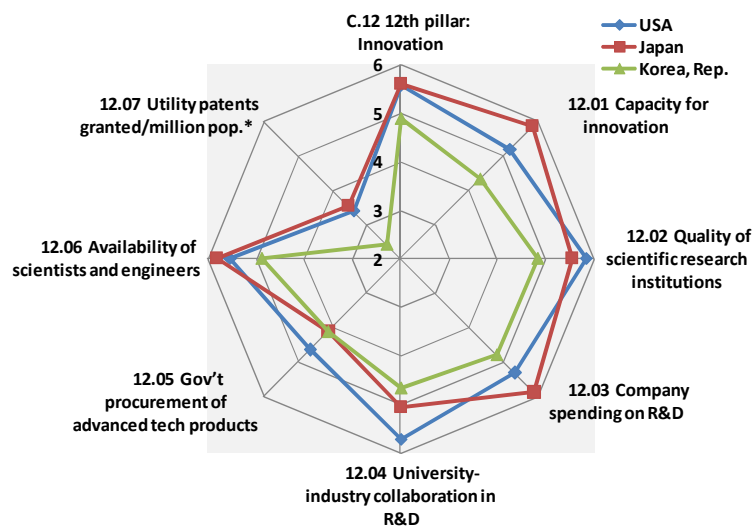
* The number of patents in hundreds

**Figure 4: Comparison Display of the 9th Pillar -
Technological Readiness and Belonging Sub Pillars and Indicators***
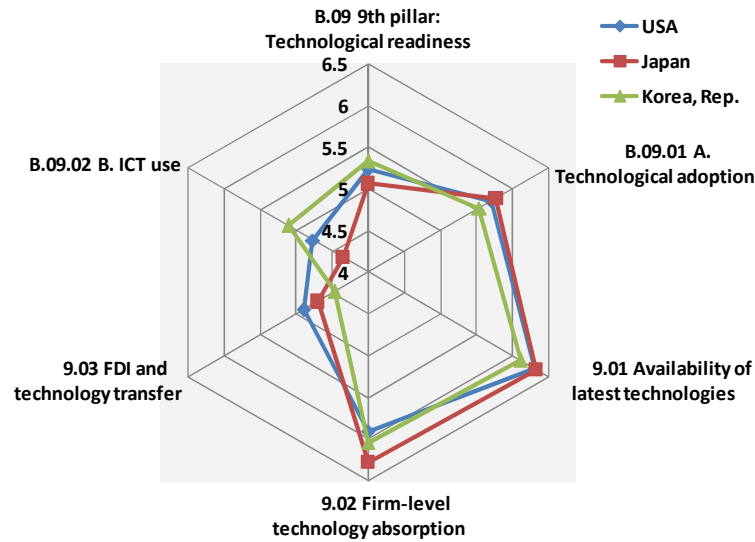
** The sub pillars and indicators were chosen in order of better diagram normalization

South Korea is on the high 14th place in the world for innovation (while by the overall GCI is in the 24th place), but this is still significantly lower compared to Japan and the United States that are on the 4th and 5th place for innovation and in the 10th and 6th place by the GCI. As for technological readiness South Korea and the United States are on the 16th and 17th place, while Japan is only in the 22nd place.

**Figure 5: Comparison Display of 5th the Pillar -
Higher Education and Training and Belonging Sub Pillars**
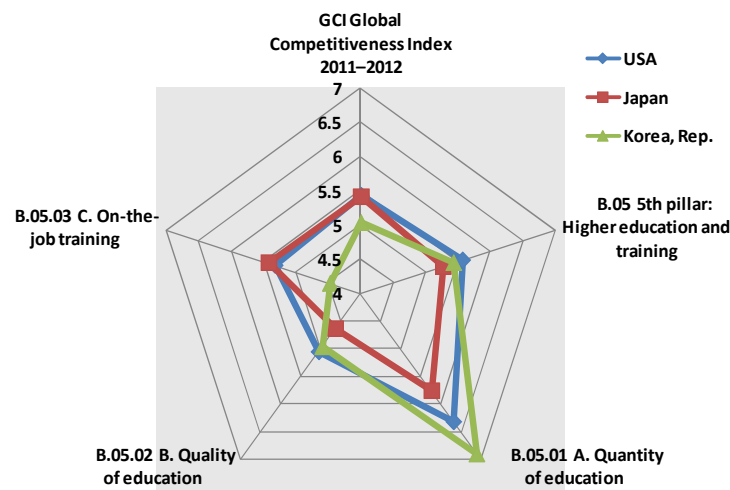
One of the key determinants of economic progress of South Korea is the improvement of the human capital quality. Impressive progress of this Asian country in human resources development in relation to the U.S. and Japan is shown in the Figure 3, which gives a comparative view of the fifth pillar that relates to the higher education and vocational training.

Figure 6: Tree Diagram According to Data for GCI, 5th, 9th and 12th Pillar - for the First 25 Economies Ranked by GCI
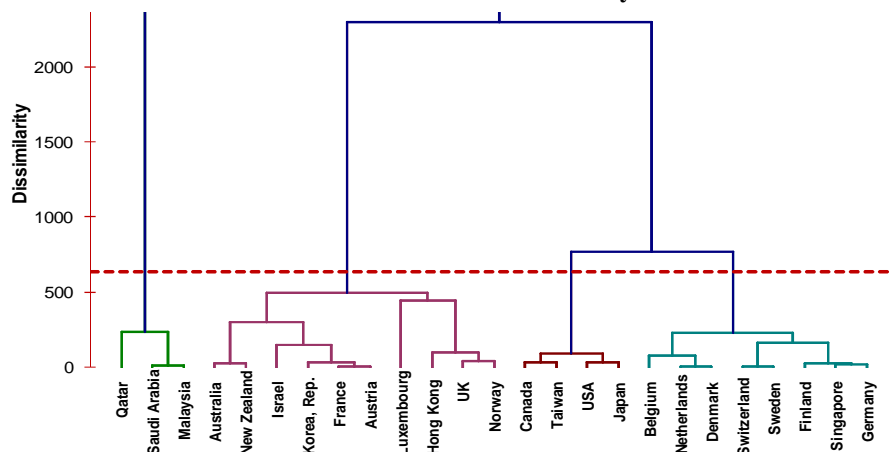
In the grouping process of 25 countries selected according to the observed variables, we used the bottom-up agglomerative hierarchical clustering method. In the initial step, each country is treated as a separate cluster. Their merging, based on mutual similarity in terms of values of observed variables, into the pairs of clusters, represent the result of all subsequent clustering iterations, until all the observed entities become consolidated within a single cluster. If as a possible cross-section of tree diagram is taken a difference level of about 650, three clusters are identified out of observed countries. The largest group includes 12 countries, or about 50% of all observed countries. In this cluster are Japan and the United States, but with the lowest mutual difference in the whole cluster (on the basis of the data the U.S. and Japan differ less than individually with any other country analyzed).

The second cluster includes 10 countries, or 40% of all observed countries. In this cluster is the third country of our focus, South Korea, which was isolated independently in sub cluster, and shows the smallest differences in relation to France and Austria, which constitute the second sub cluster.

The third group refers to the three countries, or 12% of the observed number: Qatar, Saudi Arabia and Malaysia, and this cluster showed a significantly greater difference in comparison to the two previous clusters.

From the matrix we see that the strongest correlation is between the GCI and its 12th Pillar - Innovation.

**Figure 7: Correlation Matrix of GCI, 5th, 9th and 12th Pillar
- For the First 25 Economies Ranked by GCI**

Conclusion

The key determinant of country's innovativeness is the quality of its innovation system, which marks the network of public and private institutions, whose activities and interactions determine the creation, import, continuous improvement and diffusion of innovations conceived in the broadest sense. On the other hand, the improvement of innovation capacity of the country marks an important premise of the establishment and functioning of national systems of innovation.

There is an expressed lag of innovativeness of Serbia behind the countries innovative leaders in the world, and the countries of the European Union. The lag is evident in all five perceived parameters of innovation inputs (institutions, human capital and research, infrastructure, market sophistication and business sophistication). Particularly is expressed the lagging of our country behind the most innovative economies referred to the market sophistication. This is an area to which the creators of development policy of the country need to give a special attention.

There is a direct correlation between the quality of national systems of innovation and economy competitiveness considered by the methodology of the World Economic Forum.

In examining the relation between global competitiveness and the level of innovativeness for twenty-five most innovative economies in the world, a very strong interdependence is established between the variations of the observed variables.

It is noticeable that Japan and the U.S. have the most similar position by all three shown parameters (index of global competitiveness, technological readiness, innovation). On the other hand, in relation to them, South Korea has a much lower index of competitiveness and innovation, and a slightly stronger technological readiness.

One of the key determinants of economic progress of South Korea is the improvement of the quality of human capital (education and training).

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Enclosure 1: Values of Global Competitiveness Index, the 5th, 9th, and 12th Pillars for the USA, Japan, and South Korea

	USA		Japan		South Korea	
	Rang	Score	Rang	Score	Rang	Score
GCI Global Competitiveness Index	**5**	**5.43**	**9**	**5.4**	**24**	**5.02**
5th pillar: Higher education and training	**13**	**5.57**	**19**	**5.27**	**17**	**5.44**
5.1 Quantity education	**10**	**6.33**	**30**	**5.77**	**2**	**6.9**
5.01 Secondary education enrollment rate	50	94.11	22	100.89	38	97.16
5.02 Tertiary education enrollment rate	6	82.92	35	58.03	1	98.09
5.2 Quality education	**20**	**5.05**	**39**	**4.64**	**25**	**4.96**
5.03 Quality of the educational system	26	4.67	36	4.41	55	3.93
5.04 Quality of math and science education	51	4.3	24	4.9	12	5.24
5.05 Quality of management schools	12	5.44	57	4.32	50	4.5
5.06 Internet access in schools	24	5.8	39	4.93	10	6.18
5.3 Training	**12**	**5.32**	**8**	**5.41**	**36**	**4.46**
5.07 Local availability of research and training services	11	5.63	12	5.5	39	4.64
5.08 Extent of staff training	12	5.01	6	5.32	41	4.28
9th pillar: Technological readiness	**20**	**5.23**	**25**	**5.06**	**18**	**5.33**
9.I Application technology	**21**	**5.7**	**15**	**5.77**	**31**	**5.54**
9.1 Availability of latest technologies	18	6.3	15	6.33	24	6.11
9.2 Firm-level technology absorption	18	5.9	3	6.27	8	6.04
9.3 FDI and technology transfer	49	4.9	65	4.7	86	4.47
9.II Use ICT-a	**20**	**4.77**	**29**	**4.35**	**15**	**5.11**
9.4 Internet users	18	79	15	80	10	83.7
9.5 Broadband Internet subscriptions	18	26.34	17	26.91	4	36.63
9.6 Internet bandwidth	26	29	43	12.38	48	9.94
9.7 Households with computer %	27	75.54	7	88.5	17	81.8

12th pillar: Innovation	5	5.57	4	5.59	14	4.89
12.1 Capacity for innovation	7	5.19	1	5.84	20	4.33
12.2 Quality of scientific research institutions	7	5.83	11	5.54	25	4.82
12.3 Company spending on R&D	6	5.34	1	5.89	11	4.8
12.4 University-industry collaboration in R&D	3	5.71	16	5.06	25	4.66
12.5 Gov't procurement of advanced tech products	9	4.66	32	4.12	31	4.13
12.6 Availability of scientists and engineers	4	5.53	2	5.81	23	4.89
12.7 Utility patents granted per million population *	3	3.39	2	3.53	5	2.41

Source: The Global Innovation Index 2011, Accelerating Growth and Development, INSEAD.

KONCEPT NACIONALNOG INOVACIONOG SISTEMA I KONKURENTNOST PRIVREDE

Rezime: Konkurentnost zemlje zavisi od inovativnosti njene privrede. Jedna od ključnih determinanti inovativnosti privrede je inovacioni sistem zemlje, koji označava mrežu javnih i privatnih institucija čije aktivnosti i interakcije određuju nastajanje, uvoz, kontinuirano usavršavanje i difuziju inovacija shvaćenih u najširem značenju. S druge, pak, strane, unapređenje inovacionog kapaciteta zemlje označava važnu premisu uspostavljanja i funkcionisanja nacionalnog inovacionog sistema.

Ključne reči: inovacije, inovacioni kapacitet privrede, nacionalni inovacioni sistem

TRADE IN THE CONDITIONS OF INTERNET-WEB ECONOMY
(Socioeconomic Assumptions and Ethical Principles)

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Abstract: The content of this study should serve as a guide for the reader in understanding the electronic commerce in terms of "new economy" (digital-Internet economy). The market developed countries recognize the information and communication technology (ICT) as a resource to increase their company's competitive advantage. The distinguished "old economy" accepts the challenges of the "digital economy" and replaces paper business electronic data interchange (EDI). In addition to virtual stores, on-lajn retailers and customers, and electronic auctions develop as well as electronic exchange electronic trade fairs etc. and electronic institutions. Parallel to the electronic exchange of messages and business documents, trade companies implement information and communication technology in macro-micro organizational structure of retail network. In addition to its retail network by the "brick and mortar" electronic retailing channel known as retail sales on a "click and mortar" is developed. There is "moving" sell on the Internet. But do not forget that e-commerce can spontaneously develop. It must be substantially designed project of different stakeholders. Marketing Partnership stores, manufacturers and consumers, on the one hand, statutory and legal framework, government support, international organizations and bodies for standardization of information and communication infrastructure, on the other hand are the assumptions to further develop e-commerce.

Keywords: trade, Internet-Web, digital economy, privacy, ethics, legal regulations

Introduction

Trade falls into information-intensive activities regardless of whether it is retail, wholesale or foreign trade. A large assortment and great number of suppliers

and buyers lead to a steady increase in business documentation such as order forms, dispatch notes, receiving slips, invoices and the like. For example, the purchase and sales process of the most famous British trade company "Marks & Spencer" involves more than 800 domestic and foreign suppliers, who are serving 15 million consumers each week. If we assume that each of these suppliers delivers only ten products, the assortment would be as large as 8000 products. Each delivery must be provided with appropriate delivery note, invoice, receipt, record of quality and quantity received and requisition form issued by 685 stores in the country and abroad. Suppose now that in such a wide range of purchase-sales activities mechanical means are used for transmitting and processing the data. How much time, paper and labor it would take? When and how the concept of "new economy", the so-called "digital economy", and electronic commerce could be affirmed? In what way and how much time it would take to transform the traditional "brick and mortar" trading into a "click and mortar" trade? (Clinton, Gore 2000, 121; Kauffman, Paul 2008, 32) The answer to this question offers a new way of communication between business partners, based on information and communication technologies (ICT). The ICTs became "architects" of the trade with a new business format. They lead to the reengineering of the traditional concept of trade, thereby affirming the concept of electronic commerce.

The countries with developed markets recognize information technology as a resource to increase competitive advantage of their companies. Renowned scholar and writer of several works in the field of IT and electronic commerce Efraim Turban used the examples of the Company Wal-Mart and Amazon.com to show, relying on Porter's value chain, that these companies increased their sales by 20% and improved their efficiency in supply chain management (SCM) by 15-45% after they had introduced electronic sales channels. This is not a solitary example, since other companies have also started to promote the e-commerce, like Bristol-Myers Squibb (BMS), the world leader in the production of medicines, children's food and cosmetics with more than 30,000 business partners. Known by then as the "old economy" company, BMS accepted the challenges of the "digital economy" and replaced its former costly business paperwork with the electronic data interchange (EDI-Electronic Data Interchange), and after two years "moved" to the Internet. Implementation of EDI has led to the reengineering of the entire supply chain and the development of new business formats of electronic commerce (B2B, B2C, B2A, C2A, C2C, C2B). (Lovreta, Končar, Petković 2011, 343; Končar 2008, 263) On the other hand, the implementation of the concept of electronic commerce means that there are socio-economic and ethical assumptions, which is the subject of this paper.

1. Trade – From Traditional Buying and Selling to Electronic Marketing Channel

The countries with developed markets recognize the information and communication technology (ICT) as a resource to increase competitive advantages

of their companies. The traditionally recognizable "old economy" companies have accepted the challenges of the "digital economy" and replaced their former over-expensive business paperwork with electronic data interchange (EDI). In parallel with the electronic exchange of messages and business documents, trade companies implement the ICT into a macro-micro organizational structure of the retail network. In addition to the retail network by the "brick and mortar" system, electronic retail channels develop, better known as "click and mortar" retailing. This leads to "moving" of sales to the Internet.

According to the principles on which the e-commerce project is built, the focal point is the consumer of products and services, or the user of information, as in the traditional trade. Sale and purchase should overcome barriers of space and time, while the e-commerce management, relying on the marketing information system (MIS), informs customers about the properties of "package deals" that can satisfy their needs, desires and expectations. In this way, electronic commerce is becoming an important instrument for carrying out trading activities through telecommunications network where the place of honor belongs to the Internet, among others. (Well, Vitale 2002, 27; Award 2007, 7-8) In this respect, **we should distinguish between e-business in a broad sense**, comprising: a) e-banking, b) e-exchanges, c) e -consulting, d) e-engineering, e) e-learning, f) e-booking systems (Computer Reservation System) on one hand, and e-business in the narrow sense within the national, regional or global markets.

E-business in the narrow sense should be understood as the instrumentalization of information and communication infrastructure in the performance of business, as well as administrative and educational-entertaining activities. In other words, **e-business does not always mean the transfer of ownership, as is the case with e-commerce**. For example, the characteristic of e-business can be attached to the accounting and financial system supported by information and communication infrastructure, and even to surfing the Internet in terms of leisure activities (entertainment), etc. E-business is transformed into a new (higher) quality, e-commerce, at the moment when exchange of values occurs. (Award 2007, 8) **E-commerce,** or e-distribution in the broader sense, **should be understood as "channeling goods and services from producers to consumers through information and communication networks"**. This is a very important institution of the electronic market in the conditions of a new digital economy, which is done via EDI and the Internet. The EDI and the Internet, though the most important carriers of e-commerce, can not be equalized with e-commerce. Internet commerce is a narrower concept than e-commerce. The Internet provides the possibility of purchasing and selling goods, services, information and other intangible products in a virtual environment. (Ćuzović, Sokolov-Mladenović, Ćuzović 2011, 63)

Last but not least in significance (importance), it should be noted that the e-commerce should not be formed a myth. This is a new revolutionary way of conducting trade activities based on the application of modern communication and information technologies, paving the way for a new economy type, the so-called digital (Internet) economy. The truth is that e-commerce, having been mentioned as a vision in the 80s of the previous century, has now become reality in the market economies of developed countries. However, the big question is whether the economic policy makers and carriers of trading activities in the countries that have not yet completed the transition, such as ours, are able to, given the limited resources, catch up in a relatively short time with the new Internet economy and bridge the gap between it and the technically and technologically stalled trade in relation to the developed world. These difficulties are especially evident in information and communication infrastructure consisting of: (Turban, Lee, King, Liang 2009, 82) a) computer hardware b) development software, c) telecommunications network (EDI, Internet and Intranet), d) databases, and e) personnel managing the information and communication infrastructure. Legal regulations, socio-economic implications, ethical, cultural and other characteristics of the exponents of national economies should be added to this. Electronic commerce as a project of the multidimensional character includes adequate financial resources, so that a Cost-Benefit Analysis may give an answer to the question whether to withdraw or to invest in e-commerce.

2. Electronic commerce - A Meaningfully Designed Project of Different Stakeholders

Electronic commerce involves a meaningfully designed project that cannot run spontaneously, but requires the participation of four reference subjects "structure", which are known as the basis of e-commerce, namely: (Turban, Lee, King, Liang 2009, 254) a) people and organizations involved (buyers, sellers, intermediaries, services, employees, managers, etc..), b) institutional entities (economic policy carriers, legislative regulations, standardization of information and communication infrastructure, business documents and safety and security protocols), c) multimedia contents of web sites (including marketing, promotion and market research), and d) marketing management of supply chain (Supply Chain Management - SCM).

In chronological terms, electronic commerce has evolved in its development. Direction of electronic commerce evolution is conditioned by the development of ICT. The launch of Sputnik signaled a shift of the industrial into the postindustrial-information society. The development of satellite and cable television generated the era of global communication. Scientific and technical progress in the field of micro-electronics has produced new information and communication systems, such as: EAN/GS1, EPOS, EFTPOS, EDI and EDIFACT. The development of the Internet created a way to switch from the "old economy" to

the "new economy", so called digital economy. This digital economy is often called the Internet economy or the Web economy in the literature and practice. In the new digital economy, the nature of trade as a primary marketing institution is changing as well.

2.1. Stages in the Development of Electronic Commerce

In its development, electronic commerce has passed the way from the launch of Sputnik to the emergence of the Internet. However, in the development of electronic commerce, we can distinguish two characteristic phases, namely: a) the application of ICT in traditional institutions of trade, and b) the development of new electronic institutions of commerce. The innovations that bring along a scientific and technical progress are basic for this differentiation. Observed through that prism, the first phase is characterized by the application of computers, development of EAN/GS1 system, EPOS and EFTPOS systems in the traditional trade. With the emergence of EDI, EDIFACT standards and the Internet, a new phase of institutional innovations in trade began, known as electronic-Internet commerce. Thus, during the 90s of the last century, in the market developed countries trade grew into a modern market institution with specific characteristics as compared to the traditional commerce. In addition to virtual stores, online retailers and customers, electronic auctions, electronic stock exchanges, electronic trade fairs and other electronic institutions are being developed, too.

Paperwork and business documents are replaced by electronic business documents (e-order forms, e-dispatch notes, e-invoices, e-bills of entry, e-waybills and other). New models of electronic commerce are developed, such as B2B, B2C, B2A, C2A, C2C, C2B, G2C, etc. Logically, this development of information and communication technology has opened new questions that could not be explored, analyzed and generalized in the framework of general principles of traditional economy. Among others, the question arises of how to standardize the electronic commerce on the Internet rather than use excessively priced VAN networks as a platform on which EDI functions as the basis of B2B trade model. The problem was partially overcome by developing EDIFACT standards, and later by accepting HTTP transaction protocols and SET security protocols to ensure greater safety to B2B commerce. The research area is expanded to the entire supply chain.

It is recognized that electronic commerce cannot tolerate variety of national standards. It is necessary to standardize the entire telecommunication infrastructure that will provide a uniform language of communication in the marketing channel, from browsing and presentation of business information, system of payments, delivery of goods, to resolving customer complaints. Resolution of this issue has been attempted by the Global Netxchange (GNX) retailers' associations consisting of Carrefour, Sears, Subway, Kroger, Sianabary's and Karstadt Quelle & Pinault Printemps Redoute, in cooperation with Oracle IT

Corporation which is a shareholder (GNX). Another retail network, WWW Retail Exchange (WWWRE), which connects Royal Ahold in the Netherlands and the U.S. CVS drugstore chain, along with IBM consulting services, is working on the development of standards for B2B model of e-commerce. However, fear of uncertainty has not been eliminated, so that the electronic business documents standardized against the EDIFACT standard are prevailing. (Banday-padhay 2002, 255) Accordingly, standardization of information and communication systems, business documents and security flows represents one of the key preconditions for the development of B2B e-commerce model. Without going further into this issue, we would point out that the EDI and Internet technologies revived debates and fostered predictions of further development of electronic commerce.

3. The Factors on Which Further Development of Electronic Commerce Will Depend

The development of electronic commerce observed from a macroeconomic point of view is directly related to the economic development of the country in which it will be implemented. At the global level, the gap between developed and developing countries is increasing. Predictions of J. J. Servan-Schreiber, author of the book "The American Challenge", are coming true. Namely, this writer predicted that information technology would lead to the situation in which the underdeveloped would not be able to communicate with the developed. For our topic, it is important to mention factors that were manifested as limitations in previous development of electronic commerce, namely: (Lovreta, Radunović, Petković, Končar 2000, 248) "a) socioeconomic environment, b) culture and habits, c) business environment, and d) technical requirements". Turban, McLean and Wetherbe divided constraints in the development of electronic commerce into two groups, namely: (Turban, King, Lang 2010, p. 122) "a) technical limitations, and b) non-technical limitations". **Technical limitations** of e-commerce refer to the following: lack of standards of safety and reliability of information and communication systems, security and safety standards and protocols of hardware, software, information and communication networks and databases still do not inspire confidence in customers; hardware-software component of electronic commerce is progressing so quickly that consumers are often unable to follow; it is difficult to integrate the Internet and electronic commerce software into the existing organizational structure of enterprises; the application of Internet and EDI requires reengineering of the organizational structure of enterprises; customers have to possess a special software to access Web servers; special Web servers, in addition to network servers, cause additional costs and expensive or inadequate access to the Internet of certain users. It is realistic to expect that in future many of these limitations will be, if not completely eliminated, at least reduced to an acceptable context. When it comes to **non-technical constraints** of development and application of electronic commerce, the following are most often listed:

(Turban, King, Lang 2010, 125) 1) statutory and legal regulations, including tax policy, 2) inconsistent and not standardized national legislations of electronic commerce with regard to the international legislation, 3) difficulties in measuring the economic benefits of moving to the concept of electronic commerce, 4) lack of trust and resistance of customers related to virtual shops, 5) opinion that electronic commerce is expensive and that many buyers and sellers do not want to even "try" to make a purchase, 6) many sellers and buyers are waiting for the e-commerce to prove useful, and only then to join in, 7) lack of critical mass (on the side of buyers and sellers) in e-commerce leads to enterprise unprofitability, which discourages those who have set off (Supplemented by S. Ć.).

As scientific and technical progress advances, many of these limitations to development and implementation of electronic commerce will be reduced or overcome. This applies particularly to technical limitations. It is also certain that ratio of the benefits of electronic commerce to its shortcomings will grow in line with the application of experience and knowledge in information and communication technologies. In such conditions, the acceptance of electronic commerce will develop and expand. In order to build trust in electronic commerce and take advantage of economic and other benefits that it brings, involvement is necessary of not only business systems, but also of public administration, that is, of the Government. In many countries, the emphasized limiting factor for the development of electronic commerce is lack of a feeling about the advantages of e-business, let alone e-commerce. Public administration (Government) is the "seller" of public services, on the one hand, and the user of services that are provided by modern information and communication technologies, on the other. Recognizing this cause-effect relationship between electronic business and the public sector's efficiency, governments of some countries have moved at an accelerated pace towards adopting innovations brought along by the scientific and technical progress.

Parallel to the development of electronic commerce, governments of the countries with developed markets also promote the concept of **electronic administration**. The fact that the development of electronic commerce is a priority was confirmed by the United Nations (UN) at the General Assembly way back in 1985, when it was stated: (Whinston, Soon-Yong 1999, 125) "... it is up to the governments and international organizations to take action where necessary in accordance with the recommendations of the Commission, to ensure legal security in the context of broadest possible automatic data processing". The project to promote electronic business and electronic commerce was joined by UNCTAD (United Nations Conference on Trade and Development) as well, with the recommendation: "Latest advances in information technology offer opportunities to improve trade efficiency. A concerted effort has to be taken to accelerate and consolidate the work in this area". Since then, countries, international organizations, business associations and managements have undertaken a set of

incentives for the development of electronic commerce. (Davidson 2009, p. 2010) This led to the creation of the Agenda for the Development of Information Society, better known as "e-Europe 2005". Within this project, the sub-project "e-SEEurope Initiative - Electronic South Eastern Europe Initiative" was formed, in the broadest sense representing the "Electronic model of South East Europe". (STI 2006, 214; Studija „Evropa i globalno informaciono društvo" 2005, 264) These trends are moving our country, as in 2010 adopted Strategy for Information Society in Serbia until 2020. (Sl. glasnik RS, 21/2010)

3.1. The Role of State in Developing Electronic Commerce

Through large and expensive experiments, the countries with developed markets search for the opportunity to rationalize the problem of business papers in trade and other complementary activities. Namely, doing business with paper documents represented a major problem in carrying out trading activities. It was especially pronounced in the performance of foreign trade activities, where the process of trading involved suppliers, exporters, importers, transport companies, freight forwarders, customs, insurance companies, etc. Each delivery must be equipped with delivery note, invoice, record of received quality and quantity, customs declaration, waybill, etc. Imagine how many of administrative staff are engaged in trading activities related to processing and distribution of business documents. This question was placed on the agenda of the United Nations, which, within the Economic Commission-UN/CEFACT, adopted "Recommendations for the development of international trade based on electronic data interchange EDI". EEC Council of Ministers in 1987 adopted a project TEDIS (Trade Electronic Data Interchange System), which in the broadest sense means the European model for the EDI system. Immediately upon approval of this project, financial resources in the amount of ECU 31.5 million were allocated in order to provide initial conditions for the development of electronic commerce. This is the evidence that the project of electronic commerce can not develop spontaneously, but it is necessary to allocate financial resources for its implementation. It is therefore essential that electronic commerce has its place in the National Strategy of Economic Development. We will conclude that the state assistance in the development and implementation of electronic commerce is necessary. Of course, not in terms of taking on the role of management in developing the concept of electronic commerce, but in function of a guiding factor in the creation of infrastructural preconditions for the development of electronic commerce.

3.2. International Organizations (ISO, IEC, ITU)
– Coordinators of New Trade Development

The transition of trade from the mechanical to the electronic phase of development is a very long and complex process. It is understandable that in the process of electronic commerce the nature of trading activities is changing, as well.

Territorial expansion of electronic commerce has opened up the question of standards that will enable linking of different information systems, standardization of content and format of messages and telecommunication networks and the development of a standardized users' Internet service. Until the emergence of the Internet, international trade in goods was based on the European standard for business documents GTDI (Guidelines Trade Data Interchange) and the American National Standard ANSI X.12. A marketing-oriented management of commercial enterprises in the countries with developed markets recognizes the fact that the problem of diversity of national standards of business documentation must be eliminated if it is to operate in the international market.

International Organization for Standardization (ISO), International Telecommunication Union (ITU) and the International Electronic Commission (IEC) are included in solving the problems of standardization in electronic commerce. Electronic commerce opens up new questions of standardization, which should solve: the problem of uncertainty of business in electronic commerce, protection of participants in electronic commerce against fraud and abuse, ensure the confidentiality of data and transactions, and eliminate misuse of credit cards and electronic money. In other words, standardization in e-commerce system should provide: (Schneider 2010, 302) a uniform (understandable) language of communication between all participants, transaction security, protection of customer privacy and their trust in electronic commerce. So far, these have found the application in e-commerce: (Turban, King 2011, 320) 1) UN/EDIFACT standards, 2) OBI - Open Bay on the Internet, 3) OTP-The Open Trading Protocol, 4) SET - Secure Electronic Transaction, 5) P3P - Platform for Privacy Preferences, and 6) SSL - Secure Sockets Layer. Standardization is a very important prerequisite for the development of electronic commerce, which may also be witnessed by the fact that many of these standards have served as a platform for creators of legal statutory regulations for the Law on Electronic Commerce (legal protection of data, reliability of electronic signatures, international commercial arbitration, etc.).

3.3. Trust of Customers as a Factor of Electronic Commerce Development

In the system of electronic commerce all the sales activities take place virtually without direct meetings of sellers, buyers and other participants in the distribution channel. The buyer on the Web site does not have the opportunity to see the "brick-and-mortar" store in which he/she shops. (Berman 2009, 20) At the same time, the buyer does not know basic performances of the trade company that offers the range of goods and services. Economic and financial indicators of the company, its trading image, quality of assortment and the policy of resolving consumer complaints are unknown to the buyer, who is also deprived of the opportunity to have a look around, compare and try the merchandise. An additional

problem is the distrust towards electronic money and electronic-paperless business documentation. Trading from their apartments over the Internet with many unknown (impersonal-virtual) sellers, customers are deprived of social atmosphere offered by the traditional trading facilities. Cyber crime is not an unusual occurrence in electronic commerce, too.

In electronic commerce, information resources are scattered along the distribution chain, including the supporting subjects, such as banks, insurance companies, etc. Furthermore, staff travel and carry company computers and data. Information is distributed through a network organization, and may be "vulnerable" in many places and at all times. Measures for the protection of electronic commerce information system, such as procedures, devices, software, security and safety standards and protocols, can not guarantee absolute security both to the buyer and the seller. According to the Computer Security Institute report, 64% of the companies operating through the Internet have experienced computer fraud. These frauds range from the spreading of viruses, hacker intrusions, data theft and decoding messages to cyber crime. What may make customers happy is the fact that the protection of information and communication systems of electronic commerce is constantly advancing. However, this observation can also be found in the literature: (Turban, King 2011, 320) "When we talk about security on the Web - Web Security is a race between those who make "locks" and those who "crack" them. If those who make "locks" prevail, safety of the Internet and electronic commerce credibility is in danger".

From the complex of problems related to the (dis)trust of customers in the electronic commerce system, we would raise two questions that are particularly interesting from the viewpoint of further development of electronic commerce: 1) how to build customer trust in the system of electronic commerce, and 2) how to protect the privacy and safety of customers in the electronic commerce system.

Before answering these questions, we should be reminded of Peter Drucker, an authority in the field of management, who emphasizes "that the first task of the enterprise is to create customers… The customer is the basis of the enterprise, he/she is actually the employer". (Drucker 2006, 58) Referring to the buyer's concept of value, Kotler points out "that the customer's value can be defined as a combination of benefits and sacrifices that occur when a customer uses the product or service in order to satisfy specific needs." (Kotler 2011, 568) Starting from these positions, it is logical that the buyer in the system of electronic commerce builds his trust on the basis of benefits and sacrifices arising from electronic commerce. Each forgetfulness of the seller in relation to the customer regarding the range of goods, quality of services and the like shall be punished by customer's withdrawing from purchase. This marketing slogan, made in the traditional conditions of trade activities, has not lost its significance even in electronic commerce. On the contrary, given that electronic commerce, among other limiting factors, is facing the "faceless" identity of buyers and sellers, where the buyer is only "a number" on the Web, this marketing slogan is even more pronounced.

Starting from the theory of information economics (digital economy) and transaction cost theory, Chatterjee and Datta believe that customer distrust in electronic commerce may be viewed through the relationship of amount of costs for obtaining information about the seller and expected benefits. (Chatterjee, Datta 2006, 525) Lack of knowledge on the seller and its assortment compels the customer to invest more effort in order to more precisely define his/her relationship with the seller, "conclude a sales contract" and monitor the execution of all activities along the chain of distribution. In the conditions of electronic commerce, it is hardest to establish trust between business partners because they are virtual. The higher level of distrust between the buyer and the seller the greater transaction costs, and vice versa. In other words, trust of the buyer towards the seller reduces the effort and time of negotiation, conclusion and implementation of the sales contract. (Davidson 2009, 220) In this sense, the model of consumer confidence in electronic commerce was developed. It is a function of different elements (variables): 1) the individual's preference to believe, 2) credibility of the commissioner (the characteristics of person in which the trust is placed), 3) the seller's ability to deliver product-service against the agreed procedure, 4) the integrity of the seller, 5) behavior of the seller in accordance with the principles that are acceptable to the consumer, 6) the seller's benevolence, 7) the seller's electronic identifiability and ethical recognizability, 8) institutional trust, 9) trust in the sales channel - Internet, 10) confidence in the socio-cultural environment, and 11) confidence in the safety of the transaction (confidentiality and protection of data, data integrity, inability of retraction and identification of participants in transactions). (Turban, King 2011, 150)

Another group of theoreticians observe consumer confidence in electronic commerce from the aspect of consumer protection and lists several pieces of advice: (Turban, King, Lee, Liang 2009, 238) 1) you should look for trustworthy commercial names on the websites like Wal-Mart Online, Disney Online and Amazon.com, 2) look for an unknown sales site to find out the company address, phone number and e-mail; call and examine the staff about the firm, 3) check the seller at the local Chamber of Commerce or at the Better Business Bureau, or look for recognized seals like TRUSTe, 4) explore how safe the seller's site is and how it is organized, 5) check refund policies, warranties and other service agreements, 6) compare prices with those in regular stores; too low prices are usually unrealistic and probably there is a trap, 7) Ask your friends what they know about the e-seller; find their statements and comments, 8) find out what you can do in the event of a dispute, 9) Consult the National Fraud Information Center, 10) check consumerworld.org for other useful information and 11) be aware that you have the same rights as a buyer in a traditional store.

Finally, the European Commission (in 2009) launched eYouGuide. This is a new on-line mechanism for advising consumers on their digital rights guaranteed by EU regulations. This specific guide was created as a response to the resolution

adopted in 2007 by the European Parliament, which requires active support to the development of digital market and digital commerce. In such circumstances, consumer confidence in electronic commerce builds up, as well. (European Parlament Resolution 2007)

3.4. How to Protect Privacy in Electronic Commerce

The problem of privacy and safety of customers in electronic commerce was growing at the same pace as the electronic commerce was developing. This is logical. Virtual-e-commerce has opened the way for numerous abuses (computer theft, fraud in online auctions, intrusions into the network, copying databases, misuse of credit cards and other frauds and deceptions) on the one hand, and endangered the privacy and safety of customers, on the other. Consumer protection from fraud in electronic commerce is becoming as important as the development of the protection and security of hardware, software and networks. The issues of consumer privacy in electronic commerce are becoming an important segment of the legal regulations in countries with developed markets. U.S. legislation instrumentalizes the right to privacy of consumers in electronic commerce within: (Turban, King 2011, 370) the act on electronic communications privacy, the computer security act, the act on video privacy protection, the data privacy act, the act on Internet privacy protection, etc. In the EU the issue of privacy protection is regulated by the Directive on Electronic Commerce, Data Protection Act, anti-terrorism legislation, and so on. The latest EU project "eYouGuide" (2009) represents a kind of "patron" of consumer rights in electronic commerce.

According to the EU regulations, "data controllers" (persons who process the transaction the customer) are obliged to inform the customer why they require information. Customer data may not be sold to companies engaged in direct marketing. EU Data Protection and Privacy Directives require that Website must inform customers about the data it possesses, whether obtained directly or through other sites. Also, the customer has the right to know: whether his personal data are collected (stored and used), which of his data are processed and for what purposes (to whom they are revealed), which is the selection of data, which criterion is used in selecting the personal information on customers, etc. (Stošić 2009, 17)

European legislation in the field of electronic commerce, related to its narrow segment - the protection of privacy and security of consumers, in addition to personal data, regulates also the following: a) the obligations and terms of sale of on-line traders, b) the safety of delivery, c) the right to complain, d) promotion, e) the protection of children against the instigators of purchase, f) on-line payments and g) compensation for faulty products.

3.5. Ethnical and Other Issues Affecting Electronic Commerce

Electronic commerce is a young (tentatively named) "branch" of economic activity. As a business activity of economic entities in the conditions of "new-

digital economy", it began to develop in the nineties of the last century, but it experienced a real expansion with the application of the Internet as a platform where business transactions take place. Internet business opportunities are expanding, so the contemporary theory and progressive practice are often unable to follow, due to the speed of changing information and communication technologies on the one hand, and the demands of business people on the other. New technologies bring new knowledge, but create new problems, as well. In the conditions of electronic commerce, traditional sales contracts "do not apply" any more. The psychology of selling and buying is changing. Traditional retail network is replaced by virtual stores. Strong business relationships built up through long-term business cooperation get replaced by mostly accidental meeting of the seller and the buyer on the Website. Former privacy and security of the customer, based on the sales contract clauses, is left to the SET technology, SSL protocols and cryptographic keys. There are attempts to replace the trust developed in years between the seller and the buyer by an "eContract", etc. These, as well as other questions are the reason to ask ourselves: Is there a place for ethics in the system of electronic commerce? Group of authors in the field of information technology management, with reference to the Bible and Confucian philosophy, emphasized: (Turban, King, Lang 2010, 41) "In everything you do, behave towards others in the same way that you would like them to treat you. If you put yourself in the position of other people and consider how you would feel as the object of a concrete decision, it should help you understand whether the decision is good and honest." The use of ICT and the development of the concept of electronic commerce raise many ethical questions. They range from monitoring emails to potential attacks on the privacy of millions of consumers whose data are stored in the private and public databases. If the ethical principles and principles of the participants fail in the system of electronic commerce, it will reduce its benefits, damage the image of companies that participate in it, destroy the morals of employees and increase the distrust of customers. On the other hand, one should not state too hastily that ethics is a key factor for (lack of) success in electronic commerce. Maybe the issue of trust and security of trade via the Internet will improve to such an extent that the volume of operations will increase from the current 2% to 10% in 2011.

In the analysis of ethics as a factor relevant to electronic commerce, it should be borne in mind that a good part of the ethical principles can not be standardized. Particular actions are characterized (un)ethical depending on the country, organization and circumstances in which the evaluated activity is performed. The development of electronic commerce has modified the traditional principles of trade and created new ones. If you call your travel agent and ask him to book an air ticket for you and the agent says: "Sorry, the computer is out of order", who is to blame? Maybe the computer really does not work, or the agent is too busy. And if the computer does not work, why is it so? Whose fault is this? Would it be a software error, installation or maintenance problem, or... Of course,

we never know the answers to these questions. Thus, the ethical laws are valuable for raising awareness of employees in an electronic store, but they do have limitations. Therefore, it would not be wise to impose on employees in Brazil ethical principles that have been developed in Norway. Although customers are the "core" of electronic commerce in general, the concept of individual privacy differs from country to country. For instance, individual privacy is more developed in Europe and North America than in South Asia, where cultural patterns of the individual are in favor of the society. By this analogy, privacy laws are more developed in the legal systems of Canada, Sweden, Great Britain, Hong Kong as compared to China and Mexico.

Finally, the question is: what are the general ethical principles in the system of electronic commerce? The answer is: (Turban, King, Lang 2010, 52) "1) personal privacy, 2) the privacy of data, 3) the ownership of information, 4) freedom of speech, 5) responsibility for (im)properly performed work, and 6) right of intellectual property (digital property: software, movies and music, patents, trademarks, books and copies)".

4. Legal and Statutory Regulations
as a Factor of Electronic Commerce Development

For the economic objectivization of the electronic commerce development level and the prospects of its future development, it is not sufficient to state that "electronic commerce has become the norm, and its growth in future could not be called otherwise than explosive." (Turban, King, 2011, 88) It is necessary to consider other factors of influence on its development, as well. For this segment of electronic commerce, it is interesting to quote the data of the Federal Bureau of Investigation (FBI): "the value of average robbery is $ 3,000, the average clerical fraud is $ 23,000 and the average electronic theft is $ 600,000". This and the other studies show that the creators of "virtual trade" are facing the question: how to harmonize traditional trade legislation with the requirements of the digital economy? The answer to this question may be comprehended through the impact of legislation on the development and implementation of electronic commerce, which are manifested primarily in the following elements (Vilus 1998, 38; UNCITRAL 2009, 20):

- electronic equivalent for a "written document" and "personal signature"
- confirmation of the time and place of sending - receiving electronic messages and
- protection and filing of electronic messages.

The starting and at the same time focal point of the legal aspect of electronic commerce is related to the **electronic signature** of business documents. Research shows that most national legislations require that electronic business documents must be prepared also in writing and be duly signed. The question is:

what is the guarantee that the electronic message is legally valid, and that the court (arbitration) shall accept it as evidence in the event of a dispute?

These issues were given importance in the **Model Law on Electronic Commerce** adopted in 1996 by the United Nations Commission on International Trade Law (UNCITRAL). (Vilus 1998, 39) The adoption of this law was followed by EDI agreements between business partners (contracting parties), stating that the EDI-message shall be regarded as an adequate substitute for a "written document", and a "digital signature" as an adequate substitute for a personal signature. Form and content of the digital signature are different in some national legislations. While some countries (Germany, Italy, UK) have already made digital signatures official, others do not require such signature. Their legislation considers that the electronic message has the equivalent in a written document, if the information contained in such message was accepted by a computer application of partners participating in a business transaction. In order to avoid variety of national legislation regarding electronic signatures, the Model Law on Electronic Commerce tried to standardize some rules for the interpretation of electronic signature. This is essentially the replacement of an autograph with a digital signature based on the cryptographic identification of the business document sender. For the legal validity of digital signature, it is necessary to provide criteria as to its authenticity regarding the personal signature. Therefore, certification bodies, digital signature verifiers, are recommended. Certification bodies "decode" digital signature by cryptographic keys and PIN codes. Each business partner is protected against false digital signature, if knowing the public key of the signer. Alongside with this, it is sufficient that the recipient of an electronic message may dispose of the untransformed message of the sender and that, based on mathematical and cryptographic procedures, he may accurately determine that the written message has not been altered during the electronic transformations.

These discussions have not taken the issue of electronic signature off the agenda of UNCITRAL. The subject had been discussed at the session of UNCITRAL in New York and Vienna. (Dokumenti UNCITRAL-a 2011) Certification bodies, cryptographic keys and authentication of electronic signature were placed once again on the agenda. The complexity of this problem, with a variety of limiting factors, will not block the use of EDI and EDIFACT standards. There are some investigations in favor of this, performed in the countries using EDI and EDIFACT standards, which showed that in the ten-year practice of this information-communication system functioning there was no litigation. (Magal, Word 2009, 25) Even when a dispute occurs, the EDI associations direct business partners to alternative dispute resolutions (mediation, arbitration or revision of the EDI Agreement). In our national legislation, the regulatory environment for EDI/EDIFACT standards and the Internet is defined in the Act on Electronic Signatures and the **Law on Electronic Commerce**, which represented a step forward in defining the legal framework of electronic commerce. The **Act on**

Electronic Signatures, which was passed in 2004, (Službeni glasnik RS, 135/04) regulates the use of electronic signature in legal matters and other legal actions, business operations, as well as rights, duties and responsibilities related to electronic certificates. Special provisions of this Act regulate the electronic signature and the qualified electronic signature. Namely, in order to be qualified, electronic signature must meet the following requirements:

- it is exclusively associated with the signatory,
- it clearly identifies the signer,
- it is created by using the means that the signatory can independently manage and that are exclusively under the control of the signatory,
- it is directly connected with the data to which it relates, in a manner that unambiguously enables access to any modification of the original data,
- it is created by the means for the formation of a qualified electronic signature,
- it is checked against a qualified electronic certificate of the signer.

The Law on Electronic Commerce, adopted in May 2009, (Službeni glasnik RS, 41/09) regulates the area of information society services, which are rendered at a distance upon the user's personal request, over the electronic equipment for data processing and storing, for a fee. This particularly applies to selling goods and services over the Internet, as well as facilitating the search for data and services that are transmitted through electronic network, providing network access or data storing for users of services.

The protection (confidentiality) of the electronic message represents an extremely important segment of electronic commerce. In order to enable business partners to protect contents of their electronic messages, the European Model of EDI Agreement legally defined this area. This agreement covers relevant issues, while national economies where there is no clear legal framework in the field of electronic commerce apply the "provisions of the European Convention on protection of individuals with regard to automatic data processing". ((1997, 69)

Email archiving is an integral part of the electronic transaction. Each business partner in electronic transactions is obliged to chronologically and in an unaltered form keep a register of sent and received emails. Parties may determine the time (periods) in which this information has to be kept, taking into account that the Law on Electronic Commerce prescribes the longest period of three years. This obligation is conditioned by the requirements of tax legislation, the Agency for Payments and other organs. Electronic message must be archived in the format in which it was sent (received). Some agreements stipulate the possibility of controlling the electronic register at least annually, in order to provide an insight into electronic commercial transactions to the competent (tax, etc.) authorities. The obligation is also envisaged of the business partners to allow "electronic and computer records to be easily available, reproduced in a human readable format and printed if required". (UNCITRAL 2009, 30)

In addition to electronic signature, confirmations of the time and place of sending - receiving electronic messages, protection and archiving of electronic messages, the following laws relating to the area of electronic commerce were adopted in the EU trade legislation, such as: (Dokumenti UNCITRAL-a, 2011) **Counterfeit Access Device and Computer Fraud Act, Computer Fraud and Abuse Act, Law on Electronic Communications Privacy, Electronic Fund Transfer Act and Video Privacy Protection Act**.

These would, roughly, be the basic institutional preconditions for the development of electronic commerce in the global theory and practice. This research of the electronic environment in countries with developed markets will stimulate the creation and further shaping of our model of electronic commerce to meet the expected changes in the EU market. It remains to believe that the state with its stimulating policy, along with the entrepreneurial spirit of **managers** of business systems, shall also **change the information character** of the economy as a whole, and especially of **trade**. If so we behave, the development and application of electronic commerce will create a very broad and content-rich area for further research.

Conclusion

Trade bears the epithet of an information-intensive economic activity. Innovations that the latest stage of scientific and technical progress brings along could be applied in trade. Trade has been transformed from a classical purchasing to the electronic channel of marketing. In parallel with the electronic exchange of messages and business documents, trade companies are implementing ICT in the macro-micro organizational structure of the retail network. In addition to the retail network by the system of "brick and mortar", electronic retail channels are developing known as retail by the "click and mortar" system. This leads to "moving" of the sales to the Internet. The development of electronic commerce opens up many issues. This leads to better expression of the stages in the development of electronic commerce, the factors (technical and non-technical), the role of government and international organizations, but also of the issues related to privacy and data protection of customers. Through the theoretical and practical research, an attempt was made in this paper to find answers to these questions, which will largely affect further development of electronic commerce in the world and in our country. At the same time, special emphasis was placed on ethical principles and legal regulations as factors in the development of electronic commerce. Thus, ethical principles in the system of electronic commerce are reflected in elements such as: 1) personal privacy, 2) the privacy of data, 3) the ownership of information, 4) freedom of speech, 5) responsibility for (im)properly performed work, and 6) right of intellectual property (digital property: software, movies and music, patents, trademarks, books and copies). The statutory-legal regulation in the development and implementation of electronic commerce is

manifested in the following elements: the electronic equivalent of a "written document" and "personal signature", confirmation of the time and place of sending - receiving electronic messages and protection and archiving of electronic messages. An encouraging fact is that a lot of progress was made in our country towards creating the institutional basis for the development and implementation of electronic commerce, primarily through the adoption of the Act on Electronic Signatures and the Law on Electronic Commerce.

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TRGOVINA U USLOVIMA INTERNET-WEB EKONOMIJE
(Društveno-ekonomske pretpostavke i etička načela)

Rezime: Sadržaj istraživanja u ovom radu treba da posluži čitaocu kao vodič u razumevanju elektronske trgovine u uslovima „nove ekonomije" (digitalne-Internet ekonomije). Tržišno razvijene zemlje prepoznaju informaciono-komunikacione tehnologije (IKT) kao resurs za povećanje konkurentskih prednosti svojih kompanija. Prepoznatljive kompanije „stare ekonomije" prihvataju izazove „digitalne ekonomije" i papirno poslovanje zamenjuju elektronskom razmenom podataka (EDI). Pored virtuelnih prodavnica, on-lajn prodavaca i kupaca, razvijaju se i elektronske aukcije, elektronske berze elektronski sajmovi i dr. elektronske institucije. Paralelno sa elektronskom razmenom poruka i poslovne dokumentacij, trgovinske kompanije instrumentalizuju IKT u makro-mikro organizacionu strukturu maloprodajne mreže. Pored maloprodajne mreže po sistemu"cigla i malter" razvijaju se elektronski kanali maloprodaje poznatiji kao maloprodaja po sistemu "klik i malter". Dolazi do "seljenja" prodaje na Internet. Međutim, ne treba zaboraviti da se e-trgovina može spontano razvijati. To mora biti sadržajno osmišljen projekat različitih stejkholdera. Marketing partnerstvo trgovine, proizvođača i potrošača, s jedne strane, zakonsko-pravna regulativa, podrška države, međunarodnih organizacija i tela za standardizaciju informaciono-komunikacione infrastrukture, s druge strane, pretpostavke su za dalji razvoj e-trgovine.

Ključne reči: trgovina, Internet-Web, digitalna ekonomija, privatnost, etika, zakonsko-pravna regulativa.

STATE AID – AN INSTRUMENT OF ENVIRONMENTAL PROTECTION IN THE EUROPEAN UNION AND SERBIA

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Abstract: Sustainable development concept originates from the need for environmental protection in order to maintain the quality of environment at the appropriate level for the present and future generations. Bearing in mind the growing importance of the sustainable development concept, firstly we analyze the environmental protection as one of its three main and mutually conditioned components. In addition, we indicate the regulatory framework in the European Union and the Republic of Serbia, that is trying to regulate key issues in the environmental management as well as environmental protection field. The main part of this paper is concerned with the role and importance of state aid in achieving environmental objectives. In this context the analysis was conducted on what a state and its organizations are doing in institutional and financial sense to achieve environmental protection within the EU and Serbia.

Keywords: sustainable development, environment, state aid

Introduction

Achieving the right to the development means achieving the right to continuous improvement of economic, social, cultural and political conditions for life. In order to improve life quality, in global terms, it is necessary to ensure steady economic growth, equality in meeting the people needs, prevention or

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mitigation of poverty and unemployment, rational use of natural resources etc. These moments are an integral part of *sustainable development concept* whose consistent application is increasingly emphasized in the modern economy. In addition to economic and social component, environmental component is one of the three basic and mutually conditioned components of sustainable development. It includes environmental protection and natural resources preservation.

In providing environmental protection, the state can play a significant role in institutional (regulatory) and financial terms. In this sense, the paper analyses the institutional framework in the environmental protection filed and emphasizes the importance and role of the state aid institute in environmental protection. *State aid* is one of instruments that the state can use to improve environmental quality. In this paper is conducted the analysis of past experiences in the use of state aid for environmental protection as well as the way through that this institute is regulated and implemented within the European Union countries. The paper also assesses the role that this instrument has in environmental policy in the Republic of Serbia.

1. Environmental Protection as a Component of Sustainable Development

The most frequently used conceptual definition of sustainable development is given in the "Brundtland Commission Report" ("World Commission on Environment and Development") entitled "Our Common Future" (United Nations 1987). Sustainable development emphasizes the way of using natural resources in meeting the current generation needs without compromising the possibility of satisfying the future generation's needs. "Although the concept of sustainable development originated from the scientific literature in which the sustainability is interpreted as the natural resources management in a way that ensures the preservation of their reproductive capacity, Brundtland Commission`s definition of sustainable development allows a broader interpretation of this term that affects the economic and social sphere" (Jovanović Gavrilović 2006, 56).

The social component of sustainable development means meeting the people needs through the implementation and realization of human rights. The possibility of satisfying basic human needs which include access to education, health services, food etc., should be based on non-discriminatory basis in gender, political and ethnic sense. This pillar of sustainable development also involves the promotion of democracy, equal treatment of women and children, training of poor people for the efficient use of resources at their disposal in order to meet needs and changing lifestyles.

The economic component of sustainable development aims to ensure the availability of labour and thus enable people to acquire sources of income through their own work as well as finance satisfying quality of life. Economically sustainable system manages to ensure continuous production of goods/services and in this system is possible to avoid extreme sectorial (branch) discrepancies especially with the possible negative impact on industrial and agricultural production.

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Between economic and social development exists a high degree of reciprocal interdependence. However, it is impossible to separate the benefit of human beings from the benefit of natural environment in which they live. Therefore, an essential component of sustainable development is *ecological component*. Environmentally sustainable system must involve the preservation of existing natural resources base stability avoiding over-exploitation of renewable resources and unjustified depletion of non-renewable natural resources. "This includes maintenance of biodiversity, atmospheric stability, and other ecosystem functions not ordinarily classed as economic resources." (Harris 2002, 6). Economic and social development must be accomplished in a manner that is environmentally friendly, ensuring not only sustainable use but also natural resources availability for future generations. "Spending the environment and its resources has its growth limits, because of that any further development must be sustainable development for sustainable future" (Đukanović, 1996, 169). The implementation of sustainable development model "means searching for ways to reconcile economic, environmental, political and cultural development with respecting the diversity of civilizations that exist and the needs for environmental protection as well as environmental improvement, i.e. between economic growth, social justice and healthy environment" (Miltojević 2003, 437).

In the early 70s of the last century there was a significant increase in concern for environmental protection and preservation. One of the first conferences at the global level that indicated the environmental pollution problems was held in 1972 in Stockholm. Then the insufficient attention was given to the impact of industrialization, the application of new techniques and technologies and commercial activities of economic entities on environmental quality. The seriousness of the problem has engaged all relevant stakeholders – government, international organizations and institutions to join forces and create adequate regulations and requirements for sustainable development. This is in a sense of all environmental elements at the global level (water, air, land, flora, fauna etc.). World Environmental Summits, held in Rio de Janeiro, 1992 and Johannesburg, 2002, indicated that the business community is very committed to the sustainable development concept. In June 2012, the conference *"UN Rio+20"* will be held again in Rio de Janeiro and the importance of a "green economy" as well as institutional framework for sustainable development will be the main topics.

2. Environmental Protection in the EU and Serbia – The Institutional Framework

Environmental protection as a component of sustainable development becomes an imperative for not only for EU member states but also for other socially responsible entities. The environmental law concept was affirmed at the EU level by entry into force of the "Aarhus Convention", "Directive 2003/4 European Commission" and the "Lisbon Treaty". To meet the environmental

obligations from these international instruments, it is necessary to establish mechanisms through which all significant social subjects especially enterprises will be obligated or motivated to maintain and improve environmental quality. "The European Union observes environment as a problem that is not bound to national borders but is treated as a regional problem – the environmental right is an integral part of the EU policy" (Kostić 2007, 53).

"Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters - Aarhus Convention" establishes a number of public' rights (individuals and their associations) related to the environment. The Convention covers the so-called three pillars which are reflected by: 1) the right of everyone to access environmental information, then 2) the public's right to participate in decision making regarding the environment and 3) the right of access to the judicial authorities in the case of violation or disregarding the previous two rights or environmental rights in general. "The right of access to environmental information as the first pillar of the Convention is a prerequisite for achieving the other two rights in this domain" (Stec, Casey-Lfkowitz 2000, 49).

Five years after the adoption of the "Aarhus Convention", "Directive 2003/4/EC of the European Parliament and of the Council on Public Access to Environmental Information" came into force at the EU level (Directive 2003/4/ EC 2003)[1] and replaced the old directive – "Directive 90/313" of the European Commission (Council Directive 90/313/EEC 1990)[2]. Member states have been obligated to incorporate the new Directive in national law by February 2005. According to the Article 1 of this Directive as the most important aims stand out: 1) guaranteeing the right to access information and 2) providing systematic availability and dissemination of environmental information to the public. This information includes (Directive 2003/4/ EC 2003, p. 30): 1) legislation in environmental field; 2) programs and plans for environmental protection; 3) Reports on the environmental state; 4) Data about activities that affect the environment; 5) Authorizations and agreements related to the environment; and 6) Studies of environmental impact as well as risk assessment. State governments according to the Article 3, Paragraph 2a, are obligated to the request for information respond in a standard deadline of 30 days from the receipt request or in exceptional cases within two months.

"Lisbon Treaty" also known as the "Reform Treaty or the European Union" (Treaty of Lisbon 2007)[3] regulates much more complex environmental field and its protection compared to the "Aarhus Convention" and "Directive 2003/4 EC". The

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[1] The Directive was entered into force on 14 February 2003.

[2] „The Directive 90/313 EC on the right of public access to environmental information" was entered into force on 7 June 1990. This is a legal document that the first established a subjective right of citizens to require relevant information and served as a design model of the Aarhus Convention.

[3] "The Lisbon Treaty" was signed on 13 December 2007 and entered into force on 1 December 2009. With this contract the EU obtained legal status, strengthened the EU democratic values and goals and introduced the EU citizens` right of initiative in starting legislative process.

"Lisbon Treaty" includes specific measures relating to the treatment and halting climate changes and energy policy.[4] "According to the provisions of this Contract, environmental protection and improvement as well as sustainable development should become the basic values not only within the EU but also in relations between the Union and the world wide" (Kostić, Gasmi 2007, 353)."

In contrast to the macro level where the environment is viewed as a dimension of sustainable development, at the micro level (the concrete social entities level, namely companies) the environment and its protection is considered as an element of corporate social responsibility. Bearing in mind that the economic entities with their gainful activities affect the environment, they must respect and adapt their business to the environmental regulations. In addition many companies in the EU and world-wide conduct additional environmental projects/programs within their corporate social responsibility objectives. Companies are therefore expected to be a good corporate citizen and to actively contribute, in compliance with their abilities, to solving social problems such as poverty, unemployment, human rights and environmental protection. Therefore, companies do not operate in isolation from the society around them, they are an integral part of it and their competitive advantage depends precisely on the conditions and circumstances in which they work. In this context corporate social responsibility is becoming one of the basic company strategy`s elements in which specific requirements of stakeholders – the community come to the fore.

Environmental regulation in Serbia has its basis in the highest legislative act. Legislative-legal and institutional framework for environmental management is determined by the Constitution of the Republic of Serbia. It provides not only the right of citizens to the healthy environment but also their obligation to protect and improve the environment in accordance with the law. The so-called environmental legislation in the Republic of Serbia has over 100 laws and other regulations (Jovanović, Radukić, Petrović-Ranđelović 2011, 184).

One of the most important documents for implementation of sustainable development concept is the "*National Sustainable Development Strategy of the Republic of Serbia*" for the period from 2008 to 2017 ("National Sustainable Development Strategy of the Republic of Serbia 2007"). This Strategy defines the sustainable development objectives and potential ways of their realization ("National Sustainable Development Strategy of the Republic of Serbia" 2007, 2). The Strategy is based on the globally accepted principles that are identified in the Johannesburg's "*Declaration on Sustainable Development*" ("World Summit on Sustainable Development" – WSSD 2002), "*Millennium Development Objectives of the United Nations*" (United Nations 2005) and "*Sustainable Development Strategy of the European Union*" (European Commission 2006), and these are:

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[4] Article 191 of this Contract relates to climate changes, their treatment and halting, and that requires intensive international cooperation, while Article 194 concerns energy policy making, taking into account the need to preserve and improve the environment.

inter-generational solidarity as well as solidarity within generations; open and democratic society – citizen participation in decision making; knowledge as a factor of development; involvement in social processes; integrating environmental issues into other sector policies; the precautionary principle; the principle "polluter/user pays"; inclusion of costs related to the environment in the product price; sustainable production and consumption.

3. The Role of State in Achieving Environmental Objectives

In contemporary conditions the state can play a significant role in achieving the sustainable development objectives. In this sense, the state role is important for creating the legal and institutional framework that should regulate key issues in the environmental management as well as environmental protection field. State`s activities directed toward the design and implementation of instruments and mechanisms to stimulate protection and "punish" polluters policies certainly contribute to solving problems and achieving environmental objectives of sustainable development to the largest extent.

Different types of economic activities carry a risk of damaging the environment and cause pollution. If there is no state intervention, market participants can avoid paying the full cost of environmental damage. In that case, the market will not allocate resources in an efficient way given that the producer does not take into account the negative external effects of its production which bear to the society as a whole. This kind of irrationality and market imperfections justifies and requires the state's involvement and intervention.

After the 70s of the XX century the environmental policy in industrialized countries was characterized by two essential features: the first, a number of principles that set the basis for the creation of environmental policies at the micro and international level have been developed, among which the most important is „polluter pays" principle, and the second a series of instruments necessary for creating and implementing environmental policies have been created (Jovanović, Radukić, Petrović-Ranđelović 2011, 155). Generally speaking the state can use two sets of instruments. One group of the instruments are instruments on the revenue side of budgets, such as taxes and fees, while other group of instruments comprise instruments on the expenditure side of budgets which include different types of incentives that the state is doing to order to improve environmental protection.

3.1. *State Aid as an Instrument for Environmental Protection in the EU*

Category that, at the level of the EU developed countries, has an important place in the overall structure of investment in environmental protection and that is gaining in importance is the category of *state aid for environmental protection*. The strategy "Europe 2020" highlights sustainable development as one of the top priorities (European Commission 2010). It includes the so-called "20/20/20"

environmental goals that mean "20% increase in energy efficiency, 20% reduction in greenhouse gas (GHG) emissions, 20% share of renewables in overall EU energy consumption by 2020" (European Commission 2010). State aid could contribute to these objectives directly or indirectly, especially when aid results in the correction of market failures or when aid is sufficient incentive to motivate the recipient to increase environmental protection (European Commission 2011, 21).

State aid for environmental protection is becoming increasingly important at the EU level and occupies a significant percentage in the structure of the total approved state aid. For ensuring the appropriate use of allocated funds to environmental protection, this issue is regulated at the EU level by *"Guidelines on state aid for environmental protection"* (European Commission 2008). Consistency of application of the Guidelines provides that the effects of environmental protection overcome the effects of distortion of competition that *state aid*, as a form of selective government intervention, implies. In order to state aid for environmental protection be justified, it must lead *to changing behaviour of the recipient in ways that will increase the overall level of environmental protection in relation to the situation before approving of state aid*.

The European Commission, as a body which controls state aid at the EU level, has identified a number of situations in which state aid for environmental protection is considered reasonable and compatible with the internal European market (European Commission 2008):

- "aid for undertakings which go beyond Community standards or which increase the level of environmental protection in the absence of Community standards;
- aid for early adaptation to future Community standards;
- aid for environmental studies;
- aid for energy saving;
- aid for renewable energy sources;
- aid for cogeneration and aid for district heating;
- aid for waste management;
- aid for the remediation of contaminated sites;
- aid for the relocation of undertakings."

The state aid for environmental protection recorded a continuous increase in the absolute and relative terms at the EU level in the period from 2001 to 2010. Thus, state aid for environmental protection has grown from 7 billion euros in 2001 to 14.5 billion euros in 2010 at the level of EU 27. In addition, there are significant disparities in the level of spending on environmental protection between different member states.

The largest provider of state aid aimed to environmental goals is Germany in 2010. Even 38.27% of the total granted state aid at the EU 27 level was approved in Germany, followed by Sweden and the United Kingdom with 15% and 9%, respectively, and the Netherlands and Austria with a share of 7% of the total

approved state aid for environmental protection. On the other hand, a certain although small number of EU countries are characterized by lack of allocations on behalf of environmental protection objectives. These countries were Romania, Portugal, Cyprus and Greece in 2010 (European Commission 2011, 21).

3.2. State Aid as an Instrument for Environmental Protection in Serbia

Serbia, along with the commitment and aspiration towards the European integration process, was ratified the "Aarhus Convention" in May 2009. Also, a set of laws and regulations that reflect the European principles and standards for the protection of the environment, as well as amendments to the "Law on Environmental Protection" ("Law on Amendments and Supplements to the Law on Environmental Protection" 2009) were adopted in the same year. All this should result in that, year after year, Serbia has a better ranking according to the environmental criteria in Europe, as well as globally.

Table 1: Comparison of the Values and the Ranking of the EU Countries and Serbia According to the EPI and its Sub-Indices for 2012

Country	EPI 2012		„Environmental Health"		„Ecosystem Vitality"	
	value	rank	value	rank	value	rank
Latvia	70,4	2	73,8	57	68,9	3
Luxembourg	69,2	4	100,0	1	56,0	34
France	69,0	6	98,9	15	56,2	32
Austria	68,9	7	99,0	10	56,0	33
Italy	68,9	8	100,0	1	55,6	38
United Kingdom	68,8	9	98,1	17	56,3	31
Sweden	68,8	9	100,0	1	55,5	39
Germany	66,9	11	99,0	10	53,2	48
Slovakia	66,6	12	94,4	27	54,7	43
Netherlands	65,7	16	97,2	20	52,1	55
Lithuania	65,5	17	83,3	43	57,9	27
Czech Republic	64,8	18	96,0	22	51,4	57
Finland	64,4	19	100,0	1	49,2	65
Denmark	63,6	21	99,0	10	48,4	71
Poland	63,5	22	89,2	35	52,4	52
Belgium	63,0	24	97,2	20	48,4	72
Slovenia	62,2	28	88,0	36	512	59
Spain	60,3	32	99,0	10	43,7	83
Greece	60,0	33	96,0	22	44,6	79
Ireland	58,7	36	98,1	16	41,8	89
Portugal	57,6	41	93,0	30	42,5	88
Cyprus	57,1	44	100,0	1	38,8	103
Hungary	57,1	45	93,8	28	41,4	90
Bulgaria	56,3	53	92,2	31	40,9	91
Estonia	56,1	54	70,5	65	49,9	63
Malta	48,5	87	91,2	33	30,2	122
Romania	48,3	88	60,7	87	43,0	84
Serbia	46,1	103	72,7	59	34,8	117

Source: Environmental Performance Index 2012

Instrument for analysis and consideration of the situation in the field of environmental policy in Serbia, as well as for comparison of the situation in the field of environmental protection in Serbia and neighboring countries and the EU, is "*Environmental Performance Index* – EPI" (Environmental Performance Index 2012). It is an instrument for the quantification and comparison of environmental performance between countries. This methodology was developed in cooperation between Yale and Columbia University with support from the *World Economic Forum* and the *European Commission*. The index consists of two subindexes, *"Environmental Health"* and *"Ecosystem Vitality"* and, despite the absolute values of the index and subindexes, it ranks the ranking of countries according to the subindexes is determining regularly. *Table 1* provides a comparative review of values of EPI and its subindexes and rank of all the EU countries and Serbia according to these values for 2012.

Positioning of Serbia according to the EPI is the 103rd place in the world which ranks Serbia in the group of countries with very poor environmental performance. Among the EU countries, Latvia, Luxembourg, France, Austria, Italy, the United Kingdom and Sweden stand out as countries that belong to a group of nine countries in the world with the best environmental performance (Environmental Performance Index 2012). If we analyze the rank of Serbia according to EPI subindexes it can be concluded that according to the value and rank of subindex – "Environmental Health" Serbia takes the 59th place in the world, which means that the impact of the environmental conditions on human health is much better assessed than the "Ecosystem Vitality", i.e. natural resources management field (the 117th place in the world). This indicates that it should be given much more importance to the policy of management of natural resources and their protection, primarily by the state. Good environmental management, in addition to adequate policies, includes financial support for implementation of action plans and achieve strategic goals.

Notwithstanding the overall increase in state funding in absolute terms, for Serbia, compared to the practice of developed countries, it is still characterized relatively low investment in environment protection. Serbia sets aside 0.3% of GDP for the environmental goals in 2010 (Serbian Government 2009, 33). The experiences of EU member states show that these countries had total investments in the environment in the range 1.5-2.5% of GDP in the period of pre-accession to the EU (Agency for the Environmental Protection 2011, 159).

Figure 1 shows the projections of environmental investment in Serbia, expressed as a percentage of GDP by 2019, according to the "Budget Memorandum for 2010" (Serbian Government 2009) and to the "National Programme of the Environment" ("National Programme of the Environment" 2010).

According to the "*Budget Memorandum of the Republic of Serbia*" (Serbian Government 2009) it does not provide the increase in investment in environmental protection. In fact, it is planned to maintain current levels of

investment of only 0.3% of GDP by 2013. On the other hand, the "*National Environmental Protection Program*" ("National Program of Environment" 2010), with projected growth of 5%, predicts a significant increase in investment in environmental protection. Thus, the total expenditures for these purposes should be 1.2% of GDP 2014 or 2.4% of GDP 2019 and thus will be significantly closer to the EU criteria and requirements in this field

Figure 1: Projections of Total Investment in Environmental Protection in the Republic of Serbia (as a Percentage of GDP)
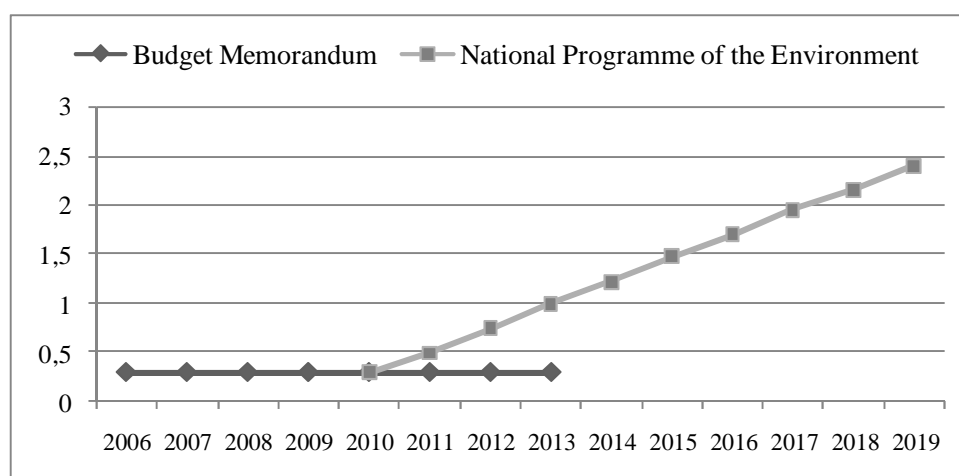
Source: Agency for the Environmental Protection 2011, 159.

While the pre-accession Serbian commitments led to the necessity of harmonization of legislation and institutions to the EU practice, consistency application approved legislation remains a problem, even in the field of environmental protection. The Law (Law on State Aid Control 2009) and Regulation (Regulation on Rules for State Aid Granting of Serbia 2010) on state aid in the Republic of Serbia envisage the allocation of state aid for environmental protection as one of the main goals of horizontal state aid.[5] Priority goals and intensity of state aid for environmental protection are fully consistent with the objectives defined at the EU level. While total state aid as a percentage of GDP in Serbia is significantly lower than level in developed countries, there are significant disparities in the allocation objectives of state aid in relation to the EU also. Thus, it is still recorded a very modest investment on behalf of state aid for environmental protection in Serbia.

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[5] In addition to the horizontal, the other categories of state aid are (Regulation on Rules for State Aid Granting of Serbia 2010): "regional state aid, sectorial state aid and state aid of small values (de minimize state aid). Horizontal state aid is given: for small and medium businesses, for the rehabilitation and restructuring undertakings in difficulty, employment, environment, research, development and innovation, training, in the form of venture capital, in the cultural field".

Table 2 shows review of state aid as a percentage of eligible investments, which are implemented by small, medium and large enterprises in order to improve the environment. This policy of incentives from the state, which was adopted by the *European Commission* within the document – "Guidelines on state aid for the environment" (European Commission 2008), were adopted in an equivalent manner in Serbian legislation by enacting the "Law and Regulation on State Aid Control 2009 and 2010" (Law on State Aid Control 2009 and Regulation on Rules for State Aid Granting of Serbia 2010). Under reasonable investments it is involved additional investments that the undertaking is taking to achieve a goal that contributes to improving the environment.

Table 2: The Rules for Distributing State Aid for Environmental Protection by Categories of Enterprises (Expressed as a Percentage of Eligible Investments)

Type of state aid for environmental protection	Small enterprises	Medium enterprises	Large enterprises
State aid for achieving higher standards than current standars in the Republic of Serbia or for increase the level of environmental protection in the absence of standards	80%	70%	60%
State aid for early adaptation to future standards in the Republic of Serbia *- more than three years* *- between one and three years* *before their entering into force*	25% 20%	20% 15%	15% 10%
State aid for the preparation of environmental studies	70%	60%	50%
State aid for achieving energy savings	80%	70%	60%
State aid for producing of energy from renewable sources	80%	70%	60%
State aid for facilities for combined production of electricity and heat (cogeneration)	80%	70%	60%
State aid for waste management	70%	60%	50%
State aid for the rehabilitation of contaminated sites	100%	100%	100%
State aid for the relocation of enterprisees	70%	60%	50%

Source: Review Made According to the Regulation on Rules
for State Aid Granting of Serbia 2010

Figure 2 gives a comparative review of spending on behalf of state aid for environmental protection as a percentage of total granted state aid in the EU as a whole, EU 15, EU 12 and Serbia in 2010.

**Figure 2: The State Aid Share for Environmental Protection
in a Total State Aid Granted in the EU and Serbia in 2010**
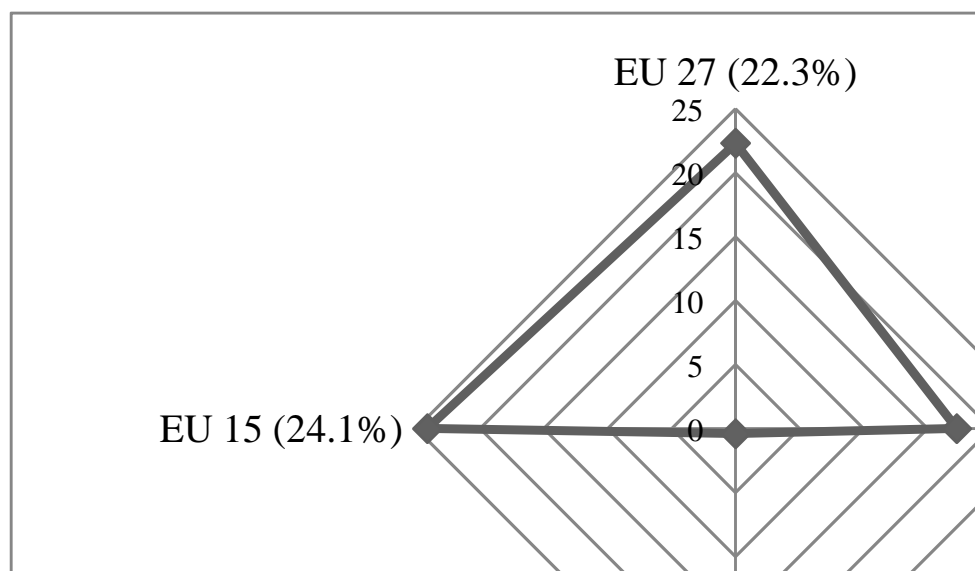
Source: European Commission 2011, Commission for State Aid Control 2011, 14

In contrast to the practice of the European countries and major spending on behalf of state aid for environmental protection, in Serbia it has recorded more than a modest share of this form of state aid in the overall structure of aid, only 0.4% in 2010. The share of this type of aid in the overall aid amounts to 22.3% at the level of EU 27. At the level of EU 15 and EU 12 this type of aid amounts to 24.1% and 17.3%, respectively.

It should be noted that, in addition to research and development and training, environmental protection was one of three completely ignored objective of state aid policy in Serbia until 2009. In Serbia it was not recorded separation in the name of state aid for environmental protection until 2009 (when it was allocated only 5 million RSD, or about 53,000 euros) (Commission for State Aid Control 2011, 14). In this context, 63 million RSD (or about 650,000 euros) of state aid for environmental protection in 2010 certainly represent an improvement over the previous period, but it still not enough that Serbia to be able to count on its positive effects and the convergence towards the European good practice in this field. This fact, among others, must be considered in explaining the relatively low ranking of Serbia at the world level according to the environmental protection and environmental quality.

Table 3 gives a comparative overview of state aid for environmental protection, as a percentage of total granted aid, and EPI values for eight EU countries in which the highest spending on behalf of state aid for environmental protection was recorded in 2010.

Table 3. Comparative Review of State Aid for Environmental Protection and Environmental Performance Index (EPI) for Selected Countries in Europe and for Serbia in 2010

Country	State aid for environmental protection as % of total state aid	The value of the Environmental Performance Index (EPI)	Rank of countries according to the Environmental Performance Index (EPI)
Sweden	86	68,8	9
Lithuania	78	70,3	2
Netherlands	55	65,7	16
Austria	49	68,9	7
Finland	40	65,4	19
Germany	38	66,9	11
Slovakia	36	66,6	12
United Kingdom	34	68,8	9
Serbia	*0,4*	*46,1*	*103*

Source: "State Aid control, Scoreboard, reports and studies 2010"
and "Environmental Performance Index 2010"

Serbia, with the participation of state aid for environmental protection in the total state aid of only 0.4% in 2010, recorded EPI value of 46.1 and the positioning on the 103rd place. Also, it can be seen in the table that the analysed eight EU countries, where state aid is a very important instrument in environmental policy, recorded a very high value of the EPI through 65 (the range of values of this index is between 25.32 and 76.69 for 2012) and placed in the top 20 out of 132 countries for which projections EPI was performed in 2012.

Conclusion

The role of the state in achieving the objectives of sustainable development can be extremely high. In this sense, the creation of institutional frameworks and using different instruments and mechanisms largely contribute to solving problems and achieving ecological goals of sustainable development. However, good environmental management, in addition to adequate policies, includes financial support for implementation of action plans and achieving strategic goals. Category that has an important place in the overall structure of investment in environmental protection and which is gaining in importance at the level of the EU developed countries is the category of *state aid for environmental protection*. How important is this instrument shows the fact that the EU allocations for state aid in area of environmental protection for a period of ten years (2001-2010.) are more than doubled (from 7 billion euros in 2001 to 14.5 billion euros in 2010).

With the latest legal regulations in Serbia, the priority objectives and the intensity of state aid for environmental protection are in full compliance with the defined objectives at the EU level. However, we still recorded a very modest investment on the behalf of state aid for environmental protection. State aid for

environmental protection accounts for only 0.4% of the total approved state aid in Serbia in 2010, while 2009 year was the year in which for the first time set aside also a modest amount of state aid for this purpose (little more than 50,000 euros)**.**

Instrument for analysis and consideration of the situation in the field of environmental policy in Serbia, as well as for comparison environmental state in Serbia in relation to the neighboring countries and the EU is the *"Environmental Performance Index"*. As the countries with the most significant appropriations for state aid for environmental protection are also the countries that record a very high EPI value, the importance of this form of state aid must not be neglected. Policy makers in state aid and environmental policy in Serbia should follow good practice in Europe and, without neglecting the importance of other instruments, study the possibilities and effects of this instrument in order to improve environmental conditions and to provide better positioning of Serbia with regard to various indicators of the quality of environment.

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DRŽAVNA POMOĆ – INSTRUMENT ZA ZAŠTITU ŽIVOTNE SREDINE U EVROPSKOJ UNIJI I SRBIJI

Rezime: Koncept održivog razvoja nastao je iz potrebe očuvanja životne sredine kako bi se njen kvalitet održao na odgovarajućem nivou za sadašnje, ali i buduće generacije. Imajući u vidu sve veći značaj koncepta održivog razvoja u savremenim uslovima, najpre analiziramo zaštitu životne sredine kao jednu od tri njegove glavne i međusobno uslovljene komponente. Zatim ukazujemo na regulatorni okvir u Evropskoj uniji i Republici Srbiji kojim se nastoje urediti ključna pitanja iz oblasti upravljanja i zaštite životne sredine. Glavni deo ovog rada tiče se uloge i značaja državne pomoći u postizanju ciljeva zaštite životne sredine. U tom kontekstu, izvršena je analiza onoga što jedna država i njene organizacije čine u institucionalnom i finansijskom smislu radi ostvarivanja zaštite životne sredine u okviru EU, ali i Srbiji.

Ključne reči: održivi razvoj, životna sredina, državna pomoć

RESEARCHING THE IMPACT OF INNOVATIONS ON BUSINESS DEVELOPMENT AND REGIONAL DEVELOPMENT

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Abstract: Regions and other local environment are included in the current globalization. Businesses as an integral part of the region are heavily dependent on global environmental change. Analysis of economic trends in the world and most dynamic development policies of developed countries shows, that the innovation capability that enables rapid adaptation to changes in the international arena offers the only possibility to improve the competitive position. Only a highly innovative country, region, company can maintain long-term advantage over competitors and can ensure economic competitiveness and economic growth. Innovation enables companies to improve competitiveness and profitability by creating, developing or marketing innovative new products or ideas. Innovations, research and development, enabling the developed economies of the European Union to its citizens adequate welfare and quality of life. In this paper we present some important results of research and studies of regional development. These results are based on secondary use of the statistical data and secondary data obtained from interviews and semi-structured interviews on the qualitative approach, with which we presents a more detailed picture of events in the steerable markets, innovative centers in regional development and talk about the transfer of knowledge and research in the economy.

Keywords: innovation, innovation potential, guiding markets, knowledge

1. Introduction

What is the key factor that makes a particular regional environment (EU, Slovenia, South East Slovenia region) an appropriate basis for the development of internationally competitive and successful economic activity? How to influence the trends of labour productivity slowdown? Domadenik, P. et al. (2010, p. 1) respond by saying that "an important part of the answer lies in stimulating technological

development, transferring knowledge and research into the industry, active operation of companies in the field of creating new knowledge and new technologies, stimulating innovation and formation of new jobs with high added value, thereby stimulating business dynamics and creating conditions providing the EU with a competitive position in the long-term competition in global markets". According to Porter (2000), the most important sources of competition are innovation and sophistication of products and services. Likar (2006) gives the following economic goals of innovation: increasing added value, reducing production costs, increasing the share of successful inventions which become innovations, raising quality of products or services, improving efficiency of the development, enhancing and reducing the time for the introduction of new products or services, and developing new families of products or services.

2. The Role of Innovation and the Aspects of Innovation Activity

Achieving purposes and objectives is the foundation of every company. Both managers and employees express the objectives through their interests or wishes and requirements. Every manager must set and achieve objectives, thereby successfully managing the organisation. Kotler (2006) specifies the following activities: defining the mission of the company and/or organisation, formation of strategic business units, allocation of resources to each business unit, and planning of new activities. Markič (2004, p. 27) emphasises that for a company and/or another organisation to be a successful facilitator of changes, they must develop policy of planned innovation. Different authors divide the process of innovation into several stages or phases (definition of the strategy, design, risk, business analysis, development and technological preparation, trial use, marketing of the product or service). For the innovation processes divided by Schumpeter (2010) into three phases (from invention through innovation to diffusion of ideas), educated, creative people with adequate knowledge are needed. The risk of the idea is a particularly important item in the innovation model. It only generates low costs in the initial phases, but later the costs rise significantly, so the course of action must be in line with the costs for the development, production preparation and marketing of each possibility. Innovation, together with technological progress, is one of the main sources of economic growth. Differences in economic growth and satisfaction of society can be partly explained by differences in the success of countries in the field of innovation. Categories having a large impact on the development of innovation include capital and technological currents (cooperation between the industry and the research sphere).

Scientific literature provides many definitions on the subject of innovations and innovation activity. Innovation has no general and uniform definition; every researcher defines it differently. Innovation is an idea successfully transformed into a new product or method (new/improved products, processes or services) providing new value to the users and new economic value to the creator of the innovation.

Companies do it in order to make progress, compete and be successfully distinguished from the competitors in the market. Innovation may also be comprised of a set of minor changes. The Statistical Office of the Republic of Slovenia measures innovation activity of Slovenian companies in accordance with international methodology of OECD and with recommendation of the European statistical office Eurostat in order to make a uniform survey of innovation activity (SURS).

Rašič and Markič (2008, p. 105-106) present a model for planning innovation policy in a company which encompasses the following four steps: seek for current opportunities (compete), seek for current capacities of the company (control), opportunities for the future (creativity), suitable and required abilities to implement the strategy (cooperation). Strategic planning of innovation policy in micro and small enterprises can be divided into: definition of the strategy (competition, cooperation, creativity and control), introducing improvements or novelties in the area in question (methods of work, marketing, methods of management, stimulation of innovation activities, research and development, ...), stimulating innovation (competition, clients' needs, advances in technology, financial stimulation from support institution and state co-funding, ...), planning innovation policy (definition of planning, importance of planning, information for employees on the strategy, rewarding employees, collecting proposals from employees), successful business operation (investment resources, relationships with suppliers, ...). In implementing innovation policy, cooperation of all participants of the business process, design, execution, control and feedback information, competition and control should not be neglected.

Scientific papers indicate that economic progress may be achieved through technologic progress, i.e. through innovations which are closely related to the development of markets and size of the organisation (Schumpeter, 2010, Rašič and Markič, 2008). Rašič and Markič (2008, p. 26-27) claim that the majority of people associate innovation with companies in the sense they perform the same thing in a new or improved way and use new technology to provide new products. They typically associate innovation with improvements of products, processes or services. In continuation, the authors emphasise that companies must be, in order to have long-term opportunities to succeed, innovative. If companies want to survive and remain competitive, they must plan and develop innovation policy and continuously transform inventions into innovations. They must seek new ideas and options for better business operation, thereby satisfying clients' needs. Innovative companies are the most important component of competitive economy in a region. It is not enough for them to have state-of-the-art equipment, educated employees and invest large amounts in R&D, they must possess something more than their competitors - knowledge on how to combine the available resources in a way that is difficult to imitate. This can include exceptional business ideas, above-averagely efficient production methods, strategies, organisational structures or technological improvements or new products (Gramc, 2007). In an innovation-oriented

environment, human resources are an important factor, since educated and qualified employees use their potential, ideas and knowledge to contribute to the company's or organisation's innovation policy.

The state has an important role in stimulating innovation activity at the national and regional level, which is required for all companies, particularly for micro and small enterprises which have an impact on the regional development. Regions which are able to create many innovative companies or companies based on new technologies will generate larger and faster growing income, primarily by export and new jobs, and will thus achieve greater and faster economic growth (Rašič and Markič, 2008, p. 36). In Slovenia, there are several institutions supporting innovation of companies and other organisations (e.g. the Chamber of Commerce and Industry of Slovenia, Technology Park Ljubljana, Association of Slovenian Innovators...).

2.1 Innovation in Enterprises

Survival and growth of micro, small and medium-sized enterprises are important for regions and economies which are either poorly developed or have a small domestic market, such as Slovenia, where companies have almost no other chance than to focus on international markets. Innovations and technological progress are needed to enter foreign markets. "This is the reason why small and medium-sized enterprises in Slovenia and elsewhere in the world are becoming more and more interesting for researchers of internationalisation and international entrepreneurship associated with innovation" (Ruzzier and Mlakar, 2011, p. 44).

Different authors have different opinions as to how innovative large or small enterprises are. A weakness of small enterprises is lack of technological knowledge, lack of employees with higher education, lack of resources, while large enterprises have a significant impact on technological progress. Companies with large market power have more options to fund research and development from their profit, they are able to compare returns on innovations more easily and therefore show more initiatives for innovations, have more projects in a given moment and can distribute the R&D risks among them, and have better access to external resources. However, innovation activity in small enterprises is becoming increasingly important for the companies themselves and for the governments. "By entering global markets, the situation of small enterprises changed in the sense that innovation activity in the field of production of products, processes and management in general is not longer just a matter of choice but a precondition for growth and survival" (Varese, 2006, in Rašič and Markič, 2008).

3. Innovation Policy in the Field of Lead Markets

Competitiveness of companies in the European Union highly depends on the innovation activity. The Lisbon Strategy for Growth and Jobs is one of the fundamental documents including an extensive range of measures and policies

aimed at improving legislative and business environment in the European Union in order to stimulate innovation activities of economic entities. This strategy is the basis for the Lead Market Initiative aimed at creating and marketing innovative products and services. These are expected to constitute a supporting element of enhancing investments in R&D in fast-developing markets for products based on technologically demanding innovative activities (Domadenik et al., 2010, p. 1-6). "Through the Lead Market Initiative, the EU may have a significant impact on factors influencing innovations, namely on the first buyers' side. Moreover, public institutions may, through public procurements, influence the extent of R&D, which become more profitable and less risky due to the presence of buyers. This can encourage new cooperation between educational institutions and companies and additionally attracts students to high-tech industry. In addition, public institutions can have a significant impact on standard formation and intellectual property protection" (Domadenik et al., 2010, p. 7).

Main factors justifying the lead market idea as one of the options that could efficiently contribute to faster development of new technology and faster economic development are numerous, but depend on many complementary conditions. The existence of markets in favour of innovations is the key factor influencing the extent of investments in R&D, technological progress and emergence of new, innovative products and services. The lead markets in the EU may influence the fragmentation and the small size of the market which constitute an obstacle for many companies in the innovation activity. The existence of lead markets reduces risk for the companies which develop new, innovative products and services and acts as an additional stimulation for larger investments in R&D. The lead markets are an important step in the learning process, since innovators obtain precious feedback information from the first users concerning potential improvements of products or services as well as faults. Through the learning process, they enable the companies to improve the product, which is subsequently presented to a larger range of users, which positively affects the company's operation, since production of the product is scaled-up. This is how smaller and medium-sized enterprises which have the opportunity to be successful and innovative may establish themselves more easily and obtain credibility.

Research on the lead markets in the world, Europe and Slovenia included companies and institutions present in the sector of eco-innovations and low-carbon technologies and the sectors of biotechnology, e-health and ICT (Domadenik et al., 2010, p. 11-13). On a European and global scale, Slovenian companies in the lead markets are small, highly specialised enterprises operating in the niche markets where areas in the company's activities combine, e.g. digital technologies and intelligent transport systems, eco-innovations and biotechnology, etc. A large problem for the companies is acquisition of funding for development activities. Some lead markets (eco-innovations and e-health) depend on state actions. The state specifies standards and priorities which are the driving force of the development and create demand in the market. Domestic market and nationally

obtained certificates for new products are often a starting point allowing entry into foreign markets. Due to a limited level of protection and time-consuming procedures, protection of intellectual property rights is a grave problem for companies in all areas of lead markets. Companies and research institutions link up and cooperate within clusters[1], technological networks and other formal and informal types of cooperation, which can be a good way to stimulate development in the industry (Domadenik et al., 2010).

4. Innovation Potential in the EU and Slovenia

The study of innovation in the European and other countries carried out for the European Innovation Scoreboard (EIS) classified the countries participating in 2010 in the following categories: ***innovation leaders****:* Denmark, Finland, Germany, Sweden, Switzerland are above the EU 27 average; ***innovation followers:*** Austria, Belgium, Cyprus, Estonia, France, Ireland, Luxembourg, Slovenia, Netherlands, United Kingdom; ***moderate innovators:*** Czech Republic, Greece, Hungary, Italy, Malta, Poland, Portugal, Slovakia, Spain; ***catching-up countries:*** Bulgaria, Latvia, Lithuania and Romania. According to this classification, Slovenia ranks among the so-called "moderate innovators", countries which fall behind the average, which is not an encouraging piece of information.

Table 1: Total Index of Innovation Leaders in the EU by Year

Year/country	2003	2004	2005	2006	2007
Sweden	0,82	0,8	0,78	0,76	0,73
Switzerland	0,68	0,69	0,68	0,67	0,67
Finland	0,69	0,68	0,65	0,67	0,64
Denmark	0,68	0,66	0,65	0,64	0,61
Germany	0,59	0,59	0,59	0,59	0,59
United Kingdom	0,57	0,57	0,56	0,55	0,57
EU-25	n. p.	0,45	0,45	0,45	0,45
Slovenia	0,32	0,34	0,34	0,36	0,35

Source: The Statistical Office of the Republic of Slovenia

Table 1 showing the total index of innovation leaders in the EU indicates that Slovenia is below the EU average. Eurostat assesses innovation potential of countries using the following indicators: education level of adolescents by gender,

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[1] A cluster is a complex system integrating several actors, such as companies, knowledge holders (e.g. universities, R&D institutes and laboratories), support institutions (e.g. chambers of commerce and industry, development agencies, sectoral associations) and the government. This system provides cooperation and competition among the actors, exploitation of synergy effects (joint promotion, joint R&D investments), stimulation of innovation and creation of new business opportunities.

number of higher education graduates in technical and natural subjects by gender, proportion of expenditure allocated for R&D work, number of patent applications (with the European Patent Office), number of patent applications in the USA, and the amount of high-risk investments.

The analysis of economic growth levels in the OECD Member States showed that the fastest growing countries were those which managed to develop new products, processes and services based on new technologies (and not necessarily those where new technologies were developed).

Economic growth is the foundation for increased general satisfaction in a society. An important economic indicator of business dynamics of statistical regions' development is also the number of newly established companies in a determined period. The SURS data show that in the study period between 2004 and 2010, the trend of newly established companies without a predecessor was positive (on average more than 12.800 companies), a third of which were established each year in the Osrednjeslovenska region. The number of companies in Slovenia increased by 5.5% between 2008 and 2009 (152,514 companies). The increasing trend of number of companies also continued through 2010, when a 3.12% increase compared to 2009 was observed. However, after 2008, the number of employees decreased in all cohesion and statistical regions of Slovenia. In 2009, the number of employees decreased by 1.96% with respect to 2008, and in 2010, by 4.47% with respect to 2008, of which in Osrednjeslovenska region in 2010 by 2.4% with respect to 2008. Gross domestic product (GDP) per capita in Slovenia was, on average, increasing from 2003 to 2008, and dropped in 2009 (on average by 6.2%), which is indicated by Table 2. Data for the first five statistical regions (with respect to 2009) show that every year between 2003 and 2009, the Osrednjeslovenska and Obalno-kraška regions were the only regions above the Slovenian average.

Table 2: Regional Gross Domestic Product in Slovenia, Region, 2003-2009

Year/ region	2003	2004	2005	2006	2007	2008	2009
SLOVENIA	12942	13645	14355	15464	17120	18437	17295
Osrednjeslovenska	18305	19313	20462	22267	24500	25950	24660
Obalno-kraška	13831	14559	15160	16486	18269	19860	18848
Goriška	12427	12910	13552	14442	16345	17654	16358
South East Slovenia	12203	12942	13390	14672	16225	17499	15978
Savinjska	11456	12077	12783	13538	14958	16498	15396

Source: The Statistical Office of the Republic of Slovenia

Data showing the structure of investments per capita indicate that only two regions, Osrednjeslovenska and Obalno-kraška, are highly above average. In 2005, according to SURS, the most investments in new capacities were made in the

Osrednjeslovenska statistical region, followed by South East Slovenia, Podravska and Savinjska regions. The largest differences in Slovenia can be observed in gross domestic expenditure on R&D[2]. The highest number of researchers and research organisation are concentrated in the Osrednjeslovenska region, where also the most resources are spent (Adam, F. et al., 2010, p. 79). As indicated in Table 3, the Osrednjeslovenska and Obalno-kraška statistical regions rank on top by expenditure on R&D between 2007 and 2010.

Table 3: Gross Domestic Expenditure on R&D by Statistical Region in Slovenia, 2007-2010

Year / region	2007	2008	2009	2010
SLOVENIA	500508	616949	656882	745942
Osrednjeslovenska	275979	337009	356257	403266
South East Slovenia	63006	75815	76960	89933
Gorenjska	52003	54481	52397	63362
Savinjska	33610	47986	45845	57169
Podravska	28978	36389	42675	47211

Source: The Statistical Office of the Republic of Slovenia

Results of the SURS survey show that in the period of several years, innovation activity in large companies is significantly higher than in small companies[3]. According to the size of the company (between 2006 and 2008), small enterprises (with 10-49 employees), with 1549 innovation active companies (44.5% of all small enterprises) lag behind medium-sized (570 companies or 63.4% of all medium-sized enterprises) and large enterprises (191 of a total of 214 large enterprises). Large enterprises (enterprises with more than 250 employees) were the most active with respect to innovation. According to the 2009 data, there were 76.9% innovation active large enterprises (SURS), and more than 89% in the entire observational period. Level of innovation also depends on the economic branch. Between 2006 and 2008, there were more innovation active enterprises among enterprises in the manufacturing category (54.6%) than among enterprises in the selected service category (46.1%). International comparisons (European Innovation Scoreboard, 2009) show that Slovenia lags far behind according to the growth indicators of innovative enterprises, according to the growth and employment in technologically intensive industries, especially services (72% of the EU average), according to the intensity of introducing new solutions and products into the market (67% of the EU average) and according to the share of high-tech export services (43% of the average) (Official Gazette of the Republic of Slovenia).

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[2] R&D – research and development

[3] One of the reasons for such results may be methodology of data acquisition, according to which an enterprise is considered innovative if it develops or introduces at least one innovation in the observational period, which is a far more ambitious goal for small enterprises than for large ones.

Table 4: Innovation Activity of Enterprises, Slovenia, 2006-2008

Number of employees in the enterprise	Innovation activity of enterprises				Non-innovative enterp.
	Innovation active enterprises				Total
	only technological	only non-technological	technological and non-technological	Total	Total
10 - 49	285	588	676	**1549**	**1932**
50 - 249	109	127	334	**570**	**329**
≥ 250	25	17	149	**191**	**23**
Total	419	732	1159	**2310**	**2284**
Shares of enterprises (%)	9.1	15.9	25.2	**50.3**	**49.7**

After 2000, Slovenia observed increased innovation in enterprises. Proportion of innovative enterprises, which was 21.08% in 2000, reached 35.01% by 2006. This also contributed to economic growth, as GDP increased from 4.4 to 6.8% in 2007. Table 4 shows that the proportion of all innovation active enterprises in Slovenia between 2006 and 2008 amounted to 50.3% (out of all 4594 enterprises). The majority of them were small enterprises which together introduced the highest number of technological and non-technological innovations (30.26% with respect to all innovation active enterprises). Innovation active enterprises with non-technological innovations (31.67%) were fewer than technologically and non-technologically active taken together (50.17%). The most innovations among technological innovations were innovations of products and procedures.

The quantitative part of the study by Rašič and Markič (2008, p. 98-102) gives evidence of the importance of innovation policy and innovation planning. The study confirms the hypothesis that innovation policy in micro and small enterprises has a positive impact on success. A major factor positively influencing the success of micro and small enterprises is frequency of introducing or implementing changes and innovations in the business operation method in terms of improvements and novelties. Poor innovation in micro and small enterprises leads to poor success. The hypothesis that the planning strategy of innovation policy influences success has been confirmed; however, this only applies so far as the employees are informed of the innovation strategy. A survey of a sample of interviewed enterprises shows that the Osrednjeslovenska region is among the least successful.

For Slovenian enterprises, the highest obstacles for innovation are the lack of financial resources, the lack of highly educated workforce, high risks related to innovation, the lack of information, inadequate tax legislation and inefficient administration. The most problematic factors for business operation are inflation, inefficient state bureaucracy, inadequately educated workforce, corruption, and poor working ethics (Technology Park Ljubljana, 2009, SURS).

4.2 Actors of Innovation in the Regions

As far as individual local and regional structures are concerned, they have different dynamics and level of development and presence of society and knowledge economy. Development cores differ according to the type and development of these structures. Numerous factors can be monitored, such as availability of human resources, the number of newly established enterprises (particularly high-tech), the presence of support institutions in the form of development agencies, technology parks, etc.

In addition to human capital, which must be "in circulation" in order to speak of successful economic and social development, support institutions in knowledge economy are particularly important from the perspective of knowledge flow between academic institutions as producers and high-tech enterprises as subjects able to use this knowledge for innovative products and services and be competitive in the labour market. Support environments provide the enterprises with institutional and infrastructural foundation, while being a framework for just as important flexible organisational approaches and establishment of cooperative informal networks.

Sociocultural and organisational aspects of the transfer of knowledge and technologies in four selected regions in Slovenia were studied using the qualitative methodology. Osrednjeslovenska and South East Slovenia regions, which have significant impact on Slovenian economy, are presented below. The qualitative part of the study was performed using the focus group method and the semi-structured interview method. The main focus of the study was on *establishing the knowledge flow and intensity of integration between high-tech companies and support institutions, assessing the chances for development and innovation breakthrough in a region, identification of the most important actors, and assessing what is the role of the state in stimulating regional development cores.*

Respondents from support institutions, high-tech companies, development institute and state agency included in the study from the Osrednjeslovenska region gave their arguments to assess the chances of the region for an innovation breakthrough. The following was indicated: realisation of entrepreneurial initiatives with high knowledge technology and higher potential for growth is required, good balance between the instruments for stimulating growth of newly established companies on the one side and instruments for stimulating growth of the existing companies on the other side should be achieved; they also underlined

the issue of low trust between business people and emphasised the importance of interdisciplinary integration of knowledge and transfer of knowledge and technologies into industry, they pointed out systemic obstacles in creating an innovative environment and expressed criticism towards spatial and functional design of support institutions and insufficient (formal) communication and cooperation with other institutions that should be more outwardly open, and stressed the importance of informal contacts in the communication with the relevant actors. A respondent from a state agency said that due to insufficient staffing, the agency was unable to perform any research or analyses concerning the inclusion of Slovenian companies in the regional development cores. Based on the data, it follows that the institutions are directed each in its support activity and do not foster any mutual contacts characteristic of regional development strategies. They pointed out that the projects put out for tender by the state are too short-term. Among other things, the focus group participants also underlined the following obstacles (funding, poor use of creative expert personnel, no development focus): on average, the region draws less resources from the address of strengthening regional development potentials than other regions (seventh place in Slovenia), poorly used development potential (not comparable with other capitals), no development focus in Slovenia, since the trend goes towards levelling out between the other regions and the centre. They also pointed out that the issue of intellectual property protection (insufficient experience) impedes innovation (e.g., the University's investment is not returned), etc. (Adam, F. et al. 2010, p. 120-128).

In the conclusion of the study, representatives of support institutions and other actors of the innovation system stress that it is evident that the mechanism for innovation breakthrough has been formed and that concentration of creative expert personnel who could make part of the potential development cores is ongoing. However, issues of development priorities have not been resolved yet, i.e. which industries or parts of industries should be developed irrespective of whether micro or small enterprises are concerned. Neither is there a real coordination and synergy between individual elements of the innovation system.

The study participants began to observe tendencies for potential development and innovation breakthrough of the *South East Slovenia region* in 2006, when the state policy concerning stimulation of regional development changed. The decisive creative actors were to make a significant contribution to the breakthrough. Synergy of operation between the Chamber of Commerce and Industry of Dolenjska and Bela Krajina, the University Research Centre Novo mesto and the Development Centre was emphasised. Operation of the institutions enhanced intensity of transfer of knowledge and flow of information resulting in formation and accreditation of post-secondary courses in the region. According to the study participants, the innovative actors in the region that have a decisive impact on the breakthrough of the region are also large companies or strong industry (pharmacy and automotive industry) and clearly defined regional focus on particular development goals. Large companies in the region encourage clustering.

While stressing the benefits of a large company operation for the regional development, one should be aware that companies associated with a single industry are at risk of "falling asleep". An inhibiting factor for the regional development is association of creative regional actors at the local level. Representatives of high-tech companies participating in the study saw the cooperation with the representatives of local and regional government as occasional, mostly focusing on expert cooperation.

With regard to the role of the state in encouraging regional development, they believe that own initiative and willingness of the environment for an intense cooperation between regional actors are more important for regional development than the role of the state ("The state does not have a clear view as to which industries are worth supporting"). They see that the state and its institutions systematically hinder or inhibit regional development in the field of higher education. They give the initiative on association of agencies (following the example of the Slovenian Research Agency) in order to increase transparency of tenders published at the national level. They point out the problematic flow of information and lack of statistical data as to how successful companies were when applying for tenders /Adam et al., 2010, p. 130-136).

5. Conclusion

If Slovenian companies are to operate successfully in competitive regional and global markets, they have to use different measures and stimulations to create conditions providing continuous innovations and development of new knowledge allowing them to overtake their competitors with new, innovative solutions. Innovation, or success of innovation processes, is important for survival and growth or micro, small and medium-sized enterprises. In Slovenian companies, innovation will mostly depend on their innovation policy and planning strategy focused on creation and marketing of innovative products and services. Success of innovation processes also depends on the ability of the companies to create information network to obtain data on demands and needs of consumers in carefully selected target markets, on the ability to detect new trends and needs, and on time needed to transform the created knowledge into innovations. Therefore, the key challenge in the field of research, innovations and technological development is directing and encouraging R&D in the public and business sector in the fields where research potential can be combined with business activity, and added value and competition can be increased. At the same time, adequate organisational structure of research organisations must be provided to enable them to adapt more to the challenges of contemporary research work. The role of the state is important in terms of leading development policy allowing creation of conditions for regional development and elimination of the most problematic factors in business operation (inflation, inefficient state bureaucracy, inadequately trained workforce, ...).

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ISTRAŽIVANJE UTICAJA INOVACIJA NA RAZVOJ PREDUZEĆA I REGIONALNI RAZVOJ

Rezime: Regioni i druge lokalne sredine su uključeni u tokove globalizacije. Preduzeća, kao sastavni deo regiona, jako zavise od globalnih promena sredine. Analize privrednih tokova u svetu i razvojna politika najdinamičnije razvijenih država ukazuju na to, da je inovacijska sposobnost ta koja omogućava brzo prilagođavanje promenama u međunarodnom prostoru i jedina nudi mogućnost za poboljšanje konkurentske pozicije. Samo vrlo inovativna zemlja, region, preduzeće može zadržati dugoročnu prednost pred konkurencijom i tako obezbedi privrednu konkurenciju i ekonomski rast. Inovativnost preduzećima omogućava poboljšanje konkurentnosti i profitabilnost stvaranjem, razvojem ili inovativnim plasiranjem novih proizvoda i ideja. Inovacije, istraživanja i razvoj omogućavaju razvijenim zemljama Evropske unije, da svojim državljanima nude odgovarajuće blagostanje i kvalitet života. U ovom članku smo predstavili i analizirali neke važne rezultate istraživanja i studija o regionalnom razvoju. Oni se zasnivaju na sekundarnoj upotrebi statističkih podataka i sekundarnih podataka, dobijenih iz intervjua i polu-strukturiranih intervjua kvalitativnog pristupa, kojima prikazujemo detaljniju sliku dešavanja na vodećim tržištima, inovativnih centara u regionalnom razvoju i govorimo o transferu znanja i istraživanja u privredi.

Ključne reči: inovacija, inovacioni potencijal, vodeća tržišta, znanje

TRANSPORTATION AND ECONOMY OF U.S. CITIES

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Abstract: The aim of this paper is to describe the role and importance of transport for development of American cities, but also to explain and quantitatively assess the current negative impacts of automobile dependence in the economy. Research proves that the problem of automobile dependency is far more serious than material costs, and that traffic in many American cities becomes an obstacle to their economic development. This paper gives the analysis and quantitative estimation (OLS method, multiple regressions) of the impact of the most important traffic parameters on the economy of American cities.

Keywords: U.S. cities, automobile dependency, transport cost, congestion, urban sprawl

1. Introduction

Economic development of the United States today and their primary position in the global economy can largely be credited to the developed, widespread and high-quality transportation system. On the other hand, the development and popularization of traffic, in the first place the availability of cars and their massive use, have for several decades been showing numerous problems of excessive car use - pollution, delays, costs for infrastructure, petrol, parking and others.

Given the numerous serious and complex problems that traffic causes to the U.S. economy, as well as the global importance of the U.S. economy, recent scientific studies of this relationship are surprisingly scarce.

In recent years, one of the main causes of excessive automobile use, the urban sprawl, has been increasingly analyzed, the important papers being by Oliver Gillham and Alex MacLean (2002), Edward Glaeser and Janet Kohlhase (2001), Michael Stoll (2005), although the very traffic is not the focus of their research.

The authors Randal Crane and Daniel Chatman (2004) deal with the issue of the relationship between traffic and sprawl. There are studies of a positive correlation between investment in transport improvements and economic development by encouraging the agglomeration process (Daniel Graham 2007). Significant research of negative impacts of traffic on the economy is represented in the papers of Peter Newman and Jeff Kenworthy (1989) and Newman and Kenworthy (1999).

If the traffic impact on the economy of American cities is observed only through the issue of financial loss due to wasted time and fuel, the importance of this problem is underestimated because the U.S. economy can cope with that loss. The assumption of this paper is that the problem of automobile dependency is far more serious than material costs, i.e. that *traffic in many American cities becomes an obstacle to their economic development*. Although motorization in itself is the precondition of economic growth, its negative effects can have a considerably greater impact than its benefits.

This thesis will be demonstrated by the quantitative measurement of the impact of all most important traffic features (not only of negative factors) on the selected economic parameters, by means of the multiple regression analysis (OLS). The analysis is applied to the cities individually and collectively, in small or large groups, the aim being to classify the American cities according to their vulnerability to the negative effects of traffic.

If there are noticeable differences among the cities that are more or less sensitive to the effects of automobile dependency, these differences will point to the deeper causes of the problem, thus showing how to overcome it.

2. The Positive Effects of Traffic on the Development of U.S. Cities

Powerful and efficient transportation system provides businesses with access to raw materials and market and ensures that the goods, services, business, entertainment and people are available to other people. Increasing the efficiency of the transportation system provides the increased productivity in the economy in different ways. Reducing the cost of delivery can increase economic efficiency and provide higher returns in relation to costs. This increases the profitability, reduces retail prices, and improves the quality of service in terms of delivery, which enables the increase of taxes. All this encourages economic development. According to John Luke Gallup and Jeffrey Sachs (1998) and other authors in the field of economic geography even the more modest achievements regarding efficiency can provide significant benefits.

The benefits arising from the geographical proximity of a market space, raw materials, suppliers or source of labour are achieved by the activities of *agglomeration forces*. Agglomeration forces lead to concentration of economic activity, creating an environment that further encourages the enlargement of

economic activity. Dense regional agglomerations of economic activities are an important source of growth in the economy at any level of development. This is witnessed by numerous works of eminent scientists: Paul Krugman et al. (1999), Gallup and Sachs (1998) and many others.

For the U.S. economy traffic was more important than in many other countries, mainly due to the size of the territory. Without the link to the existing centres, many remote parts would remain completely undeveloped, and uneven development slows down the overall economic growth.

Secondly, the very fact that the U.S. is the country of huge production and consumption points to the necessity of a developed and efficient transportation system that would connect them. Although the U.S. is rich in significant and varied natural resources, these resources are spatially dispersed throughout the country. That is why the U.S. transportation network is an extremely important link within the U.S. economy.

The appearance of the first car was an important driver of urbanization. During the twentieth century a number of improvements have been achieved in automotive transport: speed, comfort, fuel efficiency and reliability of vehicles increased. Car traffic significantly influenced the increase of productivity and supported economic development. Productivity grew as the carts and animal traction for transport were gradually replaced by motor vehicles, while at the same time public transport increased the availability of labour.

Rail transportation development made a key contribution to the industrial revolution and North America's expansion to the west. Economic development increased greatly during the nineteenth century, by increasing personal and freight mobility.

In some cases the growth of American cities was so large, that the largest urban areas merged to form clusters of cities. Traffic improvements, a high standard of living, good transport infrastructure, interconnected transportation corridors, both rail and road, supported the development of specific clusters of cities - megalopolises. Megalopolises, as large urban agglomerations, with a population of 10 million or more, have a large (central) city of 100 000 to 500 000 inhabitants, while in suburban areas there are several times more inhabitants.

Megalopolises become the new competitive entities in the global economy. They are characterized by a steady increase of the flow of goods, capital and people between metropolitan areas within them; they attract the largest number of talents and generate most of the innovations in the United States. The increase of the quality and volume of traffic was probably one of the most important factors that enabled the rise of American megalopolises to the position they have today in the world economy.

Due to, until recently, a strong positive relationship between motorization and economic productivity, the general opinion is that strategies that reduce mobility must be economically harmful. I believe that there is an economically optimal level of mobility beyond which increased driving is economically harmful.

3. The Negative Effects of Traffic

Thanks to technological advances and other factors, transportation costs have declined rapidly over time. A more detailed analysis of the decline of transport costs has recently been given by E. L. Glaeser and Kohlhase (2003). According these authors, "the average cost of moving a ton a mile in 1890 was 18.5 cents (in 2001 dollars); today this cost is 2.3 cents." The reduction in transport costs leads to the massive use of cars in all developed countries. However, nowhere has this phenomenon changed the structure of cities and life as in the U.S. American cities have undergone a major transformation. This leads to the appearance of urban sprawl – the urban area begins to dissipate, suburban areas grow rapidly and new settlements, economically and socially linked to the metropolis, but geographically distant from it, spring up. More and more people live outside the cities where they work, the population is condensed in wider urban areas and there is a strong dispersion of jobs. Workers cover ever longer distances to work daily. Given the increasingly longer distances within the city areas, hiking and bicycle use are becoming more inconvenient for commuting. Most activities require the use of a car as a result of both the area's isolation from the city and the isolation of the area's residential zones from its industrial and commercial zones.

The extreme territorial size of American cities is the result of suburbanization, i.e. the intensive development of the suburbs in recent American history. It would have been possible neither without the very low transport costs, nor the strong support of the U.S. government, primarily influenced by a number of interested lobbies. The State encouraged the tax policy that supported the settlement of the suburbs through cheap loans, low taxes, large-scale campaign for improving the American roads in 1920s, state campaigns etc. so that 80-90 percent of U.S. residents live in them today. At the beginning of the process of suburbanization, American corporate interests, who had experienced the benefits coming from suburban development, lobbied hard for Federal subsidies. Oil companies, car manufacturers, homebuilders, and unions joined forces to lobby for the creation of new highways that would lead to suburban growth far from city centres all over the nation. Today the power, abundance and impact of these interest groups is further increased (the car lobby allocates about $ 60 million for Congress annually), while the public policy has not changed until the present day. In addition to tax policy, the government and the whole American society have a number of mechanisms to encourage car purchases (soft loans and low taxes for buying a new car, etc.).

The term *sprawl* has emerged exactly during the study of the phenomenon of suburbanization of American cities. Areas of urban sprawl are characterized as highly dependent on automobiles for transportation, a condition known as automobile dependency.

Automobile dependency is a term that also originated through the study of American cities. It is coined by Newman and Kenworthy (1989) to capture the predicament of most cities in the United States, Canada, Australia and New Zealand, and to a lesser extent, large cities in Europe. The term *dependenc*y is used to emphasize the principle - the more it is used, the less of the desired effect is gained.

The most important negative impacts of automobile dependency on the economy are the occupation of the most expensive urban land in the central urban zones, which are used for roads, parking areas, garages, than also traffic congestion, infrastructure costs, consumer costs, mobility barriers, accident damages, depletion of non-renewable resources, slowing down of manufacturing process due to delivery delays of inputs etc.

In modern developed economies, due to the growing negative effects of automobile dependency, the positive relationship between motorization and economic development is very weak. In many American cities, whose automobile dependency is higher than anywhere in the world, motorization is negatively correlated with economic indicators.

This statement will be subjected to econometric check in the example of American cities. However, in the example of the world's great cities, and without any research it can be seen that the differences in the use of a car do not lead to proportional differences in economic parameters.

Economically successful countries such as Norway and Sweden are much less motorized than the U.S., while their GDP per capita is much higher. According to the European Environment Agency (2007), the number of kilometres travelled per capita in North America at over 21500, while in the developed European OECD countries, this number only 11 000. These states have about 20 percent higher GDP per capita than North America. One comes to a similar conclusion about the relationship between economic parameters and the use of a car by comparing rich and poor Asian cities. That comparison is given by Newman and Kenworthy (1999). In the rich Asian cities cars are used less than in the poor ones, with GDP per capita in them being several times higher.

Here are some of the characteristics of traffic in American cities. Based on the Texas Transportation Institute data (2011), the average values of the most important indicators of traffic were calculated in the period 1982-2009. The percentage of *congested travel peak* in most problematic cities like LA and San Francisco reaches 70-80 percent. A surprising fact is that the cities that have a relatively small population (200-600 thousand) Orlando, Denver, Atlanta, Miami, Sacramento, have more than 50 percent of traffic jams.

With the increase of very heavy traffic conditions in American cities the length of commuting increases too. In urban areas of the U.S. the length of commuting increased from 35 to 45 minutes in just two decades, according to the Regional Plan Association data (2006). The constant increase in the delays does not only bring consequences in the form of staff time spent, but also leads to delays in the delivery of necessary manufacturing processes and product shipments. Average annual hours of delay per car-commuter equal more than 60 in Los Angeles, Washington, San Francisco, Chicago, San Jose and in Seattle they are 40-50 hours. Similar to the previous factor, according to this one, small cities such as Orlando, Atlanta, Nashville, Denver, are highly rated with over 30 hours of annual delays per car-commuter caused by congestion.

The problem of oil consumption requires special attention as a result of automobile dependency in the United States. Demand for oil in the transportation sector has constantly been increasing over the past 30 years, both in quantity and in terms of a share in total oil demand. According to estimates by the International Energy Agency (2007), transport will soon become the only sector in which demand for oil increases. In the United States as much as 2/3 of total oil consumption goes to transportation. The enormous consumption of oil in the U.S. is even more evident when it comes to data on consumption per capita. According to the EIA (2007) U.S. and Canada, whereby the U.S. spend disproportionately more, have a 2.5 times greater oil consumption than other industrialized countries, and nearly six times greater consumption than the world average. Most excess fuel per car commuter is consumed in Los Angeles, as much as 35 gallons per year over the amount that would be required if there were no jams. In Washington, the consumption amounts to 31.1, followed by San Francisco, Chicago and Seattle, with over 20 gallons, Houston, Atlanta, Boston and Phoenix with more than 16 gallons per year per car commuter.

According to these and many other negative effects, the total costs of traffic jams also increase. In ten most vulnerable cities, these costs amount to $ 600 up to 1300 $ per year per car - commuter. Los Angeles, Washington and Chicago have jam costs over $ 1000 a year, followed by Atlanta, Baltimore and Houston with more than 700 $, Orlando, San Diego and San Jose with over 650 $.

The impact of these negative effects on the economy of the U.S. cities will be evaluated quantitatively, by the implementation of the method of ordinary least squares (OLS) in multiple regressions.

4. The Impact Analysis of Automobile Dependency on the Economy of the U.S. Cities

Analysis of individual and collective influence of various factors on the economy of American cities was enabled owing to the existence of an abundance of statistical material. All the important traffic parameters in American cities

(collective and individual) in the period 1982-2010 are given in the *Urban Mobility Reports*, by Texas Transportation Institute (2011). These reports provide estimates of parameters such as loss of time and delay, additional fuel consumption and money expenditure, due to the constant and increasingly longer traffic delays, frequency of delays in particular cities and many others. The necessary economic parameters of U.S. cities are provided by BEA (2).

We shall investigate the influence of the most important factors of automobile dependency by applying multiple regression analysis to per capita income as an economic indicator for the selected U.S. cities. The chosen variables are not only the selected negative factors, but all the available measurable features of traffic in American cities. In addition to the negative factors of standstills, fuel consumption and the delays which have already been discussed, the multiple regression also includes the number of miles covered on highways, which greatly facilitate traffic, the number of miles covered on arterial streets, travel time index, and others.

All variables that we shall test statistically are at the same time the reflection of the general positive impact of motorization on the economy and its negative effects. Therefore, it can be expected that some apparently negative effects as variables in the regression analysis do not show a negative sign. However, we expect a negative cumulative impact of these variables in most U.S. cities.

The analysis is based on a sample of 48 U.S. cities with a population over 300 000, according to the data for a period of 28 years (1982 - 2009), which resulted in statistically significant weight of 1344 observations. The result of the obtained values of parameters is shown in Table 1.

The output (Table 1) shows the results of fitting a multiple linear regression model to describe the relationship between Income per capita and nine independent variables. Since the P-value in the ANOVA table is less than 0.01, except the *arterial street miles* variable (P-value 〉 0.1), there is a statistically significant relationship between the variables at the 99 percent confidence level.

The R-Squared statistic indicates that the model as fitted explains 70.0998 percent of the variability in Income per capita. The adjusted R-squared statistic, which is more suitable for comparing models with different numbers of independent variables, is 69.8981 percent.

Negative correlation in the multiple regressions was demonstrated in five variables: congested system, annual excess fuel consumed, annual hours of delay, roadway congestion index and arterial street miles, but the statistical significance of the last variable is less than 90 percent.

As a representation of this correlation scatter-plot 1 (appendix) clearly indicates a negative relationship between traffic and income per capita in most U.S. cities.

Table 1 Transportation's Factors and Income in American Cities

Multiple Regression Analysis

Dependent variable: Income per capita

Parameter	Estimate	Standard Error	T Statistic	P-Value
CONSTANT	11787.6	5217.83	2.25909	0.0239
Freeway Daily Vehicle-Miles per capita	699.535	69.4207	10.0767	0.0000
Arterial Street Daily Vehicle Miles per capita	-0.0104513	0.0116528	-0.896886	0.3698
Congested travel (% of Peak VMT)	305.204	41.6426	7.32914	0.0000
Congested System (% of lane-miles)	-57.4625	32.1383	-1.78797	0.0738
Annual Excess Fuel Consumed (Gallons /Auto Commuter)	-647.276	60.5259	-10.6942	0.0000
Annual Hours of Delay per Auto Commuter	-217.494	51.7086	-4.20615	0.0000
Trivel Index	8218.92	4855.74	1.69262	0.0905
Annual Congestion Cost per AutoCommuter ($)	35.4467	1.54953	22.8758	0.0000
Roadway Congestion Index	-18318.4	2835.34	-6.46073	0.0000

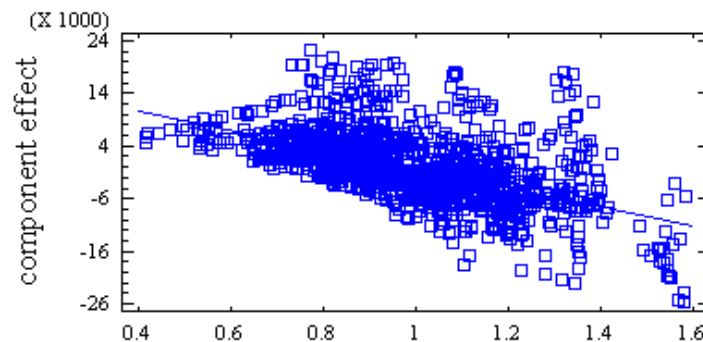
R-squared = 70.0998 percent
R-squared (adjusted for d.f.) = 69.8981 percent
Standard Error of Est. = 5595.09
Mean absolute error = 4019.96

Scatter-plot 1 Transportation's Factors and Income in American Cities

In the part covering the negative factors of automobile dependency we have found a relatively high ranking of the cities which by population do not belong to the big ones. For example, Atlanta, Denver, Orlando, and Nashville are among the first ten or fifteen American cities according to all negative factors of automobile dependency, although according to population they are ranked between 25th and 79th position.

For example, Nashville has a 50 percent larger area than New York, and only 600 thousand inhabitants versus 8.1 million residents of New York. Atlanta has 20 times smaller population than New York, and only 2 times smaller area. This situation is similar with many other cities.

Los Angeles has a 50 percent greater area than New York and 2.5 times smaller population (3.8 vs. 8.2 million). This city is consistently ranked as the first U.S. city in terms of the fuel consumption, total or measured, per number of inhabitants, the first in terms of the number of hours of delay per year (total and per car), the first or second in terms of the costs caused by delays, the first in terms of the cost caused by the delays (total or per car).

Houston is two times larger than New York, and has nearly four times smaller population, and according to all negative parameters involved in the analysis, it is in a worse position than New York.

These unexpected differences among cities in terms of sensitivity to the negative impacts of traffic encourage us to apply multiple regression separately on each of 48 U.S. cities. Because of the relatively small sample of 28 years, the statistical significance of one or two parameters in the analysis of almost each town is smaller than 90 percent. Because of that, but also due to excessive volume, these analyses are not included in the work. They are not the aim of the research, but provide a good basis to classify the cities into those more and less affected by the consequences of automobile dependency.

The first group includes the cities where the traffic in a multiple regression shows a negative effect on income per capita. It is surprising that most American cities belong here. They are: Atlanta, Austin, Chicago, San Antonio, San Diego, Houston, Denver, Dallas, NY, LA, Las Vegas, Detroit, Kansas-city, Memphis, Nashville, Phoenix, Miami, Cincinnati, Baltimore, Fresno, Salt Lake City and others.

Another group of U.S. cities still has a slightly positive cumulative effect of nine traffic factors analyzed on revenues. These are: Akron, Albany, Albuquerque, Milwaukee, Philadelphia, Omaha, Sacramento, Louisville, St. Louis, Tampa, and Tulsa. For example, Philadelphia is the fourth most populated American city, but according to the negative traffic effects it is ranked below the half of the 48 cities analyzed. As with the previous group, due to the relatively small sample, somewhere the statistical significance is less than 90 percent, but this does not influence the fact that in these cities, the negative effects of traffic have relatively little importance. In other cities, the impact of these factors did not prove to be either particularly positive or negative.

A common feature of most cities of the first group is an extremely large surface area in relation to its population. All cities of the second group have a much smaller area than the cities that are singled out as a highly-sensitive to the negative effects of automobile dependency.

The City of New York requires further analysis. The statistics indicate a somewhat better position of New York regarding the negative effects of traffic compared to other large American cities, though New York has a population many times larger than they do. For example, in terms of the quantity of fuel consumed due to delay, in the observed period New York occupied the 16th position on average (the average calculated on the basis of data of TTI 2011). In terms of the number of hours of delay it occupies the 15th position. According to the annual congestion cost New York is on the 13th place. In single regression analysis it shows the negative effects of automobile dependency, but they are also somewhat less pronounced than in other big cities.

Table 2 Economy of the Largest U.S. Cities and Transportation Factors

Multiple Regression Analysis

Dependent variable: Income per capita

Parameter	Estimate	Standard Error	T Statistic	P-Value
CONSTANT	9167.1	6857.87	1.33673	0.1778
Freeway Daily Vehicle-Miles per capita	605.304	85.909	7.04586	0.0000
Arterial Street Daily Vehicle Miles per capita	0.0801639	0.0152179	5.26774	0.0000
Congested travel (% of Peak VMT)	480.32	55.048	8.72548	0.0000
Congested System (% of lane-miles)	-133.047	49.1736	-2.70566	0.0071
Annual Excess Fuel Consumed (Gallons / Auto Commuter)	-965.859	104.911	-9.20642	0.0000
Annual Hours of Delay per Auto Commuter	-283.942	78.2051	-3.63074	0.0003
Travel Index	13177.4	6769.33	1.94663	0.0522
Annual Congestion Cost per Auto Commuter ($)	36.1006	2.10173	17.1766	0.0000
Roadway Congestion Index	-23766.7	3879.94	-6.12552	0.0000

R-squared = 77.0922 percent
R-squared (adjusted for d.f.) = 76.6497 percent
Standard Error of Est. = 4563.26
Mean absolute error = 3201.12

Here we come to the issue of a relatively small area compared to its population. On the one hand, it caused the highest population density in the U.S., but on the other, far shorter average distances covered by car. With about 300 km^2, New York is only at the 24th place in terms of the size of space it takes up (Census Bureau 2010). It is smaller than many U.S. cities: San Antonio, Nashville, San Diego, Kansas City, Louisville, Phoenix and many others. In order to make as precise conclusions as possible, we have carried out another test of the same parameters on a sample of 20 *spatially* largest U.S. cities. These are almost all cities in the first group except for Miami, Cincinnati and Salem, which do not cover a large surface. The obtained results are shown in table 2.

The output shows the results of fitting a multiple linear regression model to describe the relationship between Income per capita and 9 independent variables. Since the P-value in the ANOVA table is less than 0.01, there is a statistically significant relationship between the variables at the 99 percent confidence level.

The result of the analysis shows a negative sign of the same four variables as on the larger sample in the previous analysis, and the *Arterial Street Daily Vehicle Miles* variable, now with 100 percent statistical significance, has a positive sign.

As a representation of this correlation Scatter-plot 2 (appendix) clearly indicates even more pronounced negative correlation between traffic and income per capita in major U.S. cities than in the previous sample that included almost all major US cities.

Scatter-plot 2 The Largest U.S. Cities and Transportation Factors
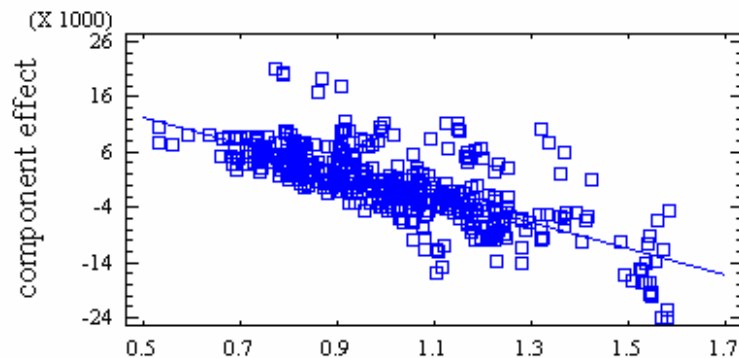
5. Discussion

The data analysis and the ordinary least squares method (OLS) in multiple linear regressions found the regularity of appearance of the negative consequences of traffic in spatially largest cities. Using multiple analysis on the spatially 20 largest U.S. cities greater statistical significance was achieved than in the analysis

of all major American cities; R-squared and R-squared adjusted are about 77 percent vs. 70 percent and 69 percent.

In addition, the results of the second in relation to the first multiple regression relatively precisely indicate the sensitivity of dispersed cities in relation to the summary of the results. The negative sign of the impact of all factors analyzed on Income per capita is even more pronounced. The *Annual Excess Fuel Consumed* factor shows about 30 percent higher negative impact than was its value in the multiple regression for all cities. The *congested System* variable in these cities is 2.5 higher than in the sample of 48 cities. The *Annual Hours of Delay per Auto Commuter* factor and a Roadway Congestion Index are also higher of those obtained on a sample of 48 cities.

In recent years, in some American cities a trend towards reducing the negative effects of the phenomena analyzed can be seen. However, the decline in the use of cars in U.S. cities can not be considered a trend, first, because it does not apply to all cities, second, because the decline is of much smaller scale than the growth in previous decades and third, because the trend has been noticeable only since 2008 or 2009. The TTI data (2011) indicate that it is exactly the cities that suffer most from automobile dependency that do not show a declining trend of parameters such as mileage, fuel consumption, hours of delay due to standstill and others. In some cities there was a decrease in the value of these factors but only for a short period, but the rising trend was back after a year or two.

The improvement was mainly due to the use of special operational treatment such as: Traffic Incident Management, Traffic Signal Timing, Arterial Management, Access Management, Freeway Operations and Traffic Management, Road Weather Management. In many cities, the application of these solutions gave significant positive results in preventing further deterioration. However, we must conclude that this is actually a treatment of symptoms, while the causes of problems remain untouched.

Traffic congestion in U.S. cities is not the result of excessive population density as in other world cities. On the contrary! Most of these cities have a very low population density, more precisely, except New York and San Francisco other cities in this group are among the least populated U.S. cities (Census Bureau 2010).

As it is not possible that the traffic jams are the result of low population density, it follows that the dispersed city structure caused by *urban sprawl* could be considered the largest contributor to the negative impact of traffic on the economy of American cities. The negative effects of *urban sprawl* in academic articles have been discussed only in the early XXI century and they have soon provoked a real debate in academic circles (Gillham 2002, Glaeser, Edward 2001, Stoll 2005th, Crane and Chatman 2004).

Although this phenomenon was not the subject of this study, the results of all analyses of the negative impacts of traffic on the economy suggest that urban sprawl is one of its most important, if not the most important cause.

6. Conclusion

The research results clearly indicate a positive role, but also the challenges that traffic poses to economic development of American cities. Transport is still an essential factor in the American economy, but primarily in terms of the interconnection of cities and regions, while in terms of mobility inside towns, the existing traffic solutions occur as an obstacle to further development.

The study presents the data and the statistically measured effects of numerous factors of traffic on the economy of American cities, oil consumption, time spent on the way to work due to delays, loss of large areas of urban land and other urban parameters of the American cities, reaching record levels globally.

In recent years, U.S. planners, scientists and government have made special efforts to make the life in cities bearable. In many cities the use of these operational treatments gave significant positive results in preventing further deterioration. The best effects, however, can be observed in the cities that were the least affected, while there are no effects in cities with the most serious consequences of automobile dependency. This shows that the operational treatments are certainly useful but not sufficient because they do not affect the causes of this problem.

Appropriate strategies to reduce vehicle travel in American cities can support their economic development.

Statistical analysis, as well as the analysis of the obtained results, has confirmed the essential negative impact of the spatial size of a city on the traffic characteristics. Cities that are most endangered by the consequences of automobile dependency, and in which the values of the negative impact of traffic keep increasing, are actually spatially the largest U.S. cities - LA, Chicago, Houston and others.

Excessive dispersion of economic activity on large areas around the city acts as a kind of anti-agglomeration mechanism. The advantages of agglomeration processes, which are strongly emphasized in scientific works from the late twentieth century, have been erased in American cities by the effect of urban sprawl for several decades. Although this phenomenon has not been the subject of research on the impact of traffic on the economy, the results of the analysis clearly indicate that urban sprawl is a key mediator of negative correlation between these two phenomena.

Accordingly, the most important recommendation is, of course, to stop the process of suburbanization, but it is very unlikely that this will happen. In this regard, there are two questions that we have no answer to. First, whether the designers of urban and economic policy in the U.S. have knowledge on a direct correlation between suburbanization and the traffic collapse which are a part of everyday life in most American cities. The second question refers to the will for such large changes in the structure of American cities. Giving a positive answer to even both questions would not make quickly and clearly visible effects; it is rather that the positive results would be gradually manifested for decades.

The relatively fast traffic relief in cities would be achieved by increasing the road pricing (parking taxes, tolls, fuel taxes, license fees, and congestion charges). If we go back to the beginning of the story about the development of automobile dependency in the United States and a key influence of the decline in transport costs on the enormous increase in the number of cars, it seems that the increase in road pricing would have significant positive effects. The high cost of transport would also reduce the intensity of suburban settlement and the creation of new suburban centres. At the same time, the population would be more encouraged to use public transport, which exhibits many positive effects on the economy of cities.

In recent years, several world cities, London, Stockholm, Singapore and Milan have recorded a very positive experience with raising the transport cost, especially with the introduction of a congestion charge in central areas. Various forms of congestion charges have been introduced in these cities in the last decade. In London since 2003 some charges have been introduced for some categories of motor vehicles to travel at certain times within the Congestion Charge Zone. Positive results in certain aspects of congestion were seen the day after the introduction of the fee. After 6 months, according to a Transport for London report (2003) congestion inside the charging zone reduced for 30percent, *Journey time reliability has improved by an average of 30 percent*, and a total savings were estimated to be 50 million pounds a year. The congestion charge systems were introduced in Stockholm in 2007, and in Milan 2008, and in a trial six-month period they gave very positive results.

In the USA congestion pricing in the form of variable tolls by time-of-the-day have also been implemented in several bridges and tunnels providing access to the central business districts of several major cities. These measures had positive effects at given locations, but are focused on too narrow fields because of which the impacts on the economy of the entire city are relatively small. There have been only two initiatives for the introduction of congestion pricing in the U.S., in New York and San Francisco, and none has been accepted. New York Legislature declined to vote on it, stalling the initiative, while San Francisco Board of Supervisors determined the year of 2015 as a probation period in San Francisco.

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Nataša Milenković

SAOBRAĆAJ I EKONOMIJA AMERIČKIH GRADOVA

Rezime: Cilj ovog rada je da opiše ulogu i značaj saobraćaja za razvoj američkih gradova, ali i da objasni i kvantitativno oceni današnji negativni uticaj automobilske zavisnosti na njihovu ekonomiju. Istraživanje dokazuje da je problem automobilske zavisnosti daleko ozbiljniji od materijalnih troškova, odnosno da saobraćaj u mnogim američkim gradovima postaje kočnica njihovom ekonomskom razvoju. Rad analizira i kvantitativno (OLS metodom u višestrukim regresijama) procenjuje uticaj najvažnijih saobraćajnih parametara na privredu američkih gradova. To su transportni troškovi korisnika, saobraćajni zastoji, dodatna potrošnja goriva, časovi kašnjenja, indeks zastoja na putevima i drugi.

Ključne reči: gradovi SAD, automobilska zavisnost, transportni troškovi, saobraćajni zastoji, širenje gradova

LIFE INSURANCE MODELS FOR CONSISTENT MARKET

Bojan Baškot[∗]

Abstract: Basically, insurance can be divided on life and non-life insurance. If we consider risk as criteria for division, than we can talk about whole life insurance, endowment and pure endowment. We can talk about case where benefit is payable in the moment of death. Also, we can talk about case where benefit is payable at the end of the period of death. There are two types of whole life insurance. The first is term insurance and the second type is deferred whole life insurance. In this presentation main focus of observation are those insurance products with benefit payable as lump sum. Actuarial present value represents both segments of actuarial perspective on life insurance as two sided problem. On one side, there is the problem of defining the probability that some person will die at age . Second side of problem is defining present value of sum payable at some moment in future.

Keywords: actuarial present value, whole life insurance, deferred life insurance, term life insurance, endowment, whole life insurance and endowment combination

Introduction

Basically, insurance can be divided on life and non-life insurance (Šipka & Marović, 2003). The subject of interest in this presentation is life insurance. Further division for life and non-life insurance, depends from criteria which has been taken. If we accept the way of benefit payment as criteria, than we can talk about single benefit payment (a sum insured), and on the other hand, we can talk about series of payments (annuity) (Kočović & Šulejić, Osiguranje, 2002). In this presentation we will consider models for single benefit payment. If we consider risk as criteria for division, than we can talk about whole life insurance, endowment and pure endowment.

There are two types of whole life insurance. The first is term insurance, where the sum is payable if death occurs within certain period of time. The second type is deferred whole life insurance. This type of insurance provides a benefit only

if insured survive certain period of time. It is possible to combine these two types of insurance. In that case we could talk about deferred term insurance, where the sum is payable only if death occurs within certain period of time, but only if insured has survived certain period of time before that.

Let us se initial capital with C_0. At the and of month this amount will increase to $C_0\left(1+\delta/12\right)$, where δ is set as nominal rate. At the and of next month, this amount will be equal to $C_0\left(1+\delta/12\right)^2$, and so on, up to the and of the year when final amount will be equal $C_0\left(1+\delta/12\right)^{12}$. In this case we are talking about situation where we have inconsistent market. Nominal (annual) rate of interest δ is compounded monthly. In general we can write $C_0\left(1+\delta/n\right)^n$, where interest rate is compounded n times yearly. But let us take some slightly different perspective. If we take that C_0 is equal to the one unit of money. In that case we have $\left(1+\delta/n\right)^n \to e^\delta$ as $n \to \infty$, where e is defined as $\lim_{n\to\infty}\left(1+1/n\right)^n$. If $n=\infty$ we say the interest is compounded continuously and that the market is consistent. The annual growth factor in this case is e^δ, the effective interest is $i=e^\delta-1$, and at the and of the year, the capital invested becomes equal to $C_1=C_0e^\delta$. In case of consistent market, we call the characteristic δ the force of interest.

1. Life Insurance – General Model

In this presentation main focus of observation are those insurance products with benefit payable as lump sum. Triger for benefit payment can be the fact that person who had been insured has died, or had survived certain period of time. Below we will present some life insurance models.

Initial time $t=0$ is the time of policy issue, and the symbol Ψ stands for time of benefit payment. In that moment insured risk is going to be realized. Let X be (random) lifetime, or the age-at-death, of particular individual. On the other hand, realization of the contingencies of life insurance may or may not involve the death of insured person, but Ψ, is random variable and that has to be taken as fact. In the case of the life insurance for person of age x, the random variable Ψ may coincide with the moment of death $T=T\left(x\right)$, or it may differ from T. Relation between Ψ and T defines the type of insurance product.

Life insurance benefit can be paid in the moment of death. Also, the benefit can be paid at the end of the year of death (or at the end of m-thly period),

than the payment time is $K + 1$ (or $K + \dfrac{1}{m}$), where the curtate time $K = [T]$, is the integer part T.

It is known that life insurance mathematics has it background in probability theory (probability that certain person will die at some age, or probability that some person will be live at some point in future). Also, it is known that life insurance mathematics has some background in theory of interest. The main feature of any life insurance contract consists in the time lag between the moment of payment and the time of policy issue. Time lag is determined with two moments. One moment can be determined as moment of death, but also it can be determined as payment moment. These two moments can, but must coincide. We can talk about moment of death T and moment of payment Ψ. So, it is needed to include a present value of payment in perspective. If we consider inconsistent financial market, than the present value of the payment of a unit of money is given with a discount factor v. If look situation where Ψ assumes a value t, then our present value of the payment of a unit of money is given with v^t for inconsistent market. In condition where the consistent market is present, present value is defined on similar way. In that case, we have continuous time and we assume that interest is compounded continuously. It is also necessary to use discount factor for certain period of time, but now the discount factor is defined slightly different. In that case, interest calculation is based on discount factor that is given with (Gerber, 1997):

$$e^{-\delta t} \tag{0.1}$$

So, with relation (0.1) we have defined the present value of the payment of a unit of money after t years, where the financial market is consistent and δ is the unit-time-interval force of interest.

We presuppose that the interest rate (or force of interest) is certain (non-random) and does not change in time. This is serious simplification.

Let us observe a life insurance policy issued by an insurance company named Omega Insurance. Insured person is named John Smith. The payment follows the death of the insured whenever the death occurs. His/her inheritances will receive that payment of a unit of money. This type of product is called whole life insurance. As we have sad before, Ψ stands for time of benefit payment. Age-at-death is random variable. Omega Insurance must determine the present value of the payment of a unit of money which follows the death of insured in unknown moment, where financial market is consistent with force of interest δ. Difference between present value of payment and payment itself depends from force of interest and time lag between police issue and moment of payment. Force of interest is given as market value. We already have assumed that force of interest is not random. On the other hand, death of insured can occur in any time in the future with certain probabilities. Probability depends from age of insured and other

various factors. If the moment of payment Ψ is random, then the present value of future payment of a unit of money is also random, and by (0.1) is equal to the random variable Z. Random variable Z could be written as follows:

$$Z = e^{-\delta\psi}. \tag{0.2}$$

Sum payable at the moment of death is random variable, so it is impossible to determine it as one unique value. For random variable taking some values with certain probabilities we only can define expected value. Expected value for random variable Z is given as follows

$$A = E\{Z\} = E\{e^{-\delta\psi}\}. \tag{0.3}$$

The quantity A represents actuarial present value. Actuarial present value represents both segments of actuarial perspective on life insurance as two sided problem. On the one side, there is the problem of defining the probability that some person will die at age x. Second side of problem is defining present value of sum payable at some moment in future. An important fact is that, the actuarial present value is moment generating function of Ψ (Rotar, Actuarial models: The Mathematics of Insurance, 2007) is given with

$$A = E\{e^{-\delta\psi}\} = M_{\psi}(-\delta). \tag{0.4}$$

By $Z = e^{-\delta\psi}$, l th moment is

$$E\{Z^l\} = E\{e^{-l\delta\psi}\} = M_{\psi}(-l\delta). \tag{0.5}$$

If we know moment generating function $M_{\psi}(s)$, than we know all moments of Z. So, for $l = 1$ we have

$$E\{Z\} = E\{e^{-\delta\psi}\} = M_{\psi}(-\delta), \tag{0.6}$$

and for $l = 2$:

$$E\{Z^2\} = E\{e^{-2\delta\psi}\} = M_{\psi}(-2\delta). \tag{0.7}$$

Now, it is possible to define variance for our random variable:

$$Var\{Z\} = E\{Z^2\} - (E\{Z\})^2 = M_{\psi}(-2\delta) - (M_{\psi}(-2\delta))^2. \tag{0.8}$$

Let $\mu(x) = \mu$. Then X is exponential, and by the lack-of-memory property $T(x)$ is also exponential (Ross, Introduction to Probability Models, 1997).

It is known that moment generating function for exponential random variable with the parameter a and for $z < a$ is (Rotar, Actuarial models: The Mathematics of Insurance, 2007)

$$M(z) = \int_0^\infty e^{zx} a e^{-ax} dx = \frac{a}{a-z} = \frac{1}{1-\dfrac{z}{a}}. \tag{0.9}$$

For $z \geq a$ moment generating function does not exist. Therefore, we could make conclusion that moment generating function for random variable $T(x)$ is given with $M_{T(x)}(z) = \dfrac{\mu}{\mu - z}$. So, by (0.3) and (0.9) we have as follows,

$$\bar{A}_x = \frac{\mu}{\mu + \delta} \tag{0.10}$$

and:

$$Var(Z) = \frac{\mu}{\mu + 2\delta} - \left(\frac{\mu}{\mu + \delta} \right)^2. \tag{0.11}$$

It is obvious that for calculating expected value of actuarial present value and it`s variance don`t have to use age-at-death (x). It is enough that we know force of mortality and force of interest.

If we know the distribution of Ψ, then we can find not only moments but the distribution of Z. If $F_\Psi(x)$ is the distribution function of Ψ, then from (0.2) follows that distribution function is given with

$$F_Z(x) = P(Z \leq x) = P\left(e^{-\delta \Psi} \leq x\right) = P\left(\Psi \geq -(\ln x)/\delta\right). \frac{n!}{r!(n-r)!}$$

1.1. *Whole Life Insurance – Benefit Payable at the Moment of Death*

In this case $\Psi = T = T(x)$ for a life-age- x. Then the present value of the payment is $Z = e^{-\delta T(x)}$, and actuarial present value is

$$\bar{A}_x = E\left\{ e^{-\delta T(x)} \right\} = M_{T(x)}(-\delta). \tag{1.1.1}$$

In (1.1.1) $M_{T(x)}$ is moment generating function of $T(x)$. The density of $T(x)$ (Klugman, Panjer, & Willmot, 2004) is given as follows

$$f_{T(x)}(t) = \mu_x(t)\, _t p_x = \mu(x+t)\, _t p_x. \qquad (1.1.2)$$

According to (1.1.1) and (1.1.2), it follows:

$$\overline{A}_x = \int_0^\infty e^{-\delta t} \mu_x(t)\, _t p_x. \qquad (1.1.3)$$

We could see that for exponential random variable force of interest is constant and $\overline{A}_x = \dfrac{\mu}{\mu + \delta}$.

As we saw, $E\{Z^2\} = E\{e^{-2\delta T(x)}\}$, which corresponds to the actuarial present value for doubled interest rate and is given with $^2\overline{A}_x = E\{Z^2\} = E\{e^{-2\delta T(x)}\}$. Making use of this notation, we can write:

$$Var\{Z\} = {}^2\overline{A}_x - \left(\overline{A}_x\right)^2. \qquad (1.1.4)$$

1.2. Whole Life Insurance – Benefit Payable at the End of the Year of death

The models below could be applied for any choice of time unit. The fact that in the title a year has been chosen as time unit makes no limitation for using models presented below for any time unit. In this case we have $\Psi = K(x) + 1$.

If we know that equality $P(K(x) = K) = {}_k p_x q_{x+k}$ is true, than we can derive following expression for actuarial present value:

$$A_x = E\{e^{-\delta\Psi}\} = \sum_{k=0}^\infty e^{-\delta(k+1)} P(K(x) = k) = \sum_{k=0}^\infty e^{-\delta(k+1)} \times {}_k p_x \times q_{x+k}. (1.2.1)$$

Let us estimate the net premium A_{60} for Yugoslav demographic tables 1952 – 1954 and $\delta = 0,05$ (Šain, 2009.) So, we have:

$$P(K(50) = k) = \frac{l_{60+k}}{l_{60}} \frac{d_{60+k}}{l_{60+k}} = \frac{d_{60+k}}{l_{60}} \ .$$

It makes sense to take $k = 30$. It is large enough. If we take expression above and put it in (1.2.1), than follows:

$$A_{60} = \sum_{k=0}^{40} e^{-\delta(k+1)} \frac{d_{60+k}}{l_{60}} = 0.242656.$$

Another way for computing actuarial present value is based on following relation:

$$A_x = e^{-\delta} q_x + p_x e^{-\delta} A_{x+1} = e^{-\delta}\left(q_x + p_x A_{x+1}\right). \qquad (1.2.2)$$

If we know the value of A_n, for some $n > x$, and p_x, we can move „backward", and compute A_x. Proof for relation (1.2.2) is intuitive by its nature. Let us set some initial moment as standpoint for procces which has been observed. Starting from that moment, insured person can either die or survive during next year. Probability that he will die is q_x. Insured sum is one unit of money and its present value is $e^{-\delta}$. Probability that he will survive is p_x. In that case insured person will be $x+1$ years old and his/her life is „continued". Insurance process will start over and present value of the insured sum is A_{x+1}. We can conclude that actuarial present value is sum of two summands. First is $e^{-\delta}$ with probability q_x, and second one is A_{x+1} with probability p_x. So, it follows:

$$E\{Z\} = E\{Z|T(x) \le 1\} P(T(x) \le 1) + E\{Z|T(x) > 1\} P(T(x) > 1) =$$
$$= E\{Z|T(x) \le 1\} q_x + E\{Z|T(x) > 1\} p_x,$$

only if $E\{Z|T(x) \le 1\} = e^{-\delta}$ и $E\{Z|T(x) > 1\} = e^{-\delta} A_{x+1}$ is true.

Let us prove that $E\{Z|T(x) > 1\} = e^{-\delta} A_{x+1}$ is true. In that case we have:

$$E\{Z|T(x) > 1\} = E\left\{e^{-\delta(K(x)+1)} \middle| T(x) > 1\right\}$$
$$= e^{-\delta} E\left\{e^{-\delta K(x)} \middle| T(x) > 1\right\}$$
$$= e^{-\delta} E\left\{e^{-(1+\delta K(x+1))} \middle| T(x) > 1\right\}$$
$$= e^{-\delta} E\left\{e^{-(1+\delta K(x+1))}\right\} = e^{-\delta} A_{x+1}.$$

We have used the fact that life expectancies for insured person who has survived first year is equal to sum of one year and life expectancies for $x+1$ years old person expressed in years.

Analogous to the case when benefit is payable at the moment of death, we have for the case when benefit is payable at the end of the year of death and force of mortality is constant net premium defined with $A_x = \dfrac{q_x}{q_x + i}$ (Batten, 2005) . This relation could be written on the other way as follows:

$$A_x = \frac{q_x}{q_x + i} = \frac{1 - p_x}{1 - p_x + e^\delta - 1} = \frac{1 - p_x}{p_x + e^\delta}.$$

Let us look the relation between A_x и $\overline{A}_x$ with more attention. Main tool for this relation analysis is linear interpolation procedure. Here is made assumption that lifetime is uniformly distributed within each year of age. In that case we have as follows (Bowers, Gerber, Hickman, Jones, & Nesbit, 1997):

$$\overline{A}_x = \frac{i}{\delta} A_x, \tag{1.2.3}$$

where, as we have stated before, $i = e^\delta - 1$. So, i is effective annual rate (yield). It is important to notice that for small δ, correction coefficient $\dfrac{i}{\delta} \to 1$. Let us look at the situation where we have $\delta = 0.04$. In that case $i = e^{0.04} - 1 \approx 0.04081$, and $\dfrac{0.04081}{0.04} = 1.02$. This becomes understandable if we recall that

$$e^x = 1 + x + \frac{x^2}{2} + o\left(x^2\right).$$

So, if we use that fact we have as follows:

$$1 \le \frac{i}{\delta} = \frac{e^\delta - 1}{\delta} = 1 + \frac{\delta}{2} + o(\delta). \tag{1.2.4}$$

In relation (1.2.4) $\dfrac{i}{\delta}$ differs from 1 approximately by $\dfrac{\delta}{2}$.

Let us prove that $\overline{A}_x = \dfrac{i}{\delta} A_x$. According to that we will observe two quantities. Life time $T = T(x)$ and corresponding curtate time $K = K(x)$. Let us introduce the third quantity. This quantity is defined as difference between first two

(bigger one, $T = T(x)$ and smaller $K = K(x)$), and it could be named as fractional part of life time $T = T(x)$. We will denote this quantity with $T_r(x)$. As we have sad: $T_r(x) = T(x) - K(x)$. $K = K(x)$ и $T_r(x)$ are independent and $T_r(x)$ is uniform on $[0,1]$. We could write as follows:

$$\bar{A}_x = E\{e^{-\delta T}\} = E\{e^{-\delta(T_r + K)}\} = E\{e^{-\delta K}\} E\{e^{-\delta T_r}\} =$$
$$= e^{\delta} E\{e^{-\delta(K+1)}\} E\{e^{-\delta T_r}\} = e^{\delta} A_x E\{e^{-\delta T_r}\}. \tag{1.2.5}$$

It is known that $E\{e^{-\delta T_r}\} = M_{T_r}(-\delta)$ where $M_{T_r}(-z)$ moment generating function for T_r. Also, we know that $E\{e^{-\delta T_r}\} = \dfrac{1 - e^{-\delta}}{\delta}$ and according to (1.2.5), we could write as follows:

$$\bar{A}_x = e^{\delta} \frac{1 - e^{-\delta}}{\delta} A_x = \frac{e^{\delta} - 1}{\delta} A_x. \tag{1.2.6}$$

Link between (1.2.6) and (1.2.3) is obvious.

1.3. *The Case of Benefits Payable at the End of the m-nthly Period*

Let us denote by $A_x^{(m)}$ actuarial present value of benefiti payable at the m-nthly period. So, here we will present an approximation formula for $A_x^{(m)}$ assuming that the lifetime is uniformly distributed in each year. According to that, we can write (Bowers, Gerber, Hickman, Jones, & Nesbit, 1997)

$$A_x^{(m)} = \frac{i}{i^{(m)}} A_x. \tag{1.3.1}$$

It is important to mention that in relation above $i^{(m)} = m\left[(1+i)^{1/m} - 1\right]$.

Relation (1.3.1) follows from (1.2.3) and we know that $\lim\limits_{m \to \infty} i^{(m)} = \delta = \ln(1+i)$. According to that we can make conclusion that coefficient of correction $\dfrac{i}{i^{(m)}}$ is increasing if m is increasing.

Hence, for any m:

$$1 \le \frac{i}{i^{(m)}} < \frac{i}{\delta} = 1 + \frac{\delta}{2} + o(\delta).$$

According to that has been sad above, we now can write relation as follows below:

$$0 \le \frac{i}{i^{(m)}} - 1 < \frac{i}{\delta} \le \frac{\delta}{2} + e^2 \frac{\delta^2}{6}. \qquad (1.3.2)$$

It is obvious that coefficient of correction is increasing from 1 to $\frac{i}{\delta}$.

Let us prove expression for actuarial present value where benefit is payable at the end of m-nthly period of the year in which death occurs. Denote by $K^{(m)}$ the number of complete periods of the length $1/m$ that the insured survived. Let us call these periods m-ths. Set $R^{(m)} = K^{(m)} - mK$. This is the variable which represents number of complete m-ths lived in the year of death. Let us look some simple example, where $m = 12$, in other words, we are observing $\frac{1}{12}th$ of the year. We will assume that one month is equal to that $\frac{1}{12}th$ part of the year, although it is not true that every month is the same (number of days differ from month to month). Also, let say that we are observing person insured at age $T = 24.48$. This age is expressed in years. If we express that age by months, we have 293.6. We could write this as follows: $K^{(m)} = 293$, and $mK = 288$. It is obvious that person insured has lived 5 months during his/her 25 years of life and approximately 60% of 6th month. We can write $R^{(m)} = 5$.

Let us come back to the general case. Under assumption made the random variables $R^{(m)}$ and K are independent, and $R^{(m)}$ takes on values $1, 2, ..., (m-1)$ with same probability. Variable $R^{(m)}$ takes mentioned values because it is limited and it can be as large as basic unit (in our case that variable can be related with 11 month period). We mentioned before that have taken annual interest rate. According to that we must take relative interest rate (we need to divide our annual interest rate with m) and then discount benefit for $\left(K^{(m)} - 1\right)$.

Then we can write:

$$A_x^{(m)} = E\left\{\exp\left\{-\delta\left(K^{(m)}+1\right)\Big/m\right\}\right\} =$$

$$= E\left\{\exp\left\{-\delta\left(mK+R^{(m)}+1\right)\Big/m\right\}\right\} =$$

$$= E\left\{\exp\left\{-\delta K - \frac{\delta\left(R^{(m)}+1\right)}{m}\right\}\right\} =$$

$$= E\left\{\exp\left\{-\delta K\right\}\right\} E\left\{\exp\left\{-\delta\left(R^{(m)}+1\right)\Big/m\right\}\right\} =$$

$$= E\left\{\exp\left\{-\delta K\right\}\right\} E\left\{\exp\left\{-\frac{\delta}{m}\left(R^{(m)}+1\right)\right\}\right\} =$$

$$= e^{\delta} E\left\{\exp\left\{-\delta\left(K+1\right)\right\}\right\} E\left\{\exp\left\{-\frac{\delta}{m}\left(R^{(m)}+1\right)\right\}\right\} =$$

$$= A_x e^{\delta} E\left\{\exp\left\{-\frac{\delta}{m}\left(R+1\right)\right\}\right\}.$$

According to (1.1.1) expression $E\left\{\exp\left\{-\frac{\delta}{m}\left(R+1\right)\right\}\right\}$ can be write

down as $M_{R^{(m)}+1}\left(\dfrac{-\delta}{m}\right)$, where $M_{R^{(m)}+1}\left(z\right)$ is moment generating function for random variable $R^{(m)}+1$.

If we know that random variable takes values $1,2,...,m$ with identical probabilities, than we can write as follows:

$$M_{R^{(m)}+1}\left(z\right) = \sum_{k=1}^{m} e^{zk} \frac{1}{m} = \frac{1}{m} e^{z} \frac{1-e^{mz}}{1-e^{z}}. \tag{1.3.3}$$

1.4. Deferred Whole Life Insurance

This type of insurance product provides for a benefit only if the insured survives c years. As we have sad before we set $\Psi = \infty$, if condition for benefit

payment had not been satisfied. So, for $T(x) < c$ we have $\Psi = \infty$, and opposite if $T(x) \geq c$ we have $T(x) = \Psi$. Case where $T(x) = c$ is irrelevant, because we are observing continuous variable. Because $Z = e^{-\delta\Psi}$,

$$Z = \begin{cases} 0 & T(x) \leq c \\ e^{-\delta T(x)} & T(x) > c \end{cases}. \tag{1.4.1}$$

Let us observe situation where death occurs during the period of c years and $\delta = 0,1$. In that case present value of the payment of a unit of money is $Z = e^{-\delta\Psi} = e^{-0.1*\infty} = 0$. Let us assume that we have no yield on invested capital, or $\delta = 0$. So, according to that we have $(\delta = \ln(1+i) = \ln(1+0))$. Then, exponent of Napier`s number is undefined expression, or $0 \times \infty$. However, exponential function is „more powerfull" than logoritmic function. So, according to that in exponent of Napier`s number we will have $-\infty$ and then our benefit equals zero.

In this case we will denote actuarial present value with:

$$_{c|}\overline{A}_x = {}_c p_x e^{-\delta c} \overline{A}_{x+c}. \tag{1.4.2}$$

As we can see, actuarial present value for deferred whole life insurance can be presented as product of actuarial present value for whole life insurance with starting age $x+c$ and probability that insured person will survive c years. This product must be discounted for c years.

So, we can write (Rotar, Actuarial models: The Mathematics of Insurance, 2007):

$$E\{Z\} = 0 \times P(T(x) \leq c) + E\{Z|T(x) > c\} \times P(T(x) > c) =$$

$$= E\{e^{-\delta T(x)}|T(x) > c\}{}_c p_x = {}_c p_x E\{e^{-\delta(k+T(x+c))}\} = \tag{1.4.3}$$

$$= {}_c p_x e^{-\delta c} E\{e^{-\delta T(x+c)}\} = {}_c p_x e^{-\delta c} \overline{A}_{x+c}.$$

Let us set next example.

Person has arranged deferred life insurance. If he/she dies after next five years, his/her inheritances will receive a payment of a unit of money. It is known that $\delta = 0.1$ and $\mu = 0.04$. We need to determine variance for actuarial present value.

So,

$$c = 5$$
$$\delta = 0.1$$
$$\mu = 0.04$$
$$Var(Z) = ?$$

$$E\{Z\} = e^{-\mu c}e^{-\delta c}\overline{A}_{x+c} =$$

$$= e^{-c(\mu+\delta)}\frac{\mu}{\mu+\delta} \approx 0.1419$$

$$E\{Z^2\} = e^{-\mu c}e^{-\delta 2c}{}^2\overline{A}_{x+c} =$$

$$= e^{-k(\mu+2\delta)}\frac{\mu}{\mu+\delta} \approx 0.0502$$

$$Var(Z) = E\{Z^2\} - (E\{Z\})^2 \approx 0.0502 - (0.1419)^2 \approx 0.0301.$$

Let us observe the case where benefit is payable at the end of period in which death occurs. So,

$$\Psi = \infty \qquad \Leftrightarrow T(x) \leq c \Rightarrow Z = 0$$
$$\Psi = K(x) + 1 \quad \Leftrightarrow T(x) > c \Rightarrow Z = e^{-\delta(K(x)+1)}. \tag{1.4.4}$$

We will denote actuarial present value in this case as follows:

$$_{c|}A_x = \sum_{c=k}^{\infty} e^{-\delta(k+1)} * P(K(x) = k).$$

Or we could write it down as follows (Rotar, Actuarial models: The Mathematics of Insurance, 2007):

$$_{c|}A_x = {}_{c}p_x e^{-\delta c}A_{x+c}. \tag{1.4.5}$$

Because the number of discount periods is integer in this case, we could write as follows:

$$_{c|}A_x = {}_{c}p_x v^c A_{x+c}. \tag{1.4.6}$$

1.5. Term Insurance – Continuous Time

This type of insurance product, in general case, provides payment of the unit of money if death occurs during n years. So, we can write:

$$
\begin{aligned}
\left(\Psi = \infty \quad \Leftrightarrow \quad T(x) \le n\right) &\quad \Rightarrow Z = e^{-\delta T(x)}, \\
\left(\Psi = T(x) \Leftrightarrow T(x) > n\right) &\quad \Rightarrow Z = 0.
\end{aligned}
\tag{1.5.1}
$$

In this case we will denote actuarial present value with:

$$
\overline{A}^{1}_{\overline{x:n|}} = \int_{0}^{n} e^{-\delta t} f_{T(x)}(t)\, dt.
\tag{1.5.2}
$$

Here, actuarial present value depends from distribution of random variable in interval $[0,n]$ and it does not depend from mortality rate after n years (Rotar, Actuarial models: The Mathematics of Insurance, 2007).

It is possible to use next formula:

$$
\overline{A}_{x} = \overline{A}^{1}_{\overline{x:n|}} + e^{-\delta n}\,_{n}p_{x}\overline{A}_{x+n}.
\tag{1.5.3}
$$

Formula (1.5.3) can be written on other way, as follows:

$$
\overline{A}^{1}_{\overline{x:n|}} = e^{-\delta n}\,_{n}p_{x}\overline{A}_{x+n} - \overline{A}_{x}.
\tag{1.5.4}
$$

Proof for relation (1.5.3) is simple and it follows form relations (1.5.1) and (1.3.1). If we denote with Z_1 random variable in (1.3.1) where $c = n$ than Z is same as in (1.5.1). Let us write:

$$
Z = \begin{cases} e^{-\delta T(x)} & , \quad T(x) \le n \\ 0 & , \quad T(x) > n \end{cases}, \quad Z_1 = \begin{cases} 0 & , \quad T(x) \le n \\ e^{-\delta T(x)} & , \quad T(x) > n. \end{cases}
\tag{1.5.5}
$$

It is obvious $Z + Z_1 = e^{-\delta T(x)}$ and that relation in fact presents present value for a payment of a unit of money for whole life insurance contract.

Let us look the same insurance product but for the case where benefit is payable at the end of the year (or some other basic time period). So, for term insurance (term for n years) we have:

$$
Z = \begin{cases} e^{-\delta(K(x)+1)} & , \quad T(x) \le n \\ 0 & , \quad T(x) > n. \end{cases}
\tag{1.5.6}
$$

In that case we will denote actuarial present value with $A_{\overline{x:n|}}$. Also, we can write:

$$A_{\overline{x:n|}} = \sum_{k=0}^{n-1} e^{-\delta(k+1)} P\big(K(x)=k\big) = \sum_{k=0}^{n-1} e^{-\delta(k+1)} \, _n p_x q_{x+k}. \quad (1.5.7)$$

In that sense, if we observe (1.5.3) then we have:

$$A_x = A_{\overline{x:n|}}^1 + e^{-\delta n} \, _n p_x A_{x+n}, \quad\quad (1.5.8)$$

It is possible to write:

$$A_{\overline{x:n|}}^1 = e^{-\delta n} \, _n p_x A_{x+n} - A_x. \quad\quad (1.5.9)$$

2. Pure Endowment

In this case benefit is payable only if insured survives until certain age. Precisely, insured will receive payment if death does not occur upon n years. So, it is $\Psi = n$ for $T(x) > n$ and $\Psi = \infty$ for $T(x) \le n$. We can make next conclusion:

$$Z = \begin{cases} 0 & , \quad T(x) \le n \\ e^{-\delta n} & , \quad T(x) > n. \end{cases} \quad\quad (2.1)$$

In this case we will denote actuarial present value $_n E_x$ and it will be defined as follows:

$$_n E_x = E\{Z\} = e^{-\delta n} P\big(T(x) > n\big) = e^{-\delta n} \, _n p_x. \quad (2.2)$$

If random variable is exponential (constant force of mortality) we have:

$$_n E_x = e^{-\int_0^n (\mu(x+t)+\delta)dt}. \quad\quad (2.3)$$

Relation (2.3) indicates that increase of force of mortality has same effect as increase of force of interest. This works on both sides.

If we know that random variable can take value 0 or some other exactly determined value with probabilities q and p, respectively, than we can determine variance for mentioned random variable as follows:

$$Var\{Z\} = e^{-\delta 2n} \, _n p_x \big(1 - \, _n p_x\big). \quad\quad (2.4)$$

3. Endowment

In this case benefit is payable if insured survives n years, but also if he/she dies during next n years his/her inheritances will receive payment. If inheritances receive payment in exact moment when insured dies, we can write:

$$Z = \begin{cases} e^{-\delta T(x)} & , \quad T(x) \leq n \\ e^{-\delta n} & , \quad T(x) > n. \end{cases} \tag{3.1}$$

Let us denote actuarial present value $\overline{A}_{x:\overline{n}|}$. Also we will denote random variable in (1.5.1) with Z_1, and in (2.1) with Z_2. So, we can write:

$$Z_1 = \begin{cases} e^{-\delta n} & , \quad T(x) \leq n \\ 0 & , \quad T(x) > n, \end{cases} \tag{3.2}$$

and:

$$Z_2 = \begin{cases} 0 & , \quad T(x) \leq n \\ e^{-\delta n} & , \quad T(x) > n. \end{cases} \tag{3.3}$$

In this case present value for this type of insurance product is given with $Z = Z_1 + Z_2$. So,

$$\overline{A}_{x:\overline{n}|} = E\{Z\} = E\{Z_1\} + E\{Z_2\} = \overline{A}_{x:\overline{n}|}^1 + {}_nE_x = \overline{A}_{x:\overline{n}|}^1 + e^{-\delta n} {}_np_x. \tag{3.4}$$

If we have case where benefit is payable at the end of a year in which death occurs, we can write as follows:

$$Z = \begin{cases} e^{-\delta(K(x)+1)} & , \quad K(x) < n \\ e^{-\delta n} & , \quad K(x) \geq n. \end{cases} \tag{3.5}$$

Here we have two different cases:

1) First case is when insured dies during interval $[n-1, n)$ and benefit will be paid to inheritances at the end of the n-th year. So, $t = n$ (if we know that $n = K-1$ than also $\min\{K(x)+1, n\} = n$),

2) Second case is when insured lives until age of $x+n$ years, than benefit is payable at n-th moment (we know that $K(x) \geq n$ and $\min\{K(x)+1, n\} = n$).

Let us denote actuarial present value in this case with $A_{x:\overline{n}|}$.

Let us make parallel with (3.2) and (3.3), than for benefit payable at the end of the year when death occurs or at the end of the year upon which insured has survived:

$$Z_1 = \begin{cases} e^{-\delta(K(x)+1)} & , \quad K(x) < n \\ 0 & , \qquad K(x) \geq n . \end{cases} \tag{3.6}$$

Also we can write:

$$Z_2 = \begin{cases} 0 & , \quad K(x) < n \\ e^{-\delta n} & , \quad K(x) \geq n. \end{cases} \tag{3.7}$$

So, we have:

$$A_{x:\overline{n}|} = A^1_{\overline{x:n}|} + {}_n E_x = A^1_{\overline{x:n}|} + e^{-\delta n} {}_n p_x. \tag{3.8}$$

If we observe expression (3.8) in context where force of interest is double sized, then:

$${}^2 A_{x:\overline{n}|} = {}^2 A^1_{\overline{x:n}|} + {}^2_n E_x = {}^2 A^1_{\overline{x:n}|} + e^{-2\delta n} {}_n p_x. \tag{3.9}$$

Expression (3.9) provides simple way to calculate variance for our random variable.

If force of mortality is constant, than we have:

$${}_n E_x = e^{-n(\mu+\delta)}. \tag{3.10}$$

If know that force of mortality is constant, expression (1.5.2) can be defined as follows:

$$\overline{A}^1_{\overline{x:n}|} = A_x \left(1 - {}_n E_x\right).$$

On the other hand, if we have similar situation, but where benefit is payable at the end of the year in which death occurs, than (Batten, 2005):

$$\overline{A}^1_{\overline{x:n}|} = A_x \left(1 - {}_n E_x\right).$$

Conclusion

Modern economical perspective demands evolved insurance models. Deterministic models have their place in future, but modern financial markets are

going through reconstruction with historical proportion, and that puts some serious challenges in front of economical science and practice as well.

Observing financial markets as consistent, assumes that interest rate function is presented as continuous function. In that case force of interest is synonym for rate of interest. If interest rate function is given as continuous function, than we can have stochastic approach to interest rate theory. In other words, in that case interest rate is random.

Extreme financial market volatility is reality. That is the fact, and that fact threatens to diminish wealth that has been accumulated over several generations. Finance measure wealth through money. Well, money cannot be simply piled up, because than it is useless. Money must be scattered trough out different investment opportunities.

Volatility is threat in deed, but also it is opportunity. Economical ups and downs are natural, and that fact must be taken as chance. That chance is not gamblers chance. That chance must be observed and used with scientific tools.

Extreme volatility seeks extreme scientific tools.

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MODELI ŽIVOTNOG OSIGURANJA
U USLOVIMA KONZISTENTNOG TRŽIŠTA

Rezime: U osnovi, osiguranje se može podijeliti na životno i neživotno. Ako usvojimo vrstu rizika kao kriterijum podjele, tada možemo govoriti o osiguranju kapitala za slučaj smrti, osiguranju kapitala za slučaj doživljenja i mješovitom osiguranju kapitala. Isto tako, razlikujemo one vidove životnog osiguranja gdje se osigurana suma plaća u trenutku smrti, sa jedne strane, a sa druge strane imamo životna osiguranja gdje se osigurana suma plaća na kraju perioda u kojem se desio smrtni slučaj. U ovom radu fokus je stavljen na one vrste osiguranja kod kojih se osigurana suma isplaćuje jednokratno. Aktuarska sadašnja vrijednost predstavlja rezultat dvodimenzionalnog posmatranja problematike životnog osiguranja. Sa jedne strane potrebno je odrediti vjerovatnoću da će određena osoba starosti x umrijeti. Druga strana problema je sadržana u određivanju sadašnje vrijednosti novčanog iznosa raspoloživog u nekom trenutku u budućnosti.

Ključne riječi: aktuarska sadašnja vrijednost, doživotno osiguranje kapitala, odgođeno osiguranje kapitala, privremeno osiguranje kapitala, osiguranje kapitala za slučaj doživljenja, mješovito osiguranje kapitala.

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