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Republic of Serbia, 18000 Niš, Trg Kralja Aleksandra 11
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3. Malinić S. The modern accounting system – the answer to the challenges of the environment, enterprise and management, 40 godina računovodstva i korporativnih finansija: 1-11, Zlatibor, AAAS, Beograd.
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Review paper

BEHAVIORAL ANALYSIS OF ECONOMIC CHOICE: CONTRIBUTION TO IMPROVING ECONOMIC RATIONALITY

UDC 159.9.019.4:330

Dragan Petrović

University of Niš, Faculty of Economics, Serbia

Abstract. *If we start from the presumption that the aim of the theoretical analysis of the complex socio-economic reality is to provide certain knowledge by applying of which there can be improvement and betterment of that reality, then economical and theoretical mainstream usually does this starting from axiom of the rationality. On the other hand, if we keep in mind the current empirical data on the numerous problems and inefficient functioning of the economic actors, then the logical question that occurs is whether the presumption of the unlimited rationality of the economic subjects should be so easily idealised. Starting from the fact that the bibehavioral economics has a special role in the powerful critical attack on the “strong core” of the neo-classical mainstream, this paper discusses numerous psychological limitations of the process of economic decision-making, and the possibilities of their overcoming. In relation to this, we especially emphasize the importance of the behavioral analysis and its instrumentalist support directed toward the improvement of economic rationality and the quality of human decisions.*

Key Words: *rational choice, behavioral economics, behavioral anomalies and biases, ‘new’ paternalism*

INTRODUCTION

It is widespread opinion that the economic science is on a high level in the world of the social sciences. The economic science primarily owns such a reputation to the presumption of the rational behaviour. As a matter of fact, the promoters of the economic ideas have been usually starting from the basic principles of deductive logic when constructing the formal models of the human behaviour. These principles state that the economic research is based on certain presumptions or axioms that don't need to be proved.

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Corresponding author: Dragan Petrović

Faculty of Economics, University of Niš, Trg kralja Aleksandra 11, 18000 Niš, Serbia

Tel: +381 18 528 652 • E-mail: dragan.petrovic@eknfak.ni.ac.rs

The typical axiom from which the neoclassical mainstream theory starts is the rational behaviour of the economic subjects in the basis of which is the presumption that the complex social phenomena can be explained within the boundaries of the elemental social impact from which they are constructed. This point of view, known as the methodological individualism, demands from the theoreticians of the rational choice to start their research with the individual impacts, and to analyse the other social phenomena as secondary or as derived from the individual impacts. This means that the starting point are the universal theoretic frames concerned with the individual that behaves rationally no matter in which of the economic activities he takes part (consumer, house hold, enterpriser). After that the theories of consumption, production, prices etc, can be created, with no help of the methodological transmission mechanisms. At the same time the accent is on the concept of the maximising rationality that starts from achieving the high satisfaction of the economic agents and in which the firms are reduced on the manufacturing functions, consumers on the utility functions, the institutions are given, and the process of optimisation is omnipresent.

The model of research that starts from the concept of the maximising rationality is close to the economists, or better to say their favourite. However, numerous empirical data about the problems and the inefficient functioning of the economic actors seem to more and more raise the question of whether and how should be persistent in defending the 'boundaries' of the maximising reality. This dilemma is not a simple one and it can be proved by the fact that any kind of accepting the existence of the bounded rationality would mean that there are also forms of irrational behaviour on the market. On the other hand, one should not ignore the fact that the conception of the full and maximising rationality shows considerable weaknesses related to the real functioning of the economy, or related to the explanation in which way the real human mind brings economic decisions and how it adjusts itself to the circumstances of the real world.

The above stated theoretical methodological problems and doubts related to the phenomenology of the human rationality and maximisation, have caused the appearance and development of the concept of the bounded rationality. As the first ones who opposed the concept of the maximising, the representatives of behavioral economic theory should be mentioned.

The behavioral economic theory has been created as a symbiosis of the economic science and psychology. Its key premise is concerned with giving up the widely accepted model of the rational choice – the fundament on which the traditional economic analysis is based. Many experiments, conducted by the behavioral economists have shown that the realistic behavior of people does not have much in common with the main protagonist of the neoclassical theory – hyper-rational homo economicus- who has unlimited calculating capabilities and perfect information.

Having in mind the strengthening of the reputation and the position of the behavioral economics in various areas, the aim of this paper is to make the realistic insight of its importance from the standpoint of improving the understanding of the economic behavior. This aim will be achieved through examining the hypothesis about the fact that the behavioral analysis of economic choice, on the basis of identifying numerous failures related to the psychological dysfunctions, provides powerful instrumentalist support for designing government measures directed toward improvement quality of human decisions.

1. THE STANDARD MODEL OF THE RATIONAL CHOICE

The standard approach, accepted in the economic theory, presupposes a full rationality of the economic actors. From the standpoint of the methodology and the conception of the scientific progress, the rational choice definitely represents a hard core of the scientific research program of the neoclassical micro economy (Lakatos, 1970, p. 191). When the economists talk about the full rationality, they have in mind a couple of things. First of all it is assumed that the individuals are capable to hierarchically order their preferences and needs (Robins, 1945[1932], pp. 78-79), and therefore to undertake actions in the direction of their full satisfying. Next, it is assumed that they have a capability of precise calculating of the expenses and utility connected to different variants of choice. That means that when they face a couple of options, individuals usually choose the one that gives best results (Elster, 1989, p. 22). Finally, in the conditions of uncertainty, the individuals rely on the calculating of the possibility of happening of certain events and possible outcomes, using all the available information for this purpose, also those that can help them to successfully correct their starting judgments and calculations (Camerer, et al., 2003, pp. 1214 -1215).

The understanding of rationality, as presented in the modern economic theory, has the epithet of formal. As a matter of fact, on the basis of the formalistic method that presupposes the existence of the formal system of the logical ties (Wilber, Harrison, 1978, p.62), the notion of rationality doesn't speak about whether the aims to which the individuals strive are justified or not, or whether there is any contradiction or opposition of the individual preferences. The dominant purpose of understanding the rationality is making a presumption about the existence of choice, which implies that with any given structure of preferences and group of limitations (physical, institutionalized, informational) the individuals choose for themselves the best variant from the group of available variants of resource usage. This means that from the rational individuals we expect they would make identical choice in the identical situations, without later reconsidering or regret for the alternative they didn't choose.

In addition to the presumption that the rational individual has personal preferences and that they are the basis of his choice, the notion of the rational individual has mild presumptions of the logical consistency expressed in the following axioms:

- The condition of completeness (independently from the degree of difference or similarity of the alternatives, the person that reaches a decision I capable to compare and order them hierarchically),
- The condition of transitivity (if a rational individual prefers the alternative option A in relation to the alternative option B, as well as the alternative option C, then he prefers A in relation to C),
- The independency of the context (the choice between two options does not depend from the order in which they appear, or whether a third alternative is available).

The last axiom refers to the fact that the individuals act and behave in the same way independently from whether they do it separately or together in a system. This axiom can be connected in the theoretical methodological literature with the individualist component of the theory of rational choice and the method of isolation related to this theory. As a matter of fact, the supporters and those who criticize the theory of the rational choice point out that it is psychological and individualistic. It is psychological because it explains the acts of the participants starting from their mental conditions. This theory is simultaneously individualistic because it is applied on the behavior of the individual participants and on

the individual activities. The social groups are observed solely as aggregates made of individuals, which means that their behavior is explained starting from the mental condition of the individuals and their interactions. Therefore, in the basis of this view of the structure of the economic and any other system is the presumption of the possibility to 'isolate' the individuals and to analyse them separately and out of the context of which they are a consistent part (Zwirn, 2007, p.54).

Philosophically speaking, the presumption of the rationality of behavior is equivalent to the presumption about the unity of the economic actors - about the existence of a unified 'I' in each one of them. The argumentation of the representatives of the neoclassical economic theory is in favor of the unified function of utility, it originates according to their opinion from the logical presumption that when we speak about the homo oeconomicus we can not think about a split personality. In addition to the logical explanations, it is interesting that we also have some picturesque explanations related to this, like those that 'in each man there is only one nose or one stomach' (Saint-Paul, 2011, p. 20).

For the neoclassical theory the principle of rationality has not only the analytical but also a normative meaning, which is expressed not only during describing or explaining of the observed phenomena but also during evaluating the alternative options by the terms good/bad. The statement that the individuals always behave rationally is in an unbreakable tie with the presumption that they excellently know what is in their best interest, and that there is no one who knows it better than them. That is why this presumption is simultaneously normative and positive: the individuals should always act for their best interest (Golubović, 2011, p. 156). In this way we actualize the question of how we should decide, which has among other things, influenced during the half of the twentieth century the appearance of the normative theory of decision making. Contrary to the descriptive theory whose aim is describing of the things as they are, the normative theory of decision making deals with the concept of rationality and the logic of making decisions, in the way they should be (Milicević, et al., 2007, p. 147)

2. THE BEHAVIORAL ECONOMICS ABOUT THE STANDARD MODELS OF RATIONAL CHOICE

The theory of the rational choice has proved to be very useful, and it is even empirically proved in many situations such as those of the competition markets (Ostrom, 1998). The fact is, however, that their conclusions often don't find confirmation in the empirical research. On this, among others, particularly insisted representatives of the new analytical approach that introduced and strengthened the name behavioral economics. Its constituting as an independent subdiscipline within the economic science was significantly affected by the „old“ behavioral economics related to H. Simon (1955, 1957) and J. Katona (1951), that emerged in the 1950s and 1960s. Then, in the 1970s, by publishment of the two articles of the well-known psychologists D. Kahneman and A. Tversky (1974), affirmation new behavioral economics occurred. In these articles they criticized the orthodox theory of expected utility, proposing the alternative conception of reaching decisions in the conditions of uncertainty, known under the name 'prospect theory'. The same importance was given to Thaler (1980) from the standpoint of popularization of the ideas of behaviorism. In his famous article he listed many empirical evidences about the suboptimality of the economic decisions. Following their example a large number of economists and psychologists entered the process of the 'dismantlement' of the model of rational choice, bringing up more and

more denying facts. Among the active representatives of the behavioral economy, among others, we can mention G. Akerlof, D. Ariely, C. Camerer, G. Loewenstein, D. Laibson, M. Rabin, C. Sunstein etc.

The representatives of the behavioral economics strive to offer numerous empirical proofs about the fact that the real behavior of people is not depicting the key segments and demands of the formal models. "We argue that the deviations of actual behavior from the normative model are too widespread to be ignored, too systematic to be dismissed as random error, and too fundamental to be accommodated by relaxing the normative system" (Tversky, Kahneman, 1986, p. 252). That is the key reason why "behavioral economics deals with the factors that influence the decisions of market participants, based on bounded - not perfect - rationality. One is not to start from the assumed behavior but to explore the actual human behavior" (Stojanović, 2013, p. 569). This means that it places in the centre of analysis the fact that people have limited knowledge, information and cognitive capabilities, which is why they can not judge about the real events in the way that the standard model of the rational choice demands.

The behavioral economics insists that the real life abounds with the examples of irrational behavior, which strongly shakes the philosophical foundations of the conventional choice, especially the presumptions about the identification of the personal interests and the existence of the unified psychological center of decision making. As a matter of fact, the results of the empirical research show that in many cases people find it hard identify, comprehend and represent to the environment their true interests, so that it often happens that in accordance with the emotional inversion in relation to the real standard of the stimulants, they act contrary to them. That is why the question that is repeated is what gives us the right to presuppose that the individuals always know which of the possible variants of impact is the best for them, and whether this presumption pretends to occupy the role of the normative standard for determining the welfare independently from whether we talk about the individuals or the society as a whole (Капелюшников, 2013, p. 74).

In addition to the difficulties related to identifying and representing the individual interests, the aberrations from the rational behavior are the consequence of the functioning of the complex psychology of the individual. As a matter of fact, people are as a rule characterized by a multiple I, which is often obvious in the situations in which reaching of the individual decisions is based on fulfilling selfish interests, not taking into consideration the interests of the other individuals. When, however, each individual acts exclusively as a rational maximizing factor of utility, it is expected that the real behavior doesn't result in the results that were intended.

By giving up the idea of practical impossibility of applying the global, overall rationality, the question that is up-to-date is concerned with the way of understanding and interpreting the surrounding in the conditions of scarce knowledge and limited analytical capabilities. In relation to this we can start the analysis by presenting the two basic conceptions about obtaining and usage of the available data (Ходжсон, 2000, pp. 49-50). The first is the conception of the *direct cognition of the socio-economic reality*. It is a kind of a direct, immediate empiricism which supposes that in the process of cognition we can use the empirical facts freely. It is assumed that the subjects get the information from the surrounding, without the previous structuring of the notions, rules and theories. This means that the information are directly acquired, to be later transformed into the useful knowledge, getting a form of the undeniable facts and precisely defined probabilities of the occurrence of a certain event. The information is precise and sufficiently transparent, so that we can

expect the rational economic actors to react the same in case they have this information. If they ever had certain wrong understandings and beliefs, they will correct them in accordance with the newly gathered information and fresh experience. That is why it is believed that the wrong beliefs can not last too long, or that they can not be the lasting characteristic of the process of cognition, although there are facts that deny such an optimistic scenario (Frey, 1992, p. 244).

As opposed to this optimistic version of judging the existing phenomena and events there is a *conception of the real cognition of the world*. It questions the issue of the capability of the common, average observer to directly and unmistakably decide what to do on the economic plan. Additionally, the insufficient capacities in the right judgment are explained by the conceptual difference between the data and information gathered by the senses. As a matter of fact, the data include a multitude of the auditory, visual and other signals that reach the human brain. However, the knowledge about the real socio-economical occurrences is not formed in the moment of obtaining the stimuli of the senses but in the moment of their reaching the human brain and placing in the system of the abstract notions and conceptions. We should adequately value not only the immediate accumulation of the information but also the development of the cognitive capacities, or acquiring of the practical and intellectual habits in the realization of the cognitive process. This means that lots of information can go through the thick 'cognitive sieve' in order to be interpreted in the right way (Petrović, Stefanović, 2009, p. 34). That is why when the stimuli of the senses come on the basis of the acquired information they are not strongly contradictory to the existing scheme of the notional conceptions, the individuals can relatively easily realize the process of the cognition of the environment. However if the information is not in accordance with the existing categorical apparatus, the question of forming the perceptions is actualized and also their influence on the decision making. That is why in the case when the stimuli of the senses are not strongly contradicting with the existent scheme of the notional conceptions, the individuals can relatively easily realize the process of cognition of the environment. However if the information is not in accordance with the existing categorical apparatus, the question of forming the perceptions is actualized and also of their influence on the decision making. That is why in the case of the 'invasion' of insufficiently clarified information it is necessary to ignore them, or to change the existing conceptual structure in accordance with this information. But, whatever happens, it is obvious that the wrong beliefs can not be momentarily excluded and that their correction is along process of the theoretically-empirical coming face to face.

3. THE BASIC COGNITIVE AND BEHAVIORAL BIASES IN THE PROCESS OF DECISION MAKING

All the economic models that start from the presumptions that the information is available, clear and precise, and that the economic agents always react to the same information in the same way, can be brought into question. The reality abounds with the examples of the aberration from the non-conventional rational model, which is primarily related to the cognitive limitations and mistakes made on this basis. The economic subjects for example can make mistakes when they reach decisions without the influence of the available information, often having too much confidence and in relation to this not giving up the fulfillment of the planned decisions. That is when as a rule they act inertly, unrealistically judging the probability of occurrence of the future events. On the other hand, they can act impulsively

and under the influence of the rapidly changing emotional conditions. That is why it is not surprising when in certain situations rather competent, functionally literate and successful people can behave irrationally, which can harm their long-term interests.

The research in the field of the human decision making try to detect the system mistakes that people make. Among the numerous mistakes related to the psychological dysfunctions, this time we will talk only about those that are most often mentioned among the representatives of the behavioral economics.

1. The hyperbolic discounting. It is well-known that the individuals prefer the present goods and that therefore they are ready to sacrifice a large quantity of the future goods in order to spend the smaller quantity of them in the future. The proportions of this conversion however are the result of the subjective norms connected to the evaluating of the time in the sense of the benefits of enjoying the ongoing consumption. Since the subjectively shaped judgments can be rather different from one individual to the other, it can happen that during the decision making about the usage of resources individuals start from different rates of discounting. That is why for example patient people have a lower discount rate while the impatient ones have a high rate.

The decisions about the usage of the resources can be considered rational if the rate of discounting is unchanged and constant during time. The 'exchange' of these two periods of time is then exclusively influenced by their time distance and as such it doesn't depend from the time difference of these periods in relation to the actual moment of time. The algorithm of discounting defined in such a way is called the exponent, having in mind that to the extent of distancing in relation to the present moment the value of the future goods is lessened according to the exponent rate.

However, as explained by the behaviorists, many people and maybe the majority of them are in the real life inconsistent concerning discounting, practicing the exponential instead of the hyperbolic discounting (Rizzo, Whitman, 2009, p. 924) This means that the norms of discounting that they use are not consistent, and that they are become higher with the closeness of the period that is being compared with the present period. That is why an individual can judge that 100 dollars that he should get for two years are the equivalent to the amount of 90 dollars that he could get for a year, but simultaneously he can judge that 100 dollars can have the same value in a year as 80 dollars in the actual period of time. It turns out that the discounting factor in the first case is 0.90 and in the second 0.80, or that the individual can have two discounting factors: 0.90 in the two next years in the future and 0.80 between the current and next year (*ibid.*, p. 925).

Making decisions in the conditions of the hyperbolic discounting gets marks of the disharmonious process in time. For example, at one moment an individual t_0 can show his intention to put in the moment t_1 85 dollars on a savings account in a bank if the effective interest rate guarantees gaining 100 dollars in the moment t_2 , starting from the fact that if the discount rate is 0,9 this seems to be a right decision. However, when the moment t_1 happens, he can give up his previous intention and 85 dollars, planned for savings can be redirected to spending. Placing money in a bank when the discount rate is 0,8 can seem to him as a less payable solution in compared to the spending of the desired goods. It turns out that in the conditions of the hyperbolic discounting, an individual starts a real 'discord' between the potential alternative decisions, choosing first one and then the other alternative option. It is analogue to the everyday questioning of the decisions in life, which all the people on planet face. For example, a man can plan to start putting money

aside for saving since the New Year's Eve, or to stop smoking and start strict diet, but when that moment comes he gives up.

The above mentioned models of behavior are placed by the behavioral theory in the category of the irrational human acting. There are primarily related to the lack of self-control, reflecting that people are not ready to resist the temptations. The strong impatience is followed by the high short term rate of discount, when those decisions that we assume will bring certain benefit are made, and that the expenses that follow the process of decision making will come gradually over time. Such an approach can, unfortunately result in the negative occurrences such as delaying of reaching the important decisions, forming of the portfolio of the mutually exclusive financial instruments (when for example, individuals use credit cards with the high interest rates, while simultaneously they buy valuable papers with lower incomes), to high indebteding, low savings etc (Капелюшников, 2013, p. 76)

2. *Psychological state*. The process of decision making is strongly influenced by the psychological state of the individuals ("hot" or "cold" state) which can result in the effects which to a large extent from what they would fulfill if they were governed by the elementary norms of the rational behavior. In some affective, biologically 'hot' and 'burning' states, individuals tend to make some hasty decisions, which will turn out to be wrong and very 'expensive' and that after they have been made the return to the old state is impossible (Camerer, et al., 2003, p. 1238). The individuals then usually start to overestimate the potential short term utility, ignoring the possible long term damage and high expenses of reaching such decisions. In that way, for example students in the state of disappointment, anger and fear can make a decision about finishing their studies, which in the long term can turn out to be a completely wrong move.

3. *The dependency from the context* can occur in two basic forms. The first is known as the '*framing effect*' (Rizzo, Whitman, 2009, p. 928), when the choice is made under the influence of the less important aspects characteristic for certain situations and events. It is related to the violation of the principle of 'independence from the insignificant alternatives' which is why, among other things the orientation in favor of A or B depends from the order of representing the options A and B. The influence of the psychological aspects on the process of acquiring and processing of information as well as on the hierarchical shaping and organization of the preferences can be characterized as a "disjunction effect: people prefer information X over information Y when they know that event A will not occur, but they prefer information Y over information X when they do not know whether event A will occur" (Garsia, 2013, p. 300).

We can illustrate the fact that the choice is very dependent from seemingly unimportant aspects of the situation, like the order of the presented options, by an example from the medical practice: when the patients are being informed that the proposed procedure of therapy has the rate of surviving of 90%, the majority will probably be ready to undergo it. However, if the order of the sentences is different and if we say first that the rate of dying during the proposed procedure is 10%, there is a high probability that the majority will show their intention to give up from it.

The dependency from the context can be observed through the possibility of evaluating the available alternatives on the basis of comparison with some referent values, sums or amounts. The referent point with which we compare can be a result of a personal experience, but also of some other factors that come from the surrounding. That is how a student can measure his success in the absolute sense, or in relation to the best possible

result that can be achieved by passing the exams. The above mentioned phenomenon however can be approached relatively, comparing one's own success with the success of colleagues. Similarly to this, the owner of a company can in one context be dissatisfied with the business of the firm, thinking that he didn't achieve the desired results. However, in the other context, on the basis of comparison with the business results of the firms from the surrounding, he can even be relatively satisfied with the achieved.

The effect of the dependence exists in the case when the answers to the questions are subconsciously adjusted to some of the previously arbitrary offered anchor. The anchoring is a set of influences that are applied in many psychological researches that are related to the beliefs about the uncertain quantities. In these experiments, the subject is asked to judge whether certain value (anchor) in these experiments is higher or lower than the uncertain quantity. The rough result is that the subjects start from the anchor and don't succeed to completely correct their judgment in accordance with their basic belief, so that their judgment is inclined toward the anchor. Even explicit uninformative hint, for example accidentally chosen number can function as an anchor. Usual explanation for the occurrence of anchoring is that the value of the anchor offers, at least temporarily a possibility for the quantity that is estimated to be around that value. For example, houses and cars are sold by bargain that begins from the initial price. It would be surprising if the initial price wouldn't have any influence on the perceptions (MekFaden, 2003, pp. 184-185).

4. *The mistakes related to the optimism and pessimism* (Rizzo, Whitman, 2009, p. 940). Depending whether people are too confident or characterized by a lack of self-confidence, there are mistakes that are in behavioral economics brought into connection with optimism and pessimism. The mistakes caused by optimistic thinking happen as a consequence of ignoring certain probability of happening of the unwanted incidents, which can cause serious damage that can often not be repaired. That is why, for example an optimist can take a great risk, investing means into valuable papers with a high rate of interest. However, the secondary market of capital is because of its dynamics and mobility a typical area with a high level of uncertainty, and an individual has to be aware of this when reaching decision about buying shares of stocks of certain companies. On the other hand, the mistakes on the basis of pessimism are characteristic for people who are not sure of themselves, and who are therefore inclined toward exaggerating the probability of certain incidents occurrence. The consequence of this is that to strong cautiousness which as a rule results in avoiding any risk when it comes to investing.

5. *The effect of availability (availability bias)* (*ibid.*, p. 940). This effect is about the mistakes that happen when the individuals give too much importance to the easily available and key information, and too little to the initial probabilities, neglecting the fact that the causes are different. It is widely accepted that the first (the primary effect) or the last experiences (the recession effect) of the experience is, chronologically speaking, more easily called into memory than those that happened between them (MekFaden, 2003, pp.186-187). For example, if recently there was a fire or it was written about in the newspaper during previous days, then people will think that the occurrence of fire is rather probable and that it happens often, which perhaps is not corresponding to the reality. When in family violence happens in Serbia or a cruel murder, the public is disturbed and there are conclusions that during the last months the violence in family has been intensified, and that the number of murder is enlarged. That, however, does not have to have basis in the statistical data, so more complete research could maybe result in the

cruel fact that it was always happening, and that it only depicts the complexity of the human relations (Kitanović, Petrović, 2010, p. 111).

The natural inclination of people toward overestimating the probability of occurrence of certain events on the basis of their witnessing such events in the close future, has its 'economic weight'. As a matter of fact, under the effect of the availability the individuals can give up even those projects that have rather moderate, reasonable degrees of risk, damaging in this way their welfare and life standard. For example, if there was recently a liquidation of a famous company, or a strike in a large company, many people will think that the bankruptcy and strikes have lately become often. Because of this, among other things, some workers of some companies can give up the intention to make legitimate demands for the salary increase, which can keep the employer in belief that they are satisfied with the salary that they are being paid.

6. *The mistakes related to presentation of the status quo (status quo bias)* (Rizzo, Whitman, p. 935). It is related to the human tendency to be reserved toward anything new, even when it can bring a lot of benefit to them or when the expenses are related to 'breaking up' with the old are relatively low. One of the reasons for such cautious evaluating of any changes is that people are rather emotional toward their work and the results of their impact which is not the case when the observers are not the participants of the observed actions and events. The other reason is related to the procrastination or delaying of reaching the decisions for future times. Finally, some people feel aversion toward the loss – the loss aversion which is why during comparing of the equivalent sums they tend to ascribe relatively higher negative value to the potential expenses than to positively evaluate the potential benefits (Капелюшников, 2013, p. 78).

The endowment effect is closely related to the above mentioned mechanism and this effect is related to the change of relation toward things in the sense of evaluating them higher right after getting ownership over them. As a matter of fact the value of certain goods is in the eyes of individuals considerably higher when they are in their property, which however is not the case when these goods are not owned by them. That is why people appreciate certain diploma more after they get it or they value their houses more after they have built them. It is present even more when the individuals treat their capital that according to their strong belief they obtained by continuous abstinence from spending. That is why it is not surprising "that the minimum compensation that people demand to give up a good has been found to be several larger than the maximum amount they are willing to pay for commensurate entitlement" (Knetsch, 1989, p. 1277).

4. BEHAVIORAL ECONOMICS IN THE FUNCTION OF THE RATIONAL CHOICE AND THE 'NEW' PATERNALISM

Although the behavioral economics doesn't interpret the economic behavior in accordance with the standard model of rational choice, this doesn't mean that one can't find the elements of any logical connection. The relationship between them is not one sided because the behavioral economics although it rejects the realism of the models of rational choice, doesn't question their normative demands and intentions. By pointing out the fact that people can make choices which are not consistent with their best interests, the representatives of the behavioral economics come to the idea that the paternalistically oriented policy can help the individuals to make better and decisions of higher quality. In

this way we come to the affirmation of the new normative program of the behavioral economics known under the term 'the new paternalism'.

In principle, the paternalism withstands "interference with a person's liberty of action justified by reasons referring exclusively to the welfare, good, happiness, needs, interests or values of the person being coerced" (Dworkin, 1972, p. 65). Although it doesn't have the mark of the state engagement, it is usual that under paternalism we primarily think about the activity in the field of bringing laws and measures that relax the process of decision making. Dependently from how deeply we enter the process of individual decision making, we can differentiate the 'hard' and the 'soft' paternalism (Madhadam, Gutmann, 2013, 1-20). Although when the other conditions are the same we give priority to the 'soft' paternalism and the characteristic of minimal limitation of the freedom of choice, we should not underestimate the justification of introducing some immediate prohibitions, direct limitations, as well as high taxes and other state charges. When measures of the 'soft' paternalism don't give the desired results, it is justified that the state intervenes by a 'fierce' limitation of the free choice.

The instruments of the state policy that are supported by the 'new' paternalists represent the complex combination of the legislative and administrative prohibitions, taxes, offering information that is needed, as well as certain means of persuading and manipulating with the 'architecture' of choice. It is not only about the new original recommendations but also about the multitude of the usual instruments of the state regulations which were used before. In principle, the behaviorists find all forms of the government regulations to be desirable and allowed if they bring about the efficient prevention and correction of the cognitive and psychological biases and mistakes (Rizzo and Whitman, 2009, p. 910).

Although the argumentation about the new paternalism is theoretically rather convincing, the practical realization of the paternalistic actions is not simple. In the conditions of the existence of the 'multiple I' it is necessary to determine which are the 'real' preferences of the individuals-which segments of choice should be taken as a starting point, and what can be left out. The additional problem is that the individuals can make not only useful, but from the standpoint of their interests wrong decisions. The fact that we supposedly know what is for our best interest is not automatically guaranteeing that we will behave in accordance with this. For example, the addicts continue with the self-destructive habits, although they have the expenses related to health, money, work and family ties.

Therefore direct limitations and prohibitions are less supported by the representatives of the behavioral economics and the 'new' paternalism than some traditional instruments of the government regulations such as sin taxes (alcoholic drinks, smoking, hazardous games) and the unhealthy food and drinks (greasy food, carbonated beverage etc) (O' Donoghue, Rabin, pp. 190-91). By enlarging the expenses related to the consummation of the harmful goods (junk food), 'sin taxes' can lessen the negative consequences, caused by the defect will and hyperbolic discounting, redirecting in this way the individuals of the bounded rationality to the more reasonable and socially acceptable behavior.

The actions of the individuals that are contradicting with their own interests, among other things, happen because they don't have sufficient information and unlimited cognitive capabilities. In order to prevent this and to direct the individual in the right way it is desirable to use the paternalistic intervention which would lead the individual to make the decision that he himself would make if he was deciding on the completely rational basis. The contribution of the behavioral economics in the field of promoting the state regulations can be best seen through the support of the process of manipulation with the

'architecture of choice' (Santos, 2011, p. 720; Wright, Ginsburg, 2012, p. 1056). It is related to the fact that the government is due to make a choice for and instead an individual in certain cases, since we can assume that he cannot deal with such a task in certain situations. For example, one could propose to the workers to automatically take part in the savings plans (Sunstein, Thaler, 2003, p.1172) which helps in excluding the mistakes connected with the inconsistency, the weakness of will, the hyperbolic discounting etc.

When we talk about the Republic of Serbia, and having in mind the negative experiences with the engagement of the state up to now, as well as the absence of the expected effects on the basis of its measures and actions, a question that arises is concerned with the theoretical relevancy and practical basis of the state interventionism as such. It seems that a certain progress can be made by the 'new' behavioral economics, whose research helped us to be a step closer to the understanding of the behavior of the economic actors. Together with this, the presumptions for the affirmation of the 'new' paternalism would be created and the creating of the corresponding government measures and activities directed toward supporting the efficient allocation of resources. If we have in mind the fact that the carriers of the economic activity in Serbia still haven't accepted the elementary norms of the market behavior, then the need for the new behaviorist approach and reaffirming of the role of the state in the light of enabling and easement of the rational choice is even more prominent.

As opposed to the traditional paternalism, which from the perspective of the citizens of the Serbia is related to the need of the state to intervene in order to lessen the unequal share of the incomes and the contribution to the realization of the idea of equality, the 'new' paternalism is directed toward helping the people to enlarge the level of their own welfare. This means that the role of the state is not in reacting and helping people after they have already certain, often wrong decisions about the allocation of the rare resources. Instead it is desirable to define the thought-out engagement of the state with the aim of improving the quality of the individual decisions. That is why the paternalistic syndrome embodied in the expectations of the citizens that the state will protect them even when they haven't accomplished the planned aims, should be changed and brought back into the realistic frames where the state is expected to make relative the problems that could possibly appear as a consequence of the cognitive and psychological limitations, to partly solve or even prevent them. In accordance with this, the citizens should gradually give up the beliefs about the government's responsibility to provide them medical treatments, education and job, and would gradually accept the market norms of behavior where the role of the state would be to make them capable adequately directed toward making rational decisions.

CONCLUSION

In spite of the efforts of some authors to point out that all the critiques of the neoclassical maximising hypothesis were futile, it is certain that the real rationality of the economic subjects deviates from the neoclassical model of the maximising rationality. If we add the fact that in the actual circumstances there is a higher level of uncertainty, then the question of sustainability of the model of the maximising reality becomes even more relevant. It seems that in this sense special attention should devote arguments of behavioral economic theory which related to the identifying psychological dysfunctions and anomalies. This is mainly about mistakes and failures that include the inconsistency related to the discounting, the changeability of the psychological and emotional state, the dependency

from the context, the lack of self-control, too strong optimism, the orientation toward the status quo etc.

The denying of the 'illusionist' model of unlimited rationality does not mean that the rational efforts of the economic subjects should also be denied, as well as the intentions of the individuals to be rational. Instead, from the point of view of the behavioral economics, it is desirable to reconstruct the actions of the individuals in certain situations based on to which we could assume how they would act in concrete circumstances, taking exclusively rational actions and activities. In this way the reconstruction of the behavior would get a form of the normative standard, on the basis of which it is possible to evaluate the effects of different forms of the state interference on the growth of the individual and social welfare.

On the basis of all the above statements we can easily conclude that the representatives of the 'new' behavioral economics have a double sided attitude toward the standard model of the rational choice. When they have in mind their descriptive character, they reject it determinately. However, when they observe it in the sense of the normative ideal, they not only accept it but also defend it fiercely. Having in mind that the bibehavioral imperfection leads us into the situation that people can make choices which are not consistent with their best interests, the representatives of the behavioral economics came to the idea that the paternalistically oriented state can help the individuals to make better decisions.

When observed in this way, the state intervention is turning into a tool, with the help of which we can bring 'closer' the real behavior of the boundedly rational individuals to the ideal of the full rationality. In this way we come to the affirmation of the new normative program of the behavioral economics known as 'the new paternalism'. The opposing opinion to the classical liberal tradition that takes the bounded rationality of the individuals as an argument in favor of not spreading and broadening of the quantity of state interference in the sphere of economy and private life, the 'new paternalism' pushes forward the idea of the premeditated engagement of the state directed toward reaching a higher level of rationality of the economic actors. Therefore, all the mentioned ideas presented in the paper can be perceived in the context of the contribution to the affirmation comprehension of failures related to the psychological dysfunctions, which confirmed the basic hypothesis that the behavioral analysis of economic choice provides powerful instrumentalist support for designing government measures directed toward improvement quality of human decisions.

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BIHEVIORALNA ANALIZA EKONOMSKOG IZBORA: DOPRINOS UNAPREĐENJU EKONOMSKE RACIONALNOSTI

Ako počemo od pretpostavke da je zadatak teorijske analize kompleksne društveno-ekonomske stvarnosti da pruži određena saznanja čijom se praktičnom primenom može doći do unapređenja i poboljšanja te stvarnosti, onda to ekonomsko-teorijski mainstream obično čini polazeći od aksioma racionalnosti. Sa druge strane, ako imamo u vidu aktuelne empirijske podatke o brojnim problemima i neefikasnom funkcionisanju ekonomskih aktera, onda se postavlja logično pitanje da li bi pretpostavku o neograničenoj racionalnosti ekonomskih subjekata trebalo olako idealizovati. Polazeći od toga da bihevioralna ekonomija ima posebnu ulogu u snažnom kritičkom nasrtaju na "tvrdog jezgra" neoklasičnog mejnstrima, u radu se govori o brojnim psihološkim ograničenjima koja prate proces ekonomskog odlučivanja, kao i mogućnostima njihovog prevladavanja. S tim u vezi posebno se apostrofira značaj bihevioralne analize i njene instrumentalističke podrške usmerene na unapređenje ekonomske racionalnosti i poboljšanje kvaliteta ljudskih odluka.

Ključne reči: racionalni izbor, bihevioralna ekonomija, bihevioralne anomalije i predrasude, „novi“ paternalizam.

THE IMPACT OF ECONOMIC SYSTEM ON ENVIRONMENTAL POLICY IN THE REPUBLIC OF SERBIA

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Marija Petrović-Randelović, Snežana Radukić

University of Niš, Faculty of Economics, Serbia

Abstract. *Political and economic changes in the former socialist countries in the early 90s of the 20th century have not only opened up possibilities for the future democratic development of these countries, but also an opportunity for solving economic, political, social and environmental situation in the context of building a new, market economic system. The unfavourable environmental situation in Serbia is caused by many factors, among which frequent changes in the economic system in the past and inadequate economic and system solutions occupy a significant place. A critical approach to the impact of economic system solutions to the political and institutional arrangements for environmental protection in the SFRY, FRY, Serbia and Montenegro and RS is therefore a suitable starting point for understanding the importance and the need to take a more active approach to solving environmental problems in Serbia. It is also a goal of this work. In addition, solving the problems in the field of environmental protection is crucial for achieving sustainable development and improving the competitiveness of the Serbian economy.*

Key Words: *economic system, reforms, environmental policy, Republic of Serbia.*

INTRODUCTION

The economic system of the socialist countries is realized by different models from the central planning model with a dominant share of state ownership to the self-management model present in the former Yugoslavia (SFRY), which affirmed public property and opened the door for greater action of market mechanism in the economy. However, the presence of market elements and institutions “in some periods was more pronounced, at least in orientation (e.g. the mid-sixties), and there is a large resistance and deviations from the introduction of integrated market elements (the market for goods, labor and capital), when the economic system from that point took a step backwards”

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Corresponding author: Marija Petrović-Randelović

Faculty of Economics, University of Niš, Trg kralja Aleksandra 11, 18000 Niš, Serbia

Tel: +381 18 528 683 • E-mail: marija.randjelovic@eknfak.ni.ac.rs

(Arandelović, 2004, p. 339). Yet, despite these differences, all the socialist countries are characterized by the existence of common institutional commitments, which is clearly shown by numerous examples of attempts of economic reforms.

“The programs of reforms in socialist countries were generally initiated for pragmatic reasons. The reforms were a reaction, response to the crises that the socialist countries were going through with the intention to rectify their partial deficiencies. Empirically speaking, it can be noted that each new wave of economic reforms was associated with economic failure, i.e. they also appeared as a reaction to the worsening of development performances” (Mitrović, 2007, p. 33). The first symptoms of the general socio-economic crisis in the socialist countries began to manifest clearly after the 70s when a large number of macroeconomic indicators went out of the zone of positive trends. Drastic deterioration in macroeconomic performances during the 80s led to the collapse of the socialist economies and contributed to the revival of the vision of the impossibility of maintaining socialism as a system both in terms of economic, as well as environmental efficiency and achieving sustainable development. The basic economic irrationality embedded in socialism as an economic system contributed to economically irrational allocation of resources, which along with the arbitrary pricing resulted in underestimation of the value of natural resources and, inevitably, in degradation of the environment.

There are many environmental problems that are common to all the former socialist countries, despite their different geographical and climatic characteristics. Essentially, the basic environmental problems in the Central and Eastern Europe are caused by the character of the political and socio-economic systems of these countries. These systems were based on the dominance of state ownership, central planning and investments, unrealistic, controlled prices and outdated and inefficient industries. Such an environment for economic development of the socialist countries initiated the creation of an energy and resource-intensive economic structure, followed by a massive production of waste, inefficient management, lower productivity and surplus of unskilled, low-paid workforce. On the other hand, environmental problems are the result of non-compliance and poor enforcement of environmental laws and neglect of environmental problems by the state authorities. Institutional structures for the management of environmental issues were underdeveloped and the system of education was inefficient in terms of incorporating environmental issues in the teaching program. In addition, public participation in solving environmental problems was strictly forbidden, while the data on the state of the environment was kept secret in order to prevent any negative reaction of non-governmental environmental organizations.

Political and economic changes in the former socialist countries in the early 90s of the 20th century have not only opened up possibilities for the future democratic development of these countries, but also the opportunity to solve economic, political, social and environmental situations in the context of building a new, market economic system. The advantages of such orientations are reflected in increasing the efficiency of the economic system, respecting economic, i.e. market laws, introducing a multiparty system and eliminating the domination of politics over the economy, and introducing pluralism in property relations.

From the perspective of the objectives of environmental policy and sustainable development, the key elements of economic reforms are privatization and a clear definition of private property rights, the introduction of markets in order to ensure effective valorization and rational use of resources, restructuring and modernization of the industry in order to introduce modern and eco-efficient technological solutions, and eliminating

unproductive subsidies to inefficient state-owned industries. Since the unregulated market economy itself can contribute to protecting the environment, it is necessary to introduce administrative and economic instruments for environmental protection, but also a whole range of environmental regulations and ensure their effective implementation. An integrated environmental management system should contribute to the introduction of preventive measures against pollution, rather than pollution control measures. An efficient environmental management system means, above all, a clear definition of environmental laws and regulations, the introduction of monitoring of environmental performances, command and control state policy through economic instruments, developed information system for decision-making and public participation, and the development of environmental awareness through the education system. Nevertheless, the environmental policy in the new socio-economic environment should be based on the principle of “polluter pays” and “user pays”, and higher use of economic instruments to achieve full internalization of environmental costs and provide incentive for polluters to change their behavior towards the environment.

In line with the established goal, this paper is structured as follows. The introductory review considers the political and institutional solutions in environmental protection in former Yugoslavia. After that, a critical review of the environmental regulations and practices in the FR Yugoslavia, and then in the State Union of Serbia and Montenegro, will be given. Further, the regulation problematic of environmental issues in the context of building a new, market-oriented economic system in Serbia will be discussed. Finally, the synthesis of the key considerations will be carried out.

1. POLITICAL AND INSTITUTIONAL ARRANGEMENTS FOR ENVIRONMENTAL PROTECTION IN YUGOSLAVIA (SFRY)

From the second half of the 20th century until the dissolution of the former Yugoslavia (SFRY), the accepted model of development with a focus on accelerating the socialist industrialization and the frequent changes in the economic system caused a gradual destruction of environmental assets and the deterioration of the environment. Whereas from the mid-20th century, the anthropogenic influence on the environment has risen in the wider global scale, it could be concluded that the impact of economic activities on the environment in the former Yugoslavia did not differ from the global trends in this area.

The economic system of the second Yugoslavia was declared as socialist and self-management, in accordance with the character of the whole society. In these conditions, the planned organization of the economy has been the backbone of the whole society (Arandelović, 2004, p. 93). In accordance with the defined priorities and the development goals and tasks in the period before the dissolution of SFRY, it can follow that the development of the environmental protection system in the former SFRY was divided into three main stages of development.

The first phase in the development of the environmental protection system, which covers the period from 1945 to 1970, was characterized by intensive use of natural resources in order to achieve the planned objectives of economic development. “After the war, Yugoslavia faced the complex task of overcoming the adverse conditions that were the cause of its backwardness and slow economic growth in the past. It was supposed to accelerate this development, create adequate material base for the new social system and mitigate

significant differences which moved Yugoslavia away from industrialized countries” (Čobeljić, 1980, p. 72). The question of choice of the methods of economic development appears most often in the mode of the dilemma whether to give time priority to agriculture or industry in the initial stage of economic development. However, what is important to note is that this dilemma was not of any particular importance for Yugoslavia. The simple reason for it being important was that in the changed social circumstances the process of its industrialization, which started earlier and continued at a slower pace in the period between the two world wars, should significantly accelerate. In addition, the general conditions for economic development, the available natural resources and production potential of the population, consisted a starting point for such a rapid development of the industry. Therefore, the initial stage in the economic development of SFRY was characterized by strategic orientation for rapid industrialization, in which the starting point represented the priority development of heavy industry and energetics.

The second phase in the development of the environmental protection system covers the period from the 70s and lasts until the 80s of the 20th century.

By analyzing the experience of the developed countries, it could be seen that the interest of these countries to solve the problems of environmental quality has arisen since the 70s of the 20th century. It is not surprising that efforts are focused not only on technical issues in choosing the right policy to solve the problems, but, in fact, the environmental policies in different countries are a reflection of their unique political culture and institutions.

According to these trends in the developed countries, in former SFRY, defining the policy to protect and improve the environment was first approached in a comprehensive and coherent manner after the first UN Conference on the Environment in Stockholm in 1972. In accordance with the decisions of the Tenth Congress of the Communist Party of Yugoslavia, the Constitution in 1974, the Law of associated labor and other system laws, with the support of relevant social and political measures and actions, a big but by nature not a radical change was carried out in the economic system that had certain repercussions on the changes in the socio-economic and productive relationships, as well as in the field of the political system of the socialist self-management.

The adoption of the new Constitution in 1974 was round one, and for all characteristics, an important stage of development of the Yugoslav society on the basis of the socialist self-management. It provided a strong institutional support in defining the policy of protection and improvement of the environment, particularly emphasizing the importance of protecting and promoting human environment in Article 87 of the Constitution, which says: “Working people and citizens, organizations of associated labor, socio-political organizations, local communities and other autonomous organizations and communities have the right and duty to provide conditions for the preservation and development of natural and man-made resources of human environment, and to prevent and eliminate the harmful effects of the pollution of air, soil, water, watercourses and the sea, the noise or other thing that threaten those values or endanger human life and health” (Ustav SFRJ, 1974). The increasing awareness of the need to address the resulting environmental problems and their close interaction with environmental problems in other countries acted in the direction of the declaration of the constitutional right to a healthy environment, and identification of the main subjects of protection and improvement of the environment.

The onset of the third phase in the development of the environmental protection system coincides with the last attempt to reform the economic and social system in the late 80s.

At the beginning of the ninth decade of the 20th century, a number of indicators pointed to a slowdown of economic growth and the signs of economic and social crisis that put pressure on the Yugoslav economy clearly began to manifest. "In these circumstances, one of the last attempts to change the economic system was made, the amendments changed the Constitution in 1988 which opened the door to radical changes" (Arandelović, 2008, p. 187). Radical changes in the economic system followed the adoption of a set of system laws, late in 1988 and early in 1989, among which Company law is certainly the most important. In such circumstances, restoring the role of the company as the holder of the economic activities and for the first time legally forecasting companies in all types of property rights, and decentralization of management is initiated by comprehensive reforms within the general legal framework, as well as the legal framework for decision-making in the field of environmental protection.

It should be noted that former SFRY had developed international cooperation in protecting and improving the environment with international organizations and institutions, as well as with regional groups, particularly with the European Union. The European Union (then the European Community) was the most important economic partner of SFRY in economic and many other fields. During the 80s of the 20th century, there was a trend towards the intensification of cooperation in the protection and improvement of the environment. The start of cooperation in the protection and improvement of the environment can be traced back to 1972, after the adoption of the General Resolution at the first Ministerial Conference on European Cooperation in the field of scientific and technological research. In order to provide the necessary support for the priorities of environmental protection, Yugoslavia, as one of the signatories of the Resolution, was committed to the ratification of most of the documents adopted by the European Union and to the gradual harmonization of national environmental legislation with the European Union legislation in the field of environmental protection. Effective international cooperation with the European Union is expected to provide the possibility to better meet environmental requirements and to create preconditions for efficient integration into the framework of the Community.

Based on the analysis of global environmental trends and the assessment of the environmental situation in the country, the environmental policy in the former SFRY was supposed to define the priority environmental objectives and instruments to be achieved in a way that contributes to balancing the relationship between the need for greater economic growth and the requirement for the realization of the ecological balance in environment. However, from today's perspective, it can be seen that, despite raising awareness of environmental issues, there was no comprehensive and consistent environmental policy in the former SFRY. This policy, with its measures and applied instruments, should have contributed to the mitigation of environmental problems. That is partly because, in the whole period of its existence, objectives related to the development of socio-economic relations had the advantage and held a high place in the ranking of priority development goals. In addition, frequent changes in the economic system and economic policy influenced the changes in the definition and implementation of the environmental policy, because of which it was left with no visible effects. Under the pressure of the general economic problems, especially after the 80s, such as the decline in the GDP rate, high inflation, the deficit in the balance of payments and threatened foreign trade liquidity and, and on the threshold of social and political crisis, in the late 80s, environmental problems lost their importance and were pushed into the background.

2. CRITICAL REVIEW OF ENVIRONMENTAL REGULATIONS AND PRACTICE IN THE FR YUGOSLAVIA

2.1. The economic context

The former SFRY was pursuing a strategy of industrialization and economic development, which was based on import substitution and protectionist attitude towards the domestic industry and agriculture, with the sole reliance on the exploitation of natural resources. Such strategic direction of development is basically characterized by inefficient use of raw materials and energy, which eventually led to the high import dependence on foreign sources of energy and the accumulation of external debt. Our prominent academician Nikola Čobeljić (1984, p. 78) lists the five main causes of environmental degradation in Yugoslavia: a rapid and specific process of industrialization, urbanization, the use of “profit-oriented technology”, “wasteful” consumption patterns and mechanism of market economy.

The disintegration of the Yugoslav federation in 1991 resulted in the destruction of the common market of Yugoslavia which had a negative impact on relations of related supplies between the republics. This was especially true if we bear in mind that between the former Yugoslav republics there was a high degree of interdependence of economic activities in view of the large amount of energy resources and production. Among the factors that determine such a high degree of interdependence are: the differences in climatic conditions, the differences in the availability of mineral resources, the conditions for the realization of agricultural production, and partly the differences in the level of achieved technological development and the level of wealth between them. With the disruption of trade relations and links among the republics, there was a sharp decline in production, where the industry lost suppliers and markets, and the economic difficulties of the republics were compounded by wartime destruction of fixed assets.

The imposition of sanctions against FR Yugoslavia by the international community led to serious economic stagnation and impoverishment of the population in the early 90s. The situation in the economy further deteriorated due to hyperinflation, which began in February 1992, and gradually blossomed and reached its peak in January 1994, when it was only during this month that it reached the amount of 313.563,558% (Savezni zavod za statistiku, 1994). By cutting the inflationary spiral with the introduction of the new dinar in June 1994, a relative price stability was recorded in the period from 1995 to 1997, but already in 1998 the signs of inflationary pressure started to appear again. However, even after the UN sanctions were lifted in December 1995, the expected effects of rapid economic recovery failed to happen. To illustrate, the GDP growth between 1995 and 1998 was of lower intensity, while the already high unemployment rate continued to grow. The unemployment which was at 21% in 1991 increased to 27.9% in 2001. “The period of apparent economic recovery and reform attempts in mid-decade was interrupted by the Kosovo crisis in 1999. A significant economic decline in the 90s can be summarized by key macroeconomic indicators. In 2002, in Serbia and Montenegro the gross national income per capita was only 50% of the level in 1989. The level of export in 2000 was the third of the same amount in 1991. The import was hit less drastic; in 1999 the import was about 60% of its level in 1991 (it is believed that the official indicators of economic activity decreased the actual level of economic activity, given the vast size of the gray economy and exchange of goods, which increased during the 90s).” (Svetska banka, 2002, p. 25).

2.2. The institutional framework for decision making regarding environmental protection

The adoption of the new Constitution on April 27, 1992 was created as a realistic assumption for the construction and operation of a new economic system, but also defining a new approach to environmental issues and problems. The starting point for the definition of environmental policy in Serbia and Montenegro was formulated in the Constitution of FR Yugoslavia and the member republics.

“In accordance with the constitution established competences, the right to a healthy environment is formulated as one of the fundamental rights of man. The basis for the functioning of an effective environmental management system is consisted by adjusted principles, delineated responsibilities and contemporary and efficient socio-administrative measures. These measures have their basis in the Constitution of the Federal Republic of Yugoslavia” (Ministarstvo zdravlja i zaštite životne okoline Republike Srbije, 2002, p. 7). Responsibilities in terms of basic environmental issues were divided between the federal level (Department of Environment within the Federal Secretariat for Labor, Health and Social Care) and national level (Ministry of Health and Environmental Protection of Serbia, until May 2002, while after June 2002, a new Ministry for Protection of Natural Resources and Environment was established, as well as the Ministry of Environmental Protection and Spatial Planning of Montenegro). Also, in larger municipalities in both Republics, there were institutions that were responsible for environmental protection. Specific competencies in the field of environment were awarded to some other ministries and institutions at the federal and republican level.

The federal state bore some responsibility for the environment by establishing the conditions and methods for carrying out economic and other activities. Its competence was the formulation of policy, adoption and implementation of legislation, other laws and general procedures for the adoption of the law, as well as providing judicial protection in terms of the basis of the environment. In accordance with the recommendations of the United Nations Conference on Environment and Development in Rio de Janeiro, held in 1992, the FR Yugoslavia adopted two key strategic documents in 1993 – the Resolution of environmental policy in the FRY and the Resolution on biodiversity conservation. By their adoption, the FRY was committed to the acceptance of the concept of sustainable development, which was used as a parameter in the formulation of environmental policy.

The resolution of environmental policy defined 12 programs that were related to certain areas of environment and 49 priority measures that should be reviewed and adopted every five years. The following objectives of the policy were proclaimed in the Resolution of environmental policy (Ministarstvo zdravlja i zaštite životne okoline Republike Srbije, 2002, p. 220-221):

- Creating a basis for building human-oriented society in the Federal Republic of Yugoslavia, which will be permanently developed in harmony with nature taking into account the rights of future generations to meet their own needs at the same or higher level.
- Providing conditions for the conservation, rational use and preventing the degradation of natural resources, preventing uncontrolled pollution and further degradation of the environment and repairing the consequences of past pollution and environmental degradation.

- Environmental management in a way that provides the conditions for the protection and promotion of human health.
- Developing an integrated system of protection and improvement of environment and quality of life, improving the existing system of environmental protection in man-made environment and providing an institutional framework for the effective functioning of that system.
- Ensuring the conditions where interests arising from the concept of sustainable development and the protection and enhancement of the environment are analyzed and taken into account when planning settlements and the use of land.
- Gradual introduction into practice of the principle of “polluter pays”, by unique system solutions for the entire territory of the country.
- Providing conditions for the development of pollution control technology that is appropriate to the specifics of our area and to the achieved level of development.
- Preservation of “satisfactory” natural balance in our country and participation in ensuring the protection of the biosphere.
- Preventing the import and transfer of “dirty technologies”.

The environmental policy was based on the following principles: integrity, hierarchy of interests and goals, quality, efficiency, market neutrality, awareness, program orientation, preventive action, the polluter pays and solidarity.

The adoption of the Law of basic principles of environmental protection in 1998 provided institutional support for the implementation of the Resolution on Environmental Policy in the Federal Republic of Yugoslavia. Another key strategic document, Resolution on biodiversity conservation policy, clearly defined objectives and principles of the protection of biodiversity policy, and established four programs for their implementation, including program control and program discovery of processes, as well as activities with a negative impact on biodiversity. The last document, the Program of medium-term recovery and transition, was prepared for the donors' conference organized by the World Bank and the European Commission in June 2001. Chapter 12, which explicitly refers to the field of environment, defined short-term and long-term goals, and proposed program of work for the environment based on the convergence to the legislation of the European Union.

The legal framework governing the protection of the environment was well developed, since in addition to the federal law, there were a wide range of laws and regulations on the level of republics. The most important among federal laws is definitely the Law on the foundations of environmental protection in 1998 (“Službeni list SRJ”, br. 24/98). Particularly, it established an institutional framework for the introduction of an “integrated system of environmental protection, planning and management of natural resources and the implementation of environmental protection measures” (Article 4 of the Law). In addition, the basic intention for adoption of this Law was to bring closer the national legislation on environmental issues to the European Union legislation, which is one of the conditions for the integration into the Union.

2.3. Critical review of the environmental management system in FR Yugoslavia

During the last decade of the 20th century, there was a multitude of political, economic and demographic changes caused by economic and political sanctions, longstanding conflicts in the region and the transition period. In such conditions, problems related to the

environment were treated as less important in relation to economic and social problems, and the expected effects of environmental policy, established by the Resolution of environmental policy, failed to happen. The Report on the state of the environment for 2000 and priority tasks for 2001+ for Serbia state that “the results show that, except for the selected fields, environmental protection systems slept for almost a decade, apropos that established system is not implemented (as they are in other countries intensively transformed in accordance with the requirements of the protection and development of environment), and according to the assessment, the cumulated time lag for the developed countries in this area (at least 30 years) we must compensate step-by-step, by profound, carefully and professionally planned activities” (Ministarstvo zdravlja i zaštite životne okoline Republike Srbije, 2002, p. 224). In addition to economic and political reasons, unsatisfactory environmental performance in the FR Yugoslavia until 2000 was caused by the institutional deficiencies and weak enforcement of legislation in the field of environment, which was reflected in the following:

- Environmental protection in the FR Yugoslavia in the period to 2001 was regulated by a large number of federal, republican and municipal regulations, making the overall legal framework that governs environmental protection non-harmonized, inconsistent and vague. Such an approach to the regulations relating to the protection of the environment resulted in partial solutions, and in particular, the lack of coordination in this area.
- Inadequate treatment of the environment, regardless of the existence of numerous laws and regulations, was partly caused by non-alignment of existing legislation, both horizontally (across sectors) and vertically (from the municipal to the federal level).
- There was a phenomenon over regulation, whereas the jurisdictions of republican and federal authorities were correlated and overlapped in this area.
- Lack of defined legislation, which prevented operation of the federal government in taking significant actions to eliminate or reduce the consequences of such circumstances.
- Existence of certain legal inconsistencies in terms of regulating the protection of certain parts of the environment that should have been otherwise uniformly regulated.
- Low level of legal provisions appliance, due to an insufficient number of employees engaged in inspection and due to the inability to collect taxes and penalties because of the inefficient legal system.
- Lack of a comprehensive approach to environmental protection at the national level.
- Low level of information about the state of the environment due to the lack of an integrated information system for the environment.
- A system of statistical data collection could only have basic indicators of environmental conditions on the elements that were being monitored, which turned out to be a very modest base. With regard to data collection, available data were summarized screened. In addition, as the data collection methodology was not adapted to collect data relevant to sustainable development, the information on the contribution of population and industry to environmental protection was not available.

The Resolution on environmental policy envisaged that the policy was implemented from the federal budget for these purposes in the amount of at least 0.1 to 0.3 % of the Federal Republic of Yugoslavia GDP in the period to 2000, and from the fees for the use of natural assets, taxes, contributions and other sources for environmental protection. However, limited economic opportunities in the period after the introduction of sanctions

against Yugoslavia resulted in, among other things, the impossibility of adequate implementation of the program of environmental financing. Of the anticipated 0.1-0.3% of the Federal Republic of Yugoslavia GDP, around 0.001% was allocated in the period from 1998 to 2000, which reflected negatively on the possibility of environmental management. The funds appropriated for this purpose in the same period in the Republic of Serbia amounted to only about 0.02% of the gross national income. In this way, most of the objectives of environmental policy were not realized and the pressure on the environment due to the intensive use of natural resources increased. In addition, the emissions of pollutants increased due to the inability to replace outdated technology and equipment. Another consequence of international sanctions on the environment and the overall environmental management system was reflected in some restriction of international cooperation in this area, given that international cooperation on environmental protection and sustainable development depends on the total international relations of the country. The isolation of the FR Yugoslavia led to the interruption of official cooperation in the field of environment and its exclusion from international forums such as the United Nations.

3. CRITICAL REVIEW OF THE ENVIRONMENTAL PROTECTION SYSTEM IN SERBIA AT THE BEGINNING OF THE 21ST CENTURY

After the democratic changes in 2000, Serbia has taken a more active approach in the implementation of environmental policy, which is becoming an integral part of the transition process in the country and support to economic development. The Government of Serbia in June 2001, and the National Assembly in September 2001, approved the first Report on the state of the environment and the adopted environmental priorities, which primarily related to: (a) the further development of domestic environmental legislation and its harmonization with the European Union legislation, (b) access to certain international treaties in the field of environmental protection, and (c) taking part in the work of international organizations and other international initiatives, such as the process "Environment for Europe" in the field of environmental protection.

The Report on the state of the environment for 2000 and priority tasks for 2001+ for Serbia clearly identified priority areas for the protection of the environment in which the state, in cooperation with other competent authorities in the field of environmental protection, should take an active part (Svetska banka, 2002, p. 49). The most important tasks were: building of institutional and legislative capacity, waste management, education regarding environmental protection, access to information, etc.

The FRY, due to the normalization of international relations and cooperation with international organizations (OSCE, EU, REC, etc.) and international financial institutions, began to receive financial, technical and other assistance from abroad. Foreign assistance played a significant role in the implementation of some of the priority projects in the above mentioned areas, among which is the SCEPP, a project funded by the European Agency for Reconstruction, COWI, a project supported by the Danish government or Yugolex, a project for the development of legislation in the field of environment, which is implemented with the help of the Finnish government (the total budget was 2 million euros) in order to support the harmonization of environmental regulation in Serbia with the European Union legislation.

4. THE DEVELOPMENT OF THE ENVIRONMENTAL PROTECTION SYSTEM IN SERBIA AND MONTENEGRO

The intensification of the transition process of the Yugoslavian economy after 2000 resulted in constitutional and state reforms that resulted in the conclusion of the “Agreement on Principles of Relations between Serbia and Montenegro” by the Yugoslav government and relevant state Assembly of Serbia and Montenegro on March 14, 2002. This Agreement did not identify environment protection as a common function at the federal level for Serbia and Montenegro, but the environmental issues were regulated at the level of Member States. The reorganization of the federal state that followed the adoption of the Constitutional Charter by the Federal Assembly on February 4, 2003 resulted in the transformation of the Federal Republic of Yugoslavia into the State Union of Serbia and Montenegro.

These constitutional and state changes did not remain without impact on the environment. In fact, they laid a new foundation for solving problems, inherited and very unfavorable state of the environment, and initiated extensive reforms within the legislation in the field of the environment, and the need for its harmonization with the EU legislation. While the Constitutional Charter did not concretize the environmental issues at the union level, this disadvantage was partly remedied by adopting the Charter of Human and Minority Rights and Civil Liberties. This is especially emphasized in Article 46 of the Charter relating to human and minority rights and freedoms, which explicitly emphasizes: a) the liability of any person, and especially the State Union and the Member States, for the protection of the environment, b) the right of each person to a healthy environment and timely information about its state, and c) the obligation to preserve and improve the environment.

Improving the condition of the environment and rational approach to environmental problems in the State Union involved the application of appropriate policy that found its foothold in the constitutional and legal commitments and unique national legislation. However, by analyzing the experience of the State Union, it could be seen that not only was there a single legislation at the State Union, but also one of the main causes of the weaknesses and inconsistencies in solving environmental problems was the lack of uniform regulations and procedures to regulate this issue at the Member State level. The foundations of environmental protection were only laid at the State Union level, while the republics in accordance with their constitutional and legal commitments and adopted laws regulated this area on their own. This, coupled with the lack of harmonization between the economic systems of the Member States, partly prevented the creation and functioning of a single market as one of the main goals of the Constitutional Charter.

The differences in the approach to the issue of regulating the environment were reflected in the different starting points in designing environmental policies. These differences were partly consequence of an inherited condition of the institutional and legal framework in the former FR Yugoslavia.

The foundations of environmental policy in the Republic of Serbia found their stronghold in the Constitution of the Republic of Serbia (“Službeni glasnik RS”, br. 1/90), which establishes the right of a man to a healthy environment, as well as the duty of everyone in accordance with the law, to protect and improve the environment (Article 31 of the Constitution of RS). The Constitution prescribes the responsibility of the government to ensure the functioning of the system of environmental protection. At the level of the

Republic of Serbia, environmental issues are regulated in accordance with the Federal Law on the Foundations of Environmental Protection (“Službeni list SRJ”, no. 24/98, 24/99 and 44/99) and the Republic Law on Environmental Protection (“Službeni glasnik RS”, no. 66/91, 83/92, 53/93, 67/93, 48/94 and 53/95). The Law on Environmental Protection from 1991 was the most important element of the legislative framework in the field of environmental protection in Serbia. This Law regulates the system of protection and development of the environment, including urban planning, assessment of environmental impacts and building. In particular, it regulates issues related to the protection of air pollution, water, land, flora and fauna, natural resources, noise, ionizing radiation, waste and hazardous materials, issues related to the financing of protection, inspection and penalties for pollution. “In addition to this Law, specific laws on individual factors (water, forests, land, hunting, fishing) were enacted, and there are other laws that govern specific areas that are directly or indirectly related to the environment” (Ministarstvo zdravlja i zaštite životne okoline Republike Srbije, 2002, p. 7).

By the adoption of the Declaration on the Ecological State of Montenegro, on September 20, 1991, the state was committed to the establishment of a special relationship with nature by calling on all citizens to prevent a potential environmental disaster. This Declaration established environmental protection as one of the top priorities in the implementation of development policy. In the Republic of Montenegro, environmental issues were regulated by the Constitution of Montenegro (“Službeni list RCG”, br. 48/92), where it was proclaimed that Montenegro was a democratic, social, and, especially, ecological state. In accordance with the constitutional commitment, the state emerged as the main subject of environment protection by restricting the freedoms of business and entrepreneurship. Environmental issues were specifically regulated by the Law on Environmental Protection from 1996, and by more sub-acts that were supposed to contribute to the effective implementation of this Law. Other laws that were under the jurisdiction of the Ministry of Environmental Protection and Spatial Planning, i.e. Air Protection Law and Nature Protection Law, were established in 1980 and 1989.

Despite the well-placed framework for the decision-making, most projects in the field of environmental protection in the Republic of Montenegro were not realized due to ten years of economic stagnation caused by the economic and political crisis. However, after 2000, real conditions were created and opportunities increased for achieving environmental objectives and intensive cooperation with the region in this regard.

The differences in the approach to environmental issues caused the differences in the way of achieving environmental objectives. This prevented the development of a unified system of environmental management and coordinated approach to decision making. Such a situation in the field of legislation governing the protection of the environment required a transformation and improvement of organizational and institutional solutions in the field of environmental protection.

In accordance with the recommendations of the First review of the state of the environment, the institutional framework in the field of environmental protection has changed in Serbia since 2002. The state has been engaged in the field of establishing the effective institutions to create conditions for the execution of a number of national as well as international obligations arising from international treaties and obligations of the European Union in the field of environmental protection. In 2004, for the purpose of division of competence in environmental matters, the key responsibilities were shared between the Ministry of Science and Environmental Protection (Bureau for Environment) and the Ministry of

Agriculture, Water and Forestry, while some environmental issues were the responsibility of other ministries. "In addition to the Bureau for Environmental Protection, the state authorities who deal with the environmental protection are Environmental Protection Agency, which was established in 2004 as a body within the Ministry, the Fund for Environmental Protection, which became operational in 2005, the Institute for Nature Protection, the Republic Hydro meteorological Institute and the Agency for recycling" (Vlada Republike Srbije, 2006, p. 195). Significant organizational innovation within the new institutional arrangements makes the establishment of the Agency for Environmental Protection, whose jurisdiction includes the collection and detailed processing of data on the individual components of the environment in the Republic of Serbia. The main task of the Agency is to overcome the information gap and the establishment and development of an integrated national information system on environmental protection as a basis for the adoption of economically rational and environmentally effective decisions.

In 2004, in order to achieve sustainable management of natural resources and provide a healthy environment, in the Republic of Serbia a new legal framework was laid with the aim of protecting the environment by adopting the Law on Environmental Protection, Law on Strategic Environmental Impact Assessment ("Službeni glasnik RS", no. 135/04), Law on Environmental Impact Assessment ("Službeni glasnik RS", no. 135/04) and Law on Integrated Prevention and Control of Pollution ("Službeni glasnik RS", no. 135/04), followed by a series of by-laws for effective implementation of the Law. The primary purpose of this legislation was the convergence to relevant directives of the European Union and the introduction of their principles into national legislation.

However, the established institutional framework for the protection of the environment was characterized by a high degree of dispersion and overlapping of responsibilities and competences of environmental protection, which acted in the direction of weakening the environmental protection system and ineffective enforcement of laws. For example, a lack of coordination between the law in the area of environmental protection and other laws defining the jurisdiction of other institutions at the national level led to unequal approach to environmental matters and some overlap. This was partly a consequence of the legal commitments of the new Law on Environmental Protection, which gave the highest competence to the ministry responsible for environmental protection, while not specifying a closer relationship of this ministry with other sectors.

A particular problem in the implementation of specific and practical solutions in the field of environmental protection in the period of the State Union of Serbia and Montenegro was related to the undeveloped economic system, which was a real switch in the implementation of solutions in this area. Besides the emphasized institutional weaknesses, the problems in the field of environment were initiated by other reasons, mainly by the poor integration of environmental policy with other sectoral policies and non-rounded environmental legislation, inefficient system of financing of environmental protection and the lack of economic incentives for environmentally conscious behavior, unsustainable use of resources, air pollution from industrial, energy and transport sectors, and the pollution of soil, surface water and groundwater by hazardous substances and waste.

5. ENVIRONMENTAL PROTECTION SYSTEM IN THE REPUBLIC OF SERBIA

With the dissolution of the State Union in June 2006, the Republic of Serbia faced new tasks and challenges in the field of environmental protection. On the one hand, there appeared a need for the elimination of all obstacles to the full response to environmental challenges, initiating institutional transformation (and effective division of competences) and upgrading of legislation through its harmonization with the *acquis* of EU in the field of environmental protection. On the other hand, there appeared a need for setting the strategic basis for more intense realization of activities in the field of environmental protection. The most important support to environmental issues is provided by the adoption of the National Strategy for Economic Development of Serbia for the period 2006-2012, in which the increase in the standard of living and a dynamic and sustainable development are set as the key strategic objectives. The second supporting document is the National Strategy on Sustainable Development, in which the environmental issues receive their full verification. In fact, "one of the national priorities for achieving sustainable development in the Republic of Serbia is connected to the protection and improvement of the environment and rational use of natural resources. It involves the integration and harmonization of objectives and measures of all sectoral policies, harmonization of national legislation with the EU legislation and its full implementation. Priority importance is given to the adoption and implementation of national program of environmental protection and the accompanying action plans, as well as the adoption and implementation of strategy for sustainable use of resources and goods, which were passed by the Government" (Vlada Republike Srbije, 2007, p. 72-73). It is expected that the implementation of the Strategy for sustainable use of resources and goods will reduce unsustainable pressure on natural resources and, thus, indirectly contribute to reducing the level of pollution and environmental damage. The main emphasis is placed on the development of clean technologies, which will, along with the decrease of the environmental impact of economic sectors, particularly energy and industrial, help to increase energy efficiency, and with the use of incentives to use renewable energy sources contribute to the improvement of environmental quality. An urgent task in the coming period is the implementation of the National Environmental Protection Programme, in accordance with the basic principles of the EU Sixth action plan for the environment, in order to make the basic principles of environmental protection and sustainable development. It is essential to adopt an action plan, as an integral element of the strategy, which will support its effective implementation through the precise definition of priority actions, stakeholders, resources and timelines for full implementation of the strategy.

CONCLUSION

Frequent changes in the economic system and economic policy, which insisted on the accelerated industrialization of the country after World War II, are considered to be the key trigger of the ecological crisis, i.e. raising the level of pollution and intensive environmental degradation. The factors that indirectly contributed to increasing pressure on the environment are uncontrolled exploitation of natural resources and inadequate treatment of industrial wastewater.

The state of the environment deteriorated significantly in the early 90s of the 20th century, after the introduction of the new economic system, whose key components, due

to the effects of material, social and institutional constraints, were not defined until its dissolution. In addition, due to the war conflict, the problems in the environment were of secondary importance. Later, the imposition of the international embargo further worsened the condition of the natural resources of the country, and increased pollution due to poor monitoring and the application of obsolete technology. The decline in general economic activity in the period from 1990 to 1999 resulted in some reduction in the level of pollution and environmental pressures. "The economic slowdown in the 90s also contributed to improving the state of the environment in some way. Financial problems of farmers and unavailability of chemicals for agriculture significantly limited their use. The average consumption of fertilizers dropped from about 300 kg/ha to 100 kg/ha of arable land during the 90s, and as a consequence, the large-scale pollution became slightly smaller. This trend could be changed to some extent as a result of economic recovery" (Vlada Republike Srbije, 2007, p. 27). It would be wrong to conclude that the decline in general economic activity directly contributed to improving the state of the environment. Such distorted images are obtained due to inadequate application of indicators of environmental conditions that are really suggestive of a positive trend in the field of environment (for example, reduction of environmentally harmful emissions from industry, or reducing pollution by certain environmental factors) in terms of the decline of GDP. However, the analysis of the dynamics of emissions per unit of production could reveal the true picture, which could show a negative trend in the field of environmental protection, apropos on the inevitable deterioration of the environment with the revival of economic activity.

In order to solve the existing problems, minimizing risks and improving the quality of the environment, in the coming period, along with the intensification of the reform process towards a market economy and a democratic society, it is necessary to establish an environmental management system, which could be achieved through:

- Establishing and providing an integrated system of environmental protection that would allow equal access to the protection of the environment and ensure the harmonization of national legislation with international law.
- Establishing unique economic instruments, improvement of laws and regulations, particularly those in the field of market economy.
- Preparing the guidelines for institutionalized development that is safe for the environment (harmonization of existing development, economic and regional policy).
- Improving technical and technological measures as a basis for decision-making.
- Establishing institutional framework for the effective functioning of the administrative and technical systems for the protection and enhancement of the environment.
- Establishing a unified information system on environment for the entire country, which would include monitoring, cadastres, etc.
- Further democratization in the field of environmental management through direct involvement of academic institutions, industry, non-governmental organizations, interest groups, etc.
- Adjusting the laws to the Constitution through the adoption of the missing laws, and through harmonization of laws at different levels.

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UTICAJ PRIVREDNOG SISTEMA NA POLITIKU ZAŠTITE ŽIVOTNE SREDINE U REPUBLICI SRBIJI

Političkim i ekonomskim promenama u bivšim socijalističkim zemljama početkom devedesetih godina XX veka ne samo da je otvorena mogućnost za budući demokratski razvoj ovih zemalja, već i mogućnost za rešavanje ekonomske, političke, socijalne i ekološke situacije u kontekstu izgradnje novog, tržišnog privrednog sistema. Nepovoljna ekološka situacija u Srbiji uzrokovana je brojnim faktorima među kojima česte promene u privrednom sistemu u prošlosti i neadekvatna privredno-sistemska rešenja zauzimaju posebno značajno mesto. Kritički prilaz uticaju privredno-sistemske rešenja na politička i institucionalna rešenja zaštite životne sredine u SFRJ, SRJ, SCG i RS, usled toga, predstavlja pogodnu polaznu osnovu za razumevanje značaja i potrebe preduzimanja aktivnijeg pristupa u rešavanju ekoloških problema u Srbiji. To ujedno predstavlja i cilj ovog rada. Osim toga, rešavanje problema iz domena zaštite životne sredine od ključnog je značaja za ostvarivanje održivog razvoja i unapređenja konkurentnosti srpske privrede.

Ključne reči: privredni sistem, reforme, politika zaštite životne sredine, Republika Srbija.

CREATIVE ACCOUNTING AND CASH FLOWS REPORTING

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Tadija Đukić¹, Miloš Pavlović²

¹University of Niš, Faculty of Economics, Niš, Serbia

²University of Priština, Faculty of Economics, Kosovska Mitrovica, Serbia

Abstract. *Financial reporting system has been developed to provide reliable information for its users. However, regardless of how much is striving that financial reporting system provides quality information, yet there are certain circumstances that can lead to misleading financial statements. The occurrence of irregularities is affected by the following factors: complex economic reality, the accounting policies and estimates, participants in the process of financial statements preparation and presentation, specific processes within the recognition and measurement of specific positions in financial statements etc.*

Creative accounting is performed transformation of the financial statements of what is really and what the subject want to show using the existing rules and/or ignoring some of them. It can affect the amount of reported profit, the amount of reported net assets and the amount of reported net cash flows from operating activities. In this paper, the term creative accounting will be used for labeling of accounting acts made in order to present the desired and not the real picture of cash flows from operating activities.

Key Words: *financial reporting, creative accounting, cash flows, operating activities.*

INTRODUCTION

In the last few decades there are many scandals about fraud and collapse of big companies such as Enron, WorldCom, HealthSouth and many other less known, which were, according to their financial statements, operating very successfully. As more of these scandals is revealed the distrust in the financial statements and financial reporting and accounting in general is growing more and more. All this leads us to the question: Is it possible to rely on the financial statements and to make right business decisions based on them?; Whether they are and to what degree the information in financial statements are correct?; Do the companies do as they show their business in their reports? This calls into

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Corresponding author: Tadija Đukić

Faculty of Economics, University of Niš, Trg kralja Aleksandra 11, 18000 Niš, Serbia

Tel: +381 18 528 649 • E-mail: tadija.djukic@eknfak.ni.ac.rs

question one of the basic objectives of financial reporting – providing the necessary information for stakeholders.

Also, the question remains what is and what is not allowed in financial reporting. Whether accountants use their resourcefulness too much in preparing financial reports and with such actions overused choices that are allowed by the accounting regulations and whether the information contained in that reports are characterized by intelligibility, relevance, reliability and comparability as the primary characteristics of accounting information.

Each act in the financial accounting that was undertaken in order to create a different image from the real can be classified as creative accounting. There are not clearly defined boundaries of approved and disapproved and not clearly defined when some act in creative accounting made by the accountant exceeds the flexibility of accounting regulations and turns into a criminal act. Creative accounting is applicable to all financial statements. However, the subject of this paper will be a Cash flow statement as the subject of creative accounting.

What has recently evident is the growing importance of indicators based on cash flow compared to the other traditional indicators. The cash has become a central issue for the managers and the main indicator of business performance. That's why in literature we often meet with sayings such as: cash is a king, cash is the fuel that runs the company, cash is the bloodstream of the company...which shows the importance of this resource for the company in the modern business environment. Today, in business world, the company with less degree of profitability and higher degree of liquidity is more respected then the company with reverse performance.

All this, led to the fact that accountants pay more attention to the cash flow reporting and in this field attempt to show the company's operations better than they are. Steps in the reporting of cash flow and creative accounting at all, are possible to be taken in terms of accounting standards, by using their flexibility or beyond them. However, regardless of whether it is permissible or impermissible acts of creative accounting, a common characteristic is to blur the true picture of the business and thus may lead decision makers and other users of financial statements misleading.

In this paper we will highlight the importance of cash flows reporting, define creative accounting as a phenomenon and explain some of possible manipulation with cash flows as a result of creativity in the process of financial reporting.

1. CASH FLOWS FINANCIAL REPORTING

Cash is one of the key elements of the assets of each company, and cash flows are considered as a bloodstream of the company. Lately, the analysts give the advantage to the cash flow analysis rather than profit analysis. Cash flow calculation includes cash items that are excluded from the profit (capital investment, working capital, new loans, repayments of loans from past period...), while profit on the other hand involves more revenues and expenses from the period, independently of cash inflows or outflows.

According to many authors, the cash flow is superior performance measure than profit because of several reasons (Djuričin, Lončar, 2010):

1. Cash flow more accurately shows the performance than profit („cash flow is a fact, profit is an opinion“).
2. Cash flow shows a lower degree of volatility in comparison to the profits that is liable to jumps and falls.

3. Cash flow partiality to the liquidity is more appreciated than profit partiality to profitability.
4. Cash flow is more comprehensive measure that reflects a company performance, since, under the same other conditions, includes the investment and financing.

Accordingly, Statement of Cash Flows is a more appropriate measure of business performance than the Income Statement. The Income Statement includes the effects of activities on accrual basis expressing them as the difference between revenues and expenses allocated to the relevant accounting period. Because of more or less income and inflows mismatching and expenditures and outflows for a specific period, usually the result (profit/loss) reported in the Income Statement (the relation: incomes – expenditures) does not match the result determined on a cash basis reported in the Statement of Cash Flows (the relation: inflows – outflows). Because of that, in practice are often situations that companies despite the high net profit reported in the Income statement have decreasing of cash balance and problems with current liquidity maintaining.

All this indicates that for successful cash flow management it is necessary to “adjust” the result determined on an accrual basis (the Income Statement) so that approximates the net cash inflows from sales activities (Stančić, 2006).

In accordance with IAS 7 – Statement of Cash Flows, cash inflows and outflows during the accounting period are exercised by: operating, financing and investing activities. These three groups of activities include a variety of sources and uses of cash, and are shown in the Statement of Cash Flows.

Cash flows from operating activities are result of primary activities of the company and that are the income-generating activities resulting from the regular business activities of the company. Operating cash flows are related to the following activities: sale of goods, services on the market, payments to suppliers for materials, goods and services, payments of various costs (production and non-production services, payment of salaries and other operating expenses), payments for other liabilities (taxes and contributions...).

Because the operating activities include all activities from the main activity of the company, the sustainability of total cash flows directly depends of the sustainability of cash flows from operating activities.

Realized cash flows from operating activities indicate (Djukić, 2005):

- A level of company’s success in generating net cash flows from operating activities.
- Trends in net cash flows from operating activities during the period.
- Main reasons for the positive or negative net cash flows from operating activities.

The investing activities are related to the evaluation and selection of investments whose lifetime is longer than one operating year, or investments whose effects are expected in the long period of time. Cash flows from investing activities are related to following activities: purchase of property, plant and equipment, sale of intangible assets, investments in long-term financial instruments (stocks, bonds), as well as the sale of securities in the financial market.

Transactions from financing activities are those that a company receives from shareholders and creditors. These activities as a result have the change of the size and structure of companies funding – the relationship between own and borrowed capital.

Cash inflows and outflows arising from these three activities are presented in the Statement of Cash Flows as one of the basic financial statements. Statement of Cash Flows explains how the amount of cash as an item in the Balance Sheet at the beginning of the period became another cash amount shown in the Balance Sheet at the end of the reporting

period, and what is, in the reporting period, contributed to that (Libby, Libby, Daniel, 2011). Accordingly, the Statement of Cash Flows provides users with the following information (Pavlović, Bogdanović, 2013):

- Where from does the cash come during the reporting period.
- How cash is used during the reporting period and
- What are the changes in cash on the end compared to the beginning of the period.

Cash flows reporting is regulated by the International Accounting Standards (IAS), and especially IAS 7 – Statement of Cash Flows. Within these there are rules defined for preparation and presentation of this report, but however there is left a space to accountants to maneuver within the prescribed rules and thus affect the final image of the company's business.

2. DEFINITION OF CREATIVE ACCOUNTING

In the modern business environment which is primarily characterized by turbulence, dynamism and every day survival risk increasing for even most successful companies in the market, management is under constant pressure to achieve defined strategic corporate objectives and therefore make a good impression in the eyes of the owner. In order to protect themselves and to make a good impression as managers, even in the situations when it is not possible to make a good result, managers can dare to certain illegitimate actions. More precisely, if management do not achieve the good financial performance of the business that do not meet the expectations of the owners, they can use some accounting procedures in order to improve final appearance of financial reports and amounts in financial statements and to present them different from the real situation. According to this, we can make a distinction between pure and creative accounting.

The term „pure accounting“ means accounting in real financial reporting and preparation and presentation of financial statements in accordance with the prescribed Framework for Financial Reporting, i.e. Reports that do not contain significant material errors and irregularities, which objectively and fairly reflect the asset and profitable position of the company. It is the accounting that is legal and legitimate. By contrast, „creative accounting“ means the intentional taking of measures aimed at the preparation of financial statements that don't show the right material and yield strength of the company. It can be said that there has always existed certain adroitness (creativity) of accountants in preparing financial statements, but that it had never had this big size and that the consequences were not so much visible as it is the case in recent years.

In the professional literature from this area, there are different definitions of creative accounting such as:

- creative accounting involves the shaping of financial statements using the right choices and other actions permitted by the accounting regulative (Amat, Gowthorpe, 2004).
- creative accounting includes all the accounting practices that intentionally deviate from the standards in order to present desired and not real picture of the yield and financial strength of the company (Škarić-Jovanović, 2007).
- creative accounting includes a gain control and manipulation in connection with the classification of either the Balance Sheet or in the Income Statement (Škarić-Jovanović, 2011).
- The American Institute of Certified Public Accountants (AICPA) defines false financial reporting as intentional inaccuracy or omission of amounts or disclosures in

financial statements in order to deceive the users of financial report. This can include: manipulation, falsification or modification of the accounting records and accompanying documents, which are used in financial statements preparation; inaccurate (false) representations or deliberate omission of significant events or transactions from financial report and intentional misapplication of the accounting standards and rules (Stefanović, 2000).

- Creative accounting is the biggest scam after the Trojan horse (Dmitrović-Šaponja, 2007).

- Creative accounting is the process whereby accountants use their knowledge of accounting rules to manipulate the figures reported in the financial reports (Amat, Dowds, 1999).

According to most authors, the most complete definition of creative accounting is one which says that: “creative accounting includes any and all actions, including the aggressive choice and application of accounting standards, false financial reporting and all other steps taken to manipulate the data in the financial statements” (Mulford, Comiskey, 2002).

From the above definitions it is evident that creative financial reporting seriously derogates the usability of the financial statements, whether in terms of direct use of information which it contains, or in term of information basis for a serious analysis of the performance of a company.

The financial statements preparation respecting IAS is not a guarantee that they will accurately reflect the financial position and performance of the company, because it is possible to make steps of creative accounting even in the boundaries of IAS. The image of the company can be blurred further if steps of creative accounting are taken out of boundaries of IAS. Accordingly, it can be concluded that in terms of financial statements, measures of creative accounting undesirable because that financial reports don't provide a clear picture of the company, and therefore don't allow users making correct business decisions.

With measures of creative accounting, management of the company may affect the level of reported profit, the amount of reported net assets and the amount of reported cash from operating activities. In this paper, the term creative accounting will be used for marking of accounting practices that purposely deviate from the standards in order to present to the external users desired and not real picture about the cash flows from operating activities of the company.

3. CASH FLOWS CREATIVE REPORTING

Creative reporting of cash flows is relating to any step in order to create a different image than the actual cash flows, and in that way providing the wrong signal about the ability of the company to generate sustainable cash flows (Mulford, Comiskey, 2005). When we say sustainable cash flows, it is thought on cash flows from operating activities that is repeating from year to year. If there is some inflows of cash in only one year and in next year there is not we are not talking about sustainable cash flows. So, the main characteristics of sustainable cash flows are that they are cash flows from operating activities and are repeating from each operating year. According to that, in order to be successful, a company needs to achieve positive net cash flows from operating activities in the amount that is not less than in the amount in previous year.

All activities in the field of Cash flows creating accounting are focused on increasing net cash flows from operating activities. Achieving such result is possible in two ways:

1. By taking measures of creative accounting that are according IAS – within the limits prescribed by IAS and/or

2. By taking a measures of creative accounting that are beyond limits prescribed by IAS.

As it is already said, sustainable cash flows are directly depended on the cash flows from operating activities. IAS are clear in defining the cash flows from operating activities. Within these, there are considerable flexibility in their calculation and reporting. Some accountants are showing a willingness to take advantage or IAS flexibility in order to increase the presented amount of cash flows from operating activities. Despite the fact that these activities increase net cash flows from operating activities they do not increase sustainable cash flows since it is mainly a one-time increase.

In practice, there are many examples of cash flows reclassifying that artificially increase the net cash flows from operating activities by decreasing net cash flows from financing or investing activities. Below we listed some of them.

3.1. Operating vs. Investing activities

According to IAS 7 (paragraph 16), cash flows from investing activities includes cash outflows incurred to obtain the resources to participate in the creation of future earnings and cash flows and the cash invested in securities.

Many accountants and managers, with techniques and methods of creative accounting in accordance with IAS, are trying to increase the net cash flows from operating activities by reducing net cash flows from investing activities. There are three possibilities for that allowed by IAS regulations and may concern:

1. Investments held for trading.
2. Operating costs capitalization and
3. Acquisitions.

According to the IAS, investments in debt or equity securities can be classified like:

1. Investments held for trading.
2. Investments held to maturity.
3. Investments available for sale.

Investments held for trading are in the function of exploitation of short-term price fluctuations of these securities and on this basis profit generating. Holding periods are very short, sometimes shorter than one day.

Debt securities held to maturity are investments for which is the company's intention to hold them to maturity in order to cash it on the day of maturity with interest accrued.

Investments that don't belong to previous two groups are classified as investments available for sale. Depending on the time that elapses from the time of their acquisition to the date of sale investments available for sale can be classified as long-term or short-term investment.

The way of investment classification is in connection with classification of cash flows appeared from their buying or selling.

When investments are classified in the group of those held to maturity or available for sale, the cash outflows/inflows for their purchase/sale are classified as cash flows from investing activities. Unlike them, the cash flows of investments which are classified in the group of those held for trading belong to the group of cash flows from operating activities.

There are not strict rules for investment classification. That flexibility gives to the accountant's opportunity, if necessary, to rearrange cash flows by activity. If we invest in buying short-term securities, the cash outflows for that transaction belong to a group of investing activities. However, when we bought them, we can move them to a group of investments held for trading. With that action, after selling such securities, cash inflows from selling it belongs to a group of operating activities. With such transaction, we decreased net cash flow from investing activities (at the moment of their buying) and increased net cash flows from operating activities (at the moment of their selling).

The situation would be different if we have company whose main activities are trading with securities, like some financial institution (bank, insurance company...). Only in that case it is naturally to classify such activities as operating, but if it is not the case we shouldn't do such classification, primarily, because it is not sustainable cash flow and will appear only once (when the transaction of selling is done).

IAS provides a choice on certain operating costs in terms of whether it will be capitalized or will be reported as expenses at the moment of their occurrence. When they are considered as expenses, they reduce net income and net cash flows from operating activities. However, by capitalization, they are presented as outflows within investment activities and do not affect the cash flows from operating activities.

Costs of period are, in some cases in order to show better result (profit), capitalized, included into the value of an item of fixed assets and don't represent an expense of the period. They will be shown as expense at the moment when that item of fixed assets is amortized, so it will be written off gradually in a series of future periods. The most commonly used cases are:

- Capitalization of expenses for advertising campaign according to the IAS 38 – Intangible assets - advertising costs are very high, especially for new products marketing and they are particularly high in the early stage of product launch. In this stage the income from that product is on a very low level, so the companies, in order to show a better result, push expenses from the current period into future periods by capitalization of these costs.
- Capitalization of research and development costs – these costs also make expense of the period, but in some cases they are capitalized (according to the IAS 38).
- Capitalization of costs incurred directly before the factory opening – costs of establishing are not capitalized, but in many cases this practice is recorded (IAS 16 – Property, plant and equipment).
- Capitalization of maintenance and repair costs – these are typical operating costs required for the normal functioning of the assets to which they relate, but in certain cases, in order to improve the business result and performance, they are being attributed to an item of fixed assets (according to the IAS 16).
- Capitalization of interest on loans taken for purchase of fixed assets - in accordance with IAS 23 – Borrowing costs, the capitalization of interest on loans that are taken for purchase of fixed assets is permissible procedure. Capitalization of interest leads to higher net cash flows from operating activities because the amounts of capitalized interest increases the cost value of the fixed asset, and lower net cash flows from investing activities. This procedure should be disclosed in the Notes to the Financial Statements.

The company WorldCom is an example of creative accounting that did capitalization of expenses that are typical expenses of the period. In this way the company has falsely

increased net income and net cash flows from operating activities of approximately 3,8 billion US dollars. The company HealthSouth capitalized costs of sponsoring hockey team in Pennsylvania and the cost of advertising in newspapers.

Contrary, in period from 1997 to 1999 the Microsoft Company didn't capitalize the costs of development, although it is allowed. Microsoft treated that costs as the costs of the period which resulted in lower financial result than it was in reality. The motivation for such an action was attention to reduce monopoly.

Typical examples of the expenses that are capitalized are costs of software development. In accordance with IAS 38 – Intangible Assets, capitalization of additional costs is required when it reaches technological feasibility. However, it is questionable if and when is that level reached, and therefore there is a great freedom in determining that moment and the moment when the additional costs would be capitalized.

By its recognition at the time of occurrence, the costs of software development affect net income and net cash flows from operating activities. But, when they are capitalized they are cash outflows from investing activities and do not affect the cash flows from operating activities, which positively affects the net cash flows from operating activities.

The level when technological feasibility is reached is the level where the additional amortization of capitalized costs of software development from the previous period is approximately equal to the new capitalized costs in the current period. It means that the effects from that capitalization are about zero. However, analysts do not need to worry so much about the effects on earning of companies, but concerns should be directed to the policy of capitalization. Even when the effects on earnings of capitalization are zero, cash outflows are still treating as outflows from investing activities that is continuously increasing net cash flow from operating activities.

The effects of capitalization on the cash flows from operating activities are particularly noticeable when the company is changing its policy of capitalization.

Acquisition of the company is a business action in which one company – Buyer Company takes other company – Target Company and after that the target company is doing business within the main company. When a Buyer Company did such transaction, from that moment, the results of the Target Company are included in financial reports of the Buyer Company. Thus, the acquisition could be in the service of increasing profit and net cash flows from operating activities. Increasing of net cash flows from operating activities from acquisition is not sustainable, it is only one-time transaction.

Working capital increased through accounts such as receivable, inventories, accruals... reduce net cash flow from operating activities. When the specified working capital decreases the result is increasing of net cash flow from operating activities.

According to IAS 7 (paragraph 39), Cash flows from working capital got from acquisition, are presenting separately and classifying as investing activities. However, the liquidation of working capital, and in the case where it comes from acquisition, is presenting like additional cash flows from operating activities.

3.1. Operating vs. Financing activities

Cash flows from financing activities is consisted of cash inflows and outflows from the issue of shares and other securities, debt repayment, purchase of own shares, payment of dividends... As the cash flows for investing activities, cash flows from financial activities are not sustainable cash flows as it is the case with cash flows from operating activities.

IAS flexibility can be used to increase the inflows of operating activities by decreasing the inflows of financing activities. Within the IAS, there are three ways for such activities:

1. Current account overdrafts classifying as operating inflows and not as financial.
2. Receivables selling.
3. Supplier's credit.

Within IAS 7 (paragraph 8) states: Bank borrowings are generally considered to be financing activities. However, in some countries it is allowed that bank overdrafts repayable on demand are integral part of company's cash management. In these cases, allowed bank overdrafts are included as a component of cash and cash equivalents. The characteristics of such arrangements are that the bank balance often fluctuates from positive to negative (in the amount of allowed overdraft). Having this flexibility, many companies, by using allowed overdrafts, increase their cash inflows from operating activities.

Sale of receivables is another option available to the accountants to increase net cash flows from operating activities by decreasing net cash flows from financing activities. Reducing the amount of receivables and increased cash inflow will increase net cash flow from operating activities. The company has legitimate right to use Factoring in order to collect its receivables, however when receivables are putted as collateral for a loan, all proceeds on the basis of them should be threaded as financing activities.

According to some authors, sales of receivables and operating cash flows are two entirely different things. Sales of receivables are just cheap sources of financing, and as such should belong to cash flows from financing activities. (Sender, 2002).

Supplier's credit is a form of financing that is, in accordance to IAS, presenting as cash flows from operating activities. Increasing inflows from operating activities, on the one hand, results in an increase in liabilities to a supplier on the other. Extension of time for payment, liabilities to a supplier can be an effective means to increase working capital. However, additional amounts of cash, achieved in this way, are not sustainable. It will be repeated next year only if there is a further extension of time for payment (if it is 45 days in the current year, next year it should be more than 45 days).

CONCLUSION

It is evident that the creativity of accountants in presenting the results of the company occurred even before the occurrence of the creative accounting as a term. But the creativity of accountants today is much greater than in the past. As a result of that creativity, we have increasingly undermining the credibility of financial statements and the accounting profession.

The importance of information provided by Statement of cash flows to its users only increased the need for creativity in this field of reporting. The importance of cash flows from operating activities compared to the cash flows from financing and investing activities led accountants to distort the true picture of the cash flows and to make steps in increasing net cash flows from operating activities, by decreasing net cash flows from investing and financing activities. Such cash flows are not sustainable and it is obvious that accountants with those actions want to present some distorted picture of cash flows. Most of these measures (often all) gives only one-time increase in net cash flows from operating activities, and do not improve sustainability.

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KREATIVNO RAČUNOVODSTVO I FINANSIJSKO IZVEŠTAVANJE O TOKOVIMA GOTOVINE

Sistem finansijskog izveštavanja je razvijen tako da obezbedi pouzdane informacije za njegove korisnike. Međutim, bez obzira na to koliko se teži da sistem finansijskog izveštavanja obezbedi kvalitetne informacije, uvek postoje određene okolnosti tj. slabe tačke koje mogu dovesti do neispravnih finansijskih izveštaja. Na pojavu nepravilnosti utiču sledeći faktori: složena ekonomska stvarnost, računovodstvene politike i procene, lanac učesnika u procesu sastavljanja i prezentacije finansijskih izveštaja i specifični procesi u okviru priznavanja i merenja pozicija u finansijskim izveštajima.

Kreativnim računovodstvom se vrši transformacija finansijskih izveštaja od onoga što je stvarno u ono što subjekt želi prikazati koristeći postojeća pravila i/ili ignorišući neka od njih. Kreativnim računovodstvom može se uticati na visinu iskazane dobiti, visinu iskazane neto imvine i visinu iskazane neto gotovine iz poslovnih aktivnosti. U ovom radu termin kreativno računovodstvo će biti korišćen, za označavanje svih računovodstvenih praksi koje namerno odstupaju od standarda da bi eksternim korisnicima bila prezentirana željena a ne stvarna slika o novčanim tokovima iz poslovne aktivnosti preduzeća.

Ključne reči: finansijsko izveštavanje, kreativno računovodstvo, novčani tokovi, poslovna aktivnost.

SYNERGISTIC EFFECTS OF INTERNAL AUDIT AND LEAN-SIX SIGMA CONCEPT ON BUSINESS PROCESS IMPROVEMENT

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Milica Đorđević, Bojana Novičević Čečević

University of Niš, Faculty of Economics, Niš, Serbia

Abstract. *Faced with a series of challenges within the environment in which they operate, companies are more than ever aware of the fact that efforts aimed at improving business processes are some of the basic conditions, not only of growth and development, but also of the survival of the company. Only in this way can the opportunities for achieving different dimensions of competitiveness be created (in terms of costs, quality, delivery reliability, speed of monitoring the changes in demand, introduction of new products, etc.). Business process improvement can be implemented with the support of a number of concepts, among them being lean-six sigma. However, the great potential in this regard also lies in internal audit. In this regard, this paper will first discuss the essence and assumptions underlying the internal audit and lean-six sigma concept, and then review the possibilities of their integration in order to achieve better results.*

Key Words: *internal audit, lean-six sigma, process improvement.*

INTRODUCTION

Contemporary environment in which the companies conduct their business activity is characterized by constant and very rapid changes in all segments. In addition to its dynamic character, the environment is becoming increasingly complex, with increased number of components, their internal complexity, and the interaction among them. Under such circumstances, successful business can be realized only by those companies which continually adapt to these changes, not only through the creation of new business systems, but also through the continuous improvement of their existing business processes. Therefore, the guarantee of success presupposes the achievement of higher levels of effectiveness and efficiency of business processes, i.e. the achievement of desired results through the right way of the performance of business processes.

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Corresponding author: Milica Đorđević

Faculty of Economics, University of Nis, Trg kralja Aleksandra 11, 18000 Niš, Serbia

Tel: +381 18 528 663 • E-mail: milica.djordjevic@eknfak.ni.ac.rs

Approaches to business process improvement, which have been developed in practice, are numerous and their starting points are different. Among other things, internal audit and lean-six sigma concept, which stand for the subject of this paper, have completely different assumptions and methodology for business process improvement. However, despite the significant effects of business process improvement experienced by a number of companies that have implemented some of these approaches, practice has given birth to the idea of their integration. Therefore, in addition to the focus on business process improvement in the company, this could produce significant positive effects on the implementation of the very approaches.

1. INTERNAL AUDIT AND LEAN SIX SIGMA – CONTEMPORARY APPROACHES TO BUSINESS PROCESS IMPROVEMENT

The necessity of continuous business process improvement conditioned the practical development of different methodologies, techniques, tools, and programs. Some of the most famous are JIT and TQM system [more on that in 3]. Moreover, internal audit and lean-six sigma emerged as very useful approaches. Although these approaches have a different starting point, the methodology, the focus and the effects, the fact is that their contribution to the business process improvement is extremely high. The remainder of this paper will briefly reflect on the essence of these approaches.

1.1. Internal audit

The development of internal audit is associated with the development of accounting, when its primary purpose was to reduce errors in bookkeeping, prevent fraud, and misappropriation of assets. However, with the development of companies and the separation of the management from the ownership, its scope of activity, powers, and responsibilities have continuously evolved [5, 126-127]. So, today, internal audit provides the major contribution to the achievement of companies' goals and implementation of strategies for the achievement of these goals [9, 138]. Besides providing assurance that the information contained in the books accurately reflects the facts, internal audit evaluates the policies, procedures, use of authority, management quality, effectiveness of methods, special problems, and other phases of operations [6, 4]. Therefore, in addition to the financial audit (which aims to verify the reliability of accounting and financial statements), internal audit covers the so-called operational audit, which involves evaluation of business processes in general. Operational audit has the 3E characteristics, as it involves "a systematic process of evaluating an organization's effectiveness, efficiency and economy of operations under management's control, and reporting to appropriate persons the results of the evaluation along with recommendations for improvements" [17]. In accordance with this definition, operational audit involves the use of logical, systematized, and organized set of procedures, aimed at determining whether the policies and procedures that the companies apply can produce optimal levels of efficiency, effectiveness, and economy of business processes. In this regard, its scope involves:

- the assessment of whether the business practice (procedure) is suitable, not just the consideration of the extent to which the procedures are carried out, and
- the monitoring and evaluation of the procedures that are not related to accounting, financial, and administrative affairs, as well as the procedures used to conduct operations in the field of production and services [2, 291].

Therefore, the operational audit focuses on the future, because its purpose is the improvement of business processes that are carried out every day in the company. It assists all members of the company's management in carrying out their responsibilities, as well as employees at all levels to keep their work and the work of the whole company within the pre-defined limits. Internal auditors perform the assessment in relation to who, how, when, where, and how efficient and effective execution of business processes is achieved. This is primarily achieved through various analyses and assessment of the existing organizational structure, internal control system, the flow of the work process, the management performance, and the like.

The result of the operational audit is the report whose content may vary from the identification of potential "weak" points where there is a need for improvement, making recommendations regarding that improvement, the general recommendations regarding the use of the company's resources, recommendations regarding the training of the staff, reconstruction of the organization, the ways for the achievement of greater efficiency of the internal control systems, improvement of communication, information system, etc., all with the aim of achieving long-term benefits.

1.2. Lean-six sigma business concept

Lean six sigma business concept is a combination of lean and six-sigma concepts, as the two most important processes of improvement of the companies' performance, which have been developed in practice. Combining these procedures results in significant business process improvement, as it involves pooling their advantages with the aim of identification and solving problems in the execution of business processes. In this way, lean-six sigma provides an opportunity for better and faster work. The perception of the impact of lean-six sigma concept in business process improvement involves, above all, understanding of the essence of lean and six-sigma concepts separately.

Lean concept presupposes a philosophy of management that is focused on the elimination of all forms of business process defects. Considering that it was developed at the company Toyota during the nineteen-fifties, with the aim of connecting all elements of the production process in a continuous stream, the most important and most obvious results of the lean concept appear in the process of production (reducing time losses, reducing the binding of assets in various forms of inventories, savings in space, human resources, machines, etc.). For these reasons, lean terminology was at first related to the production only. Indeed, by constant striving for perfection, the establishment of the value stream, search for non-value-added activities and attempts at their elimination, lean manufacturing represents the revolution in the production process of the company [4, 244].

However, in order for the lean to have a full effect, the whole enterprise must adapt to the philosophy of continuous production process improvement and elimination of unnecessary costs. For these reasons, it is necessary that all employees in the company

understand the core of the concept, and to direct their efforts to its adequate implementation. In such situations, the focus is on the lean company that is market-oriented, integrated and flexible, with high level of internal and external coordination of business activities, and the frequency of rapid flow of material resources and information, as well as a comprehensive approach to performance management [12, 145-146].

Lean business involves an integrated approach to efficient value creation by connecting all processes in the company in a continuous flow, while eliminating non-value-added activities, reorganization of work through teams, and constant striving for improvement. In addition, such a comprehensive business system that strives for the acceleration of all processes involves the application of the key principles of lean concepts, namely:

- Recognition of waste, i.e. all processes that do not lead to value creation
- Standardization of processes – defining precise and detailed procedures, which reduces variation,
- Creating a “value stream”, thus eliminating non-value-added activities, reducing defects, interruptions, eliminating waste, etc.,
- Pull system – performing only the necessary processes and only at the moment when there is a need for them,
- Quality at the source – detection of errors in their very creation,
- Continuous improvement – striving for perfection by constant elimination of waste [16, 313].

Therefore, increasing efficiency, which is necessarily associated with the speed and quality of the process implementation, is the main driver of lean concept. Using different instruments and techniques in business processes leads to the achievement of the main goals of implementation of lean concept, which are reflected in the elimination of waste, continuous flow of production, high quality, optimizing the time of process implementation, optimizing human resources, assets, and productivity.

The Six Sigma concept is based on a detailed analysis of the processes that are focused on creating and delivering value to the end customer, in order to monitor and identify the errors and their causes, as well as on the application of appropriate techniques and tools for eliminating errors and improving quality. Six Sigma can be defined as „as a business process that allows companies to drastically improve their bottom line by designing and monitoring everyday business activities in ways that minimise waste and resources while increasing customer satisfaction by some of its proponents” [Magnusson et al., according to: 11, 693].

Six Sigma involves the use of data and statistical analysis tools for determining average process performance and output quality variations [14, 14]. The concept is based on the hypothesis that the data on the process performance can be represented by normal distribution. By determining deviations of actual process indicators from the normal distribution curve, the quality of the process is evaluated (unit of deviation, in statistical terms, is sigma). Certainly, the lower the value of sigma, the lower the waste and the narrower the distribution curve, i.e., if the process performance is within the established limits of deviation, it is considered that the level of quality of the processes is high.

Implementation of Six Sigma concept implies the five-phase methodology, known as DMAIC (**D**efine, **M**easure, **A**nalyze, **I**mprove, **C**ontrol). The essence of this methodology lies in the preliminary definition of the problem to be addressed, with the aim of bringing the business process performance to the predefined level or within the allowed level of deviation. The next phase involves the use of appropriate metrics, with the aim of quantifying or determining the limits (values) of deviations from the satisfactory level. This sets the basis for the third phase, i.e. the development of analytical tools for their deeper consideration and identification of the causes of deviations. Well-conducted first three stages allow for the proper implementation of the fourth stage, i.e. arrival at the solution focused on removing deviations by influencing key factors identified in the analysis. At the end of this methodology, the focus is on the establishment of control and monitoring of the results from previous phases, all with the aim of maintaining improvement and preventing the recurrence of observed errors.

By rigorous, focused, and effective implementation of proven high quality principles and techniques [15], six sigma contributes to the raising of the level of product quality and customer satisfaction, reducing the number of defects and shortening the production cycle, thereby simultaneously ensuring productivity growth and ultimately increasing profitability and profit.

Based on the foregoing, it can be said that Lean and Six Sigma are certainly concepts that provide the basis for the business process improvement in the company. However, bearing in mind that Six Sigma focuses more on the quality of the processes, rather than the speed of their performance, whereas lean concept is primarily focused on the speed of process realization, their integration into the new so-called lean-six sigma concept leads to significant benefits. Therefore, the lean six sigma concept involves the application of a phased approach DMAIC. In this process, when the optimal “value stream” is determined, lean idea focuses on the identification and determination of additional value, and then six sigma tools are used to help identify and reduce variation. In this way, lean - six sigma provides a disciplined approach to problem solving, which accelerates the implementation of already existing ideas, introduces the standard methods into practice, and brings measurable results.

After consideration of the essence of the internal audit, lean, and six-sigma concept, the presentation of the comparative review of their approach to business process improvement would be significant (Table 1).

The table above clearly shows that internal audit, lean, and six sigma concepts have different starting points in the business process improvement, that they apply different methodology, and achieve different effects. Also, each of these approaches to business process improvement has certain shortcomings, which calls for the need and the perception of opportunities for their integration, in order to achieve synergistic effects.

Table 1 Comparative review of internal audit, lean, and six sigma

Program	Operational audit	Lean	Six Sigma
Theory	Adding value	Remove waste	Reduce variation
Application guidelines	1. Plan 2. Perform 3. Analyze 4. Recommend 5. Follow-up	1. Identify value 2. Identify value stream 3. Flow 4. Pull 5. Perfection	1. Define 2. Measure 3. Analyze 4. Improve 5. Control
Focus	Cross functional business processes	Flow focused	Problem focused
Assumptions	Assessment of organization risk, capability and performance.	Waste removal will improve business performance. Many small improvements are better than systems analysis.	A problem exists. Figures and numbers are valued. System output improves if variation in all processes is reduced
Primary effects	Meeting organizational goals.	Reduced flow time	Uniform process output
Secondary effects	Identify poor work practices in order to improve them. Assist in the evaluation of quality control procedures adopted. Evaluate implementation processes. Improving the efficiency and effectiveness of operations and increasing customer satisfaction.	Less variation. Uniform output. Less inventory. New accounting system. Flow-performans measure for the managers. Improve quality.	Less waste. Fast throughput. Less inventory. Fluctuation – performance measures for managers. Improved quality.
Criticism	Operational auditors more expert in the field of audit than in the field of business.	Statistical or system analysis not valued.	System interaction not considered. Processes improved independently.

Source: [11, 696]

2. DIRECT IMPACT OF INTERNAL AUDIT ON THE FUNCTIONING OF LEAN-SIX SIGMA BUSINESS CONCEPT

Today, after acknowledging the experiences of a number of multinational companies, there is no doubt that Lean Six Sigma is a proven and complete concept that, in addition to being aimed at speeding up and improving the quality of business process implementation, at the same time implies the constant improvement of business activities. It is believed that Lean Six Sigma is the perfect concept, as its improvement is not expected from some external experts, but from adequately trained and competent persons who are part of the team that implements lean six sigma concept, monitors the defined processes and their implementation, and sees room for their improvement on the basis of adequate analyses. However, the fact is that it is a relatively complex concept, whose planning, introduction to business, and application can be very costly and even risky if not adequately managed and controlled. The reasons for this standpoint are the following:

- There may be constraints in project management – implementation of lean six sigma concept involves proper setting of goals, planning, and implementation of different activities. Sometimes there may be gaps, especially if the team whose responsibility is the implementation of the concept performs the work along with their regular duties.
- Poor budget controls – focus on the benefits of applying lean six sigma principles ignores the analysis and control of costs that can be very high.
- Limited supporting documentation – although it is always necessary to provide documentation which confirms the implementation and results of the application of the concept, the requirements in this respect are not as rigorous, which is why only minimal supporting documentation is often provided.
- Failures to coordinate six sigma efforts– the implementation of six sigma concept often involves hiring a team of experts from various fields, who carry out their responsibilities in this process in parallel with the everyday job for which they are responsible. Such a situation may be the cause of a number of errors in the coordination of activities, which is why it is appropriate to provide a multidisciplinary management program [10, 718].

Bearing all this in mind, the assessment of the application of lean six sigma concept becomes necessary, especially in the beginning, when the companies are aware that its satisfactory introduction and implementation will require a lot of time and effort.

In this regard, the significant contribution is provided by internal, i.e. operational audit, as its integral part, which controls and assesses the implementation of the entire lean six sigma concept. Its aim is to assess the efficiency, effectiveness, and frugality of implementation of lean six sigma concept, and point out any flaws or omissions that need to be overcome. More specifically, operational audit procedures determine deviations of what “is”, i.e. what has been achieved, from what “should be”, i.e. what has been pre-defined. In this sense, the essence of the assessment of the application of lean six sigma concept can be illustrated as follows (Figure 1).

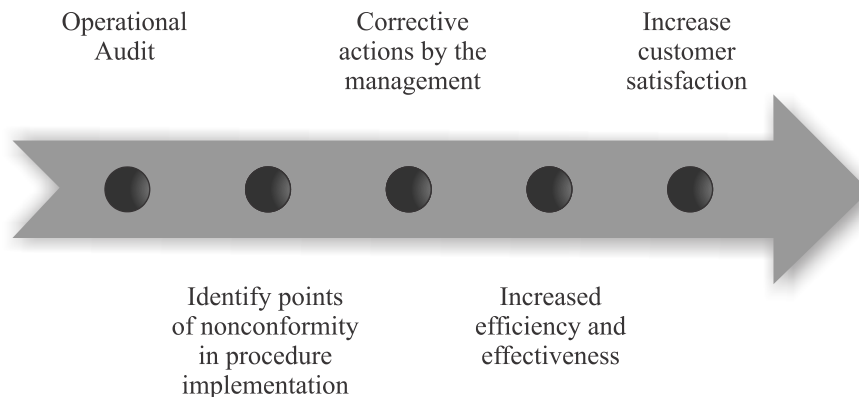


Fig. 1 Impact of operational audit on increasing customer s' satisfaction

Source: [13]

Therefore, operational audit identifies points of nonconformity of implementation with predefined procedures, reports to the management of the company thereof, which is expected to perform corrective actions with the aim of increasing effectiveness and efficiency, which undoubtedly should lead to increased customer satisfaction. Its significance in the present context lies in the fact that:

- It provides assistance in the evaluation of the mode of application and quality of implementation of lean-six sigma procedures adopted by the company,
- It provides assistance in identifying poorly managed procedures,
- It provides valuable suggestions which create room for improvement,
- It contributes to increased levels of customer satisfaction, and so on.

Certainly, operational audit has highly developed techniques and tools. However, in assessing the application of lean-six sigma concept, special attention must be paid to the adequacy of internal audit procedures that need to be carried out, bearing in mind that lean-six sigma concept is a very sensitive area. It involves:

- Adequate planning and distribution of audit activities (defining a clear goal of review and assessment, confirming the planned operational audit activities with the management and staff responsible for implementing lean six sigma concept, etc.);
- Assessment and understanding of the lean six sigma oriented company (consideration of recent achievements and ongoing projects, consideration of the number and responsibilities of staff involved in the implementation of this concept, review and assessment of the budget allocated to the implementation of lean six sigma concept, determination of the reasons for any deviations, evaluation of the effectiveness of the supporting lean six sigma systems, communication process, etc.);
- Review and assessment of the lean six sigma project management process (review of procedures relating to the concept development, planning, and management, determination of whether the appropriate goals of the concept are established and adequate monitoring, review of the documentation related to the concept implementation through the sampling system, determination of the adequacy of procedures for reporting on the progress and results of the application of the concept, etc.);

- Confirming the consistent application of DMAIC methodology in one of the completed projects;
- Assessment of the adequacy and completeness of the application of the concept (where possible, consideration of the focus of realization of the concept on: improving the use of resources, increase of revenue and profit, improving customer relations and service, new product introduction and process improvement, assessing the results and the level of achieved improvement of the specific project through the method of random sample, etc);
- Identification of whether the communication tools are adequate and whether they provide timely communication of the results of the concept application to interested parties [10, 720].

What is in this place particularly important to emphasize is the fact that the implementation of the above audit procedures should not jeopardize the continuity of implementing lean six-sigma concepts – in terms of its suspension during the audit. In addition, it is a basic condition for ensuring the independence of the audit that, in fact, is its essence.

Also, audit can achieve the full potential in the process of improving the implementation of lean six sigma concept if it fully knows its essence and characteristics. The focus here is on the fact that internal auditors need to be able to identify and focus on high-risk areas of application of the concept and be able to test the established system of performance measures (in the sense whether the performance measurement system is adequate, whether the measures are in line with the strategic objectives of the concept, whether the performance measures are accurately determined, how the reporting on actual performance is done, etc.). Also, internal auditors should compare the realized performance with the best practice or internally established standards, because in this way it is possible to isolate areas where the implementation of lean six sigma concept has flaws, or identify better ways to perform activities in the tradition of other companies [18, 8-10]. It certainly carries with it certain challenges that internal auditors should face: possession of knowledge, skills, and experience in various fields in which the lean six sigma concept is applied.

3. FEEDBACK EFFECT OF LEAN-SIX SIGMA BUSINESS CONCEPT ON INTERNAL AUDIT

By identifying and eliminating non-value-added activities, and then by focusing on quality improvement of the business processes, lean six sigma concept finds its application and contributes to improving not only the production process, but also those processes that are focused on providing services, those in the financial sector, and others. Hence the idea of using this concept, i.e. the incorporation of lean six sigma methodology in internal audit with a view to its improvement seems fully justified.

Certainly, it is a fact that each application of internal audit has its own peculiarities and differs from others, which is why certain principles of lean six sigma concept can not be strictly embedded and applied in all processes of internal audit [10, 719]. However, the basic principles of lean six sigma concept, which are reflected in the ongoing monitoring of activities and the elimination of errors and shortcomings, are certainly the most important and applicable in internal audit. These activities undoubtedly contribute to the overall quality of the internal audit.

The possibility of incorporating DMAIC methodology in internal audit is shown in Table 2.

Table 2 Five steps of successful internal audit

Lean six sigma phase	Corresponding internal audit phase
Define	Planning
Measure	Performance
Analyze	Analysis
Improve (redesign)	Recommendations
Control	Follow-up

Source: [1, 40]

As already mentioned, the first phase of lean six sigma concept involves defining the problem or problematic process and key factors of the process that needs to be addressed – measure, analyze, improve, and control them. The first phase of internal audit – its planning – should be approached in a similar way. Adequate planning of internal audit should contribute to a proper decision on the implementation of the priorities of the internal audit, and then to the determination of the goals to be achieved. In addition, the internal audit plan should be based on knowledge of the specifics of the company's operations, and it has to support its development strategy. For these reasons, for the proper implementation of the first phase of lean six sigma concept, as well as for internal audit planning, it is advisable to develop a map of the process. Process mapping provides better detection, understanding, and evaluation of potential defects and problems.

Important goals to be achieved at this stage are: [1, 40]

- *Creating project documentation* – the focus is on the formal documentation which defines the purpose of the internal audit activities and its scope, which involves the identification of key activities and areas in the company to be included in the audit, and their prioritizing according to certain criteria. Also, it is important to clearly define the number and qualifications of people who will be involved, to define their powers and responsibilities, to assess the request for resources, and so on.
- *Providing support to the company's management* – in this regard, the company's management perceives the process of internal audit as important for business process improvement. Only in this way, the management will accept the recommendations of the internal audit, focused on removing the shortcomings in processes, and make further efforts to overcome barriers to further improvements.
- *Define project outcomes* – outcomes that are expected from the implementation of the recommendations of the internal audit must be determined and measurable. They can be expressed in increased production of a number of units, cost saving, and the like.

Measurement is the second phase, which involves a number of financial and operational analyses to quantify deviations from preset standards of business process performance. For instance, when assessing the effectiveness of internal control systems and the application of appropriate metrics, internal audit can determine the values of the various risks that companies face every day and that internal control should address. Risk value that ranges from 0 to 5 is determined by the probability of its occurrence and degree

of impact on business operations. Although the risk can virtually never be completely eliminated or reduced to zero, the risk value corresponding to zero is set as a standard to strive for. It follows that the risks of high value, which deviate a lot from zero (the probability of their occurrence and the impact is huge), point out the weakness of internal control in their identification and management.

The next phase involves the analysis, i.e. study of the obtained results, all with the aim of finding the causes of deviations and assessing their impact on process performance. Internal auditors perform tests that enable them to better understand the condition of the existing system. Thus, by testing attributes, in this case, control, the internal auditor identifies areas of internal control systems that are not functioning as planned, or are not in accordance with prescribed policies, procedures, rules, and regulations. Also, by the implementation of quantitative (core) tests, internal auditor is able to determine the effects, i.e. the impact of part of the system of internal control that is not adequately projected at the quality of output. In doing so, the various instruments of data presentation, analysis, and surveys may be used, provided that the commonly applied instruments in the context of lean six sigma are: cause-and-effect diagram, "5 Whys" technique, and the Pareto principle.

After careful implementation of the phases of measurement and analysis, based on the results obtained, in the fourth phase, the auditor should be able to identify opportunities for process improvement and provide recommendations for eliminating deviations (errors, omissions, etc.). These recommendations are contained in the report of the internal auditor and "call for action to correct existing conditions or improve operations and may suggest approaches to correcting or enhancing performance as a guide for management in achieving desired results" (Practice Advisory 2410-1). Recommendations can provide the general course of action and specific suggestions regarding business performance, or may suggest further investigation or conducting special examination. Also, it is very important that the report recommendations are ranked according to their importance, as it will enable the company's management that is responsible for taking corrective actions to identify the most important recommendations that should be implemented first. In any case, lean six sigma orientation implies that the recommendations of the internal auditors are those that involve the minimum cost of their implementation. In addition, shortening the lead time, as the target of the lean concept, points to the fact that the internal auditor's recommendations should focus on the possible elimination of certain steps in the process, while preserving its integrity.

The last phase, the phase of control, is carried out with the aim of maintaining changes in the inputs of the process, in order to maintain and improve the outputs that have been achieved in this regard. Corresponding phase of internal audit in this stage is the follow-up, where "internal auditors evaluate the adequacy, effectiveness, and timeliness of actions taken by management on reported observations and recommendations" (Practice Advisory 2500.A1-1). In doing so, the auditors can in various ways collect and analyze data that indicate the acceptance and implementation of recommendations by the management: interviewing staff responsible for implementing the recommendations, review of supporting documentation, conducting tests to determine the effectiveness of the actions taken, and the like [7].

Applying lean six sigma principles in the process of internal audit is undoubtedly of great importance for raising its effectiveness, as it allows it to acquire better insight and

understanding of the processes in the company, as well as identify opportunities for improvement. This importance has been recognized by the Institute of Internal Auditors, an international association that has the strongest impact on the permanent development of theory and practice of internal auditing. In this regard, the Institute has initiated the organization of various courses and trainings, with the purpose of presenting the basis of lean six sigma methodology and instruments that can be used in planning and performing the audit. The aim of the trainings is to explain the relationship of lean six sigma methodology and internal auditing standards, connect the DMAIC methodology with the five stages of internal auditing, highlight the need and importance of the process mapping in the company, explain the purpose and method of application of the various instruments of analysis, and the like (www.theiia.org). Participants have the opportunity to put their knowledge and skills through a variety of case studies and exercises, thus becoming able to integrate techniques and tools of Lean Six Sigma concept into the specific audit activities.

CONCLUSION

Internal audit, lean, and six sigma undoubtedly represent some of the most important approaches to business process improvement of modern companies. Specifically, focusing on the overall business process, i.e. its efficiency, effectiveness, and frugality, internal audit assesses risks, identifies weaknesses in the process, and makes recommendations for its improvement. In this way, it contributes to the realization of the company's goals, by adding value and long-term benefits. On the other hand, the lean concept is based on the principle of creating more value for customers with less work, focusing on the process flow, i.e. its shortening, by eliminating non-value-added activities. Six sigma involves a detailed analysis of the process, identification of flaws, and making proposals for their elimination. In this way, by using different instruments, six sigma contributes to continuous quality improvement of all processes. Moreover, the companies' need to shorten the flow of the process by applying lean concept is at the same time accompanied by the need to improve its quality, which is why the practice has developed lean six sigma concept.

Benefits that companies can achieve by applying lean six sigma concept are certainly conditioned by the manner and quality of introduction, planning, and implementation of this concept. Through the control and assessment of lean-six sigma concept, internal audit can provide maximum support, reflected in the identification of possible areas where the application of the concept is not compatible with pre-defined procedures, and the provision of valuable suggestions which create space for business process improvement.

On the other hand, internal audit can provide the maximum effect only if it is properly planned and executed. In this sense, there are possibilities of integrating lean six sigma concept in the entire internal audit process. By applying methodologies, techniques, and tools of lean six sigma concepts, internal auditors gain better and deeper understanding of the business processes in the company, where they get the opportunity to provide adequate recommendations for continuous improvement.

By recognizing and exploiting the potential of internal audit and lean-six sigma concept, as well as their integration, many companies today experience significant improvement of their processes, which consequently contributes to the achievement of competitive advantage and overall business performance.

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SINERGIJSKI EFEKTI INTERNE REVIZIJE I LEAN-SIX SIGMA KONCEPTA NA UNAPREĐENJE POSLOVNIH PROCESA

Suočena sa nizom izazova iz okruženja u kojem posluju, preduzeća su više nego ikad svesna činjenice da napori usmereni na unapređenje poslovnih procesa predstavljaju jedan od osnovnih uslova, ne samo rasta i razvoja, već i opstanka preduzeća. Jedino na taj način stvaraju se mogućnosti za postizanje konkurentnosti po različitim dimenzijama (u troškovima, kvalitetu, pouzdanosti isporuke, brzini praćenja promene u tražnji, uvođenje novih proizvoda i sl.). Unapređenje poslovnih procesa je moguće realizovati uz podršku brojnih konceptata među kojima se posebno ističe lean-six sigma. Međutim, veoma veliki potencijal u tom smislu poseduje i interna revizija. S tim u vezi, u radu će najpre biti reči o suštini i pretpostavkama na kojima se temelje interna revizija i lean-six sigma koncept, a zatim će se sagledati mogućnosti njihovog intergrisanja sa ciljem postizanja boljih rezultata.

Ključne reči: interna revizija, lean-six sigma, unapređenje poslovnih procesa.

ADOPTION AND IMPLEMENTATION OF INFORMATION TECHNOLOGY IN SMALL AND MEDIUM ENTERPRISES

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Slavoljub Milovanović

University of Niš, Faculty of Economics, Niš, Serbia

Abstract. *Small and medium enterprises (SMEs) have great impact on economy of every country and small business sector is one of the fastest growing sectors of the economy. SMEs are becoming more dependent on information technologies (IT) for their operations. IT is a form of organizational resources that can be transformed into a valuable, rare and not easily imitable asset. The asset then makes the base of competitive advantage and high business performance. Researches in IT implementation have primarily focused on large corporations, but results of the researches may not be fully applicable in small and medium enterprises and there is need to investigate specificity of IT adoption and implementation in SMEs. Therefore, this paper researches the most important issues and challenges in adoption and implementation of information technologies in small and medium enterprises. Also, the paper treats problems of adoption, implementation and use of groupware technology.*

Key Words: *Information Technologies, IT adoption, IT implementation, Small and Medium Enterprises, Groupware.*

INTRODUCTION

Small and medium enterprises (SMEs) make great part of economy in every country. For example, in the United States, SMEs make 99.7 percent of all firms and employ 60-80 percent of new employees annually, over the last decade. Also, in USA about 600,000 new SMEs are established each year, although more than 500,000 existing SMEs are closed. Crucial question for SMEs is how to survive in today turbulent environment and competition. (Jie et al. 2009, 46-53)

In comparison with large companies, SMEs have limited resources and little influence on the market. Their survival depends on their ability to take full potential of the resources and quickly adapt to market changes. IT is a driver of operational flexibility and competitive

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Corresponding author: Slavoljub Milovanović

Faculty of Economics, University of Niš, Trg kralja Aleksandra 11, 18000 Niš, Serbia

Tel: +381 18 528 646 • E-mail: smilovan@eknfak.ni.ac.rs

advantage, and may help SMEs to be more flexible, to survive and succeed. Also, information and communication technology (ICT) infrastructure is deemed as important in supporting operational, tactical and strategic goals of enterprises. (Wasko et al. 2011, 645-652)

However, many studies showing the positive effect of IT resources engagement on enterprise performance were conducted in large US-based firms. Small number of researches has focused on use of information and communication technologies in SMEs and the issues related to IT adoption and implementation in SMEs. IS (Information Systems) theories and practices developed for large organizations may not be fully applicable in small and medium enterprises. Challenges, opportunities, and management issues of IT implementation in SMEs are unique and deserve special attention of research community. (She-I et al. 2008, 275-294)

Considering need for new researches in that specific field of IS, the paper has focus on adoption and implementation of IT in SMEs with brief view to groupware technology. The paper is organized in five sections. In next section, prior researches on IT implementation in SMEs are briefly presented. In third section, a model of IT adoption and implementation in SMEs with factors influencing on the adoption and implementation are described. In fourth section, main issues in implementation and use of groupware technology in SMEs are analysed. Final section is dedicated to concluding remarks.

1. PRIOR RESEARCHES ON IT IMPLEMENTATION IN SMEs – A BRIEF REVIEW

Information technologies can improve enterprise business performance and competitive advantage. This is particularly fact if enterprises use IT on innovative way to compete with their rivals. However, adoption and application of the new technologies is very complex and difficult task. As we previously mentioned, great number of studies and researches is dedicated to IT adoption and implementation in large enterprises, but studies of IT implementation in small and medium enterprises are very rare. In addition, small and medium enterprises have specific attributes influencing process of IT implementation that require special attention and investigation.

SMEs differ from large enterprises in many aspects. For example, large firms have greater scope of operation and compete in diverse markets, have a better ability to allocate IS development costs on larger units of production, and have internal IS development technical staff. All the aspects and attributes typically are not related to SMEs.

On the other hand, SMEs have their own specific attributes. For example, in small enterprises, decision making is centralized in one or two persons, bureaucratic procedures are minimal, standard operation procedures are not well established, long-term planning is limited, and there is greater dependence on external services for IS operations. Therefore, the problems and opportunities in SMEs considering IS implementation are unique and require special focus.

Traditionally, SMEs have been the slowest in adopting modern information technologies. Large enterprises make high level of investment in hardware, software, hiring and training IT professionals. SMEs usually lag behind large firms considering adoption and implementation of advanced IT products. However, the decreasing cost of storage and processing hardware and the increasing number of software applications designed for SMEs eliminate barriers that prevent SMEs from adoption of new IT. In recent years, SMEs invested a significant amount of resources in IT implementation.

A recent survey (Zhang et al. 2008, 357-380) shows that IT environments of SMEs are no longer based only on desktop PCs. Over 75% of SMEs have more than one server and the majority of SMEs have distributed IT infrastructures. Also, the literature (Nambisan 2013, 215-226) on SMEs suggests that the enterprises can make benefit from using IT. For example, IT enables SMEs to better manage their customer bases, keep information about customers in a more organized manner and also share knowledge within the organization more efficiently. Other benefits of IT that SMEs can achieve include: cost reduction, improved profitability, better customer service, enlarged market scope, and tighter interorganizational relationships with trading partners. Information communication has become important factor of success in the Internet age. Communication technologies such as e-mail, the Web, interorganizational systems (IOS), and electronic data interchange have dramatically changed business processes.

A common theme in many studies about IT implementation in SMEs is the importance of contextual and organizational factors in achievement of business success. The studies (Khazanchi 2005, 88-95) (Davison et al. 2013, 89-109) try to find answers to following questions: What kinds of organizational, contextual, and other factors influence IT success in SMEs? What makes one enterprise more innovative compared with other enterprises? For example, there is some evidence that organizational size is just one important factor in making a firm innovate and adopt new IT.

There are several investigations that explore the factors influencing the adoption of communication technologies in SMEs. One investigation (Premkumar 2003, 91-121) evaluates the impact of six factors (perceived usefulness, cost, compatibility, top management support, competitive advantage, and size) on the adoption of communication technologies. Data is collected from 207 firms and the results of data analysis reveal that competitive advantage, top management support, and size are important determinants of adoption of communication technologies.

A study (Lee, Runge 2001, 44-57) of drivers of IT adoption in 188 small retail businesses reveals that owner's perceived relative advantage and firm's willingness to innovate have an impact on potential IT adoption in SMEs. In another study (Magal, Lewis 1995, 75-83), authors investigated factors that affect IT success in SMEs. Examination of 150 SMEs have showed that respondent's awareness of IT and attitude toward IT are critical factors in their use of new IT.

Mentioned research (Khazanchi 2005, 88-95) analyses factors that determine conditions for Electronic Data Interchange (EDI) implementation. Research question in the research is: Under what conditions SMEs are likely candidates for the information technology implementation? The four distinct factors influencing on the conditions are: internal/external business and technological environment, organizational readiness and trading partner support, financial impact, workflow productivity. Although the research is related to the specific IT, the four factors are clearly robust and could potentially be applicable to any information technology implementation in the small firm context.

In the next section, we try to define a comprehensive and integral model of IT adoption and implementation in SMEs. Model shows four major domains or layers with all important factors influencing IT adoption and implementation.

2. A MODEL OF IT ADOPTION AND IMPLEMENTATION IN SMEs

The four major domains or different layers influencing adoption, design and use of information technology are: individual domain, technology domain, organizational domain and environmental domain (Thong 1999, 187-214). The main goal of information technology adoption and implementation in an organization is to enable employees to complete various work tasks. Primary elements in the domain are the individuals and the tasks that needs to be completed. The technology domain at the next layer provides the tools and information for the individuals in order to do theirs work tasks. The information technology is implemented in the specific organizational context. Thus, various characteristics of the organization influence IT adoption and implementation. The organizational context is deemed a domain separate from individual domain. Organizations are described as a collection of individuals working to accomplish a business objective with a common set of rules, procedures, and value systems. Collective vision and belief regarding information systems of organization may not be the same as that of the individuals within the organization. Because of that, there is need to differentiate the organization domain from the individual domain influencing adoption and implementation of IT. Final domain in IT adoption and implementation model is external environment. Organizations react to the environment by innovations in data processing and analysing in order to compete in the marketplace. Model of IT adoption and implementation with four domain and all factors influencing the adoption and implementation in SMEs is shown on figure 1.

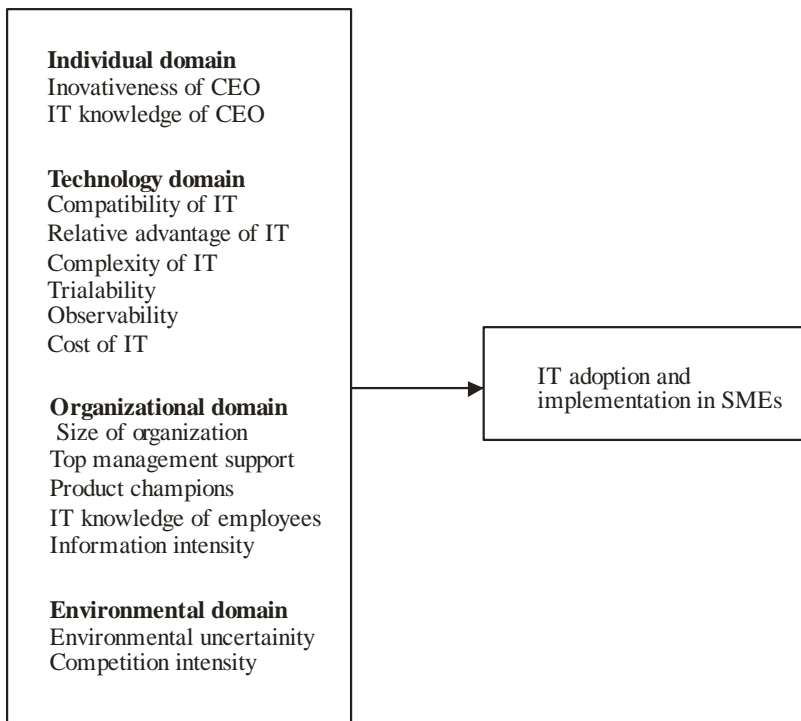


Fig. 1 Model of IT adoption and implementation in SMEs

Source: (Thong 1999, 187-214)

Individual Domain. It is difficult to clearly describe the effect of individual characteristics on IT implementation because the technology is implemented across multiple individuals. Individual factors such as demographics are useful in studying individual-level IT implementation. There are many various demographic factors such as education, job tenure, cognitive style, and IS expertise and experience that influence IT adoption and implementation. Also many studies have researched user involvement and user training as factors of IT implementation success. Some studies considered these factors as an individual variables while others considered the factors at the organizational level. The context of the study determines which approach (individual or organizational) will be accepted (Igbaria 1990, 637–652).

In a small and medium organization, CEO (Chief Executive Officer) is usually the owner of the organization and main decision maker. Therefore, characteristics of CEO are essential in decision making on adoption and implementation of IT. Technological innovations and changes (Andriole 2012, 61-72) depend not only on factors such as business size or market forces, but also on the abilities and preferences of CEO. CEO can belong to two group of managers: adaptors and innovators. Adaptor searches for solutions that have been already tried and understood, while innovator seeks solutions that have not been tried and that are risky. CEO willingness to innovate in IT domain impacts on the other members of organization to easily adopt new technological innovation (for example, new software application, new hardware device, new procedure in data processing etc.)

Second characteristic of SME's CEO influencing IT adoption is his or her technical knowledge. Lack of necessary skills and technical knowledge can be serious obstacle to IT adoption and implementation. Overcoming of the obstacles will lead to greater likelihood of the innovation adoption. CEOs in SMEs often lack basic knowledge of IT and consequently they are not aware of IT potentials. Education of these CEOs about the benefits of IT will lead to greater readiness for IT adoption. (Enns, McDonagh 2012, 1-10).

Technology Domain. Innovation/technology characteristics are very important factors influencing IT adoption/diffusion in an organization. An individual forms an opinion toward the innovation on basis of the characteristics. The opinion leads to adoption and rejection of innovation and, if the decision is to adopt, to implementation of innovation. The perception of the potential adopter toward an IT is main determinant of the IT adoption.

Tornatzky and Klein (1982, 28–45) identified three variables that are related to IT adoption: compatibility, complexity, and relative advantage. Other studies (Moore, Benbasat 1991, 192–222) have also included other variables such as cost, trialability, and observability. *Compatibility* is positively related to adoption of an innovation. Compatibility is the degree to which an innovation is consistent with the existing values, past experiences, and needs of the receivers. Compatibility has organizational and technical aspect. Organizational compatibility means that the innovation should be compatible with the organization's values and beliefs, while technical compatibility is related to work practices and system interfaces. If the IT is compatible with existing work practices and existing software/hardware products, the SME is more likely to adopt it. *Complexity* is the degree to which an innovation is perceived as relatively difficult to understand and use. Ease of use of computer systems is positively related to adoption of innovation, while the perceived complexity of the IT has negative effect on decision to adopt the IT. Technology acceptance model (TAM) is often used in studies of the impact of ease of use (or complexity) and perceived usefulness (or relative advantage) on IT adoption and usage. *Relative advantage* is

the degree to which an innovation is perceived as better than previous solution. This factor from technology domain is positively related to IT adoption. The positive perceptions of the benefits of IT make an incentive for a SME to adopt the innovation. *Trialability* is the degree to which an innovation may be experimented, while *observability* is the degree to which the results of an innovation are visible to others. However, trialability and observability are factors that are hard to measure. Finally, the *cost* effectiveness of the innovation is significant variable in analysing IT adoption and implementation.

Organizational Domain. Impact of various organizational factors on IS implementation is obvious because most of information systems are implemented in an organizational context. The organizational factors that are important to study are: degree of top management support, existence of a product champion, organizational size, IT knowledge of employees, information intensity and communication channels. We have already mentioned user training and user involvement which can be individual factors and organizational factors as well.

Top management support and commitment sends strong signals within the organization, reduces or eliminates political barriers in IT adoption and provides resources for IT implementation. *Product champions* play a critical role in propagation of the innovation to the decision makers, developing an implementation plan, facilitating resource allocation, and removing barriers to implementation. Considering the impact of *organizational size* on IT implementation there is a threshold level beyond which size is not an important factor. Larger organizations have more resources and technical expertise to facilitate IT implementation. However, they have more bureaucratic practices and resistance to change that smaller organizations may not have. Small businesses have scarce of resources because they operate in following conditions: a highly competitive environment, financial constrains, lack of professional expertise and high pressure of external forces. This unique conditions cause constrains on financial resources, a lack of internal technical expertise and a short-range management perspective. Consequently, SMEs face more obstacles to adoption of IT than large organizations. Even among SMEs, if an enterprise is larger, it is more able to hire people with specialized skills, such as knowledge of IT. In addition, larger enterprises have more potential to use IT than smaller enterprises, because of their larger scale of operations

IT knowledge of employees in a SME has positive effect on IT adoption and implementation, but SMEs usually have lack of specialized IT knowledge and technical skills. Problems with developing the necessary skills and technical knowledge may cause that SMEs postpone adoption of the innovation until they provide sufficient internal expertise. Thus, if employees of SMEs have IT knowledge and skills, the enterprises are more willing to adopt IT. The degree to which information is present in the product or service of enterprise reflects the level of *information intensity* of that product or service. Similarly, we can measure information intensity of business processes by determination of degree to which information is present in business processes of an enterprise. SMEs in more information-intensive sectors are more likely to adopt IT than those in less information-intensive sectors. For example, financial organizations like banks and insurance companies are more information-intensive, because their main functions are related to processing of financial information. Greater information intensity can make CEO of a small enterprise to think of IT as main competitive weapon and that increases probability of IT adoption. Finally, use of various *communication channels* to get information for adoption is significant factor that impacts on IT adoption/diffusion.

Environmental Domain. Environmental factors have emphasized the use of IT to gain competitive advantage. Growth of interorganisation information systems (IOS) extending organizational boundaries draw attention on the impact of environmental factors on IT implementation. Users of IS are not only internal staff audience, but also organization's customers, suppliers, and other trading partners. Hence, many studies have examined the impact of competitive advantage in initiating the implementation of IOS, the role of interorganizational dependence and power on adoption of these systems. In most cases, the powerful trading partner influences IT implementation. Researchers have also examined the role of incentives and the transaction climate between the trading partners in facilitating the implementation of IOS (Choudhury 1997, 1–24).

Generally speaking, competition increases probability of innovation adoption, because strong rivalry between enterprises pushes the enterprises to be innovative. Intense competition leads to environmental uncertainty and increases need for innovation and rate of innovation adoption. By adopting IT, enterprises will be able to compete in three ways. *First*, IT can change industry structure and thus change the rules of competition. *Second*, IT can give enterprises new ways to outperform their rivals and thus create competitive advantage. *Finally*, enterprise can create new business from existing IT operations. Small or medium enterprise in more competitive environment have greater need to adopt and use IT in gaining of competitive advantage. On the other hand, small enterprise in less competitive environment is not pushed to be innovative.

3. IMPLEMENTATION AND USE OF GROUPWARE IN SMEs

Groupware technology supports group of users working on common tasks, processes and projects. Groupware have some specific attributes which make it different from traditional IT. *First*, groupware technology is not so expensive. There are low cost solutions and even free technologies (e-mail, repositories, etc.). *Second*, groupware technology is complementary and has a supportive role because groupware adoption is parallel to the normal work flows. These two attributes make groupware affordable for SMEs. *Third*, groupware technology is versatile, because implementation and use of the technology depend on the meaning that users give to it and the its characteristics which they emphasize and use.

Groupware is collaborative technology that plays a key role in knowledge management. Table 1 shows a classification of groupware technologies that categorizes the technologies in two types: systems supporting information exchange (ECS - electronic communication systems) and systems that support group of users constituting team (teamwork systems). The aim of the first category of systems is to make the relationship between individuals or organizations easier. The aim of the second category of systems is to integrate information in work processes that have been previously defined. The systems make automation of defined work flows (Mrenoño-Cerdán 2008, 87-96).

The main characteristic of ECSs is the versatility since they affect the communication processes. In the process, there are various levels of interest of users in sharing their information or knowledge and the levels of exploitation of the possibilities offered by these systems. The flexibility of groupware (especially of ECS) means that the group finally defines its use. For example, ECS can be used exclusively in information exchange, but also can be used to support group working in processes and joint decision-making. (Milovanovic 2011, 469-480)

Table 1 Classification of groupware

Category of groupware	Electronic Communications Systems	Teamwork Systems
Concept	It allows the exchange of information, documents and opinions	Work is done through the system
Aim	Relation	Integration
Applications	Email, discussion forums, repositories, yellow pages	Workflow, project management, shared databases, group decision systems

Potential benefits of groupware can be viewed through the perceived usefulness and the relative advantage of the technology. However, the so-called productivity paradox of IT can be connected to groupware technology. The real problem related to productivity paradox of groupware technology is the lack of understanding of tacit knowledge and its relationship with the technology. Investments in traditional IT have limited consequences on competitiveness, but investments in knowledge management technologies like groupware have great impact on gaining competitive advantage. In addition, if groupware supports management of tacit knowledge, enterprise can expect more benefits. Tacit knowledge represents the most valuable resource for knowledge management, especially in innovation processes. However, if groupware is used in the coding of existing knowledge in explicit forms and sharing this knowledge through the whole organization, benefits are low. Tacit knowledge is not easily formulated or modified into explicit forms due to personal and contextual nature of the knowledge. Process of modification and conversion of tacit knowledge into explicit form is known as externalization. The communication of tacit knowledge needs a shared system of meaning for its understanding and application. Groupware should support the communication in order to gain greater benefits and competitiveness.

The benefits derived from groupware (particularly Electronic Communication Systems) depend on its use. Technology is socially built. Users give the different meanings to it and emphasize its various characteristics and uses. Therefore, organizational context that encourages employees' participation and creativity must be created. In the context, groupware is the ideal tool to channel the potential of participants, allowing them to share and develop their individual knowledge. Autonomy is a significant dimension of learning and knowledge exchange that facilitate learning among individuals or groups of individuals. The employees' autonomy allows employees to experiment with their knowledge thus improving organizational knowledge assets.

Consequently, the organizational context influences adoption and implementation of groupware technology. The organizational variables that should be considered are: CEO's innovativeness, knowledge externalization and employees' autonomy. However, the simple adoption of groupware does not lead always to better business performance. This is case particularly in adoption of Electronic Communication Systems, due to versatility of the systems. The reason for that is in the fact that SMEs often adopt low-cost and low sophisticated technologies with no intention to change business processes and practices. For example, they can adopt document management systems which are just document warehouses without associated search technologies.

CONCLUSION

IT is significant driver of every enterprise effectiveness and competitiveness. However, there are conflicting opinions about the role of IT on a SME performance. Many owners of SMEs view IT as a cost, as opposed to having the potential for enabling them to grow. In addition, adoption and implementation of IT in a SME mainly depends on individual characteristics, technical knowledge, and innovativeness of the SME owner which often plays role of CEO. Except individual domain, technological, organizational and environmental domains impact adoption and implementation of IT in SMEs. Considering groupware, we can conclude that the technology is affordable for SMEs, but certain adoption and implementation guidelines are needed. Groupware should allow the exchange and creation of tacit knowledge in an environment featured by innovation and autonomy.

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USVAJANJE I IMPLEMENTACIJA INFORMACIONE TEHNOLOGIJE U MALIM I SREDNJIM PREDUZEĆIMA

Mala i srednja preduzeća (MSP) imaju veliki uticaj na ekonomiju svake zemlje i sektor malog biznisa je jedan od najbrže rastućih u takvim ekonomijama. Funkcionisanje MSP sve više zavisi od informacionih tehnologija (IT). IT je forma organizacionih resursa koji se mogu transformisati u vredna, retka sredstva koja se teško mogu imitirati. Ova sredstva onda čine osnovu konkurentске prednosti i boljih poslovnih performansi. Istraživanja implementacije IT su primarno bila fokusirana na velika preduzeća i korporacije, ali rezultati tih istraživanja možda nisu u potpunosti primenljiva na mala i srednja preduzeća i postoji potreba za istraživanjem specifičnosti usvajanja i implementacije IT u MSP. Stoga, ovaj rad istražuje najvažnija pitanja i izazove u usvajanju i implementaciji IT u MSP. Takođe, ovaj rad tretira probleme usvajanja, implementacije i korišćenja tehnologije za podršku grupnom radu korisnika.

Ključne reči: Informacione tehnologije, usvajanje IT, implementacija IT, mala i srednja preduzeća, groupware tehnologija.

MULTI-CRITERIA METHODS AND MODELS FOR DECISION MAKING IN PUBLIC PROCUREMENT

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Ivana Veselinović

University of Niš, Faculty of Economics, Niš, Serbia

Abstract. *Selection of the best supplier in the public procurement process is a typical example of a multi-criteria decision making problem. The purpose of this paper is to present possible approaches for weights determination in order to facilitate decision making in the public procurement process. Considering the fact that criteria weights can affect the final ranking of the alternatives it is very important to access the process of weights assigning with seriousness and responsibility. Adequately estimated weights reduce the possibility of abuse and fraud in the public procurement system. Determination of weights is done based on a subjective approach (Analytic Hierarchy Process).*

Key Words: *Supplier selection, Analytic Hierarchy Process, Multi-criteria decision making, Public procurement, Criteria Weights.*

INTRODUCTION

One of the main features of modern business is the need to make a large number of decisions that are depending on a number of different criteria. The process of public procurement involves selection of the best supplier in the public procurement. One of the most important questions for local and national Governments is providing public facilities for their citizens in the time and in the amount they require. On the other hand, there is a question of choosing the right provider of those facilities, given the fact that there are a lot of private firms that are willing to offer their services. Procurer faces with the situation which demands that he makes a compromise between the available resources and the quality of required goods or services. Therefore, procurer usually considers only the price of the required goods and services, without paying any attention on the other aspects of the subject of procurement. However, selection of the offer based only on the criteria of

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Corresponding author: Ivana Veselinović, PhD. student

Faculty of Economics, University of Niš, Trg kralja Aleksandra 11, 18000 Niš, Serbia

E-mail: ivana.veselinovic@eknfak.ni.ac.rs

the lowest price is not always the best possible solution, there are a lot of other criteria that should be taken into consideration.

The quality of this process affects on the final efficiency of the organization. Application of multi-attribute decision making methods can be considered as a means to support decision making in public procurement.

The question of weights determination in public procurement is very important. Procurer can favor a certain bidder by giving a high weight to a criterion that only that competitor can satisfy. Having in mind that public procurements are financed by the money of the tax payers that kind of situation can lead to unsatisfactory choice which will not fulfill the requires of the citizens. This is why the application of scientific methods is important in the weight determination process in public procurements.

The basic premise of this paper is that the choice of the best offer is difficult in conditions where there are a number of criteria that can be used to assess them. The use of exact scientific methods for determination of the relative significance of each of the criteria and their use for ranking the offers can facilitate the decision making process.

This paper will first emphasized the importance of the public procurement system, a brief overview of legislation in this area and the potential for misuse of public procurement will be presented. Furthermore we will explain the basic concepts of multi-criteria decision making and the way of forming the multi-criteria model. One of the key problems of multi-criteria decision making is to determine the relative significance or weights of different criteria. The process of determining the relative significance of attributes consists in defining and assigning weighting factor to each individual criterion. Then on an empirical example the calculation of weights using the AHP method as the subjective methods for determining the value of weights is shown. The subject of the analysis will be public procurement carried out by local authorities, and the ultimate goal is to determine relevant criteria and weights for this type of procurement.

The main objective of this paper is to show the importance of the procurement process for the organization and the possibilities and advantages of multi-criteria analysis methods for the selection of the best offer.

1. BACKGROUND

In the contemporary business conditions the selection of the best supplier becomes the problem from whose solution depend the business performance. Adequately organized tender procedure should simplify the selection of the best supplier. The organization of public procurement procedure and the selection of the supplier are prescribed by the Law on Public Procurement. Since the private sector does not have its own rules, the entities in the private sector also apply the guidelines given by the Law on Public Procurement.

The problem of supplier selection has multi-criteria nature since it is characterized with number of criteria that should be examined. Therefore, it has been a subject of many different papers, books and case studies.

A lot of authors have been dealing with the problem of public procurement. The main problem of procurement selection is related to objectivity of the selection process. Hence, the application of multi-attribute decision making methods is proposed. Cheung *et al* (2001) propose the use of an Analytical Hierarchy Process for procurement selection. They have developed a selection method that uses multi-attribute utility technology and

the Analytical Hierarchy Process. Application of a model for supplier evaluation based on the Analytical Hierarchy Process can also be found in [11]. Haq and Kannan (2006) suggest a structured model for evaluating vendor selection using the analytical hierarchy process and fuzzy analytical hierarchy process. According to [20] fuzzy analytic hierarchy process can be used in selecting the best supplier firm, and it can satisfy the determined criteria to the greatest extent. Benyoucef and Canbolat (2007) propose the use of fuzzy AHP-based supplier selection, while Hsieha et al (2004) suggest fuzzy multi-criteria decision making approach for planning and design tenders selection. Contractor selection can be also performed by using the analytic network process [6]. However, great weakness of every model for procurement selection is disagreement among the experts about the importance of the criteria. Chan *et al* (2001) present the possibility of application of Delphi method in selection of procurement. According to them, the application of Delphi method leads to an objective opinion.

Vendor selection can also be performed by integrated fuzzy multi-criteria decision making method [36]. Dulmin and Mininno (2003) suggest the use of a multi-criteria decision aid method for supplier selection. Other authors propose the use of outranking methods in support of supplier selection [12]. They show that an outranking approach can be applied as a decision making tool for initial purchasing decisions. De Boer, Labrob and Morlacchi (2001) give an extended review of decision methods for supplier selection support.

Other authors propose the use of TOPSIS method combined with intuitionistic fuzzy set in selection of an appropriate supplier [5]. Few authors have shown that application of mathematical techniques (such as multi-objective programming or goal programming) is suitable for the solution of this decision problem [38]. Since these mathematical techniques have problems in inclusion of qualitative factors which are very important in supplier selection Ghodsypour and O'Brien (1998) suggest an integration of the Analytical Hierarchy Process and linear programming.

2. PUBLIC PROCUREMENT - DEFINITION AND IMPORTANCE

The public procurement system is an area of public finances, which attracts a lot of attention of contemporary society. Through the effective functioning of this system fair and efficient allocation of public resources is carried out and the optimal quantity of goods is financed by public funds. It is necessary to have an adequate legal framework which will act as a prevention and which will inhibit the occurrence of corruption mechanisms.

According to the Law on Public Procurement of the Republic of Serbia, which came into force on January 6, 2013 and is applicable from April 1, 2013, the term public procurement is defined as the procurement of goods, services or works by the purchaser in the manner and under the conditions prescribed by this Law.

Bearing in mind that a prerequisite for the use of EU pre-accession funds, and other forms of international assistance is the existence of a regulated public procurement system, which includes effective monitoring and control of the probity of the public procurement system, it can be concluded that international aspects of public procurement is also very important.

Free competition, legal certainty and transparency in public procurements reduce overall business risk in Republic of Serbia, making it more attractive for foreign investors and companies, which ultimately have an impact on the dynamics of its economic development.

Public procurements, through which the state determines what shall be bought, how and at what cost, are the key instrument through which the government achieve some of its strategic objectives, such as economic development, stimulation of employment and others [30]. For the achievement of this strategic role of public procurements, it is essential that the public procurement system is successful in carrying out its functions.

2.1. The role of the state in the public procurement system regulation

The only way possible to ensure achievement of objectives stated in the law and other regulations relating to public procurements is an economical and efficient use of public funds, which will result in prevention of corruption in public procurements.

Republic of Serbia until the 2002 did not have a law which has regulated public procurements area uniquely and comprehensively for all supplies made by public authorities and organizations, institutions and public companies. Far-reaching consequences of such a situation where the procurement of goods whose technology was outdated, and largely obsolete in developed countries, lack of interest of quality foreign bidders to offer their products and services in these circumstances, due to the lack of precise rules that would ensure healthy competition, and equality of all bidders and public in the process of choosing the best among them.

In order to eliminate the negative consequences that may arise due to inadequate regulation of public procurements, the Republic of Serbia in May 2002 passed the first Law on Public Procurement (published in the Official Gazette of the Republic of Serbia, No. 39/02)

After more than a year of implementation of this law certain deficiencies were identified in practice which led to dysfunction of purchasers, due to their commitment to carry out public procurement procedure under strictly defined rules even in the cases where that was not justified.

In this regard, in the 2004 the Law on Amendments and Supplements to the Law on Public Procurement was passed (published in the Official Gazette of the Republic of Serbia, No. 55/04). With these changes, basic concept of the law was not violated.

According to the first empirical indicators of long-term application of the Law on Public Procurement proper and consistent application of the basic principles underlying the implementation of public procurement was not fully ensured. To improve the regulation of the public procurement system, a new law was adopted on December 2008 (published in the Official Gazette of the Republic of Serbia, No. 116). Further improvement in this area has led to the adoption of the new Public Procurement Law (published in the Official Gazette of the Republic of Serbia, No. 124/2012)

The goal of the normative regulation of an area is not to limit the area and to stop its development, but to provide a legislative framework for it to develop simultaneously with the development of these areas in neighboring countries and in other countries of democratic orientation. Only good legislative framework can provide unhindered exchange of goods and services, development and networking of the markets, the inflow of foreign capital, improvement of economic relations with other countries and the improvement of economic, and therefore the overall development of our society.

2.2. Corruption mechanisms

According to the Corruption Perception Index (*CPI*), published by the international non-governmental organization "Transparency International", Republic of Serbia in the 2013 was located at 72nd place out of 177 countries. As one of the main generators of corruption, the same report states the area of public procurement.

Corruption in public procurement causes a loss of public funds, and also affects that the acquired goods, services and works do not suit the needs of the customer regarding to their characteristics, quality and delivery times. Inadequately implemented public procurement can enlarge the costs of purchaser on the one hand, while on the other hand, the quality of services provided to the citizens can be lower than expected. Various abuses may appear within the planning, implementation of the public procurement and realization of the contract. In this sense, different corruption mechanisms can be identified [37]:

- Purchase of unnecessary items (in content, quantity or quality)
- Deliberate determination of unrealistic estimated value
- Illicit fragmentation of procurement in order to apply the procedure of procurement of low value
- The formation of the procurement subject so that it can be provided only by a particular bidder
- Frequent and unjustified use of exceptions
- Conflict of interest
- Discriminatory conditions for the participation of bidders
- Discriminatory technical specifications
- Discriminatory criteria for the selection of the best bid

3. METHODS AND MODELS OF MULTI-CRITERIA DECISION ANALYSIS

The problem of making adequate decisions is the essence of every business and it affects the success and longevity of the business. The decision implies a choice between several different alternatives. In situations where the decision maker is faced with a choice between alternatives that can be evaluated on the basis of a single criterion issue boils down to a simple choice of alternative that is consistent with the objectives of the decision makers. However, in a situation where the decision maker is faced with the problem of choosing between different alternatives which are evaluated based on multiple criteria decision maker cannot make a simple comparison of alternatives. In order to perform the best choice the application of multi-criteria decision making is necessary.

3.1. Basic concepts of multi-criteria decision making and the formulation of multi-criteria model

Multi-criteria decision making refers to the determination of the best alternative in the conditions where there is a larger number of, usually, mutually conflicting criteria.

The real problems have some common characteristics, namely [10]:

- A large number of criteria
- Conflict among the criteria

- Not comparable units of measurement
- Projection or selection. Solutions of this type of problem are either projection of the best action (alternative) or a selection of the best action from a set of pre-defined finite action.

Methods of multi-criteria analysis are focused on the problem of choosing between one of m alternatives A_i ($i = 1, 2, \dots, m$) based on the n criteria X_j ($j = 1, 2, \dots, n$). Each of the alternatives is the vector $A_j = (x_{i1}, x_{i2}, \dots, x_{ij}, \dots, x_{im})$. A common way of representing the problem of multi-criteria analysis is matrix form [18].

Alternatives in the model form set with a finite number of elements. Alternatives should be tested, evaluated, priorities should be established, and finally a choice should be made.

The criteria in the model are represented by the corresponding function, and their importance is shown by the corresponding weights. Depending on the type of the extreme value of the criterion function, there are two types of criteria. The first group of criteria consists of those criteria where the interest of decision makers is to achieve the maximum value of the criterion function. The second group includes criteria where the interest of decision makers is to achieve the minimum value of the criterion function. The importance of the criteria in the model directly depends on the preferences of decision makers, more precisely, of the weights which are assigned to a specific criterion by the decision maker.

Attributes are the relevant characteristics of each of the alternatives and they represent the means for evaluating achieved level of each of the criteria.

3.2. Methods of multi-criteria analysis

Multi-criteria analysis methods are suitable for solving a large number of real problems of a different nature. Some of the most popular methods used for troubleshooting multi attribute decision making include the analytic hierarchy process (AHP) method, ELECTRE method, PROMETHEE method, TOPSIS method, the simple additive weighting (SAW) and many others. Examples of practical applications of these methods in the field of quantitative finance are given in Table 1-4 [28]. Categorization was done according to the data which Zopounidis (1999) introduced in his work "Multicriteria decision aid in financial management."

Table 1 Application of multi-criteria analysis methods for the assessment of credit risk and the risk of bankruptcy

<i>Approach</i>	<i>Method</i>	<i>Study</i>
Multi-attribute utility theory	<i>AHP</i>	Srinivasan and Kim (1987) Srinivasan and Ruparel (1990) Jablonsky (1993)
Comparison of alternatives	<i>ELECTRE</i>	Dimitras et al. (1995) Bergeron et al. (1996) Khalil et al. (2000)

Table 2 Application of multi-criteria analysis methods in the portfolio selection and portfolio management

<i>Approach</i>	<i>Method</i>	<i>Study</i>
Multi-attribute utility theory	<i>AHP</i>	Saaty et al. (1980)
Comparison of alternatives	<i>ELECTRE</i>	Martel et al. (1988, 1991) Szala (1990) Khoury et al. (1993) Hurson and Zopounidis (1995, 1997) Hurson and Ricci (1998)
Comparison of alternatives	<i>PROMETHEE</i>	Khoury and Martel (1990) Martel et al. (1991) Hababou and Martel (1998)

Table 3 Application of multi-criteria analysis method for assessing corporate performance

<i>Approach</i>	<i>Method</i>	<i>Study</i>
Multi-attribute utility theory	<i>AHP</i>	Lee et al. (1995) Babic and Plazibat (1998)
Comparison of alternatives	<i>ELECTRE</i> <i>PROMETHEE</i>	Colson and Mbangala (1998) Mareschal and Mertens (1990, 1992, 1993) Mareschal and Brans (1991) Pardalos et al. (1997) Babic and Plazibat (1998) Colson and Mbangala (1998) Zmitri et al. (1998) Baourakis et al. (2002)

Table 4 Application of multi-criteria analysis method for investment assessment

<i>Approach</i>	<i>Method</i>	<i>Study</i>
Multi-attribute utility theory	<i>AHP</i>	Kivijarvi and Tuominen (1992)
Comparison of alternatives	<i>ELECTRE</i>	Danila (1980) Buchanan et al. (1999)
Comparison of alternatives	<i>PROMETHEE</i>	Ribarovic and Mladineo (1987) Vranes et al. (1996)

Examples of practical applications of TOPSIS method are given in Table 5. Categorization was done according to the data which Behzadian et al. (2012) introduced in their work “A state-of-art survey of TOPSIS applications”.

Table 5 Application of TOPSIS method

Area of application	Study
Supply Chain Management and Logistics	Alimoradi, Yussuf, and Zulkifli (2011)
	Cheng, Ye, and Yang (2009)
	Yang, Bonsall, and Wang (2011)
	Awasthi, Chauhan, and Omrani (2011)
Design, construction and manufacturing	Athanasopoulos, Riba, and Athanasopoulou (2009)
	Chang and Chen (2010)
	Lu, Yang, and Wang (2011)
	Li et al. (2009)
Marketing	Khademi-Zare, Zarei, Sadeghieh, and Saleh Owlia (2010)
	Secme et al. (2009)
	Yu, Guo, Guo, and Huang (2011)
Human Resources Management	Boran et al. (2011)
	Chen, Li, and Liu (2011)
	Wang, Liu, and Zhang (2005)
Health and Safety	Ekmekçioglu, Kaya, and Kahraman (2010)
	Krohling and Campanharo (2011)
	Wang, Fan, and Wang (2010)
	Azzam and Mousa (2010)
Energetics	Opricovic and Tzeng (2007)
	Yan et al. (2011)
	Srdevic, Medeiros, and Faria (2004)
Water management	Dai et al. (2010)
	Afshar et al. (2011)

Simple additive weighting method has a wide range of applications. Most of the composite indicators are calculated by applying this method (e.g., GCI, The Global Competitiveness Index). Some well-known examples of the application of simple additive weighting method involve application of SAW method in the selection of staff [1], then for the selection of the best location of health facilities [21], as well as the application of SAW method in choosing the best location of factory plant [8].

4. SIGNIFICANCE OF WEIGHTS

Many methods for solving multi-attribute decision making problems require a clearly defined and expressed weights. However, in practice it is often difficult to determine the relative importance of the criteria, given the fact that the weights do not have clear economic significance, but they influence on the final result. Not all attributes have equal importance. The role of the weights is to reflect the relative importance of each of the attributes in relation to other attributes. One of the key problems of multi-criteria decision making is the determination of the relative significance of various criteria.

The process of determining the relative significance of the attribute consists in defining and assigning a weight to each individual criterion. Particular weight should be as accurate as possible in order to show the contribution of each criterion to the overall result. Assigning weights in multi-criteria decision making is a critical phase of the entire

decision making process. It is clear that the obtained result depends on the relative significance which has been assigned to each of the criteria. Therefore, evaluation and awarding of weights plays a key role in the multi-attribute decision making process

Weights should be in accordance with the purpose of analysis. Further, the weights themselves are useful information for those who control the implementation of a specific project which is evaluated using the multi-attribute decision making methods, since they quantitatively show preferences of decision makers.

One example may be the introduction of the Malcolm Baldrige National Quality Award in the United States. This award was introduced in order to stimulate American companies to improve quality and productivity. The relative importance of customer satisfaction is much higher than the weights of the other categories, which reflect the orientation of the Ministry of Trade to consumers [17].

5. APPROACHES TO THE WEIGHTS DETERMINATION

The impact of a particular criterion C_j ($j = 1, \dots, n$) on the final decision may have a different intensity, so it is necessary to determine the weights of each criterion, w_j . There are several approaches for determining the relative significance of the attribute. Regardless of the applied approach, the value of the weights must be normalized, i.e., the sum of weight coefficients must be equal to one.

In this regard, there are three approaches for determination of the relative significance of attributes:

- 1) The subjective approach
- 2) The objective approach
- 3) The combined approach, which combines the two previous approaches

a) The subjective approach to the weights determination

Subjective methods for determining the weights are based on the evaluation of experts. Their experience and knowledge are the most valuable information on contemplated criteria.

Weights obtained from the subjective approach reflect the subjective judgment or intuition of the decision maker. Therefore, the results obtained by using weights established by this approach can be affected by the lack of knowledge or experience of the decision maker.

Among the most famous subjective approaches are:

- 1) The Delphi Method
- 2) The Analytic Hierarchy Process Method (AHP method)
- 3) Additive Normalization Method

1) Delphi method

Delphi method is one of the basic methods of forecasting and is the best known and most widely used method of expert evaluation.

With this method direct discussion and confrontation of people and opinions is avoided, and that was something that made the classical method of obtaining the joint prediction from the expert group on the open meeting biased.

The starting point of the method is the definition of the problem for which the forecast is required. After defining the problem, formation a group of experts who will participate

in the forecasting is the next step. Contacts with experts are carried out through the series of questionnaires. Through questionnaires forecasts and all the necessary information are required from them, while the anonymity of the experts and the obtained forecast is guaranteed.

The first series of questionnaires which is being submitted to experts contain the necessary information, and they are asked to give their prediction that must be supported by appropriate arguments. Based on the obtained forecast, average forecast is being calculated, which represents the average of the individual forecasts, and also forecast variation around the mean value is determined, which is a measure of forecast accuracy. The second series of questionnaires sent to experts contain calculated average forecast, a measure of precision of forecasts and extreme forecasts with their reasons. Experts are then asked to reconsider their initial forecast, to do the correction if they want and to provide an opinion on the extreme forecasts, together with appropriate arguments. For processing the results Table 6 is used [24].

Table 6 Table for processing the results obtained by Delphi method

Criteria	Experts				Mean value	Standard deviation	Coefficient of variation
	E ₁	E ₂	...	E _n			
C ₁							
C ₂							
...							
C _n							

The process is being repeated until the mean value of the $i+1^{\text{st}}$ circle does not show a slight deviation from the mean values of weight obtained in i^{th} circle (usually no more than 5 rounds) or until the mean value of the coefficient of variation drops to a satisfactory level [24].

2) The Analytic Hierarchy Process Method

This method was developed by Thomas Saaty in the early seventies of the last century. AHP is a tool in the analysis of decision making, created in order to assist decision makers in solving complex problems involving a larger number of decision makers and a number of criteria.

AHP is based on the concept of balance, which is used to determine the relative significance of the overall set of attributes, activities or criteria, and applies to analyzed decision problem [10].

“AHP allows the decision-maker to structure complicated problems in the form of a decision hierarchy” [2]. The hierarchy is structured in three levels: criteria, alternatives and goals. Bearing that in mind, the process starts from the lowest level in the hierarchy, and therefore the first step focuses on determination of relative importance of criteria. Main objective is to determine how much each of the criteria contributes to the goal. Next step consists in measuring the level of achievement of each criterion for alternatives. Finally, in the third step, the significance of the alternatives for the goal can be determined. The relative importance of alternatives demonstrates the relative importance of the criteria in achieving the goal of the hierarchy [23].

Determination of criteria weights is based on using pair-wise comparison of the criteria and calculation of weights by using a specific method of prioritization. The decision maker compares each criterion with the other and determines the level of preference for each pair of criteria.

The process of creating the model requires four stages [18]:

1. Problem structuring
2. Data collection
3. Evaluation of the weights
4. Determination of the problem solution

In the first stage the decomposition of decision making problem is carried out into a series of a hierarchy, where each level represents a smaller number of comparable attributes. In other words, the problem is viewed as a hierarchy where at the top is the goal of the problem, while the lower levels consist of attributes on the basis of which decisions are made. The lowest hierarchical level is composed of the range of alternatives from which the best is selected, i.e. m alternatives whose comparison is performed.

The second phase of the AHP method involves collecting data and their measurement. Then, the comparison of the two pairs of attribute at a given level of the hierarchy, relative to an attribute of the higher level is performed. The essence of the comparisons by couples is to determine which of the two observed attributes better in relation to a given criterion. Obtained results from the corresponding comparison matrix.

In the third phase corresponding weights are calculated. This phase gives a unique normalized eigenvectors of weights of all attributes at each level of the hierarchy. The process of weights determination will be shown through empirical research.

The final step involves the determination of the final, overall priority vector at the level of the criteria. The relative importance of each criterion is expressed through weights. On the other hand, at the level of an alternative it is possible to determine the rank of alternatives for each of the monitored criteria.

3) Additive Normalization Method

First step of this method consists of normalization of the columns. Normalization of columns is done by dividing each element of the column of the decision making matrix by the sum of that column. Then the obtained normalized values of elements are summed and divided by the number of elements in column. The method is simple and is often used in practice, although it may lead to a distortion of priorities in some specific cases.

b) An objective approach to weights determination

Taking into account the fact that the weights of criteria can significantly affect the outcome of the decision making process, it is clear that special attention must be paid to the objectivity of criteria. The methods of objective approach to weights determination focus on the analysis of decision making matrix.

In the objective approach to the weights determination criteria are viewed as sources of information and the relative importance of the criteria reflects the amount of information contained in each of them.

The most known objective methods are:

- 1) Entropy method
- 2) Statistical methods

1) Entropy method

Determination of objective weights of criteria according to the method of entropy is based on the measurement of indeterminacy of information contained in the decision matrix. Determination of criteria weights w_j is carried out in four steps [22]. In the first step, the normalization of criterion values a_{ij} is performed. Obtained elements create normalized decision matrix. In the second step the value of entropy is determined. The amount of information contained in the normalized decision matrix and emitted by each criterion C_j can be measured as the value of entropy e_j [31].

In the third step, the degree of diversification d_j is determined. The greater the diversification of the initial criterion values a_{ij} of alternative A_i for a given criterion C_j , the value of d_j for the given criteria is larger, and it can be concluded that the importance of criteria C_j for a given decision making problem is higher [25]. If all the values of the degree of diversification for a particular criterion are the same, observed criterion can be omitted because it does not give new information to decision makers [39]. In the fourth step the relative weights of the criteria can be obtained by the simple additive normalization.

The method can be regarded as an objective because it generates criteria weights directly from the value of criterion for each alternative and it eliminates the problem of subjectivity, incompetence or lack of decision makers.

2) Statistical methods

For the weights determination we can use a number of statistical methods. Two of them will be explain in detail.

a) Method CRITIC (CRiteria Importance Through Intercriteria Correlation) is a method for the determination of objective weights of criteria that includes intensity of contrast and conflict contained in the structure of the decision problem.

To determine the contrast of criteria the standard deviation of normalized criterion values in columns is used, as well as the correlation coefficients of all pairs of columns.

Objective weights obtained in this way represent the amount of information contained in the decision matrix and provide unbiased information that decision maker uses in solving decision-making problems.

b) Chi-square test is used to calculate whether there is a statistically significant correlation between the frequencies of the two attribute characteristics or between the obtained (observed) frequencies and the frequencies expected in a particular hypothesis. Chi-square is suitable in cases where the data have quantitative and qualitative nature.

Chi-square test may include the following modalities:

- the tests of goodness of fit which examines the difference between the distribution of obtained and expected frequency
- the test of independence or test of equality (or difference) determines whether the examined independent samples belong to the same or are taken from different sets
- the test of homogeneity which is used to test the correlation between the two characteristics of a set. Two independent samples are taken from one set, and the correlation between the two characteristics is tested. Determination of the intensity of

the bonds between observed characteristics is done by calculating the coefficient of contingency. The value of Pearson's coefficient of contingency is positive and is located in the interval $[0, 1]$.

6. THE RESULTS OF EMPIRICAL RESEARCH

In this section the advantages of the usage of multi-criteria decision making methods in public procurements will be presented.

6.1. Research methodology

The basic premise of this paper is that the choice of the best offer is difficult in conditions where there are a number of criteria that can be used to assess them. The use of exact scientific methods for determination of the relative significance of each of the criteria and their use for ranking the offers can facilitate the decision making process.

Therefore, the basic hypothesis (H_0) in this paper is that there is no difference in the perception of the decision makers of the importance of the criteria when the weights are determined using the exact scientific methods in relation to the empirical method.

In order to prove that, a subjective method will be applied on the available data. Results will show that the use of the scientifically determined weights reduces the possibility of corruption in public procurements. Also, the use of the scientifically determined weights can provides higher welfare because procurer can obtain the object of the procurement that completely fulfills the requests of the citizens.

The main objective of this section of the paper is determination of criteria weights on the basis of subjective approach. For that purpose the AHP method will be used.

6.2. Application of Analytic Hierarchy Process for weights determination

Calculation of subjective preferences of decision maker will be performed based on data obtained from the Public Procurement Office of the City of Nis. Information about public procurements in the period from 2011 until 2013 shall be used. The purpose of the analysis is to assign weights to criteria relevant for the evaluation of the bids.

In the given period Public Procurement Office of the City of Nis used empirical weights for bids ranking. They have performed two types of public procurement, one was based on the criterion of the lowest price, and other was most economically advantageous tender criterion. The offered price was the dominant criterion in this period. In 2011 lowest price criterion was applied in 162 tenders, in 2012 for 178 tenders and in 2013 for 130 tenders while other criteria were neglected. The most economically advantageous tender criterion was applied in 40 tenders-6 tenders in 2013, 16 tenders in 2012 and 18 tenders in 2011. In addition to the price, in this type of tenders other non-price criteria were also considered for the evaluation of the bids. Depending on the type of procurement different non-price criteria were applied. The list of all non-price criteria is given in the Table 7.

Table 7 Non-price criteria used for the evaluation of public procurements in the period from 2011 until 2013

Criterion	Number of tenders in which the stated criterion was applied		
	2011	2012	2013
Deadline for works execution	-	4	2
Deadline for construction works	1	-	-
References	5	1	1
Terms of payment	4	-	-
Delivery time	9	3	-
Deadline for payment	9	3	-
The conditions and terms of payment	1	1	-
Economic characteristics	-	-	1
Technical characteristics	-	1	-
Quality of processing and manufacturing	1	2	-
Esthetic and functional characteristics	1	2	-
Number of gas stations in the City of Nis	2	1	1
Number of gas stations along the highway Belgrade-Nis	2	1	1
Loan period	-	2	1
Effective interest rate	-	2	1

In the further course of the research a specific public procurement related to a fuel supply for official vehicles shall be analyzed. In order to do that, a questionnaire was sent to the person responsible for the public procurements in the Public Procurement Office of the City of Nis. The questionnaire contained three criteria: offered price, number of gas stations in the City of Nis and number of gas stations along the highway Belgrade-Nis, that were supposed to be evaluated from 1 to 5. The following ratings were received:

Table 8 Criteria rating

Criterion	Rating
Offered price	5
Number of gas stations in the City of Nis	4
Number of gas stations along the highway Belgrade-Nis	2

Based on the obtained ratings the comparison of criteria was performed. Comparison of importance of the particular criteria regarding to the target was carried out based on the Saaty scale. The obtained values were entered into the comparison matrix.

Table 9 Comparison matrix

	Offered price	Number of gas stations in the City of Nis	Number of gas stations along the highway Belgrade-Nis
Offered price	1.000	3.000	9.000
Number of gas stations in the City of Nis	0.333	1.000	6.000
Number of gas stations along the highway Belgrade-Nis	0.111	0.167	1.000

To determine the vector of eigenvalues of the comparison matrix of comparison, a normalization of previously obtained values was performed. Normalization was performed by the following formula:

$$w_{ij} = \frac{a_{ij}}{\sum_{i=1}^m a_{ij}}, \quad i, j = 1, 2, 3$$

The value of criteria weights was obtained by applying the formula:

$$w_j = \frac{\sum_{j=1}^n w_{ij}}{3}, \quad i, j = 1, 2, 3$$

Based on the obtained results it is possible to determine the weights of each criterion.

Table 10 Criteria weights

Criterion	Weights
Offered price	0.658
Number of gas stations in the City of Nis	0.282
Number of gas stations along the highway Belgrade-Nis	0.060

In order to calculate the Consistency Ratio (CR), the measure of consistency was calculated first. To calculate the consistency measures MMULT function in Microsoft Excel, MS Office package was applied. The obtained results are given in Table 11.

Table 11 Calculation of the vector of priorities and consistency measure

	Offered price	Number of gas stations in the City of Nis	Number of gas stations along the highway Belgrade-Nis	Wj	Consistency Measure (λ)
Offered price	0.692	0.720	0.563	0.658	3.103
Number of gas stations in the City of Nis	0.231	0.240	0.375	0.282	3.051
Number of gas stations along the highway Belgrade-Nis	0.077	0.040	0.063	.060	3.009

Based on the calculated consistency measure the calculation of consistency index is performed. Consistency ratio is the ratio between consistency measure $\lambda_{\max} = 3.103$ and random index (RI). Random index depends on the number of rows in the decision matrix, and its values are given in Table 12.

Table 12 Random index value

1	2	3	4	5	6	7	8	9	10
0.00	0.00	0.580	0.900	1.120	1.240	1.320	1.410	1.450	1.490

If the consistency ratio is less than 0.10 result is accurate enough, and there is no need for further adjustment. If the level of consistency ratio is greater than 0.10 result should be re-analyze.

Table 13 Consistency Ratio

CI	0.051
RI (n=3)	0.580
CR=CI/RI	0.088

6.3. Comparative analysis

A comparative analysis of the results of different approaches is aimed to assess the differences in the weights determined by different approaches. Also, the initial hypothesis assumes that there is a difference in the preferences of decision makers about the importance of the criteria when they are expressed through empirical weights and those preferences generated using the scientific method.

The Public Procurement Office of the City of Nis had previously established certain weights based on experience. When it comes to the purchase of fuel for official vehicles, this procurement is evaluated by three criteria whose weights are given in Table 14.

Table 14 Empirical weights

Criterion	Weights
Offered price	0.700
Number of gas stations in the City of Nis	0.200
Number of gas stations along the highway Belgrade-Nis	0.100

In the further course of the analysis t-test will be applied to determine whether there are statistically significant differences between the empirically determined weights and weights determined by AHP method. The results are shown in Table 15.

Table 15 Overview of the weights determined by different approaches and p-value

Empirical approach	AHP approach	p-value	Interpretation
0.7000	0.6583	0.0572	By conventional criteria, this difference is considered to be not quite statistically significant.
0.2000	0.2819	0.0067	By conventional criteria, this difference is considered to be very statistically significant.
0.1000	0.0598	0.0653	By conventional criteria, this difference is considered to be not quite statistically significant.

For this purpose the GraphPad Software was used. The results show that there is no statistically significant difference between the empirical weights and weights determined by AHP method regarding to the first and third criteria, i.e. in these cases the p-value is greater than 0.05. Regarding the second criterion, p-value is less than 0.05, and it can be concluded that there is a statistically significant difference between empirical weights and weights obtained by AHP method.

CONCLUSION

Adequate legislation and the use of multi-criteria analysis methods in evaluating public procurements can greatly facilitate the process of decision making and reduce the abuse of the public procurement system, which is especially important considering the fact that the abuse of this system leads to inefficient allocation of public funds.

The efficiency of the public procurement system leads to an increase in welfare due to the fact that public funds are used in a quantity that is sufficient to provide the required quantity and quality of the subject of procurement.

Therefore, in this paper we have tried to prove that for an adequate, efficient and consistent decision making in the public procurement application of multi-criteria analysis methods is essential. Assigning criteria weights is an important step in the decision making process. This is because the value of weights largely determines the final decision of the decision maker.

In this paper we have tried to prove that for a consistent and good decision making one of the most important issues that should be considered is determination of the appropriate weights.

The first part of the paper defined the main terms in the public procurement system, gave a short review of the legislation in this area in the Republic of Serbia, and also showed potential corruption mechanisms which could arise in the public procurement system.

The second part of this paper was committed to the methods and models of multi-criteria decision analysis, basic concepts of multi-criteria decision making and the formation multi-criteria model. Short review of some of the most important multi-criteria decision making methods was shown at the end of this section.

The third part of this paper demonstrated the importance of the criteria weights and presented some of the basic approaches which could be used for weights determination. In addition, these approaches were classified into three groups, the subjective and objective approach, while the combined approach is actually a combination of subjective and objective approaches. Some of the most important subjective approaches such as Delphi method, AHP method, and the Additive Normalization Method were shown, and also some of the well-known objective methods such as the method of entropy and statistical methods.

In the fourth part of the paper the results of an empirical study were presented. An overview of all possible criteria that Public Procurement Office of the City of Nis used in the period from 2011 to 2013 was given. Then, based on the score obtained from the person responsible for public procurements in the Public Procurement Office of the City of Nis the determination of weights was performed by the AHP method.

Based on the obtained results it can be concluded that the initial hypothesis is not proven, i.e. there is a difference in the perception of the decision makers of the importance of the criteria when the weights are determined using the exact scientific methods in relation to the empirical method.

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VIŠEKRITERIJUMSKI METODI I MODELI ODLUČIVANJA U JAVNIM NABAVKAMA

Izbor najboljeg ponuđača u procesu javne nabavke predstavlja tipičan primer višekriterijumskog problema odlučivanja. Osnovna svrha ovog rada jeste prezentovanje mogućih pristupa za izračunavanje pondera u cilju olakšavanja postupka donošenja odluka u procesu javne nabavke. Imajući u vidu činjenicu da težinski koeficijenti kriterijuma mogu da utiču na konačni redosled alternative, veoma je važno ozbiljno i odgovorno pristupiti procesu određivanja pondera. Adekvatno određeni težinski koeficijenti smanjuju mogućnost pojave zloupotreba i prevara u sistemu javnih nabavki. Određivanje pondera u radu je izvršeno na bazi subjektivnog pristupa (Analitički hijerarhijski proces).

Ključne reči: *Izbor ponuđača, analitički hijerarhijski proces, višekriterijumsko odlučivanje, javne nabavke, težinski koeficijenti.*

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Contents

Dragan Petrović

BEHAVIORAL ANALYSIS OF ECONOMIC CHOICE: CONTRIBUTION TO
IMPROVING ECONOMIC RATIONALITY 191

Marija Petrović-Randelović, Snežana Radukić

THE IMPACT OF ECONOMIC SYSTEM
ON ENVIRONMENTAL POLICY IN THE REPUBLIC OF SERBIA 207

Tadija Đukić, Miloš Pavlović

CREATIVE ACCOUNTING AND CASH FLOWS REPORTING 225

Milica Đorđević, Bojana Novičević Čečević

SYNERGISTIC EFFECTS OF INTERNAL AUDIT AND LEAN-SIX SIGMA
CONCEPT ON BUSINESS PROCESS IMPROVEMENT 237

Slavoljub Milovanović

ADOPTION AND IMPLEMENTATION OF INFORMATION TECHNOLOGY
IN SMALL AND MEDIUM ENTERPRISES 251

Ivana Veselinović

MULTI-CRITERIA METHODS AND MODELS FOR DECISION MAKING
IN PUBLIC PROCUREMENT..... 261