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# Impact of Management Upon Organizational Network Effectiveness

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*This paper explores the process of managing organizational networks and explains the impact that management has on the effectiveness of organizational networks. Three basic models or forms of network management are shown in this paper, which have been developed thanks to their basic structural characteristics. Regulations have been formulated on the basis of testing the performance of each of these models. The authors advocate combining analytical and network management perspective which is the major contribution of this work. The management perspective explains the network as the unit of analysis, looking at networks as forms of social organization, and network analytical perspective contributes to the central idea which is explained in this work and it is shown that the network are presented as a set of actors or nodes, with relations between them, whether network members are present or absent.*

## 1. Introduction

Network organizations are widely recognized by both academics and practitioners as an important form of multiorganizational management. The advantages of the network coordination in both sectors, the private and the public, are significant, including improvement in learning, a more efficient employment of resources, a greater opportunity to plan and solve complex problems, higher competitiveness and a better service for clients and customers. Although the researchers and their studies of organizational networks provided for a big step to be made in the last 15 years, there is still a significant discrepancy between the knowledge we have about the overall operation of networks and a practical application of that knowledge. It is hence of great importance to understand the process of organizational network operation since it is only then that we can understand why the network provides for some outputs, regardless of whether the network is the result of the bottom-up processes or is a product of the strategic decisions of the network participants.

In this work we analyse a critical role of the network management process and its impact upon the network effectiveness. As a concept, effectiveness has long been critical for the researchers as well as for the practitioners, where the network effectiveness in operations was defined as an achievement of the positive outputs of the network - the levels that normally cannot be achieved in the conditions when individual organizational participants act autonomously. As a form of the management approach, the network management views networks as units of analysis. The network is viewed as a coordination mechanism, or, as it is often called, the network management. Starting from Williamson (Markets and

Hierarchies, 1975), the literature in this field has developed various forms of management in the last two decades. From an aspect of economics, there is a conventional attitude that the market is the only efficient system of non-hierarchical coordination. From the standpoint of organizational and administrative science, the literature in this field offered some explanations that organizations cannot be viewed as something that is not subject to change (see Perrow, 1986) and that other forms of coordination such as networks are capable of achieving objectives. Hence the discussion on whether networks are simply a combination of elements of market and hierarchy could be placed somewhere between market and hierarchy, or networks could be understood better as unique forms of management (see Powell, 1990).

Although networks were studied from different angles, surprisingly little attention was paid to the management of the entire organizational network. This broad focus is what Powell (2005, 1133) almost defines as "enlightenment of the structure of collective action". On one hand, the reason to adopt a narrower perspective may be hidden among the objectives for which organizations enter network relationships, primarily because of their own efficiency, rather than the efficiency of multiorganizational arrangements (Salancik, 1995). The development of a deep understanding of network management requires a collection of data on complex networks, which may be time consuming and expensive. Despite an ever increasing literature on networks as units of measure, a majority of these reports was purely academic (Agranoff and McGuire, 2003; 2003). Finally, there seems to be a sort of opposition against many who are engaged in studying networks in a discussion on a formal control mechanism.

A common assumption is that since networks became the arrangers of cooperation – management that imply hierarchy and control, this is no more appropriate (Kenis and Provan, 2006).

## 2. Forms of network management

On the basis of the literature review, the network management forms may be classed into two different dimensions. Firstly, network management may be a mediation. Every organization is in some interaction with any other organization in network management, the result of which is the management of a decentralised form. This is what we call shared management. In case of the other extreme, the network can be a high-level mediation, with a number of organizations that interact, except in cases of operational issues such as business transfers, of clients, information on services, etc., or network management is conducted through an individual organization that has a role of a highly centralized network broker. In certain cases, an individual organization may take on the key management activities, leaving the rest to network members. An alternative is that the network members may allocate the responsibilities in network management among various subsets or narrow circles of network members, where an individual organization does not take on significant management tasks.

Another difference in view of management could be made in mediation networks on the basis of whether the network is a member that is managed or the network is externally managed. As noted above, the member-networks that are managed, on one hand, are managed collectively by the members themselves (shared management), or, on the other hand, an individual network participant may assume the role of the leader organization. The externally managed networks are managed by one administrative organization, which can be agreed upon by all the network members, or can be mandated as part of the process of network creation. Either form has its specific strengths and weaknesses and leads to outputs that are predominantly dependent on the form selected.

### 2.1 Participants – networks that are managed

The most frequent form in practice, and the simplest one, is the participant management. This form is managed by a network of members without an isolated and single management entity. This type of management may be formal: e.g., through regular meetings of certain organizational representatives, or, less formal, through the current but typically non-coordinated efforts of those that have their stake in the success of the network. On one hand, the participants of the managed networks may be highly decentralised, including a ma-

majority or all the network members in interaction on relatively equal bases in the management process. This is called the shared management of participants.

The network participants are responsible for managing the relations and operations of internal networks, as well as for external relations with such groups as the financiers, the government and the customers. In health-care and humanitarian organizations, the shared management networks are commonly owned, partly due to the fact that networks are seen as an important method of building the “community capacity” (Chaskin et al., 2001). Only by participation of all the network participants, on equal bases, will the participants be committed to the network objectives. In business, shared management can be implemented in smaller strategic alliances and partnerships (where the joint ownership by several firms is not allowed) created for the purpose of developing new products (Venkatraman and Lee, 2004).

The power in the network, at least as regards the network on the decision level, is more or less symmetrical, even if there are differences in organizational size, resource capacities and performances. There is no specific, formal administrative unit, although some administrative and coordination activities may be delegated to one member or to a specific network entity. Theoretically, network operates collectively and no individual entity represents the network as a whole.

### 2.2 Leading organization in network management

The shared participant management may include some or all the network members, however, there are a large number of cases that do not lead to such a decentralized management. In such cases the inefficiency of shared management may suggest that a more centralized approach can be more appropriate. A centralized management of the networks can be conducted through a “leader organization”. In business, the leader organization management is usually performed in the vertical relations of buyer/supplier, especially when there are an individual, powerful, often a large buyer/supplier/financier and a number of weaker and smaller suppliers/buyers/receivers of the resources of firms. The most evident examples of this can be found in Keiretsu models of Japanese manufacture (Gerlach, 1922) and in similar models of cooperative buyer/supplier models in the U.S.A. (Uzzi, 1999) and in Europe (Inzerilli, 1990; Lazerson, 1995). For example, in film production, a leader organization can be the largest film studio (Jones and DeFilippi, 1996) and business can be done in horizontal multilateral networks, most commonly when one organization has enough resources and a legitimacy to participate and takes on the leading role. This model is frequently encountered in health-care and humanitarian

organizations where there can be a node – the supplying agency that takes on the role of a network leader due to its central position. The node in the health-care organization can be a hospital or a clinical centre (Weiner and Alexander, 1998). Teisman and Klijn (200) also describe a government agency in the role of a leader organization in the development of economy, for example.

In the leader organization management type, all larger activities of the network and the key decisions are coordinated through and by individual members-participants who play the role of the leader organization. Hence the network management is becoming highly centralized and mediating, with asymmetrically positioned power. The leader organization supplies the network to the administration and/or facilitates the activities of the organization members in their efforts to achieve the network objectives, which can coincide with the objectives of the leader organization. The leader organization itself can ensure the administration costs, receive contributions within its competences from network members, or seek and control the access to external financiers through donations or government funding. The role of the leader organization may be assigned on the basis of the consent of its members, on the basis of what they see to be most efficient and most effective for their participation, or it may be established as mandatory, often by one external source of financing.

### **2.3. Network administration organization (NAO model)**

The third form of network management is the network administration organization or a NAO model. The basic idea for this model is that separate administrative units are set especially for the purpose of managing the network and its activities. Although the network members are still interactive with one another, as in the leader organization model, the NAO model is centralized. The network mediator (in this case, NAO) has a key role in the network coordination and maintenance. Contrary to the leader organization model, the NAO is not the second member of the organization. The network is managed externally, with an established NAO, or through the mandates, or by the members themselves. The NAO can be a government entity, or a non-profit entity, which frequently is a case, even when the network members are profit firms. For example, Human and Provan (2000) describe two networks in timber industry, both managed by NAOs. The firms were profit firms, however, the NAO were non-profit organizations. The NAO can also be a single profit corporation, such as Nexia International, a global accounting network described by Koza and Lewin (1999).

The NAO model may be rated modestly on a scale if it consists of only one individual who is often considered to be a facilitator or a mediator of the network, or it can be a formal organization including the executive director, the board of experts and the board that operates outside the physical boundaries of the office (McEvily and Zaheer, 2004; Provan, Isett and Milward, 2004). This newer form can be implemented as a mechanism to improve the network legitimacy, being engaged in particular and complex issues and problems on the network level, and in reducing the complexity of shared management. These more formal NAO models have the board structures that include all or a subset of network members (Evan and OLK, 1990). The board specifies the issues on a strategic level and leaves operations decisions to the NAO leader. The government starts the NAOs that are generally set as a primary form of the network, to stimulate its growth through targeted financing and/or incentives for the purpose of ensuring that the network objectives are achieved. Such NAOs are established locally for the purpose of achieving the board's objectives, as well as those related to regional economic development.

### **3. Network management and effectiveness**

The basic issue in managing any network is that the needs and operations of the member-organizations must be adjusted and coordinated. Although the arrangements of pairs may, of course, be difficult to manage, with the growth in the number of organizations-participants in the network, the number of potential relations grows exponentially. In such circumstances management becomes extremely complex. Shared management is often seen as desirable by the network participants, when the participants can retain full control over the network orientation. This form proved to be favourable for small organizational networks. When problems emerge in such networks, a face-to-face discussions among participants are possible. As the number of participants in the organization grows, the shared management becomes increasingly ineffective, and the participants themselves ignore critical issues or waste a lot of time trying to coordinate over 10, 20, or more organizations (see Faerman, McCaffrey and Van Slyke, 2001). The network complexity problem is especially acute when the participants are geographically dispersed, hence the organization of frequent meetings of all the participants is difficult or even impossible to accomplish.

The structural solution to this problem is the centralization of the network management activities via a mediating organization, or a leader organization, or a NAO. All the above mentioned forms can easily include a larger number of network participants since a direct

participation of all the organizations in making many decisions within the network is not necessary any longer. With the centralized management, the participants need not be in interaction with each other, but can interact directly with the leader organization or a NAO for the coordinating purposes within the network and on the level of its needs.

Despite there being special reasons that a leader organization be favoured over the NAO and vice versa, when the management of relations becomes complex with a tendency of growth in the number of participants, any form is certainly more effective in the network objectives achievement compared to self-management. There are only a few organizations that would be “adequate“ for each of the management forms, although the literature in this field (Burn, 2004) says that the forms of shared management would be more effective for the organizations of six to eight network members. Generally, the NAO form is most effective in the networks with the largest number of participants, due to its unique administrative structure.

### **3.1. Consensus on network objectives**

Scientists have for years discussed the goals and the goal consensus on both levels, organizational and integrational (Van de Ven, 1976). The main issue has been that the consensus in the objectives in the “similarity domain“ allows for the organizational participants to cooperate in a better way than when there is a conflict among them, although the conflict can also be a stimulus for innovation. This topic has rather important implications for the understanding of the network members’ behaviour.

The literature on networks places the accent on similarity and homophily, rather than on the consensus of objectives by itself. Homophily was often offered as an explanation why certain actors are attractive for each other and why the form of relationships is a network (Monge and Contractor, 2003; Powel et al., 2005).

In any case, in objective-oriented networks, not only the organizational, but also the objectives on the network level, lead the organizational activity. Such objectives may include the development of a new client, attracting finances, solving the community needs or provision of services to the clients. The network objectives can also be process-oriented. In accordance with an early work of Van de Ven (1976) on this topic, when there is a general consensus on broad objectives on the network level related to the contents and the process of the objective and in the absence of hierarchy, the network participants that are more involved and committed to the network will work together more often. This does not imply that the objectives of the network mem-

bers have to be similar. In fact, the similarity of objectives may prove to be a difficulty in working together, especially when the pressure of the competition leads the organizational networks to rejecting cooperation and information sharing.

Although a high-level consensus of objectives is obviously an advantage in building the relations of dedication on the network level, the networks can still be effective, only with moderate levels of objectives’ consensus. A critical question is how the network relations are managed. The self-management forms are most likely effective when the participants can generally agree about the network on the level of objectives. In such a situation the organizations can work together without any significant clashes, where each one gives its contribution to the broad network objectives, while each of them simultaneously achieves its own objectives. It is important to remember that trust is not necessary for the consensus of objectives. Trust is based on the reputation and experience from the previous interaction, whereas the consensus is based on the similarity of objectives.

On the other hand, when the consensus of objectives is extremely low, there is almost no place for the network participation at all. On the medium scale of measuring the consensus of objectives, regardless of whether the leader is an agency or a NAO, the forms of management are more appropriate than self-management. More precisely, the forms of management via the leader agencies will be appropriate in those situations when the network participants show a moderately low consensus of objectives.

The leader organizations take on a majority of strategic and operative decisions (Graddy and Chen, 2006) and are most competent for decision making about the network on the level of objectives, when the network members are not capable of resolving the conflict by themselves and are only partially committed to the network objectives. This situation may not result into the long-term network sustainability, but in a short term, the leader organization can retain a broad focus on the network level, which would prove to be difficult if the participants tried to reach the agreement by themselves. On the contrary, the NAO form requires that more people participate, at least a subset of the network members. These participants (often the members of the NAO managing board) are typically committed to the objectives on the network level and have a strategic participation with a network as a whole. Other network members are probably less committed and involved, with a modest consensus on objectives. It is the task of the NAO and the board of experts to work with the participants on a daily basis, resolving a possible conflict and fostering the commit-

ment to the network and its objectives. The consensus on objectives will be rather strong in the NAO form. Although contracts may be made on the desirability of a network and on the value of the NAO, it is recommended that there should always be an agreement on what the network is supposed to do and in which way the participants should be included.

### 3.2. Need for competence on the network level

Organizations join or form networks for various reasons, including the need to achieve legitimacy, serving the clients in a more effective manner, attracting more resources, and resolving complex problems. Regardless of these specific reasons, however, all network organizations generally require to achieve a certain aim they would otherwise not be in a position to achieve on their own. It is for this reason that the issue of how the network level objectives are achieved on the network level is a very important issue.

All the above said triggers two questions. The first is, what is the nature of the tasks assigned to the network members? And the other, which external requirements does the network face? Both questions refer to the competence on the network level. Internally, if the task of the network is such that it requires a considerable interdependence among the members, then the need for the network coordination skills and the competencies for specific tasks will be great, which means that the management is expected to facilitate an interdependent action. As to the specific issues concerned with our theorising, this means that shared management is likely to be a less effective form of management in the conditions when the demand for interdependent task is high, since the tasks will be positioned on the individual network of members for the skills that they perhaps do not have, such as an approval in writing, quality monitoring, or even conflict resolving.

On the external side, requirements may also vary from high to low, requiring different competence degrees on the network level. The external tasks may include the roles of updating or protection of the network, starting from the propositions for environmental protection, changes in financing or new regulations for overcoming it, which may in turn include the role of lobbying, recruiting new members, raising capital, building external legitimacy, etc. For example, the pressures from the external financiers to coordinate activities may be high, trying to meet their demand and the regulations that would require a centralized action of such kind that it would be rather difficult to act via shared management, since the response can be diffuse. The NAO, in any case, is supposed to ensure an individual focal point for interacting with a financier, so that the legitimacy of the network as a whole should be increased.

The leader organizations are better equipped for meeting the requirements and needs on the network level in comparison with the shared management arrangements. In any case, the leader organization may have its own set of skills and competencies that do not precisely match the collective needs of the network members. The leader organization may also be against taking on a financial obligation for building such skills. With the NAO, although the quantity of scarce resources may be significant, the job of the board of experts on the network level is to develop the necessary skills for acting on the network level.

On the basis of these major arguments we propose the following solutions that summarize the basic proposed relations through all four factors of unpredictability:

1. Higher inconsistency among the critical factors of unpredictability and a specific form of management (both within the limits of the number of inconsistent factors and scope in which all these factors are inconsistent with the characteristics of forms of management). A less favourable solution will be that a specific form of management should be effective, leading either to a total inefficiency of the network, annulment, or a change into a form of management.
2. Shared management of the network will prove to be most effective in achieving the outputs on the network level when the trust is widely spread among the network members (high intensity, decentralised trust), when the number of network participants is relatively small, when the consensus on the objective on the network level is high and the demand for competences on the network level is low.
3. The management of the leader organization will be most effective in achieving outcomes on the network level when the trust is narrowly spread among the network members (low intensity, highly centralised trust), when the number of network members is relatively moderate, and when the need for competencies on the network level is moderate.
4. The NAO management of the network will be most effective for achieving outputs on the network level when the trust is moderately to very widely spread among the network members (moderate intensity of trust), when there is a moderate to high number of network participants, when the consensus on the objective on the network level is moderately high, and when the need for competences on the network level is high.

#### 4. Recommendations for the network management process development

The final issue in this work is the network development. We have described the forms of network management, the conditions under which a certain form, if adopted, can be successful, and the tensions inherent to each form. However, what happens when the need emerges that the forms should be changed? Although there is research about how the network develops over time (Isett and Provan, 2005), these studies focused mainly upon the development of the relationships among networks, not on the development of the forms of management. If there is a discrepancy between the forms of management and one or more critical unpredictabilities we discussed (trust intensity, size, etc.) one option, naturally, for the network to avoid change will be that it will in that case be either “contagious” or fail. The change in network management is certainly not unavoidable. An alternative option for the network and its management is to change the structure components and adopt a different form of management. For example, as shared management attracts more and more members (perhaps due to its efficiency), the demands for its structure of management will change. In that sense, the managers on the network level may struggle with one form of management, which will probably be rather contagious, or they may choose to pass into another form that is consistent with having more participants, and less intensity of the trust relations.

The question is, how can we come to change the network? Are the changes from one form into another equal or is the development inhibited by the structure of the form itself? It is worth mentioning that here we are talking about the change from one form of management into another, as regards the form the network is in now. The logics underlying this argument is based upon an inherent flexibility and adaptability of the form itself.

Shared management is a most flexible and daptable form. Networks are perfectly capable of retaining their form. In any case, the success of the network should lead towards changes in the unpredictabiliy components we pointed out before (more participants, greater need for competencies on the network level, etc.), demanding change in network management.

Once the mediation form has been adopted, in any case, the range of choices is reduced. It is especially when management is established either as a leader organization or as a NAO form that the development into a shared management is uncertain. Both the leader organization and the NAO forms are steadier, less flexible forms, with instututionalized leading roles that make the change into the shared management more difficult.

Similarly, once the form of the leader organization has been adopted, if the unpredictability factors change, they do it most often in such a way as to create the NAO form as optimal. The development generally leads from the leader organization to the NAO form, rather than from the leader orgnizationn to shared management. In any case, the movement, whether from shared management or from leader organization towards the NAO is a strategic choice, and this is important to know. This means that development is not a simple and natural process that goes on as the change of the unpredictability components. On the contrary, a specific choice must be made by the participants or the manager of the network to move from managing the network of one or more participants to the third type of organization. Finally, when the NAO has been adopted as the most formal of management models, this form includes at least three basic forms for change. Our logic rests, shortly, in the following propositions:

1. Ensure the sustenance of the network over time, while the management of the network is being changed, which will in turn probably develop into a predictable form, from shared management into a more mediating form, and from the participant management into external management (NAO). The development from shared management into a mediating form is more important than that from the mediating form into the shared management. Once this has been established, the development from the NAO into another form is uncertain (inertia is strongest when the form of management is more formalized).

#### 5. Conclusion

This paper presents the research and discussion on managing organizational networks and proposes three basic forms of network management. Our intention was to improve the network theory, firstly, by discussing the basic characteristics of each of the management forms; secondly, stating the number of critical components of unpredictability that explain the effectiveness of the management form; thirdly, analysing the inherent tensions in each of the forms and the ways these tensions can be resolved in the context of the network; fourthly, by a research into the development of the network management from one form into another. Naturally, we do not deny that the network effectiveness may partly be the function of the activity of individual network participants, not that individual participants may gain advantage from the participation network, regardless of the form of management. Our major argument is that, when we focus upon collectively generated outputs on the network level, the adopted form of network management

and the respective management tensions are critical for explaining the network effectiveness.

An issue that merits further attention is the importance of development. The importance of development was discussed in general, however, empirical research and future contemplations are something yet to be done. For example, in the absence of mandate, how do the forms of network management start, in the first place? And when they do start, which are the factors that contribute to the tendency of some forms to change faster than others? In other words, are some forms more resistant to change in given components of unpredictability, and in which way is the process of change resolved? Systemic research into the network development is necessary, with special focus upon the manner in which the public network management occurs (mandate or choice) as well as upon the manner it changes over time.

Finally, although we primarily focused on explaining the impact of management forms upon the network efficiency, the efficiency itself has so far been solved only in a general sense. Research and further theorising on network management should continue to resolve the efficiency as a multidimensional variable. For example, one form of management may produce positive outcomes for some types of outcomes, such as community planning; however, not for others, such as better services. Hence, it could be possible to work backwards, predicting a form of network based on the type of outcomes achieved. The capacity would be of specific interest to those who try to investigate into and understand the functioning of illegal networks (Raab and Milward, 2003). If the form of the network could be concluded from the outcome achieved, a more effective strategy of intervention could be designed.

The work also has some practical implications. From the policy aspect, it should be clear that the selection of management forms, either through the mandate or through financial incentives, may carry critical implications for the efficiency of the entire network. From the aspect of management, on the other hand, our work proves that an effective network management requires that both demands of the network, internal and external, be identified and responded to in selecting the management form and in resolving the tensions emerging as part of this form.

The paper is also an attempt to stimulate fresh thinking about how networks can be studied in the future. A challenge for the researchers will be to broaden the focus, depart from describing the activity and behaviour of the network or focusing upon how organizations function within networks. The researchers will

need to study all networks in more detail, including the manner in which they are managed. A large comparative scale on networks is to be created in the future, on the basis of the studies of numerous types of networks over the range of various management forms. As regards the cost and the complexity of such a research, it will in any case be reasonable to encourage a cumulative accrual of knowledge on the basis of manifold studies on networks, that examine different forms of management in more detail. Some research has already been carried out, however, the accumulation of facts is not yet evident. It is our hope that this paper will stimulate that process.

## 6. REFERENCE

- [1] Williamson, Oliver E. 1975. *Markets and hierarchies: Analysis and antitrust implications* New York: Free Press.
- [2] Perrow, Charles. 1961. The analysis of goals in complex organizations. *American Sociological Review* 26:688-99.
- [3] Powell, Walter W. 1990. Neither market nor hierarchy: Network forms of organization. In *Research in organizational behavior*, ed. Barry M. Staw and Cummings L. L., vol. 12, 295-336. Greenwich, CT: JAI Press.
- [4] Powell, Walter W., Douglas R. White, Kenneth W. Koput, and Jason Owen-Smith. 2005. Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences. *American Journal of Sociology* 110:1132-205.
- [5] Salancik, Gerald. 1995. Wanted: A good theory of network organization. *Administrative Science Quarterly* 40:345-9.
- [6] Agranoff, Robert, and Michael McGuire. 2003. *Collaborative public management: New strategies for local governments* Washington, DC: Georgetown Univ. Press.
- [7] Kenis, Patrick, and Keith G. Provan. 2006. The control of public networks. *International Public Management Journal* 9:227-47.
- [8] Provan, Keith G., Amy Fish, and Joerg Sydow. 2007. Interorganizational networks at the network level: A review of the empirical literature on whole networks. *Journal of Management* 33:479-516.
- [9] Chaskin, Robert J., Prudence Brown, Sudhir Venkatesh, and Avis Vidal. 2001. *Building community capacity* New York: Aldine de Gruyter.
- [10] Venkatraman, N., and Chengteh Lee. 2004. Preferential linkage and network evolution: A conceptual model and empirical test in the U.S. video game sector. *Academy of Management Journal* 47:876-92

- [11] Gerlach, Michael L. 1992. *Alliance capitalism: The social organization of Japanese business*. Berkeley, CA: University of California Press.
- [12] Uzzi, Brian. 1999. Embeddedness in the making of financial capital: How social relations and networks benefit firms seeking financing. *American Sociological Review* 64:481–505.
- [13] Inzerilli, Giorgio. 1990. The Italian perspective: Flexible organization and social management. *International Studies of Management and Organization* 20:6–21.
- [14] Lazerson, Mark. 1995. A new phoenix? Modern putting-out in the Modena knitwear industry. *Administrative Science Quarterly* 40:34–59.
- [15] Jones, Candace, and Robert J. DeFillippi. 1996. Back to the future in film: Combining industry and self-knowledge to meet career challenges of the 21st century. *Academy of Management Executive* 10 (4): 89–104.
- [16] Weiner, Bryan J., and Jeffrey A. Alexander. 1998. The challenges of governing public-private community health partnerships. *Health Care Management Review* 23 (2): 39–55.
- [17] Teisman, Geert R., and Erik-Hans Klijn. 2002. Partnership arrangements: Governmental rhetoric or governance scheme? *Public Administration Review* 62:197–205.
- [18] Graddy, Elizabeth A., and Bin Chen. 2006. Influences on the size and scope of networks for social service delivery. *Journal of Public Administration Research and Theory* 16:533–52.
- [19] Human, Sherrie E., and Keith G. Provan. 2000. Legitimacy building in the evolution of small-firm networks: A comparative study of success and demise. *Administrative Science Quarterly* 45:327–65.
- [20] Koza, Mitchell P., and Arie Y. Lewin. 1999. The coevolution of network alliances: A longitudinal analysis of an international professional service network. *Organization Science* 10:638–53.
- [21] McEvily, Bill, and Akbar Zaheer. 2004. Architects of trust: The role of network facilitators in geographical clusters. In *Trust and distrust in organizations*, ed. R. Kramer and K. Cook, 189–213. New York: Russell Sage Foundation.
- [22] Provan, Keith G., and H. Brinton Milward. 2004. Cooperation and compromise: A network response to conflicting institutional pressures in community mental health. *Nonprofit and Voluntary Sector Quarterly* 33:489–514.
- [23] Evan, William M., and Paul Olk. 1990. R&D consortia: A new U.S. organizational form. *Sloan Management Review* 31:37–46.
- [24] [Faerman, Sue R., David P. McCaffrey, and David van Slyke. 2001. Understanding interorganizational cooperation: Public-private collaboration in regulating financial market innovation. *Organization Science* 12:372–88.
- [25] Burn, Shawn M. 2004. *Groups: Theory and practice*. Toronto, Ontario: Thomson-Wadsworth.
- [26] Van de Ven, Andrew H. 1976. On the nature, formation, and maintenance of relations among organizations. *Academy of Management Review* 1:24–36
- [27] Monge, Peter R., and Noshir S. Contractor. 2003. *Theories of communication networks*. New York: Oxford Univ. Press
- [28] Graddy, Elizabeth A., and Bin Chen. 2006. Influences on the size and scope of networks for social service delivery. *Journal of Public Administration Research and Theory* 16:533–52.
- [29] Isett, Kimberley R., and Keith G. Provan. 2005. The evolution of interorganizational network relationships over time: Does sector matter? *Journal of Public Administration Research and Theory* 15:149–65.
- [30] Raab, Joerg, and H. Brinton Milward. 2003. Dark networks as problems. *Journal of Public Administration Research and Theory* 13:413–39

# Risks of Project Financing

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*Project financing is a model of financing the projects based on the analysis of the feasibility of the project itself, since only the projects whose generated money inflow from the project is high enough to allow for the repay of invested funds are considered eligible. Consequently, the contracting followed by the project financing has to meet mutual interests of various parties, and therefore the expected economic return from each participant is in proportion with the risk they bear in the project execution process. Hence a successful project financing analysis is said to be based on the examination of all the risks that the project carries during its life cycle. This paper but points out these risks.*

## 1. Introduction

Project financing is a specific type of financing, that is, a financing technique especially suitable in the execution of infrastructure and industrial projects. It is a complex procedure by which the lender (investor) expects the loaned funds to be paid back exclusively from the returns the infrastructure project generates, where a large share of borrowed money, as well as inadequate financial results threaten to endanger the sustainability of the infrastructure project. Hence an adequate risk allocation is considered to be a key part of a quality project finance.

In the area of finance, risk is defined as a possibility that the return on investments differs from that expected. In the project finance, the risk includes the impacts of a large number of factors that may affect the project execution success. It is for this reason that risk identification, the assessment of risks and risk allocation among the project participants, as well as risk extenuation are the key activities in the project finance.

## 2. Risks in project financing

A successful project finance analysis is based upon the assessment of all the risks the project bears during its economic life cycle. Risk is the basic factor in project finance since it is deemed responsible for unexpected changes related to paying the project expenses, debt servicing and payment of dividends to the shareholders (owners). The money flow can also be affected by certain types of risks, hence, if these risks are not adequately anticipated and if an adequate protection from risks is not provided, the losses are possible. More precisely, if there is not enough cash, it is not possible to pay to the creditors, and the project becomes technically problematic too. Therefore the financial plan of the project should be designed in such a manner that it selects those among the available fi-

ancial options that minimize the risk, adjusting the financial expenses to the conditions of offer and demand on the global capital market. [5]

It is for this reason that the largest amount of time spent in designing the project is devoted to the assessment of project risks that may emerge during the project's life cycle. More precisely, the focus is upon defining the solutions that may be used to limit or eliminate any risk. Risk assessment is conducted prior to undertaking the project finance process.

The modern approach to decision making is characterised by making decisions on the basis of quantitative results that include the cost-benefit analysis or computing the criteria of net present value. Such an attitude means the implementation of the assumption on perfect certainty in the future, which is rather naive as the analysts are rarely willing to cope with anything that comes after the distribution of probabilities related to the uncertainty of events in the future. By far more sophisticated is the approach of the analysts who are ready to acknowledge the problems related to determining the probability of certain events, but do not know how to incorporate them into their analysis. All the above mentioned stress the fact that risk can be explained in a concrete way, however uncertainty cannot. [7]

The project financing risk identification and assessment refer to evaluation of various ownership-related rights that result from complex legal and financial structures of the project participants, such as sponsors, construction creditors, permanent creditors, contractors, constructors, owners of technology, suppliers and exporters. Each participant has a different task in the project execution, hence their engagement carries a different level of risk each; i.e., each participant may view the prospects and the characteristics of the proj-

ect differently and assess the risk subjectively. [14] Project finance makes it possible to allocate risk and returns in a considerably more efficient way compared to the direct (corporate) method of financing. [1] The project finance arrangements may be designed in such a way that they allocate the risk among the partici-

pants in the project execution in such a manner that each of them is satisfied (i.e., at lowest expenses). So the construction companies cope with the project execution related risk, the raw material suppliers cope exclusively with the risk related to supplies, the customers count with the price-related risk, etc. [4]

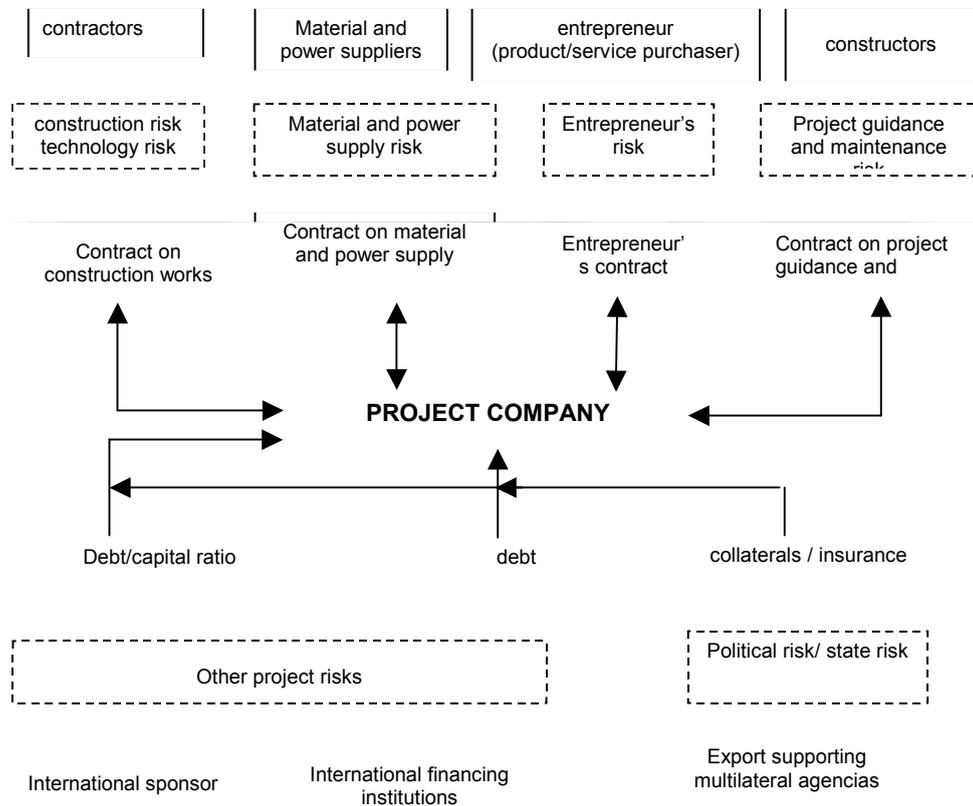


Figure 1. – A usual risk allocation structure in project finance [13]

A common mistake in risk allocation is leaving too big a scope of risk with the project company, which, due to being highly indebted, is not in a position to bear a high level of risk. On the other hand, transferring the entire risk from the project company to the other participants in the project is not feasible, since these participants may decide to take over a larger part of risk, but simultaneously expect a higher rate of capital returns, which the financial construction of the project could barely allow.

### 3. Project finance risk classification

There is a number of risk classifications in project finance. One alternative is offered by the Standard & Poor classification which assesses the project finance risk in six steps: assessment of financial and operational contracts, analysis of technology factors, analysis of the project market position, rating the risk the partners bring to the project, the analysis of the legal structure of

the project and the assessment of the financial risks that may impact the project execution. [17]

The Moody's analysis includes economic, construction, operational, technological, legal, political and regulatory risks. [16] According to Tinsley, risks in project finance are classified as: operational risk (technological, cost-related risk and management-related risk), risk of participants, the project completion risk, the risk related to material and energy supplies, market risk, infrastructure risk, environmental risk, political risk, the force majeure risk, currency risk, engineering risk, union-related risk, interest payment risk and legal risk. [12] Grimsey and Lewis list nine types of risk all infrastructure projects are faced with: technical risk, construction risk, operational risk, income-earning risk, financial risk, the force majeure risk, political risk, environmental risk

and failure in project execution that can be a result of previously mentioned risks. [10] Perhaps the most clearly put classification is the one that classes risks into three groups, i.e., commercial, financial and political risks [15], hence it is according to this classification that the specific features of project finance risks will be explained, which is simultaneously the subject of this paper.

### 3.1. Commercial risks

Commercial risks refer to the project itself, i.e., to the impact of internal factors upon the project execution. The project is exposed to risk both in the construction and in the operational (effectuation) phases. The initial frame in the commercial risk analysis is the analysis of the project appropriateness, that is, the opportunity that the product or service be effectively realized on the market. Another important issue is whether the project can be completed in a defined space of time and within the projected budget and which are the factors this can be affected by. This part of the analysis is related to the project construction period. The most important issue in the operational phase is whether the revenues will be sufficient to ensure a continuous repayment of loaned assets and the expected returns rate on the capital invested.

The commercial risk assessment also includes the analysis of the impact of the force majeure factors upon the project, as well as the issues dealing with environmental protection. Hence the commercial risk assessment incorporates the following aspects: the project appropriateness analysis, the project completion risk, the environmental protection risk, the operational risk, the income risk, the material and power supply risk, the force majeure risk and the project contracts adjustment risk. [15]

#### a) Risk appropriateness

The first step in the analysis of any project is the assessment of its commercial potential, that is, the appropriateness of the project execution. Hence this aspect of risk will be of considerable interest to creditors, since it will answer the questions such as: [6]

- Is there a market for the project product or service?
- What is the competition on the market like and are any changes anticipated in the future?
- Is the projected price of the product/service adequate in comparison with the competition?
- Can any structural changes on the market be foreseen and which would be the effects of such changes?

- Are the prospective buyers of these products/services financially eligible enough to purchase them?
- Do other players on the market encounter any specific troubles?
- Are the prices offered by the constructor and the material and power supplier realistic enough?
- Are there any factors that might hinder the normal operation of the project in the effectuation period?

#### b) Project completion risk

The project completion risk refers to the construction phase and is basically related to the monetary and technical aspects of the project. The monetary element of the project completion analyses the options as to whether the risk is a) higher in comparison with that projected by the inflation rate, the assets available, the unpredicted delays related to the project execution, or b) lower than the anticipated price related to products or services the project is to provide, that is, lower for the projected returns rate. [6]

A successful project execution in the construction phase means that the project should be completed in the planned space of time, according to the specifications stipulated and within the planned budget. The project completion risk analysis includes the analysis of the internal factors that may impact the project execution in the construction phase.

Important components in this risk group refer to: project acquisition risk, the required leases provision risk, the contractor selection risk, the risk of exceeding projected costs, revenues during the construction period, postponing the project construction completion, inadequate project performance and the third party risk. The other important element connected to the project completion risk deals with the technical process incorporated in the project itself. [6]

#### c) Environmental protection risk

The environmental protection risk refers to the effects the project may cause by the postponement of the development of its design or by its unavoidable redesign due to the failure to incorporate new standards and regulations. [6]

In designing the project it is necessary that all the regulations related to the environmental protection be observed. This risk is by far lower in inventive companies, however, some aspects here depend on the field the project belongs to. What is certain is that the impact of the project execution and exploitation upon the environment could not be higher than the standard construction of a building or a warehouse. [2] As the regu-



lations in this field are frequently subject to changes, there is a risk that may cause additional costs. A large number of factors in the public sector, as well as international organizations such as the World Bank and the European Investment Bank follow their own standards in the field of environmental protection which the project contractors are obliged to observe even in case such standards do not exist in the legislation system of the country the project is executed in. To special risks belong the activities of aggressive environmental groups that may endanger the project.

#### **d) Operational risk**

Operational risks refer to the factors that may impact the project execution in the operational phase (in the period the project is put into effect). The operational risk is one related to the market value of the project results, that is, the risk related to the capacities of the product (service), the project result, to repay the debt (the invested value) of the project. Such a type of risk may occur as a result of neglecting the project activity, of a poor assessment of the project recovery after a critical phase, a poor assessment of engineering capacities, of low productivity resulting from engaging foreign labour force or due to unrealistic prices and the change in the exchange rates. [5] The basic parameters in the operational phase are operational revenues and operational costs. In order that the project should operate as anticipated, it is necessary that the operational revenues be high enough to ensure a continuous repayment of debts and an adequate revenue rate on invested capital, as well as that the operational costs be in accordance with the forecasts. The key operational risks are: technology risk, general operation of the project, operational costs exceeding risk, project availability risk and the risk related to project maintenance.

#### **e) Technology risk**

The technology risk refers to the technologies defined in the project documentation, but that do not work according to their specification or become prematurely inapplicable. [6] Generally, the technology risk can be defined as a field resulting from the implementation of the technology used in the development of a new product (service) the project provides. [5] More precisely, the technology risk is connected to the performance of the technology the project uses, two risks being immanent to it: the new technology risk and the risk of the technology obsolescence. The new technology risk refers to the fact that the technology is not tested thoroughly enough, so even in case it proves to be good in the tests, the risk remains as to how it will behave in a long term. The implementation of new and insufficiently tested technology is not usual in

project financing. The new technology risk can be mitigated in several ways: by the contractor's guarantee and by the sponsor's guarantee that cover a long-term performance. The risk of technology obsolescence means that the technology implemented may become obsolete which results in a product not being competitive on the market. This problem is characteristic of the projects in the information technology sector.

#### **f) General operation of the project**

This risk refers to the case when the project performances are inadequate due to poor operational management. By the contract on guidance and maintenance, the project operation is assigned to an experienced contractor responsible for the project management. The contract usually stipulates penalties the contractor is obliged to pay in case of delay of the planned activities, but also defines the option of the breach of the contract in case the performance falls below the minimum allowed values. The option of the breach of contract is used considerably more in the contracts on guidance and maintenance compared to other project contracts. The investors prefer the contractors in charge of project guidance to be simultaneously the project investors, since in that case their commitment to the project is stronger.

#### **g) Risk of exceeding operational costs**

Two largest groups of costs in any project are the supplier costs and the debt servicing costs and they should be fixed. The investors attempt to limit any variable operational costs controlled by the project company in a way similar to what they do with construction costs, however, they cannot force the project company to stop fulfilling the contract obligations. The standard approach in the project company cost control (maintenance, personnel, premises, expenses following the construction period) is to determine the budget for such types of costs within the final financial construction.

#### **h) Periods when the project is not in operation**

There are periods when the project is not in operation (regular maintenance or unexpected disruptions in operation) and then it does not earn income and in some cases even has to pay penalties. The risk refers to the cases when the project is not in operation in a period longer than anticipated and hence is not in a position to earn the planned revenues.

#### **i) Maintenance**

The maintenance risk is managed by the contractor, according to the contract on project guidance and maintenance. Normally, the longer the project is in operation, the oftener it requires maintenance, al-

though the need for maintenance also depends on the extent to which its capacity is exploited. The maintenance costs should not be a problem as the project returns should cover them. The major risks as regards maintenance result from the fact that: maintenance may last longer than initially planned, the costs may be higher than expected, the money flow may be slowed down compared to the maintenance costs, and, finally, the extent to which the equipment is used is higher than expected.

#### **j) Income risk**

The income risk refers to the danger that the project will fail to generate the income high enough to cover the expenses, to service debts, and to achieve the planned rates of returns on invested assets. If the end result of a project is a product, two types of risk occur, the risk of scope – refers to the quantity of products sold, and the price risk – refers to the sales price of the product. These risks are covered by the entrepreneurial contract (a contract between the project sponsor and the customer interested in the project product or service), the contract for differences, the hedging contracts or by the contracts by which the project company takes the risk of the sales of the product on the market. If the end result of the project is based on the concession for services, the risk is related to the number of the service users.

#### **k) Supplies risk**

In order that the project execution be successful it is necessary that a continuous supplies of power, material and other inputs be effected at reasonable prices, since that can be the crucial moment in the manufacturing of products or service provision planned in the project execution. [8] It is also necessary that a long-term contract on supplies is signed, except in cases when the power supplies and the material are the commodity sold on open market. The contract on supplies is meant to reduce the risk in supplies, although some risk still exists related primarily to inputs, quality and the delivery time and the credit risk the supplier takes.

A special case are the projects that use natural resources, water or wind as power supplies. Here the risk is that the level and intensity of the water or wind may vary significantly, therefore it is necessary that a thorough analysis of scope, strength and the quality of water as well as the scope, direction and frequency of the wind be made. If, however, the mineral resources are the main input to the project or the project is based on their extraction, there is a risk that they will not be used to a satisfactory degree, therefore it is necessary that a classification is made having in mind the possibilities of renewal and the quantity estimated.

#### **l) Force majeure risk**

The force majeure risk refers to the factors from the domain of force majeure, such as strikes, floods, fires or catastrophic technical errors that can reduce the capacities or temporarily or permanently stop the project. The project is also exposed to risk of force majeure during the effectuation period. Lenders sometimes insist that they be protected against this form of force majeure. [6]

When drawing project contracts, the force majeure risk can prove to be a sensitive issue. Part of the risk can be covered by insurance, not the complete risk though, therefore this form of risk has to be somehow shared between the parties in the project financing. The insurance covers only the loss incurred by the physical damage to the project (costs of repair or replacement) or the economic loss (delay in construction or missed income) that are the consequences of a physical damage to the project. Losses in case of strike are not covered by the standard insurance; here a specific type of insurance is required, with a significantly higher insurance premium. Thus, for example, the events that count as the risk of the political force majeure are not covered by a standard insurance, except in case of physical damage (for example, in case of war or terrorism).

The party that suffers the consequences of force majeure is exempted from paying penalties and is granted a period of time to solve the problem and prepare the project to continue work; however, this does not exempt it from observing the obligations stipulated in the project contracts. If through the force majeure risk the project is permanently damaged and put out of function, the project contracts are breached. The term “permanently” refers to a period of one year and longer.

#### **m) Risk of project contract discrepancies**

A special type of risk may be a result of the discrepancies of project contracts. Each project contract is autonomous, however, it affects other contracts; hence the entire structure of project contract has to be viewed as an entity. Some problems caused by contract discrepancies are the following: different dates of project completion in the construction documents, different dates of commencement of materials and power supplies in contracts on supplies and contracts on takeover, different procedures of cost evaluation in contracts related to takeover and contracts on construction, differences in pricing the power supplies in contracts on supplies and contracts of the product/service buyer that are result of the project execution, differences in the times of revenues and pay-

ment of money related to the costs of supplies and repayment of borrowed funds, differences in understanding the force majeure risk. [9]

### 3.2. Financial risks

The project is exposed to financial risks both in the course of construction and later, during the effectuation period. The financial risks include the action of various economic factors impacting the project execution, those that may result into the deviation of the money flow from the real money flow conditions, characteristic of the respective phase in the project execution. [8] Their impact is indirect, as they affect the economic environment in which the project works. The financial risks include: inflation risk, interest rate risk and the exchange rate risk.

The impact of the inflation risk is related to the projects in which the dynamics of costs increases at such a speed that it is impossible to follow with the incomes the project earns. The inflation risk most frequently results from the contracts between the project company and the contractor (company), where such contracts are subject to the change mechanism, due to the changes in the price index. [9]

The impact of inflation upon the project, that is, upon the incomes and expenses of the project, depends on the period in which the inflation is present. Inflation may be a risk; however, it may also bring some benefits to the project. It is important that in calculating the budget of the programme the expected inflation rate be taken into consideration. During the construction period the inflation causes the costs to rise, which results in overrunning the planned budget. A larger part of construction costs should not be inflation-sensitive. The costs of construction contract, financial expenses and the expenses on the consulting services should be fixed. In the effectuation period the inflation may cause the increase in the operational costs, the level of indebtedment ratio, while the returns on invested capital rate may fall. If the incomes are defined on the basis of the tariff agreed upon, the inflation risk is reduced. The impact of inflation may be predicted by calculating the inflation sensitivity indices of individual incomes and expenses. If the inflation sensitivity indices of incomes and expenses are equal, the project company is in a rather favourable position.

Exposure to the interest rate risk depends on the structure of the project financing. If the project is financed by the bonds or loans at fixed interest rate, the project company is not faced with the interest rate risk. In practice, it is rather difficult to obtain a long-term loan at a

fixed interest rate, since such loans are not profitable to the banks, whose deposit structure is predominantly a short-term one. The basic interest rate in project finance loans is generally set in a defined time interval (most frequently a six-month period) in accordance to the interest rate on the market. The basic reference for setting the interest rate on the international market is the London Bank interest rate (LIBOR). [9]

The interest is not paid until the beginning of the project effectuation. During the project construction period the interest is capitalized, that is, added to the debt principal. During the project construction period the interest becomes an integral part of the project capital budget, and, if the interest is not fixed, it may be higher than expected and lead to exceeding the determined costs of construction. In the effectuation period, the rise in the interest rate results in the decrease in the returns rate and the creditor ratio. When "closing" the financial transaction, attention should be paid to the estimates of the interest rate trends. The sponsors prefer arrangements with floating interest rates, which the investors avoid because they would rather not be exposed to unnecessary financial risk. To mitigate the interest rate risk in cases where a floating interest rate is used, hedge arrangements are preferable: interest rate swaps, interest rate cap and collar, but other instruments too.

The exchange rate risk refers to the impact of changes of currency rate upon the project costs and incomes. The project is exposed to the exchange rate risk both in the construction and in the operational phases. The basic relations in this risk are related to the ratio of the currency used to finance the project, the currency in which the costs are paid and the project income currency. In the project construction period, in case the project is funded in one currency, and the expenses are paid in another, the risk the project company as the main contractor is exposed to is that the value of the currency in which the costs are paid may rise. For example, the construction costs amount to \$100, and are funded with €100, where the exchange rate is 1:1; if the value of the euro falls so that its ratio to the dollar amounts to 1.2:1, the value of financing will be sufficient to pay not more than \$83.3 of the construction costs, and the result is the overdraw of the planned costs (deficit) of \$16.7.

In the operational phase, if the project is financed in one currency and the income is earned in another, the change in the currency rate impacts the project money flow and consequently the project's capability of debt repayment. In that case, it would be ideal if financing were effected in the local currency, i.e., in

the currency of project income, which is most often impossible in the developing countries whose financial market is not developed enough to support project financing. The risk of currency rate change could be covered by forward contracts; however, this type of protection against risk is rarely used in practice. In the project construction period the costs should be either converted into the currency in which the project is financed, or the currency in which the project is financed should be converted into the one in which the costs are paid, which is an easier way and may even be of help in the operational period too. If the contractor agrees to be paid in the currency used to finance the project, the largest part of the problems will be solved. The second important costs are financing costs which will automatically be in the currency in which the project is financed. In the operational period, the incomes should be in the same currency as the costs and the debt to be repaid to the investors. The income currency dictates the financing currency and vice versa.

### 3.3. Political risks

A very important role in project financing is played by the government and the public sector. The political risk refers to a possibility that the Government or the political authorities of the country in which the respective infrastructure project is executed choose to affect the development of the project itself, actually the long-term sustainability of the project. [6] The projects financed through the project financing concept are long-term investments of paramount importance for the development and functioning of the local economy, hence the political will and continuous support in their execution is necessary. The political support should come from both the top levels of governance and from lower (local) levels. [3] The project will be endangered if it happens to be in the centre of political events in a country, i.e., become the issue of disagreement between the government and opposition. Here we have a strong probability that in case of the change of government the contract on the project be cancelled as disadvantageous for the country and the population, as intransparent or as corruptive. [11]

It is therefore necessary that the project be politically appropriate, that is, that it should earn benefits for the entire social community, not only to investors; that it should enhance employment, improve infrastructure, and that the product and service prices should be adjusted to the local market. If these conditions are not fulfilled, the political risk may increase significantly. Political risks may be classed into three main categories:

a) investment risks, b) risks of legislation system change, and c) quasi-political risks.

Investments risks are characteristic of developing countries, known for political and financial instability. Managing such risks requires the aid from the government of the country in which the project is executed. The risk of legislation system change is characteristic both of the projects executed in the developed countries and those executed in the developing ones. This risk means the changes within the existing legal system and the establishment of a new legal system and their impact upon the project. The quasi-political risks, however, refer to the issues such as disputes about the contracts that may have a market or a political background, which shows that the difference between commercial and political risks is not always clear.

### Conclusion

In the last fifteen years the governments worldwide have adopted project financing as a driving force in the execution of various services related to improving the field of infrastructure. Following the experiences of the pioneer in this field, the UK government, and its experiences in financing socially and economically important projects from private funds in the early 1930s, the project finance concept for infrastructure projects financing has been adjusted and adopted on all the levels of implementation in the countries all over the world.

Project financing brings numerous advantages over a direct, or corporative project financing. The benefits, however, can be identified only upon a careful analysis and a skilfull financial engineering. The project execution organization, its legal structure and the financial plan should reflect the nature of the project, since the elements such as risk, expected profitability, creditworthiness of the participants, demands and sums of collaterals related to insuring the loaned financial assets from financial institutions, the opportunity to qualify for tax savings, the project sponsor's financial position, the expectations of the host country's government, the expectations of the local autonomy, as well as any other elements, may affect the project execution.

Project finance is generally said to be a form of financing that includes even the social community, hence a thorough analysis must include the assessment of the risk expected to be accepted by all the participants in the project execution, in order that the project should be completed timely and in a defined way, since it is only in such circumstances that the execution of a project may be certain and safe.

## REFERENCE

- [1] Benković S, Milosavljević M: Prednosti i nedostaci projektnog finansiranja, *Management*, No. 52, pp. 31-39, 2009.
- [2] Bis R, Financing Innovation: A Project Finance Approach to Funding Patentable Innovation, *Intellectual Property & Technology Law Journal*, Vol. 21, No. 11, pp.14-22, 2009.
- [3] Brealy A. R, Cooper A. I, Habib A. M, Using Project Finance to Fund Infrastructure Investments, *Journal of Applied Corporate Finance*, Vol. 9.3, pp. 25-38, 1996.
- [4] Fabozzi, J. F, Peterson, P. P, *Financial Management and Analysis*, John Willy & Sons, Inc, New Yersey, 2003.
- [5] Farrel L. M, Principal – agency risk in project finance, *International Journal of Project Management*, No. 21. pp. 547-561, 2003.
- [6] Finnerty D. J, *Project financing - Asset-Based Financial Engineering*, John Wiley & sons, Inc, New Jersey, 2007.
- [7] Froud J, The Private Finance Initiative: risk, uncertainty and the state, *Accounting, Organizations and Society*, No. 28, pp. 567-589, 2003.
- [8] Gary L, *Managing Project Risk*, Harvard Business school Publishing Corporation, pp. 3, 2005.
- [9] Gatti S, *Project Finance in Theory and Practice, Designing, Structuring and Financing Private and Public Projects*, Elsevier Inc, Oxford, 2008.
- [10] Grimsey D, Lewis M. K, Evaluating the risk of public private partnership for infrastructure projects, *International Journal of Project Management*, No. 20, pp. 107-118, 2002.
- [11] Kobrin S, *Managing Political Risk Assessment*, University of California Press, Berkely, CA, USA, 1982.
- [12] Tinsley R, *Advanced project finance: structuring the risk*, Euromoney books, London, 2000.
- [13] Zulhabri I, Torrance J, Efficient risk allocation in project finance, *Planning & Surveying*, University of Technology MARA, Faculty of Architecture, Selangor, Malaysia, pp. 19, 2005.
- [14] Woody W. B, Pourian H, Risk assessment and options in project finance, *Project Management Journal*, No. 23, 1992.
- [15] Yescombe E, *Principles of project finance*, Academic Press, London, 2002.
- [16] [www.moodys.com](http://www.moodys.com), januar 2010.
- [17] [www.standardandpoors.com](http://www.standardandpoors.com), januar 2010.

# Search Engine Optimization: Understanding Key Elements of High Page Ranking

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The paper deals with the importance of web page optimization. Internet and its characteristics are shown in the beginning of this paper, as the main source of obtaining information. Web pages should have all the necessary information that people are seeking and should also be ranged as high as possible in the search engines. The fact is that almost every search begins through a search engine. The basic tool that is used here are words that describe your search area and are called keywords. Examples are showing us the differences between optimized and not-optimized pages. Article deals with the basic examples of a page optimization (on-page optimization) and also web page optimization outside the page (off-page optimization). Further on we can know about the recommended techniques and possibility how to use them in online optimization to increase your competitiveness in search marketing which leads to more web page visitors. It also shows the advantages of optimized web pages and its trends that are shown in the area of search marketing.

## 1. Introduction

Most of the companies are aware of the potential that internet. To have a web page is now days no longer a technological miracle and most of the companies have their own web page. It is important that web page is well visited. People who are browsing and looking through a web page should be able to found the necessary information as fast and as easy as possible. Due to those factors it is really important that the company's web page is on the top of the search list. Products and services that are seen on the web page are easier to reach and seen to the potential buyers if the web page is adjusted to the search engines.

The usage of internet has extremely changed the company's processes. Those companies who did not seen the global impact of the internet could or have already did effect, critical changes. Web page that is made efficiently could bring a lot of advantages. Some of them are listed here [8]:

- allows a quick, efficient and rational world market entry,
- communication with consumers is efficient and directly oriented,
- the costs of promotion are much lower and by that also ROI,
- web page is seen all over the world,
- internet allows a specific measurement of success,
- customers information is easy to get,
- your products and services are visible 24 hours a day, 7 days a week and 365 days in a year,
- other.

Search engines are the aggregators and classifiers of all the information available on the web [7]. However,

the competition is made even more ferocious by the searching behavior of the user. Search engines may return many millions of documents for each user query, but the user only looks at a selected few [2]. IT fast progress is bringing and developing new search engines all the time. Engines that once were known and popular with users could quickly become old and not efficient. Today's best engines are: Ask.com, Baidu, Bing, Cuil, Duck Duck Go, Google, Kosmix, Sogou, Yodao, Yahoo, Yandex, Yebol and others (written in alphabetic order). Figure 1 shows us the most popular engines in USA and EU.

When internet users are unable or unwilling to guess your URL (Uniform Resource Locator), they will use a search engine to find you. Now, among all the web page visits that are conducted in the United States that were immediately preceded by a search engine search, Google is responsible for the majority [10].

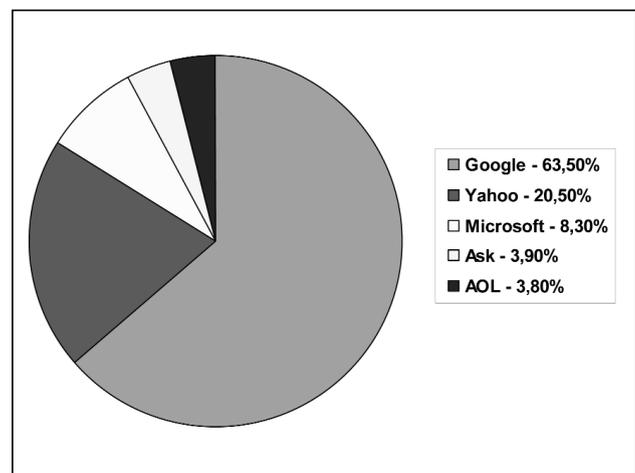


Figure 1: Search engine market share [2]

73 percent of search engine users never look beyond the first page of returned results. Accordingly, the competition for high ranking for popular user queries is now extremely intense [4]. Company could have a high search engine ranking either by web page optimization or by ad words that are payable. Both alternatives are the instruments of so called search marketing. Each of them is bringing different effects and advantages.

As fast as the internet development is, the higher is the number of its users. Now day's lifestyle of the society and individuals is hard to imagine without a usage of modern technology that is making our lives easier. Internet has changed the way of doing business as well, and brought a lot of new demands and challenges. Table 1 shows us a dynamic growth of internet users in the past years.

World Regions	Population (2009 Est.)	Internet Users (Dec. 31.2000)	Internet Users (Latest Data)	Penetration (% Population)	Growth 2000-2009
Africa	991.002.342	4.514.400	67.371.700	6,8 %	1.392,4 %
Asia	3.808.070.503	114.304.000	738.257.230	19,4 %	545,9 %
Europe	803.850.858	105.096.093	418.029.796	52,0 %	297,8 %
Middle East	202.687.005	3.284.800	57.425.046	28,3 %	1.648,2 %
North America	340.831.831	108.096.800	252.908.000	74,2 %	134,0 %
Latin America/Caribbean	586.662.468	18.068.919	179.031.479	30,5 %	890,8 %
Oceania/Australia	34.700.201	7.620.480	20.970.490	60,4 %	175,2 %
<b>World Total</b>	<b>6.767.805.208</b>	<b>360.985.492</b>	<b>1.733.993.741</b>	<b>25,6 %</b>	<b>380,3 %</b>

Table 1. World Internet Usage and Population Statistics [3]

We can expect a continuous growth of internet users. One of the important reasons is easier way of doing everyday's stuff, Time and money savings have the greatest impact on internet usage besides social factors.

Companies will be forced to see their web strategies once more and follow its competition. What will happen on the internet could be crucial to the companies. Further on we see the basics if web page optimization.

## 2. Search engine optimization

To get the most from your search engine optimization efforts, you should design and optimize your web page for your audience. Your target audience is the group of people that you are trying to reach through your online marketing efforts. Target audiences are often defined by demographic such as age groups, nationalities, or specific interests. Understanding who your target audience is and what they are searching for can greatly increase the effectiveness of a search engine optimization campaign [5].

Off-line optimization is usually carried out by a process of increasing the healthy links that are directed to the page, which we want to increase the number of visits. In addition to these techniques, there are others who add to the rise in popularity of each web page. Recently, the

growing importance of gaining social networks, which play the leading role of corporate blogs, Facebook, YouTube, Flickr and Twitter the others.

Choosing keywords is an important process that requires detailed analysis and understanding of the industry. Price and competition for certain keywords, is the largest in the area where they are most searches for individual words. The smaller the search, the less competition and prices, as shown in Figure 2 when choosing keywords is necessary to choose the correct keywords and taking into account the resources we have available and the frequency of the searches.

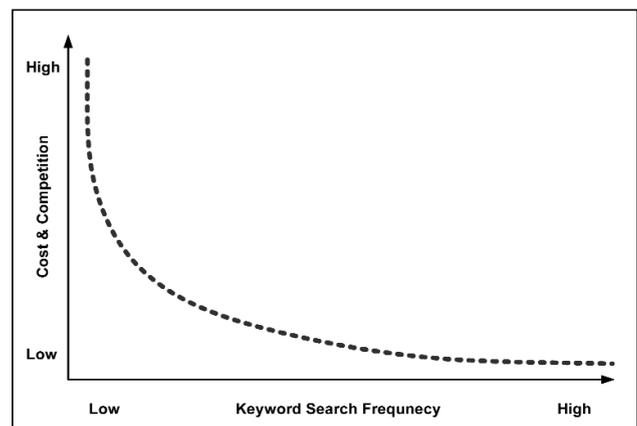


Figure 2: Long tail of keywords search frequency in SEO.

## 2.1 'On-page' Optimization

While making a properly designed web page is important and necessary to consider several factors that have and influence on the technical characteristics of web pages. It is important for proper understanding of the specific features of individual search engines, which are mutually different. There are some technical features and recommendations that it is important for the development page.

### Page File Size

The first characteristic that can be mentioned is the size of individual web page. Most attention is dedicated to the basic page in this segment (Landing Page), which is the most important page in the entire collection of an online business presentation. Recommended basic page should not overtake more than 150 KB of space size of space. Going beyond that size can makes it less specific for search engines so it could not be included in their lists. This can result in to lower web page visit's frequency.

### Amount of Links

Another important feature of the page is the number of bundles of links to other pages that are located on the web page itself. Technical characteristics have to be considered carefully so that's why it is necessary that all the specific features of other search engines are well studied before. Experience shows us that the optimal number of connections to the other web page is around 100.

### Title Tag

We can see similar restrictions in the number of characters that are used in the title, keywords and description. The most sensitive area at well optimized web page is a title. For a well designed and formed title it is necessary to know the conditions that we are working in. There are differences in terms of how to create a single Web page address and also taking into account the basic and advanced skills that can make a substantial difference, which are reflecting in the search results. Many companies are exceeding recommended technical demands while trying to describe its business. Main reasons for errors that appear on the web page happen due to lack of knowledge of a web page optimization. Properly designed and constructed web page requires an in-depth analysis and long-standing expertise in information technology, optimization and the industry in which the company performs. Most frequent mistakes that can be seen in a specific page are the technical characteristics and parameters of links that are located in the links themselves.

### Interactive Web Page Features

Rapid development of information technology brings us better and better technical features of hardware. More powerful processors, larger drives, advanced graphics

cards that can operate the software with features and graphics that were not previously known. It has also increased the fluidity and speed of networks that are now able to transfer large amounts of data.

All these enhancements that came with a fast IT development are making web page visual appearance better and more interactive. Technologies such as Flash and JavaScript are more and more present. Both have many useful properties but like any other things they have their weak sides. The weakness is reflected in the inability to integrate search engines, searching, reading, and the ranking of the elements that are built using these technologies. Therefore, the use of Flash and JavaScript-this requires special attention.

### URL (Uniform Resource Locators)

Optimizing web pages includes additional elements, which have their impact on web page ranking in search engines. The most famous search engines put great emphasis on properly selected address of the web page (URL). Web page's addresses also have other properties that are important for promotion and marketing which are necessary to consider.

### Images and Alt Text

Most of the companies make common and critical mistakes while naming the pictures that are presented on the web page. In addition to pictures the most common mistake is also naming the remarks of the pictures (alt text). Due to the prevalence of internet it is necessary to follow the standards how to display pictures on it, which have established during the years.

Most common formats that can be traced are JPEG, GIF, PNG and BMP.

### Anchor Text of Internal Links and Headings

A very important element is using keywords in internal links, followed by the use of styles (Heading) and contents of the web page itself, which plays a key role in the perception of usefulness in the eyes of users. In addition to these elements there are other factors that are equally important with professional optimization of a web page.

## 2.2 'Off-page' Optimization

Next to the on-page optimization it is really important that off-page optimization is done as well. In the past few years we can see a huge growth of so called social communities. User's exchange textual information, pictures, video content and other information

### Social Networks

It is becoming more and more important that you are present on these social networks because they are also a

part of search engines ranking list. With the help of social networks we can further increase the awareness and promotion of our products, events... Now days, Facebook, YouTube, Flickr and Twitter, and especially corporate blogs, have a big and leading role in a social networks world.

Fast development of information technology and its new products and services are the main features of today's IT world. Until recently, most of the social networks were unknown and undeveloped. But now they are on the level where they are changing business and individual's time. Therefore it is extremely important to follow these trends because they are the main things that you should be focus on in the future.

### **Link Popularity of Specific Page**

Raising popularity on the web page can also be achieved by building other links which are pointing to the web page. If you have a »healthy« link you have better chance to be ranked higher in the search engines list. Web pages that are globally known have a much more difficult job to do as unknown pages. Links show that well-known and established web pages, can contribute significantly to the popularity of the page that affects in the search engine ranking. Page rank which was developed by Google is a well known standard of page popularity. Ranking rate of a page is moving from 1 to 10. The higher the level, the better and more popular is the page.

### **2.3. Other aspect of optimization**

The purpose of most web pages is to be visible to visitors online. We can increase the visits on the page with several methods and techniques. Optimization has two methods; optimization that brings rankings in the search engines also so called organic hits. Another way is to pay for so called sponsored links.

So far we have mentioned some of the most important elements that are important for good positioning on search engines. One of the most important elements is certainly the choice of appropriate keywords. It is important to have good knowledge of the characteristics of industries in which firm performance and as well market competition. When determining keywords it is necessary to see which keywords are used by our competitors.

While making technically flawless web page it is important to have a good knowledge about positioning web page in the search engines. File description is the next element to be taken into account when drawing up web pages. Properly named files on the web page could have a significant meaning at search ranking lists.

Despite of all the technical features it is also important what kind of content is present on our web page.

Nowadays users are becoming more and more demanding about the content on the web page which has to be interesting and transparent. There are some standard ways how to write internet content and they are different to the print media text. Users usually »fly through« the content; they are not actually reading it. That's why it is important that we adjust the text in that matter.

Text on the web page is usually connected. Links between the pages are made with a help of connections that use »anchor text« for connecting words. Pictures on the web page have a great impact on psychology. It is important that the pictures are small so they are now overtaking the disc space. The next important thing is the web page structure which can be compared to a web page map.

For easier identification and searching it is important to choose appropriate name of the web page. How we name the web page is also important in terms of marketing. Hosting is just as important as selecting the name of the web page. Search engines put a lot of attention to the environment in which the web pages is located. Web pages come from environments that are trustworthy and are ranked better than others. While making the page it is important to consider search engines diversity. Today's most popular search engines are Internet Explorer, Firefox, Chrome, Opera, Safari and others.

Visits and usability of the web page is becoming more and more complex task. To achieve an appropriate level of usefulness in the eyes of visitors it is important to use different knowledge. Two main areas are definitely marketing and usability. In the future, we can expect more web pages and users, which will increase the requirements of providers and companies that are online.

### **3. Conclusion**

Internet is now a part of our everyday's life. There are more and more users that use the internet for much different kind of everyday tasks. Time and money savings are two of the main advantages of this. We can also see that companies and individuals have changed their behavior. Most of online searches is done through search engines.

Different search engines have their own individual crawlers, and as you might expect, they don't all behave exactly the same way. Some spiders fetch entire pages; other are easily bored and look at only some of the content [6].

Research and experience in this field shows us that most of the users are attracted to the web pages that are located at the top of the first page. On the first pages are the most visited web pages, which occupy the first seven places. The top ten listed pages reach to 80 percent of all clicks, which represents the majority of searches. Web pages that are listed between eleventh and twentieth place only remains left with about 15 percent of all clicks. The rest of the clicks fail to other web pages that are placed lower than twenties place.

Many companies are still not aware of the importance of optimizing web pages. Companies that are aware of the importance and power of the Internet, pay more and more energy and money just for optimizing web pages. Optimizing web pages can bring a lot of significant positive changes that can be reflected in several areas of business.

- A main feature of a well and good designs web page which also includes off-page optimization has the following advantages [9]:
- better brand promotion,
- online sales increase,
- increase of ROI,
- better competitive advantage,
- better ranking in the search engines list,
- long-term effects,
- increase of web page visits,
- other.

In the future we can expect that the number of internet users will increase. The vast majority of companies will be forced to maintain a market share and think of additional activities that are connected to the internet. Internet communities could present a big opportunity for companies. Most searches will certainly be carried out via a web search engine. Search engine optimization represents a critical point, which may represent the dividing line between success and failure of the company.

## LITERATURE

- [1] Enge E., Spencer, S., Fishkin R. Stricchiola J., *The Art of SEO: Mastering Search Engine Optimization (Theory in Practice)* (Paperback), O'Reilly Media, Inc, Sebastopol, 2010.
- [2] Evans, M.P., *Analysing Google rankings through search engine optimization data*, Internet Research, Emerald Group Publishing Limited, Vol. 17 No. 1, (2007) pp. 21-37.
- [3] Internet World Stats, *Internet Usage Statistics - The Internet Big Picture*, <http://www.internetworldstats.com/stats.htm> (2.2.2010).
- [4] Jansen, B.J., Spink, A., *How are we searching the world wide web? A comparison of nine search engine transaction logs*, *Information Processing and Management*, No. 42, (2006), pp. 248-63.
- [5] Kristopher, B.J., *Search Engine Optimization: Your Visual Blueprint for Effective Internet Marketing*, Wiley Publishing, Inc, Indianapolis, 2008.
- [6] Lieb, R., *The Truth About Search Engine Optimization*, Pearson Education, Inc., New Jersey, 2009.
- [7] Lutze, H. F., *The Findability Formula: The Easy, Non-Technical Approach to Search Engine Marketing*, John Wiley & Sons, Inc, Hoboken, New York, 2009.
- [8] Red Orbit, *Izdelava spletnih strani*, <http://www.red-orbit.com/storitve/izdelava-spletnih-strani/> (27.12.2009).
- [9] Red Orbit, *Storitve s področja optimizacije spletnih strani*, <http://www.optimizacija.eu/storitve.php?gclid=CPDG58qXmp8CFQ0TzAodQUSMng> (5.1.2010).
- [10] Smith, J., *Be #1 on Google: 52 Fast and Easy Search Engine Optimization Tools to Drive Customers to Your Web Site*, McGraw-Hill, 2010.

# Project Portfolio Management

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*The paper presents the basic characteristics of the project portfolio management process and the process itself. The project portfolio management is a new project management discipline that incorporates a simultaneous management of a number of independent projects and programmes in order to achieve strategic objectives as well as overall positive results of the organization.*

## 1. Introduction

The development of project management as a specialized management discipline can be tracked from the Project Management concept definition and the implementation (3,6,10), dealing with managing one project, to Programme Management, that includes managing a number of projects that make up a programme (4,10), to managing project portfolio (Project Portfolio Management) which incorporates managing a number of independent projects and programmes (7). We should also mention certain concepts of strategic project management (1), (16), management through projects (17), multiproject management in the organization (8), etc, advocated by some authors, with different prospects for further elaboration and implementation.

The development of the basic concept of project management and the creation of new disciplines such as programme management and the portfolio project management, shifts the focus of our attention from individual project goals to the organizational objectives. As to the programme management and the portfolio project management, these disciplines concentrate upon several projects in the company and thus clearly take into consideration, primarily, both the organizational objectives and the degree to which individual projects within the programme or the portfolio contribute to achieving organizational objectives (14).

The strategy implementation and achieving strategic goals is the main task the organization has to accomplish and the only possibility for the organization to achieve a positive immediate and future performance (18). It is for this reason that all the activities and projects stemming from the organization should be efficiently executed, using modern disciplines such as project management and the project portfolio management.

The efficient execution of a number of projects and programmes simultaneously and hence achievement

of strategic objectives of the organization uses the project portfolio management, a new discipline which allows for the organization to achieve its strategic objectives through a simultaneous execution of a large number of projects within one portfolio (15).

The project portfolio management relies upon the strategic component of the organization. It prolongs the time dimension of the project management implementation and ensures a continuous project cycle in accordance with a long-term horizon of strategic planning. The project portfolio management is based on a strategic plan and includes all the programmes and projects coming out of it or connected with the strategic plan of the organization. The strategic plan is characterised by a continuum dimension, hence the dimension of the project portfolio management that follows the strategic plan has also to be long-term and continual. The projects and programmes supporting the organizational strategic plan are executed in the process of the portfolio project management; some come to be completed, some are stopped or are left out of the process and become part of another one and this goes on continually, in accordance with the continual nature of the long-term planning.

## 2. Project portfolio management - definition

The first step in the analysis of the project portfolio management is the definition of the project portfolio management as a modern managerial discipline that allows for an efficient management of project-oriented organizations as well as linking the strategic and the project frameworks in the organization.

It should be noted that the project portfolio management connects the organizational strategic objectives and the execution of individual programmes and projects for the purpose of achieving these objectives. This means that the project portfolio management incorporates the organizational strategic aspects and includes

them into the project management concept, thus linking, to a certain way, the project portfolio management with the strategic management of the organization (1,14,16).

The project portfolio management is a modern project management discipline that incorporates managing one or a number project portfolios and links strategies and other business initiatives of the organization to the respective projects. The project portfolio management consists of a succession of subprocesses such as identification, selection, prioritization, planning and control of the execution of projects, programmes and other related activities in order that the strategic goals of individual projects and programmes and the organizational objectives in general should be achieved (13).

The project portfolio management demands that the processes of selection and prioritization be first used to create a project and programme portfolio to be executed and adjusted to the defined strategies and available resources in the organization. Therefore we can say that the portfolio is a set of projects and programmes with the completion of which the organizational strategic objectives will be achieved. Some authors (4, 17) maintain that the project portfolio includes all the projects and programmes in the project-oriented organization. Here it is worth noting that the projects and programmes that are part of the portfolio may, but need not necessarily be connected or interdependent. They are grouped and directed towards organizational strategic objectives in accordance with the defined strategies present in the organizational strategic plan.

Given that the portfolio is a set of respective projects and programmes in an organization, the difference between the portfolio, the programmes and the projects is absolutely clear, both as regards the scope and complexity and as regards the planning, the control and the management in general. The project portfolio management includes the processes of managing individual projects and programmes that make the portfolio, by which such a global project portfolio management process obtains a considerably more complex time and resource dimension compared to the individual project or a programme management process (5, 7, 11).

In simple terms, the project portfolio management has two basic sections: creating the portfolio and the portfolio execution management. The portfolio creation is a continual process that includes the selection and the prioritization of projects and programmes to create the portfolio, and then a continuous monitoring and the re-

construction of the portfolio in the sense of possible moving certain projects out of the portfolio or including new projects into it. The project portfolio management means managing individual projects and programmes using the project management and the programme management methodologies with the necessary adjusting procedures and an optimal resource usage (9, 12).

The basic objectives of the project portfolio management are as follows:

- Optimization of project portfolio results;
- Adjusting the projects and programmes with the organizational strategy,
- Selection of projects and programmes to be executed;
- Defining the priorities of projects and programmes;
- Stopping or discontinuation of certain projects or programmes;
- Coordination of internal and external resources; and organizational learning between projects and programmes (8).

In order that the project portfolio management should contribute to the strategic objectives and the overall success of the organization, the project portfolio should be designed in such a manner that the projects and programmes for the portfolio are selected through a rigorous selection and prioritization procedures, taking into account the available resources, the risk to be taken and the economic contribution to achieving organizational strategic objectives. Hence the portfolio consists of the projects that meet the following requirements (7):

- Projects are to be adjusted to the organizational strategy and goals;
- Projects are to be consistent with the organizational values and culture;
- Projects are to contribute to the positive money flow in the organization;
- Projects are to effectively implement the human and material resources of the organization;
- Projects do not contribute to organizational functioning in just one point of time; they are to contribute to the future results too.

### **3. Project portfolio management process**

The project portfolio management process can be defined in several ways, having in mind the project portfolio management goals, the basic stages and the characteristics of the portfolio and the projects and programmes consists of (5).

The project portfolio management is a rather complex process that, globally observed (4,17), consists of creating and a continuous execution of the project portfolio which in turn consists of a set of projects and programmes meant to achieve the organizational strategic objectives. It is a highly complex process that includes a large number of subprocesses, stages and activities. Generally, the project portfolio management process incorporates the following subprocesses:

- a) Project selection and prioritization and project portfolio definition,
- B) Portfolio review, maintenance and reconstruction;
- c) Project portfolio management implementation (execution of projects and programmes in the portfolio);
- d) Monitoring the execution of individual projects, programmes and the entire portfolio (14).

If the selection and prioritization are said to be the initial stages of the project portfolio management process, it should be pointed out that these phases partially overlap and condition each other, thus making the entire project portfolio management process continuous and highly complex, with certain activities and substages that overlap or repeat.

#### **a) Project selection and prioritization**

The project selection and prioritization is the initial stage in which the characteristics and contributions of the proposed projects are compared to the set selection criteria, in order that the project portfolio be created. It is a highly complex and demanding process consisting of a large number of activities and phases whose execution can be of crucial influence upon the overall project portfolio management process.

The primary aim of the project selection and prioritization is to choose those projects and programmes from the set of the needed and available projects in the organization whose execution helps achieve the organizational strategic objectives, having in mind the available resources. The portfolio selected is expected to be in accord with the strategies defined in the organizational strategic plan as well as with the available resources, and the execution of the portfolio is to bring the optimum benefit for the organization.

In order to define and conduct the project portfolio management process it is necessary that certain pre-conditions are established. These primarily refer to:

- Defining the company's strategic objectives;
- Designing the company's strategic plan;

- Defining the available resources;
- Defining the required and available budget;
- Defining the acceptable risk for the company, etc.

The project selection and prioritization process and the project portfolio definition cover the following basic phases:

- Preparation of project propositions;
- Defining the benefits from the project and setting criteria;
- Estimation of possible risks;
- Defining available resources and financial means;
- Assessing the extent to which the project is in accord with the defined organizational strategies;
- Ranking projects according to the set criteria and prioritizing;
- Selection of projects and defining the project portfolio (14).

The preparation of project propositions is the initial phase in the project selection and prioritization process that includes a complex and extensive work on gathering the necessary information on all the available and possible projects and programmes, followed by the information analysis and processing in order to obtain realistic basis in the form of certain pre-studies and proposals for further assessment, selection and ranking of projects.

The next phase in the project selection and prioritization process refers to defining the benefits a certain project brings to the organization and hence setting the criteria to measure and compare these benefits. These criteria are the basic measures for further project selection and ranking activities. Defining the benefits and the respective criteria is a highly important activity on which the success of the entire phase of the project selection and prioritization process, and consequently the success in project portfolio defining, depend.

In order that the project selection and prioritization process should continue it is necessary that an inventory of available resources be made; together with the financial funds they are the main constraining factor in the project selection and ranking. It is also necessary that we should estimate all the risks that accompany the execution of certain projects and may crucially affect our decision as whether it is justifiable to include a certain project into the project portfolio or another alternative should be sought.

In the project selection and prioritization process it is also necessary that a thorough analysis be made and

that it be determined whether the available projects are in accord with the defined organizational strategies and in which manner and to which extent they contribute to achievement of the organizational strategic objectives. In order to accomplish this task effectively, it is necessary that there be a defined and adopted organizational strategic plan with clearly set organizational strategic objectives to be achieved. The projects that are not in accord with organizational strategic objectives are not taken into consideration, thus making a shortlist of eligible projects to be included in the portfolio.

The selection phase completed, we have at disposal a set of projects and programmes adjusted to the organizational strategic objectives. The ensuing procedure of selection and ranking is to help determine which projects and programmes will constitute the project portfolio. In this further procedure we implement the previously defined selection and ranking criteria and rank the projects on the basis of a detailed analysis and assessment of the extent to which certain projects have met the criteria.

The last phase of the project selection and prioritization process includes the selection of the projects and the project portfolio definition. The project portfolio will include only the highest ranking projects, those that by meeting several criteria bring greatest benefits (financial, developmental, etc.) to the organization and for which the organization has the necessary resources and finances. Forming the project portfolio completes the project selection and prioritization phase.

#### **b) Portfolio review, maintenance and reconstruction**

The definition of the project portfolio is followed by the execution of individual projects and programmes that are part of the portfolio. This is a long-lasting process consisting of a large number of activities and including numerous participants, with different roles each in this dynamic process.

Since the project execution process is lengthy and dynamic, it may come under the impact of various factors and numerous changes that may affect not only the execution, but the very structure of the portfolio, too. Hence the constant need for continuous reviewing, maintenance and reconstruction of the portfolio. Namely, once defined, the project portfolio is not final and unchangeable. It is subject to impacts by various factors and often conditioned by necessary changes. Hence all the projects and programmes in the portfolio are subject to constant reviews and analysis to determine whether they still bring the planned benefits and ensure the achievement of the organizational strategic objectives (14).

This means that it is necessary to constantly analyse and assess the performance of each project and programme, continually assess the contribution of each project to achieving the economic and other benefits for the organization and consequently review and improve the portfolio. It is also necessary that, on the basis of previous analyses and estimations, each project be analysed and be decided whether it should be executed further, improved, or replaced. Also, we should analyse the previously set criteria for the project selection and the estimate of the project contribution to the organizational strategic objectives and change, update and confirm the set criteria, thus affecting the portfolio review, maintenance and restructuring in a certain manner.

It is worth noticing that numerous events, especially large-scale changes in the environment, highly risky events and crises may demand changes in the strategic objectives and the organizational strategies which unavoidably calls for changes in the project portfolio structure. In such situations, new projects are likely to be introduced into the project portfolio and some projects will be moved out of the portfolio.

The project portfolio maintenance and improvement is a continuous task, executed all along the project portfolio execution, these two processes being inter-related and inter-dependent to a large extent.

#### **c) Portfolio projects and programmes execution**

The defined project portfolio, i.e., the projects and programmes it consists of, have to be executed in order to derive the benefits for the organization and achieve strategic objectives. In this process of execution of individual projects and programmes in the portfolio, standard methodologies of the project and programme management are implemented that assume the provision of project plans, organization and delegation of responsibilities, allocation of resources and budget and other planning and control activities necessary to bring a certain project or programme to an end.

Due to the fact that it is a number of projects that are executed simultaneously, the organization of management of individual project, programme, and portfolio execution is generally a highly complex problem that requires that the key players in the process and their main roles and responsibilities be clearly defined. In addition to project managers and project teams in charge of managing the execution of individual projects, a very important role in the project portfolio management process belongs to the team of top managers and the Project Portfolio Council and the

Programme (Project) office as well as a number of stakeholders interested in certain projects and programmes (14).

These two organizational forms are responsible for the management of the execution of all the processes in the project portfolio management. Although it is logical that the top management, responsible for achieving the organizational strategic objectives, should be in charge of making all the managerial decisions in the project portfolio management, it usually delegates part of its authority and responsibilities to the Project Portfolio Council. In this case the Project Portfolio Council is responsible for the course of the entire project portfolio management process as well as for the efficient execution of the projects and programmes in the portfolio (14).

The Project office is in charge of monitoring and control of the execution of all the projects in the portfolio. Their task is to coordinate the execution of all the projects in the portfolio, to control the achievement of the planned project results and to inform the Project Portfolio Council of the process. On the basis of the information and the recommendations obtained from the Project office, the Project Portfolio Council makes the decision as to whether a certain project should be discontinued, continued or postponed.

It is clear that the Project Portfolio Council is the supreme authority in the project portfolio management. They decide whether the project portfolio will be altered or partly reconstructed. They also decide whether the key contributions and benefits for the organization are obtained and, consequently, whether a project should be continued or a new one should be introduced. Thus they link the execution of individual projects and programmes with the achievement of the overall organizational goals and control the achievement of these objectives.

#### **d) Monitoring execution of individual projects and programmes and of entire portfolio**

The final stage in the project portfolio management process consists of a continual monitoring and control of the execution of individual projects and programmes as well as of the entire portfolio. This phase is directly related to the project and programme execution phase and also demands an efficient organization, capable of coordinating, collaborating, information collecting, reviewing certain activities and processes in the execution. It is from this phase that information and recommendations are sent to the portfolio maintenance and execution phases, so that

changes can be made and the activities directed towards the planned strategic objectives.

Individual projects, programmes and the entire portfolio monitoring and control is carried out throughout the entire project portfolio management process. Although this phase is directly linked to the projects and programmes in the portfolio execution phase, it yields the data necessary in the portfolio maintenance and reconstruction and also impacts the selection and prioritization processes and the introduction of new projects and programmes into the portfolio.

The complexity of individual projects and programmes monitoring and control and a host of information, demands, calls for, in addition to an efficient organization and a clear managerial structure, a powerful computer support, capable of receiving, processing and distributing a large number of required and timely information. It is only in this way that the project portfolio management process can run continually, from selection and prioritization, to project portfolio creating and maintaining, to its direct execution and execution control.

This can be ensured only by a modern integrated information system with a strong computer support that assumes the use of the Internet and numerous software tools that are continually developed and improved and without which it is impossible to manage the project portfolio.

#### **4. Conclusion**

As regards the project development and the modern tendencies in the development of this specialized management discipline a conclusion can be drawn that the project portfolio management is a modern concept that offers varied opportunities for an efficient management of several different projects and programmes an organization conducts or is planning to carry out.

From managing one project (14, 18) and a tendency to achieve the set objectives of the project under considerations, we came to a need to manage a number of projects and programmes (11, 12) and to the efforts to achieve, in addition to the goals of individual projects, the overall organizational objectives. Thus the focus is shifted to organizational strategic objectives, connecting the operational aspect of the basic project management concept with a strategic aspect the organization strives to and the strategic management of the organization.

The project portfolio management process includes a number of inter-connected sub-processes (14) such as:

project identification, selection and prioritization and project portfolio definition, then the portfolio review, maintenance and reconstruction, followed by the management of the portfolio projects and programmes execution, and, finally, individual projects, programmes and the entire portfolio execution monitoring. This concept of project portfolio management is a rather simplified approach that is relatively easy to implement in practice.

To conclude, the project portfolio management consists of two global sections: portfolio definition and portfolio execution management. The portfolio definition is a continuous process that includes the project and programme selection and prioritization in order that the portfolio may be created, and then a regular portfolio monitoring and restructuring in case certain projects should be left out and some new should be entered. The portfolio execution management includes individual projects and programmes management by implementing the project management and the programme management methodologies with the necessary adjustment procedures and with the optimal use of resources.

## REFERENCES

- [1] Callahan K., Brooks L.: *Essentials of Strategic Project Management*, John Willey & Sons Inc., 2004.
- [2] Cusumano M.A., Nobeoko K.: *Thinking beyond*, The Free Press, New York, 1998.
- [3] Frigenti E., Comminos D.: *The Practice of Project Management – a guide to the business – focused approach*, Kogan Page, London, 2002.
- [4] Gareis R.: *Programme Management and Project Portfolio Management: New Competencies of Project-Oriented Organization*, PMI Symposium, Houston, 2000.
- [5] Kendall G.I., Rollins S.C.: *Advanced Project Portfolio Management and the PMO: Multiplying ROI at Warp Speed*, International Institute for Learning and J.Ross Publishing, Florida, 2003.
- [6] Kerzner, H.: *Project Management: A Systems Approach to Planning, Scheduling and Controlling*, Ninth Edition, John Willey & Sons, 2006.
- [7] Levine H.A.: *Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios and Maximizing Benefits*, John Willey & Sons, 2005.
- [8] Petrović D.: *Koncept multiprojektnog upravljanja u preduzeću*, doktorska disertacija, FON, Beograd, 2003.
- [9] Petrović D.: *Model upravljanja portfoliom projekata*, VII Internacionalni simpozijum iz projektnog menadžmenta – YUPMA 2003, Zlatibor, 2003.
- [10] Turner J. R.: *The Handbook of Project-based Management: Improving the Process for Achieving Strategic Objectives*, Mcgraw-Hill Professional, 1998
- [11] Wideman R.M.: *A Management Framework for Project, Program and Portfolio Integration*, Trafford Publishing, 2004.
- [12] Williams D., Parr T.: *Enterprise Programme Management: Delivering Value*, Palgrave Macmillan, 2004
- [13] *A Guide to the Project Management Body of Knowledge, PMBOK Guide – Fourth Edition*, Project Management Institute, Pennsylvania, USA, 2008
- [14] Jovanović P.: *Upravljanje projektom*, VŠPM, Beograd, 2010.
- [15] Jovanović P.: *Savremeni menadžment*, VŠPM, Beograd, 2009.
- [16] Grundy T., Brown L.: *Strategic project management – Creating Organizational Breakthroughs*, Thomson Learning, UK, 2002
- [17] Gareis R.: *Happy projects!*, MANZ Verlag, Vienna, 2005.
- [18] Jovanović P., Živković D., Jovanović F.: *Menadžment i projektni menadžment*, VŠPM, Beograd, 2008.

# Development of Higher Environmental Education Program

UDC: 37.033:502/504

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*Education for Sustainable Development is an investment in our future... each respective country should ensure that appropriate resources are made available for its development' - World Summit on Sustainable Development: Plan of Implementation (2002).*

## 1. Introduction

The Global Development Research Center (GDRC) endorses and supports the initiative of the UN to designate the decade of 2005 - 2015 as the 'UN Decade of Education for Sustainable Development'. The UN-DESD is to start from 1 January 2005, extending to the end of the year 2015. The UN Decade of Education for Sustainable Development - ESD seeks to (a) incorporate quantitative and qualitative ESD indicators into on-going monitoring and evaluation of Education for All - EFA and the UN Literacy Decade; (b) monitor the progress of activities undertaken by UN agencies, Governments and NGOs in observance of the Decade and facilitate the implementation and follow-up; (c) evaluate the achievement of measurable results in achieving the aims and objectives of the Decade, particularly as regards the integration of ESD into national educational policies, programmes and systems; and (d) make recommendations to further promote ESD based on results and lessons learnt from the Decade.

The main thrusts of Education for Sustainable Development, originally identified in Chapter 36 of Agenda 21, have been expanded upon in the Work Programme of the UN Commission of Sustainable Development - CSD, reports of the major UN Conferences of the 1990's:

1. *Public understanding of the principles behind sustainability.* ESD has a major role in furthering the discussion of sustainability itself and the evolution of the concept from a vision to its practical application in culturally appropriate and locally relevant forms.
2. *Mainstreaming ESD.* This social process needs to be mainstreamed into all sectors including business, agriculture, tourism, natural resource management, local government and mass media, adding value to program development and implementation.
3. *Lifelong learning for all.* The quality life-long education and learning opportunities are required for all people regardless of their occupation or circumstances.

4. *ESD is relevant to all nations.* The realization that it is our most highly educated countries that create some of the greatest threats to a sustainable future for the planet, the reorienting of existing education programs in all nations to address the social, environmental, and economic knowledge, skills, perspectives, and values inherent to sustainability is also a major thrust of ESD.

5. *Specialised Training Programs.* The development of specialized training programs to ensure that all sectors of society have the skills necessary to perform in their world in a sustainable manner.

## 2. Promoting education, public awareness and training

Education, raising of public awareness and training are linked to virtually all areas in Agenda 21, and even more closely to the ones on meeting basic needs, capacity-building, data and information, science, and the role of major groups.

Programme areas described in Agenda 21 are:

- a. Reorienting education towards sustainable development.
- b. Increasing public awareness.
- c. Promoting training.

## PROGRAMME AREAS

### A. Reorienting education towards sustainable development

#### Basis for action

Education, including formal education, public awareness and training should be recognized as a process by which human beings and societies can reach their fullest potential. Education is critical for promoting sustainable development and improving the capacity of the people to address environment and development issues. While basic education provides the underpinning for any environmental and development education, the latter needs to be incorporated as an essential part

of learning. Both formal and non-formal education are indispensable to changing people's attitudes so that they have the capacity to assess and address their sustainable development concerns.

### **Objectives**

Recognizing that countries, regional and international organizations will develop their own priorities and schedules for implementation in accordance with their needs, policies and programmes, the following objectives are proposed:

- Efforts should focus on reducing the high illiteracy levels and redressing the lack of basic education among women and should bring their literacy levels into line with those of men.
- To achieve environmental and development awareness in all sectors of society on a world-wide scale as soon as possible.
- To strive to achieve the accessibility of environmental and development education, linked to social education, from primary school age through adulthood to all groups of people.
- To promote integration of environment and development concepts, including demography, in all educational programmes, in particular the analysis of the causes of major environment and development issues in a local context, drawing on the best available scientific evidence and other appropriate sources of knowledge, and giving special emphasis to the further training of decision makers at all levels.

### **Activities**

It is recognized that countries and regional and international organizations will develop their own priorities and schedules for implementation in accordance with their needs, policies, programmes and activities.

## **B. Increasing public awareness**

### **Basis for action**

There is still a considerable lack of awareness of the interrelated nature of all human activities and the environment, due to inaccurate or insufficient information. There is a need to increase public sensitivity to environment and development problems and involvement in their solutions and foster a sense of personal environmental responsibility and greater motivation and commitment towards sustainable development.

### **Objective**

The objective is to promote broad public awareness as an essential part of a global education effort to strengthen attitudes, values and actions which are compatible with sustainable development. It is important to stress the principle of devolving authority, accountability and resources to the most appropriate level with preference given to local responsibility and control over awareness-building activities.

### **Activities**

It is recognized that countries, regional and international organizations will develop their own priorities and schedules for implementation in accordance with their needs, policies, programmes and activities.

## **C. Promoting training**

### **Basis for action**

Training is one of the most important tools to develop human resources and facilitate the transition to a more sustainable world. It should have a job-specific focus, aimed at filling gaps in knowledge and skill that would help individuals find employment and be involved in environmental and development work. At the same time, training programmes should promote a greater awareness of environment and development issues as a two-way learning process.

### **Objectives**

The following objectives are proposed:

- To establish or strengthen vocational training programmes that meet the needs of environment and development with ensured access to training opportunities, regardless of social status, age, gender, race or religion.
- To promote a flexible and adaptable workforce of various ages equipped to meet growing environment and development problems and changes arising from the transition to a sustainable society.
- To strengthen national capacities, particularly in scientific education and training, to enable Governments, employers and workers to achieve their environmental and development objectives and to facilitate the transfer and assimilation of new environmentally sound, socially acceptable and appropriate technology and know-how.
- To ensure that environmental and human ecological considerations are integrated at all manageri-

al levels and in all functional management areas, such as marketing, production and finance.

### Activities

- Countries, with the support of the United Nations system, should identify workforce training needs and assess measures to be taken to meet those needs.
- National professional associations are encouraged to develop and review their codes of ethics and conduct to strengthen environmental connections and commitment.
- Countries and educational institutions should integrate environmental and developmental issues into existing training curricula and promote the exchange of their methodologies and evaluations.
- Countries should encourage all sectors of society, such as industry, universities, government officials and employees, non-governmental organizations and community organizations, to include an environmental management component in all relevant training activities, with an emphasis on meeting immediate skill requirements through short-term formal and in-plant vocational and management training.
- Countries should strengthen or establish practical training programmes for graduates from vocational schools, high schools and universities, in all countries, to enable them to meet labour market requirements and to achieve sustainable livelihoods.
- Governments are encouraged to consult people in isolated situations, whether geographically, culturally or socially, to ascertain their needs for training to enable them to contribute more fully to developing sustainable work practices and lifestyles.
- Governments, industry, trade unions, and consumers should promote an understanding of the interrelationship between good environment and good business practices.
- Countries should develop a service of locally trained and recruited environmental technicians able to provide local people and communities, particularly in deprived urban and rural areas, with the services they require, starting from primary environmental care.
- Countries should enhance the ability to gain access to, analyse and effectively use information and knowledge available on environment and development.
- Aid agencies should strengthen the training component in all development projects, emphasizing a multidisciplinary approach, promoting awareness and providing the necessary skills for transition to a sustainable society.

- Existing networks of employers' and workers' organizations, industry associations and non-governmental organizations should facilitate the exchange of experience concerning training and awareness programmes.
- Governments, in cooperation with relevant international organizations, should develop and implement strategies to deal with national, regional and local environmental threats and emergencies, emphasizing urgent practical training and awareness programmes for increasing public preparedness.
- The United Nations system, as appropriate, should extend its training programmes, particularly its environmental training and support activities of employers' and workers' organizations.

### 3. Education for sustainable development

Education for sustainable development, also known as sustainability education, or education for a sustainable future, arose out of the statement in Chapter 36 of Agenda 21 that education is crucial to sustainable development and that all countries should initiate national strategies for education for sustainable development. As a result, education in the context of sustainability is understood as a change process rather than a message or level which must be achieved. Another realization emerging out of the sustainability literature is that major problems cannot be solved from the standpoint of our current way of living but will require a shift from traditional ways of thinking and acting upon environmental problems. The sustainability approach aims to do things differently in the first place, instead of just cleaning up the symptoms of underlying problems. It moves away from "doom and gloom" approaches towards future oriented thinking and action.

In its essence, education for a sustainable future uses content from the environment, economy and society to organize learning processes that help understanding the evolution of human interaction with the environment through development, to analyze present realities, and to plan and participate in coherent processes of change toward a more sustainable future. This set of knowledge, skills and values, endorsed by representatives of all sectors of every society, is the framework for education for sustainability and the basis for much of the new curriculum planning taking place across the world. As can be seen, the framework integrates education about the environment, economy and society within a context of critical skills and the values of hope and commitment. In trying to define education for sustainability, it is important that it be seen in the context of other major educational movements in the world.

Education for sustainable development is learner-centered, providing learners with opportunities to construct their own understanding through hands-on, minds-on investigations. Learners are engaged in direct experiences and are challenged to use higher-order thinking skills. Education for sustainable development supports the development of an active learning community where learners share ideas and expertise, and prompt continued inquiry. Also, this education provides real-world contexts and issues from which concepts and skills can be learned. It recognizes the importance of viewing the environment within the context of human influences, incorporating an examination of economics, culture, political structure, and social equity as well as natural processes and systems.

Through comprehensive, cohesive programs, learners explore how feelings, experiences, attitudes, and perceptions influence environmental issues. They become knowledgeable about natural processes and systems and gain an understanding of human processes and systems. They develop a sense of their rights and responsibilities as citizens, are able to understand the ideals, principles, and practices of citizenship in democratic societies, and they gain the skills necessary for citizenship. The awareness, knowledge, and skills needed for these local connections, and understandings provide a basis for moving out into larger systems, broader issues, and a more sophisticated comprehension of causes, connections, and consequences. Education for sustainable development fosters skills and habits that people can use throughout their lives to understand and act on environmental issues. It emphasizes critical and creative thinking skills along with other higher level thinking processes that are key to identifying, investigating, and analyzing issues, and formulating and evaluating alternative solutions.

#### **4. A framework for curriculum development for higher environmental education**

A framework for curriculum development for higher environmental education, especially good higher environmental education involves certain knowledge, skills and values.

- The knowledge needed for higher environmental education has to be about:
- The planet Earth as a finite system and the elements that constitute the planetary environment.
- The resources of the Earth, particularly soil, water, minerals, etc., and their distribution and role in supporting living organisms.
- The nature of ecosystems and biomes, their health, and their interdependence within the biosphere.
- The dependence of humans on the environmental resources for life and sustenance.

- The sustainable relationship of native societies to the environment.
- The implications of the resource distribution in determining the nature of societies and the rate and character of economic development.
- Characteristics of the development of human societies including nomadic, hunter gatherer, agricultural, industrial and post-industrial, and the impact of each on the natural environment.
- The role of science and technology in the development of societies and the impact of these technologies upon the environment.
- Philosophies and patterns of economic activity and their different impacts upon the environment, societies and cultures.
- The process of urbanization and its implications.
- The interconnectedness of present world political, economic, environmental and social issues.
- Aspects of differing perspectives and philosophies concerning the ecological and human environments.
- Cooperative international and national efforts to find solutions to common global issues, and to implement strategies for a more sustainable future.
- The implications for the global community of the political, economic and socio-cultural changes needed for a more sustainable future.
- Processes of planning, policy-making and action for sustainability by governments, businesses, non-governmental organizations and the general public.

Skills needed for higher environmental education include:

- Frame appropriate questions to guide relevant study and research.
- Define such fundamental concepts as environment, community, development and technology, and apply definitions to local, national and global experience.
- Use a range of resources and technologies in addressing questions.
- Assess the nature of bias and evaluate different points of view.
- Develop hypotheses based on balanced information, critical analysis and careful synthesis, and test them against new information and personal experience and beliefs.
- Communicate information and viewpoints effectively.
- Work towards negotiated consensus and cooperative resolution of conflict.
- Develop cooperative strategies for appropriate action to change present relationships between environmental preservation and economic development.

Values needed for higher environmental education are:

- An appreciation of the resilience, fragility and beauty of nature and the interdependence and equal importance of all life forms.
- An appreciation of the dependence of human life on the resources of a finite planet.
- An appreciation of the role of human ingenuity and individual creativity in ensuring survival and the search for appropriate and sustainable progress.
- An appreciation of the power of human beings to modify the environment.
- A sense of self-worth and rootedness in one's own culture and community.
- A respect for other cultures and recognition of the interdependence of the human community.
- A global perspective and loyalty to the world community.
- A concern for disparities and injustices, a commitment to human rights and to the peaceful resolution of conflict.
- An appreciation of the challenges faced by the human community in defining the processes needed for sustainability and in implementing the changes needed.
- A sense of balance in deciding among conflicting priorities.
- Personal acceptance of a sustainable lifestyle and a commitment to participation in change.
- A realistic appreciation of the urgency of the challenges facing the global community and the complexities that demand long-term planning for building a sustainable future.
- A sense of hope and a positive personal and social perspective on the future.
- An appreciation of the importance and worth of individual responsibility and action.

The aim of a good higher environmental education is to:

- Acquire skills, assess and apply complex management concepts in order to solve today's and tomorrow's environmental challenges.
- Gain knowledge in environmental sciences and their practical application.
- Train soft skills by working in international and interdisciplinary teams.
- Combine a theoretical orientation with practical project work.
- Give a range of practical techniques in such areas as environmental planning, environmental policy, environmental management systems (EMS),

modeling, geographic information systems (GIS) and data management.

- Corporate social responsibility, logical framework analysis, life cycle assessment (LCA), and energy analysis and planning.
- Use different tools for project design, environmental monitoring, quality control and evaluation as well as planning.
- Train in using cost-benefit and cost-effectiveness methods.
- Understanding of the social and political implications of planning and management within the environmental field.
- Understanding of the relationships between companies and stakeholders, the environmental challenges facing businesses operating on international markets, and an introduction to various types of environmental regulations.

The aim of good higher environmental education is to enable students to work in or lead interdisciplinary teams to find solutions, using environmental sciences and management methods, so that they'll be skilled to devise integrative environmental knowledge and management solutions for complex environmental issues on a regional, national and international level, for the private as well as for the public sector. What has to be offered in the program of good higher environmental education is interconnected with the wide range of requirements in professional life; therefore the program of higher environmental education is designed to meet these new sustainability challenges, by integrating inputs from the social and human sciences into the study of environmental planning and engineering. The focus is on how firms, governments, and other organisations can support sustainable development in an economically efficient and socially acceptable manner.

The mode of teaching modes varies throughout the higher environmental education program and includes formal lectures as well as project-based individual and team studies, during which students are asked to get actively involved in organisational and contents related aspects of the teaching program, giving feedback for a continuous advanced evolution of higher education for sustainable development and future.

### **5. Instead of conclusion: competencies of graduates of higher environmental education program for sustainable development**

Competency checklist of graduates of higher environmental education program for sustainable development is given in table below (table1).

No.	Competency	Performance Criteria
1.	Apply environmental science and technology	<ul style="list-style-type: none"> <li>○ The impact of human activities on the environment is clearly understood and applied to environmental auditing.</li> <li>○ The interaction of ecosystems is clearly understood and applied to environmental auditing.</li> <li>○ General methods of environmental protection are understood and applied to environmental auditing.</li> <li>○ Monitoring and measurement techniques for environmental management are understood and applied to environmental auditing.</li> </ul>
2.	Apply environmental management principles	<ul style="list-style-type: none"> <li>○ Environmental management principles are understood and applied correctly within the context of a given business/industry sector.</li> <li>○ The intent and requirement of each clause of ISO 14001, or equivalent applicable environmental standard, can be described in the context of a given business/industry sector.</li> <li>○ The relationship between environmental sciences and environmental management principles and the environmental standards is explained within the context of a given business/industry sector.</li> <li>○ Environmental procedures are documented in accordance with the environmental standard and environmental management principles.</li> <li>○ Environmental procedures are implemented in accordance with the environmental standard and environmental management principles.</li> <li>○ The environmental standard and its application are appropriate in the business/industry sector.</li> <li>○ Evidence needed to demonstrate conformity to the requirements of the environmental standard is identified and collected.</li> <li>○ The effectiveness of the entire environmental management system is evaluated within the context of a given business/industry sector.</li> <li>○ The relationship between legal compliance and conformity to the environmental management system is demonstrated in the context of an audit in a given business/industry sector.</li> <li>○ Environmental management tools such as aspect/impact evaluation, life cycle assessment, and environmental performance evaluation, are used appropriately within the context of a given business/industry sector.</li> </ul>
3.	Apply environmental systems to different operational processes	<ul style="list-style-type: none"> <li>○ The product realisation processes and supporting activities are evaluated effectively in order to establish their environmental impact and verify the degree of conformity to the environmental management system.</li> <li>○ Process-based activities and associated inputs, outputs, controls, and resources, are understood in different organizational contexts.</li> </ul>
4.	Understand the application of environmental systems to different operational processes	<ul style="list-style-type: none"> <li>○ The product realization processes and supporting activities are evaluated effectively in order to establish their environmental impact and verify the degree of conformity to the environmental management system.</li> <li>○ Process-based activities and associated inputs, outputs, controls, and resources, are understood in different organizational contexts.</li> </ul>
5.	Assess the risk of significant environmental impacts and activities identified in the context of the organization's EMS management system	<ul style="list-style-type: none"> <li>○ The level of risk for each environmental impact is assessed to determine significance.</li> <li>○ The risk assessment methodology used is soundly and scientifically and/or impact based, and is documented within the EMS system.</li> <li>○ The risk assessment methodology used is appropriate to the business type or industry sector.</li> </ul>

**Table1.** Competency Checklist of graduates of higher environmental education program for sustainable development

## REFERENCES

- [1] NEEAC. (1996). Report Assessing Environmental Education in the United States and the Implementation of the National Environmental Education Act of 1990. NEEAC, Washington, DC.
- [2] North America Association for Environmental Education. (1996). Environmental Education Materials: Guidelines for Excellence. NAAEE , Rock Spring, GA.
- [3] North America Association for Environmental Education. (2002). Guidelines for Excellence in Nonformal Environmental Education Program Development and Implementation. (draft) NAAEE, Rock Spring, GA.
- [4] Petrović, N. (2005). Environmental Education: Case of Postgraduate Environmental Management Studies on Faculty of Organizational Sciences, Serbia and Montenegro. Collection of Works, 8<sup>th</sup> "Toulon – Verona" Conference, Palermo, Italy.
- [5] Petrović, N., M. Milićević (2006). Education For Sustainable Development. Collection of Works, 9<sup>th</sup> "Toulon – Verona" Conference, Paisley, Scotland.
- [6] Petrović, N., M. Milićević (2007). Higher good Environmental Education. Collection of Works, 10<sup>th</sup> "Toulon – Verona" Conference, Thessaloniki, Greece.
- [7] Petrović, N. (2009). Ekološki menadžment. Fakultet organizacionih nauka, Beograd.
- [8] UNCED (1992). Agenda 21: Programme of Action for Sustainable Development. Rio Declaration on Environment and Development. N.Y.: United Nations.
- [9] UNDP, UNESCO, UNICEF, World Bank (1990). Final Report of the World Conference on Education for All: Meeting Basic Learning Needs, Jomtien, Thailand, 5-9 March 1990, New York, Inter-Agency Commission for the World Conference on Education for All.
- [10] UNESCO (1978). Final Report Intergovernmental Conference on Environmental Education. Organized by UNESCO in Cooperation with UNEP, Tbilisi, USSR, 14-26 October 1977, Paris: UNESCO ED/MD/49.
- [11] UNESCO-UNEP. (1978). Final Report Intergovernmental Conference on Environmental Education. Organized by UNESCO in Cooperation with UNEP, Tbilisi, USSR, 14-26 October 1997, Paris: UNESCO
- [12] UNESCO-UNEP (1976). The Belgrade Charter. Connect: UNESCO/UNEP Environmental Newsletter, Vol. 1 (1) pp. 1-2.
- [13] UNESCO (1998). Environment and Society: Education and Public Awareness for Sustainability. Proceedings of the Thessaloniki International Conference. Paris: UNESCO.

# Ecodesign in the Context of Customer's and Producer's Point of View

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*The present study reviews the attitudes and behaviours of the customers toward products which are "respectful" for the environment. To address the issue in a wider perspective, this paper also encompasses various aspects of ecodesign from producer's point of view. Two surveys were conducted. The purpose of the first survey was to investigate the awareness and intention of the Slovenian customers to purchase green products, their perceptions and attitudes towards green products. The second survey was directed to organizations to examine their attitudes toward green products and environmental issues. The study revealed that the green products have substantial awareness among Slovenian customers. The results received from the study were illuminating, and encourage the possibility for integration of environmental aspects into products, since 94 percent of respondents expressed a desire for more "green" products available on the market. For the customers the most important quality characteristics of the product are: quality, usability and practicality followed by environmental ones. Survey results indicate that environmental concern plays a fundamental role in organizations. According to the results, concern for the environment is the most important criteria that encourage organizations to introduce environmental management system (EMS) standard (mean=4,2 on a scale of 5).*

## 1. Introduction

Moving towards sustainable development is now a major concern in most of the developed countries, resulting in stricter regulations concerning the impact of the products during their manufacturing, use and end of life, including the obligation to define reverse logistics strategies and systems [29,17,21]. Generally, the goal of reducing environmental pressure by consumption can be reached via three routes: greening production and products, shifting demand to low-impact consumption categories, and lowering material demands [20,52,53,54]. While sustainable consumption targets consumers, sustainable production is related to companies and organizations that make products or offer services [56].

According to Amacher et al. [1] customer preference to purchase from "green" organizations is well established and often revealed through increased willingness to pay for products viewed as "clean," i.e., produced with environmentally friendly production or abatement technologies such as recycling and use of less polluting inputs. Leire and Thidell [30] reported that, despite the fact that product related environmental information is lacking for a range of products, available information has a potential to be further used for customer guidance. The assumption is that product-related environmental information, in combination with preconditions such as environmental awareness, knowledge and atti-

tudes, will lead customers to make informed choices when purchasing products [31].

Environmentally conscious design (eco-design) is particularly important in manufacturing industry, and many design methods and tools have been developed to support eco-design [27]. Although there are several different ways to define ecodesign [22], ecodesign may be defined as an activity that identifies the environmental aspects of a product and integrates them into the product design process in the early stage of the product development process [41]. Therefore, ecodesign approach is mainly focused on the environmental aspects of a product. It has been noted that a product must meet the basic requirements of a market. These requirements include the following: (1) meeting the required needs in terms of function, performance, durability, safety, etc.; (2) complying with all standards and regulations; and (3) corresponding to the targeted market segments, such as identifying current and emerging customer expectations [41]. If a product does not meet these basic requirements, then the product will fail in the marketplace even if it causes less stress on the environment [29].

The need to balance environmental considerations and commercial aspects has been underscored by Bird and Prentis [3], who argue that the route to long term integration of environmental considerations into the business activities is to adopt strong customer focus. Also Ritzén [48] mentioned that customer focus is essential

and that, for example, market investigations should include environmental issues. Some researchers have gone even one step further and argued that companies should train their customers in environmental issues [23].

The question that arises here is whether the customer wants a product that is designed in a way that its entire life cycle contributes to environmental protection? Therefore, this paper aims to show the customer's and producer's point of view in relation to environmentally friendly products.

## **2. Related literature**

### **2.1. Customer focus: understanding customer behaviour**

The need to adopt sustainable consumption patterns and lifestyles significantly challenges the designer's traditional focus on new product development. Sustainability provides exceptional opportunities for designers to imaginatively and creatively develop new concepts for material culture [32,26].

As Cooper [8] has written, sustainable consumption involves rethinking how products are conceived and how needs are met. In other words, it requires that we not only address efficiency (i.e. 'getting the same goods and services out of less'), but also sufficiency, (i.e. 'getting the same welfare out of fewer goods and services') [6]. Accordingly, traditional product-centred approaches alone are not capable of providing sufficient change. Highly creative, informed and sensitive design interventions are necessary for the development of alternative solutions that are ecologically responsible, socially relevant, aesthetically pleasing, economically viable, technologically appropriate, and individually satisfying [33].

However, an individual concerned about the environment does not necessarily behave in a green way in general, or in their purchasing [44]. This is known as the value-action gap. Kollmuss and Agyeman [28] explored a range of analytical frameworks as well as external and internal factors that promote pro-environmental behaviour and found conflicting and competing factors related to consumers' daily decisions. They concluded that no single definitive model adequately explains the gap between environmental knowledge and pro-environmental behaviour. A recent study found that people who are environmentally conscious do not necessarily behave pro-environmentally: for example, people might throw rubbish away when most people around them do so, which is a reactive process, as opposed to intentional decision making [40].

Leire and Thidell [31] suggest that further research is needed on how enhanced knowledge on the environmental consequences of products and consumption would influence consumers' actual use of the information. A deeper understanding may reinforce the trust of the labeling schemes as well as making consumers motivated to choose environmentally sound products. Furthermore, Leire and Thidell [31] indicate that consumer motivation may be enhanced if product-related environmental information schemes more adequately document that they result in environmental improvements. Developing environmental evaluation models for environmental information schemes is indeed a research area separate from consumers' perceptions and understanding of the information.

### **2.2. Corporate focus: towards eco-efficiency**

It is important to listen to customer requirements to obtain market needs and make them reflect on the product design [34].

Green product attributes may be environmentally sound production processes, responsible product uses, or product elimination, which customers compare with those possessed by competing conventional products [35,42]. However, the literature does not yet offer an objective definition of what makes a product "environmentally friendly". Fuller [14] define sustainable products as a form and function alternatives that possess positive ecological attributes that are nothing more than enhanced waste management factors (eco-attributes) that have purposely been designed-in (embedded) through decisions concerning how products are made/manufactured, what they are made of, how they function, how long they last, how they are distributed, how they are used, and how they are disposed of at the end of useful service life.

In some product categories, this has led to the introduction of environmental labeling [19]. This may relate to specific product categories, such as organic food, energy saving light bulbs, wood from sustainable forests. Or it may apply to broader environmental product features, as in the case of the German Blauer Engel (Blue Angel) label. In both cases, the rationale is to help customers to recognise environmentally sound products [19]. In that complex context, it has often been noticed that customers do not have competence and time for investigating the environmental impact of products; therefore, those concerned by environmental issues usually prefer to trust a label, given by an external entity, and insuring that the concerned product has a poor impact on the environment [15]. In relation with labeling, Fielding [13] pointed out that ISO 14000 series can

be seen as environmental labeling instrument used to anticipate customer demand, save money and to reduce potential compliance issues. In addition, companies can also expect that this registration would serve as a marketing tool.

Park and Tahara [41] suggest that environmental aspects have to be considered together with other product requirements, such as function, performance, economics, and consumer satisfaction in order for ecoproducts to be successful. By doing this, it is possible to develop a product that possesses a higher product value and less environmental impact – in other words, a product that has a higher eco-efficiency value. Eco-efficiency, which is defined as the ratio of the value of a product to its environmental influence [56], can be used as an analytical tool in ecodesign because eco-efficiency can help create value for a product and the company as a whole by explicitly promoting change toward sustainable growth [51].

Eco-efficiency may also be used in the identification of key ecodesign issues. It is not only effective for the identification of environmental aspects, but also other key issues of a product such as quality, cost, and customer satisfaction. This is because eco-efficiency can consider both the product's value and its environmental impact at the same time [41].

With respect to customer demands, Dalhammar [10] emphasizes the increasing importance of market driv-

ers, although this may not be entirely independent of environmental legislation which places controls on the use of particular substances or components [16].

### 3. Research results

#### 3.1 Research methodology

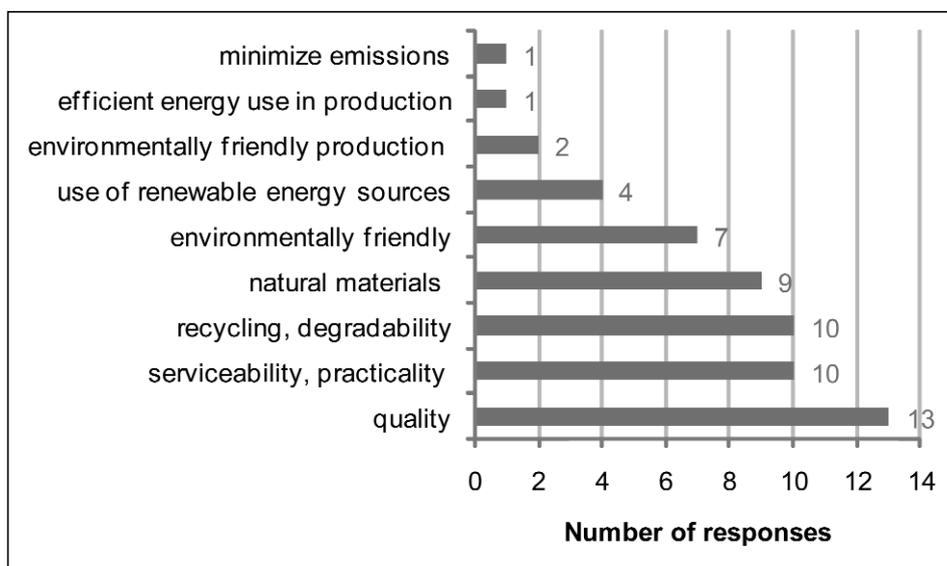
First survey questionnaire was designed, exploring issues relating to customers' attitudes towards green products and to environmental issues concerning the producers in the Slovenia. In total, 50 responses were received within research period.

For the concurrent research study, data were obtained using a second survey among Slovenian producers (sample size was 30). The sample covered a range of industries including automobiles, chemicals, plastics, IT, food and drink, paper, packaging, and some other industries and services.

The purpose of this survey was to examine producer's point of view on the integration of environmental issues in their business and in new product development process.

#### 3.2 The results of the customer survey

Responses to the question on what the customers would give emphasis in product development are presented in Picture 1. The results on the open question show that customers are aware of the importance of consideration of environmental aspects during a product design.



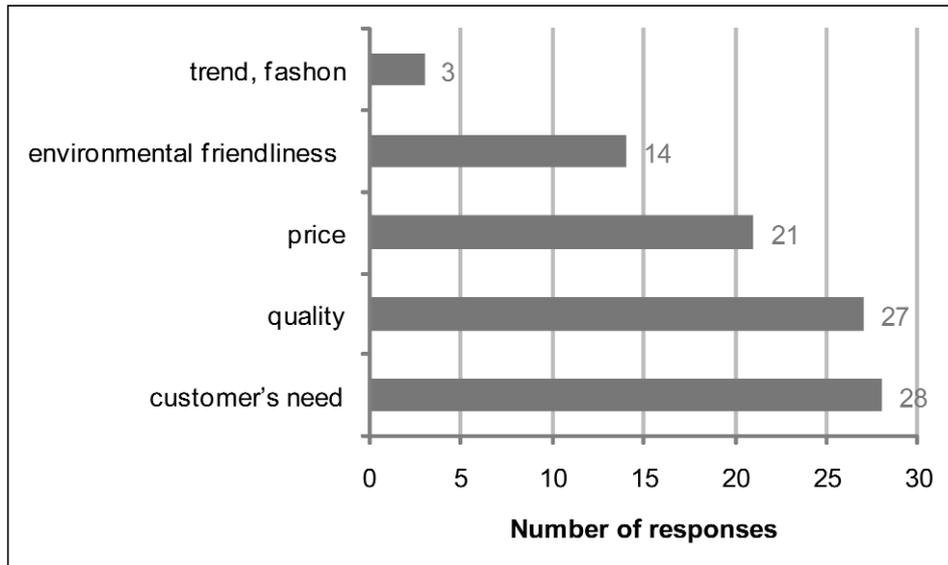
Picture 1: Focus on product development from the customer's point of view

Quality, usability and practicality seem to be the most important factors from the customer's point of view. All the other answers indicate a positive attitude of respondents to the environment as they include only characteristics that are related to environmental protection.

Furthermore, the respondents ranked the five given criteria by importance in the following order: the possibility of recycling, energy consumption in use, the environmental impact at the end use of product, the use of

environmentally friendly materials and environmentally friendly manufacturing process.

The criteria that most affect the purchase of the product are shown in Picture 2. Results indicate that customer's need is the most important criteria, following the product quality, price and environmental friendliness as the fourth criterion. The results presented in Picture 2 are consistent with the results in Picture 1, where the quality and usability were also ranked ahead factors which are related to environmental protection.

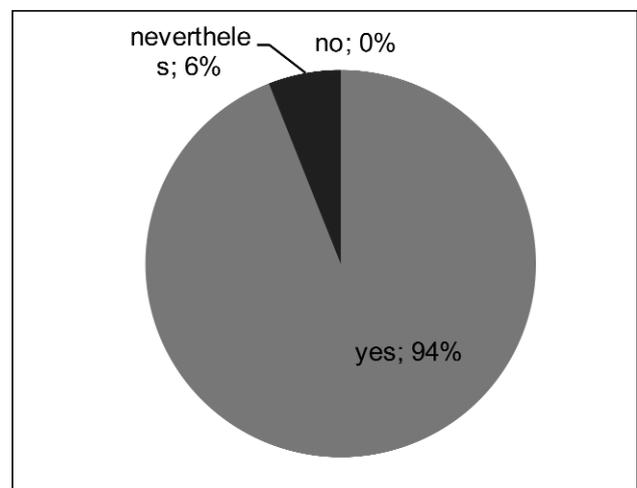


Picture 2: Purchase-decision criteria

The results presented in Picture 2, are to some extent also reflected in the decision to purchase a product that is environmentally friendly, since a relatively small proportion (20%) always decide to buy such a product, 76% of the respondents expressed that they sometimes decide to buy such a product and only 4% rarely choose environmentally friendly product.

Based on the result, it has been shown that 50% of respondents believe that there are enough environmentally friendly products on the market, 46% thought that there is not enough products on the market, while 4% respondents stated that there are enough products available on the market.

Further results are encouraging as well, since 94 percent of respondents expressed a desire for more "green" products to be introduced to the market (Picture 3). No one answered that they don't want more such products, and only 6% have no opinion or are undecided.



Picture 3: Would you like to see more environmentally friendly products on the market?

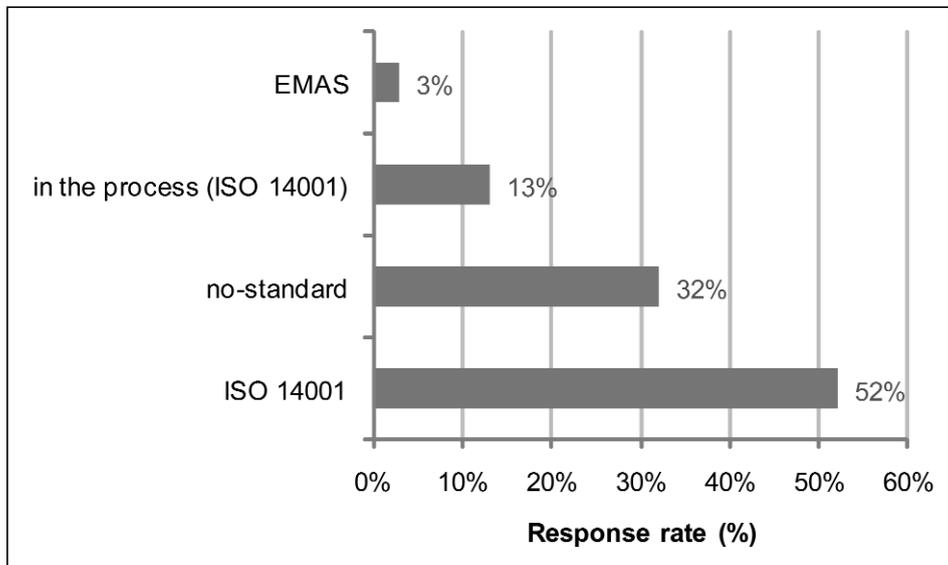
### 3.3. The results of the producer survey

The results related to the surveyed organizations will be presented in the following section.

The survey covers small (7%), medium-sized (23%) and large (70%) organizations and it provides evi-

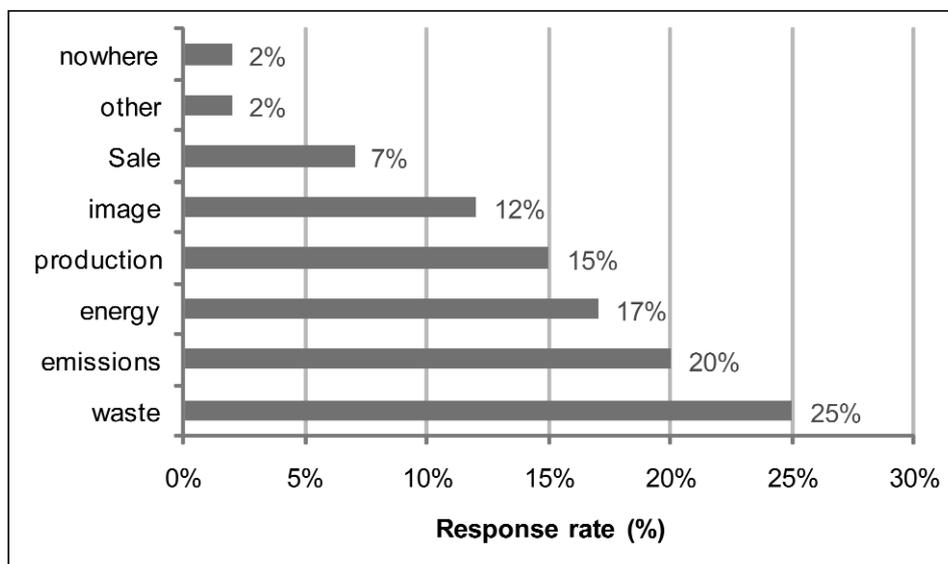
dence on producers' activities towards environmental issues.

From the results in the Picture 4 it can be seen that ISO 14001 prevails among the EMS standards (52%), following EMAS by 3%.



Picture 4: Standards related to environmental management systems

We were interested to seeing to what extent proposed criteria (Picture 5) influence the decision to introduce EMS standards.



Picture 5: Reasons for considering the environmental management system standard

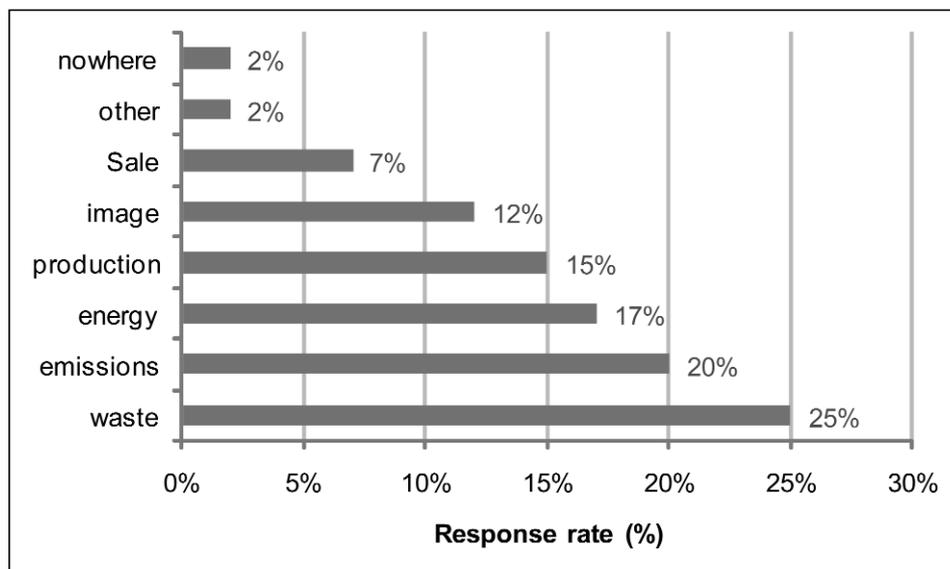
According to the results, concern for the environment is the most important criteria that encourage organizations to introduce EMS standard, followed by competitive advantage, legislation, customers, costs, suppliers, and non-goverment organizations, which influence the least.

The following results refer to planning and introduction of environmentally friendly products.

Despite the fact that 40% of the surveyed organizations have not yet implemented an EMS standard, already

60% organizations have previous experience with the introduction of environmental standards. 77% of organizations produce environmentally friendly products, 23% do not.

The results presented in the Picture 6 show the benefits of the ecodesign from the producer's point of view. Based on the results the areas where organizations see benefits follow as: waste minimization (25%), emissions (20%), energy (17%), production (15%), image (12%), sale (7%), other (2%) and nowhere (2%).



Picture 6: *What are the main benefits of EcoDesign activities?*

#### 4. Discussion

According to the research results, quality, usability and practicality are the highest ranking product characteristics from the customer's point of view as far as product development is concerned. All the other answers indicate a positive attitude of respondents to the environmental protection as they include only characteristics that are related to environmental protection.

Park and Tahara [41] indicate that a product must meet the basic requirements of a market and therefore meet customer's expectations. While producers want to meet customer's needs and expectations, they also want to make higher quality products with minimum production cost. Therefore, for the producers, product value can be defined as product quality versus cost. The improvement of product value can be accomplished by the improvement of product quality, the reduction of production cost, or the accomplishment of these two aspects simultaneously [41].

It is also indicated that environmental concern is reflected in the attitude of customers to product development as well. 86 percent of respondents identified the importance of environmental protection in product development as very important (score 5). Furthermore, the results showed that 72 percent of customers would choose the product which is more environmentally friendly. Among the criteria that influence the purchase decision, customer's need is the most important one, following the product quality, price and environmental friendliness as the fourth criterion. This is also consistent with the findings of Peattie [43], which indicates that if a product does not meet these basic requirements, then the product will fail in the marketplace even if it causes less stress on the environment. Kärnä et al. [25] indicate that satisfying the needs of customers in a profitable way is the core of marketing ideology and in turn is a core of the market economy. Environmental or "green" marketing has been seen as a tool towards sustainable development and satisfaction of different stakeholders [25].

Results indicate a positive attitude of respondents toward intention to purchase green products as well. The results showed that 94 percent of respondents expressed a desire for more “green” products on the market. However, it should be considered that customers who prefer the benefits of environmentally friendly products may not necessarily have motivation to purchase them [11]. Author suggests that for these customers any brand will do, hence there is no environmental information search involved when it comes to choosing their brands and green product labelling may not be meaningful to them. These customers would perhaps trade off product attributes such as quality, warranty and performance in their product alternatives evaluation and selection process [12]. Mintel [37] found that despite pro-environmental attitudes, intention to recycle, concern about pollution and willingness to pay more for environmentally-friendly products, few customers translated these attitudes into regular green buying behavior. Gupta and Ogden [18] reveal that several characteristics of the individual – trust, in-group identity, expectation of others’ cooperation and perceived efficacy – were significant in differentiating between “non-green” and “green” buyers.

The results show that 55% of organizations have already introduced one of the environmental management system (EMS) standards (according to the results, ISO 14001 prevails among organizations by 52%). The results can be interpreted as a good starting point for effective integration of ecodesign activities. This is consistent with previous works [5,24,55] indicating that a certified environmental management system (ISO 14001), leads to an increase in environmental planning activities (design for environment - DFE). Some other studies indicate a weak connection between environmental management systems and ecodesign [2,47].

In the present study, we found that among the factors that encourage organizations to introduce an EMS standard, concern for the environment, competitive advantage, legislation and customers’ attitude are the prevailing factors. Pouliot [46] highlights the importance of a market perspective and therefore indicates that some organizations see the certification according to ISO 14001, as a mean of competitive differentiation, which could be done by creating an environmentally friendly image.

The usefulness of EMS as a tool to manage environmental issues in companies is a question of interest to many different parties [39]. As stated by authors, one of the most interested groups conceivably are the companies themselves, who invest large amount of resources into the implementation and operation of EMS. As a natural follow up they increased environ-

mental work, but also the general value of the standardized EMS as recognized on the relevant markets. Companies are also interested in environmental management done in other business establishments. One of the reasons is to benchmark with competitors on the market [45]. Another growing trend is to demand ISO 14001 certificate from suppliers. According to the Moore and Manning [38], organizations of all size are increasingly being confronted by multiple external stakeholders to demonstrate a commitment to corporate social and environmental responsibility (CSR/CER). As stated by Shamma and Hassan [50], social and environmental responsibility is a dimension that needs to be clearly communicated to both customers and the general public.

Results from our research indicate that waste minimization, emissions, energy and production are the key areas where organizations see the benefits of environmentally friendly design. As stated in literature [4,49] the eco-design is concerned with the development of products which are more durable, energy efficient, avoid the use of toxic materials and which can be easily disassembled for recycling. It is clear that eco-design provides opportunities to minimize waste and improve the efficiency of resource use through modifications to product size, serviceable life, recyclability and in use characteristics [32,55]. In evaluating the environmental impacts of a product, some may want to identify the key environmental life cycle stage of a product, while others may want to identify the key environmental component or material of a product. Therefore, companies have to determine which level of key environmental issues will be identified [41].

## 5. Conclusions

This paper has focused on environmentally friendly products from customer and producer perspective. In order to understand the gap between customers and producers, we conducted a survey among potential customers and producers. Study results are valuable to both practitioners and theoreticians in their effort to better understand the customers and producers with regard to the environmental protection.

The findings from this research are encouraging to domestic (and foreign) companies. Results showed that potential customers support the movement towards environmentally friendly products. In spite of expressed intention, customer’s needs are still the most influential factor on the purchase decision. It seems very important for the customers, that environmental protection is integrated during the design phase. According to the results, the recycling is the most important environmental criteria.

From the producer's point of view, concern for the environment, competitive advantage, legislation and customers are the prevailing factors, particularly with regard to the decision for environmental management system (EMS) standard introducing (55% of organizations have already introduced one of the EMS standards).

At the earliest stages of the product lifecycle (product planning), organizations need to efficiently identify customer's needs and expectations. With regard to environmentally friendliness, organizations should consider, particularly:

- the focus should not be only on environmentally friendliness, but rather on the quality and usability of the product,
- green products should be comparable in price, brand, usability and performance to "traditional" products,
- organization should seek to meet and represent green approaches by improving quality characteristics with respect to durability, usability, innovations, ... of products,
- organization should support the green purchase decision by providing benefits on the field of environmental protection (human health, climate changes, bio nutrition, ...)
- it is important to bring together the concepts of production and consumption; interaction of organization to market should be considered and there is a substantial potential for improvements,
- organizations should consider the corporate social responsibility (CSR) as a possible route to gain enhanced reputation and competitive advantage at organizational level as well.

Therefore, green products should look and be perceived as "traditional" products; products should not significantly change customer's user habits; products should be comparable in price, while be more cost effective during product life-cycle and provide a sense of contribution to environmental protection.

To move towards improving the environmental performance of products, we recommend the use of ISO/TR 14062:2002 from the ISO 14000 family of standards as a guideline for integration eco-design in a product development process and thus enable organizations to identify and integrate environmental aspects into product quality characteristics.

To obtain more substantial changes, we cannot rely solely on making the existing production system more efficient as they use less resources, water and energy, generate less waste and pollution, but need to follow

the sustainability principles, and thus include economic, environmental and social aspects.

## BIBLIOGRAPHY

- [1] Amacher, G.S., Koskela, E., and Markku Ollikainen, M., "Environmental quality competition and eco-labeling", *Journal of Environmental Economics and Management*, 47 (2004) 284-306.
- [2] Ammenberg, J., and Sundin, E., "Products in environmental management systems: drivers, barriers and experiences", *Journal of Cleaner Production*, 13/4 (2005) 405-415.
- [3] Bird, E., and Prentis, H., (1998) "Customers - The Forgotten Stakeholders", *Proceedings of the 3rd International Conference Towards Sustainable Product Design*, London, 1998.
- [4] Bhamra, T.A., "Ecodesign: the search for new strategies in product development", *Proc Inst Mech Eng, BJ Eng Manuf*, 218 (2004) 557-69.
- [5] Brezet, H., Houtzager, B., Overbeeke, R., Rocha, C., and Silvester, S., "Evaluation of 55 POEM Subsidy Projects", *Product Oriented Environmental Management*, Delft Technical University, Internal report, 2000.
- [6] Carley, M., and Spapens, P., "Sharing the world: sustainable living and global equity in the 21st century", London, Earthscan, 1998.
- [7] Cook, H., "Product management: value, quality, cost, price, profits and organization", HE Cook: Kluwer Academic Press, 1997.
- [8] Cooper, T., "Product development implications of sustainable consumption", *The Design Journal*, 3/3 (2000) 46-57.
- [9] Cronin, J., Brady M, and Hult, G., "Assessing the effects of quality, value, and customer satisfaction on consumer behavioral intentions in service environments", *Journal of Retailing*, 76(2) (2000) 193-218.
- [10] Dalhammar, C., "Lagstiftningens roll i den integrerade produkt politiken", Stockholm: Naturvardsverket, 2002.
- [11] D'Souza, C., "Bridging the communication gap: dolphin safe eco-labels", *Corporate Communication: An International Journal*, 5/2 (2000) 185-90.
- [12] D'Souza, C., Taghian, M., and Lamb, P., "An empirical study on the influence of environmental labels on consumers", *Corporate Communications: An International Journal*, 11/ 2 (2006) 162-173.
- [13] Fielding, S., "ISO 14001: a plan for environmental excellence", *Industrial Maintenance & Plant Operation*, 62/8 (2001) 11-15.
- [14] Fuller, D.A., "Sustainable marketing: managerial-ecological issues", Thousand Oaks (CA), Sage Publications, 1999.

- [15] Gallastegui, I.G., "The use of eco-labels: a review of the literature", *European Environment*, 12 (2002) 316-331.
- [16] Gottberg, A., Morris, J., Pollard, S., Mark-Herbert, C., and Cook, M., "Producer responsibility, waste minimization and the WEE Directive: Case studies in eco-design from the European lighting sector", *Science of the Total Environment*, 359 (2006) 38-56.
- [17] Gou, Q., Liang, L., Huang, Z., and Xu, C., "A joint inventory model for an open-loop reverse supply chain", *International Journal of Production Economics* 116 (2008) 28-42.
- [18] Gupta, S., and Ogden, D.T., "To buy or not to buy? A social dilemma perspective on green buying", *Journal of Consumer Marketing*, 26/6 (2009) 376-391.
- [19] Hartmann, P., and Ibáñez, V.A., "Green value added", *Marketing Intelligence & Planning*, 24/7 (2006) 673-680.
- [20] Hertwich, E., "Life cycle approaches to sustainable consumption: a critical review", *Environmental Science & Technology*, 39/13 (2005) 4673.
- [21] Hong, I.H., Ammons, J.C., and Realf, M.J., "Decentralized decision-making and protocol design for recycled material flows" *International Journal of Production Economics* 116 (2008), 325-337.
- [22] International Organization for Standardization, ISO/TR14062: environmental management-integrating environmental aspects into product design and development, International Organization for Standardization; 2002.
- [23] Karlsson, M., "Green Concurrent Engineering – Assuring Environmental Performance in Product Development", Licentiate Thesis, IIEEE, Lund University, Lund, 1997.
- [24] Karlsson, M., "Green concurrent engineering. A model for DFE Management programs", Doctoral dissertation, The International Institute for Industrial Environmental Economics, Sweden: Lund University, 2001.
- [25] Kärnä, J., Hansen, E., and Juslin, H., "Social responsibility in environmental marketing planning", *European Journal of Marketing*, 37/(5/6) (2003) 848-871.
- [26] Karničar [enk, M., Metlikovič, P., Maletič, M., and Gomišček, B., "Development of new product/process : development procedure for SMEs", *Organizacija (Kranj)*, 43/2 (2010), 76-85.
- [27] Kobayashi, H., "A systematic approach to eco-innovative product design based on life cycle planning", *Advanced Engineering Informatics*, 20 (2006) 113-125.
- [28] Kollmuss, A., and Agyeman, J., "Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behaviour?", *Environmental Educational Research*, 8/3 (2002) 239-60.
- [29] Kumar, S., and Putnam, V., "Cradle to cradle: reverse logistics strategies and opportunities across three industry sectors", *International Journal of Production Economics* 115 (2008) 305-315.
- [30] Lee, K., "Integrating environmental aspects into product development", *ISO Management Systems*, 2/6 (2002) 13-6.
- [31] Leire, C., and Thidell, Å., "Product-related environmental information to guide consumer purchases e a review and analysis of research on perceptions, understanding and use among Nordic consumers", *Journal of Cleaner Production* 13 (2005) 1061-1070.
- [32] Lewis, H., and Gertsakis, J., "Design and environment", Sheffield: Greenleaf Publishing, 2001.
- [33] Marchand, A., and Walker, S., "Product development and responsible consumption: designing alternatives for sustainable lifestyles" *Journal of Cleaner Production*, 16 (2008) 1163-1169.
- [34] Masui, K., Sakao, T., Kobayashi, M., and Inaba, A., "Applying Quality Function Deployment to environmentally conscious design", *International Journal of Wuality & Realibility Management*, 20/1 (2003) 90-106.
- [35] Meffert, H., and Kirchgeorg, M., "Marktorientiertes Umweltmanagement, Schaeffer-Poeschel, Stuttgart, 1993.
- [36] Miles, M.P., and Munilla, L.S., "The eco-marketing orientation: an emerging business philosophy", In: Polonsky, M.J., and Mintu-Wimsatt, A.T. (Eds), *Environmental Marketing: Strategies, Practice, Theory, and Research*, Haworth Press, New York, NY, 1995, 3-20.
- [37] Mintel, "Green Living", US Marketing Research Report, London, 2006.
- [38] Moore, S.B., and Manring, S.L., "Strategy development in small and medium sized enterprises for sustainability and increased value creation", *Journal of Cleaner Production*, 17 (2009) 276-282.
- [39] Nawrocka, D., and Parker, T., "Finding the connection: environmental management systems and environmental performance", *Journal of Cleaner Production*, 17 (2009) 601-607.
- [40] Ohtomo, S., and Hirose, Y., "The dual-process of reactive and intentional decision-making involved in eco-friendly behaviour", *Journal of Environmental Psychology*, 27/2 (2007), 117-25.
- [41] Park, P.J., and Tahara, K., "Quantifying producer and consumer based eco-efficiencies for the identification of key ecodesign issues", *Journal of Cleaner Production*, 16 (2008) 95-104.

- [42] Peattie, K., "Environmental Marketing Management", Pitman Publishing, London, 1995.
- [43] ] Peattie, K., "Golden goose or wild goose? The hunt for the green consumer", *Business Strategy and the Environment*, 10 (2001) 187-199.
- [44] Pickett-Baker, J., and Ozaki, R., "Pro-environmental products: marketing influence on consumer purchase decision", *Journal of Consumer Marketing*, 25/5 (2008) 281-293.
- [45] Porter, M., and Van der Linde, C., "Green and competitive: ending the stalemate", *Harvard Business Review*, 73/5 (1995a) 120-34.
- [46] Pouliot, C., "ISO 14000: beyond compliance to competitiveness", *Manufacturing Engineering*, 116/5 (1996) 51-6.
- [47] Ries, G., Winkler, R. and Züst, R., "Barriers for a successful integration of environmental aspects in product design", *Proceedings of "Eco-Design '99". First International Symposium on Environmental Conscious Design and Inverse Manufacturing*, February 1-3, Tokyo, Japan, 1999, 527-32.
- [48] Ritzén, S., "Integrating Environmental Aspects into Product Development – Proactive Measures", PhD Thesis, Department of Machine Design, Royal Institute of Technology, Stockholm, 2000.
- [49] Roy, R., "Sustainable product service systems", *Futures* 2000, 32 (2000) 289-99.
- [50] Shamma, H.M., and Hassan, S.S., "Customer and non-customer perspectives for examining corporate reputation", *Journal of Product & Brand Management*, 18/5 (2009) 326-337.
- [51] Tajima, T., "Greening supply chain: enhancing competitiveness though green productivity", *Report of the top forum on enhancing competitiveness through green productivity*, Taipei (the Republic of China), 2001, 66-78.
- [52] Tukker, A., "Special issue on priorities for environmental product policy", *Journal of Industrial Ecology*, 10/3 (2006).
- [53] Tukker, A., and Tischner, U., (editors), "New business for old Europe", *Product services, sustainability and competitiveness*. Sheffield, UK: Greenleaf Publishing Ltd., 2006.
- [54] UNEP, "Consumption opportunities", Geneva, Switzerland, 2002.
- [55] Van Hemel, C., "Ecodesign empirically explored: design for environment in Dutch small and medium-sized enterprises", PhD thesis, Design for sustainability research programme, Publicationno.1, Delft University, The Netherlands, 1998.
- [56] Veleva, V., and Ellenbecker, M., "Indicators of sustainable production: framework and methodology", *Journal of Cleaner Production*, 9 (2001) 519-549.
- [57] World Business Council for Sustainable Development, "Eco-efficiency creating more value with less impact", World Business Council for Sustainable Development, ISBN2-940240-17-5, 2000.
- [58] Zeng, S.X., Tam, C.M., Tam, V.W.Y., and Deng, Z.M., "Towards implementation of ISO 14001 environmental management systems in selected industries in China", *Journal of Cleaner Production*, 13 (2005) 645-56.

# Value-at-Risk Estimation with Multivariate Garch Models

UDC: 005.334:336.76 ; 330.43

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*Value-at-Risk (VaR) method has been accepted globally by both risk managers and regulators as a tool to identify and control exposure to financial market risk. Basel II regulation employs VaR methodology for capital requirements calculations for the market risks to which commercial banks are exposed. The goal of this paper is to implement the multivariate GARCH (mGARCH) methodology as the internal VaR model for market risk measurement in Serbian commercial banks. Assuming Normal and Student-t distribution of the returns the parameters for orthogonal mGARCH and CCC-mGARCH VaR models are estimated for each of 250 consecutive days, for the hypothetical trading portfolio, by employing maximum likelihood method. The level of capital requirements are calculated for corresponding VaR methods and validation is done by applying Basel II and Kupiec test.*

## 1. Introduction

The practice of risk management is evolving rapidly, especially with the implementation of the latest regulatory standards of the Basel Committee on Banking Supervision, known as Basel II. Its main goal is to implement a set of standards for risk measurement and management that would lead to adequate assessments of the levels of capital requirements that banks and other financial institutions need to keep as a cushion against various types of risk.

The Basel II provides an incentive scheme for institutions to develop their own internal risk management models. More precisely, banks have the option to use internal risk measurement models, IMA approach, to determine their capital charge. The rationale is that banks are in a position to produce more accurate measures of their individual risk exposure with respect to a general simplistic scheme proposed by regulators.

Besides credit activities, proprietary trading, which is a source of market risk, has become one of the emphasized activities of banks. In an unstable economic environment where asset prices are volatile, this activity brings a significant amount of market risk exposure. Therefore, there is a need for adequate risk management models and tools that will better control and mitigate those risks.

According to [4], market risk is defined as the risk of losses in on- and off-balance-sheet positions arising from movements in market risk factors. The main sources of market risk are the risks related to interest rate related instruments, equities, foreign exchange, derivatives and commodity related instruments. Moreover, market risk management should be con-

ducted as a regular activity of a bank, under the jurisdiction of the risk management unit and independently from the trading sector [3].

Current regulatory standards in Serbia require the banks to measure and report market risk in its trading book, as well as to hold capital to cover potential losses. National Bank of Serbia provides a set of predefined regulatory standards in the form of tabulated reports, which banks are required to submit on a monthly basis. This supervisory framework is relatively conservative, requiring a capital charge of 12 percent of total risk-weighted assets [17]. The procedures for calculating these capital charges are in good part based on the Standardized Approach of Basel II. Moreover, Serbian banks are required to fully adopt Basel II standards by 2011, which would stimulate banks to use more advanced approaches in the future in order to reduce their capital charges.

The choice of a market risk measurement model is far from a "one-size-fits-all" procedure. In the same vain, institutions adopting internal models must ensure that their models are valid. The contemporary market risk management practice involves various "Value-at-Risk" (VaR) methods to be applied and implemented with the full compliance with Basel II standards. The Value-at-Risk has gained recognition as the primary tool for market risk measurement in banks and there is a widespread agreement on the use of it. However, there is very little consensus on the preferred method for calculating VaR. The difficulty in obtaining reliable VaR estimates stems from the fact that all extant methods involve some tradeoffs, assumptions and simplifications. Thus, determining what is the best methodology for VaR estimation becomes an empirical question and a question of implementation.

This paper considers several possible multivariate GARCH methodologies for advanced VaR estimation in trading portfolio of a bank. Those methodologies will be theoretically evaluated and applied on an example of a portfolio of assets traded in the Serbian capital market which may be hypothetically held by a particular Serbian bank.

Additionally, each of following VaR methods has been coded in MATLAB enabling estimation to become automated and capable of handling VaR assessment for a great number of financial instruments in trading portfolio.

## 2. The value-at-risk framework

The main strength of VaR is that it summarizes the exposure to market risk and it provides an aggregate view of overall portfolio's risk. The VaR estimation process, however, involves selecting two important parameters: the holding period and the confidence level. By definition, VaR measures the maximum loss in a portfolio value due to adverse market movements over a specified period of time with a given level of confidence. For instance, we estimated VaR = 50,000 RSD for a holding period of 1 day and a confidence level of  $cl = 99\%$ . This indicates that the portfolio loss is not likely to exceed 50,000 RSD during the next trading day, with a 99% probability. For most applications, the recommendation is to choose a confidence level such as 95 to 99 percent and holding period 1 or 10 days<sup>1</sup>.

The VaR estimate represents a point of the distribution of portfolio profit and loss such that if we assume some probability and thinking about 1-day losses, we can say informally that VaR is the minimum amount the bank will loose on a trading portfolio on a bad day, or the maximum it can expect loose on a good day. Generally, VaR models have to deal with four mathematical components:

The VaR modeling technique is based on two main approaches. *Univariate VaR modeling* is the way of estimating VaR by holding or assuming a single asset in a trading portfolio of a bank, or alternatively of calculating and using single portfolio return series based on weighted sum of portfolio component returns. The idea is to base VaR estimation upon single return series which must be able to capture behavior of all risk factor components. On the other hand, *Multivariate VaR*

*modeling* assumes to take into consideration the returns time series of all portfolio constituents. In general portfolios have multiple  $n$  assets, thus in order to base VaR calculation upon risk impact of each portfolio component one has to capture  $n$  time series effect into analysis<sup>2</sup>.

The VaR estimation in this paper is done according to *multivariate* methodology. In order to capture the probability density function  $f_p(\cdot)$  established by the hypothetical portfolio returns or portfolio assets time series the first step in modeling VaR is to calculate returns on each portfolio asset component as follows:

$$r_{i,t} = (P_{i,t} - P_{i,t-1}) / P_{i,t-1} \quad (1)$$

where  $r_{i,t}$  denotes the arithmetic return on asset  $i$  at time  $t$ ,  $P_{i,t}$  is the price of the asset  $i$  at time  $t$  and  $P_{i,t-1}$  is the price of the asset  $i$  at time  $t-1$ . Consequently, the hypothetical portfolio return at time  $t$ , given  $N$  assets, is defined as the weighted sum of portfolio constituent returns:

$$r_{p,t} = \sum_{i=1}^N w_{i,t} r_{i,t} \quad (2)$$

It is important to note that the VaR measure represents one-day-ahead forecast of loss. In order to check the validity of VaR model i.e. potential breach<sup>3</sup>, VaR at time  $t$  is estimated with respect to the information set  $\psi_t$  and then compared with the corresponding amount of profit/loss incurred at  $t+1$ . Consider a portfolio whose price at  $t+1$  is labeled by  $p_{t+1}$ . The variation observed from a day to day is given as  $\Delta p_{t+1} = p_{t+1} - p_t$ . Note that if  $\Delta p_{t+1}$  is positive we have a profit, while a negative value indicates a loss. The  $VaR_{1-\alpha}$  is defined in monetary units, so that the variation  $\Delta p_{t+1}$  observed for a portfolio will only be less than VaR with a probability of  $\alpha$  where  $(1-\alpha)$  represents confidence level:

$$Pr[\Delta p_{t+1} \leq -VaR_{t,1-\alpha}] = \alpha \quad (3)$$

The choice of a suitable portfolio distribution for modeling of asset and portfolio returns is an essential step in estimating VaR. At first glance, the general shape of a majority of empirical returns distributions, especially in the cases of well diversified portfolios, has indicated that the Normal distribution would be a natural assumption. Thus, when we assume that returns follow a Normal distribution with mean  $\mu_t$  and volatility  $\sigma_t$  Equation (3) can be changed to:

$$Pr\left[\frac{\Delta p_{t+1} / p_t - \mu_t}{\sigma_t} \leq \frac{-VaR_{t,1-\alpha} / p_t - \mu_t}{\sigma_t}\right] = \alpha \quad (4)$$

<sup>1</sup> The choice of the holding period depends on the characteristics of the portfolio that is held by a bank and the use of VaR. For example, if the positions changes quickly, the short horizon will be appropriate. If the purpose is to provide an accurate benchmark measure of downside risk, the horizon should be also ideally less than the average period for major portfolio rebalancing.

<sup>2</sup> As a result in such applications one needs to forecast the covariance matrix of all the assets in portfolio. Consequently, estimation of VaR will have to deal with  $n$  time series and to form corresponding covariance matrix.

<sup>3</sup> Breach is captured each time when the tomorrow's realized loss incurred in portfolio is greater than today's estimate of VaR

This shows that the right inequality side of equation (4) is the quantile of the standard Normal distribution expressed as  $Z_\alpha = -Z_{1-\alpha}$ . Thus, the VaR amount of money by univariate estimation methodology is calculated:

$$VaR_{t,1-\alpha} = -(\mu_t - Z_{1-\alpha} \cdot \sigma_t) \cdot P_t \quad (5)$$

If the VaR is defined as percentage relative to portfolio value as  $\%VaR_{t,1-\alpha} = VaR_{t,1-\alpha} / P_t$  then we have:

$$Pr[r_{t+1} \leq -\%VaR_{t,\alpha}] = \alpha \quad (6)$$

In practice, instead of working with (5) which denotes so-called “absolute” VaR, we can assume that  $\mu_t=0$  and use the “relative” VaR defined as:

$$VaR_{t,\alpha} = Z_{1-\alpha} \cdot \sigma_t \cdot P_t \quad (7)$$

The “relative” VaR does not require that we know the first moment of Normal distribution  $\mu$ . Furthermore, as we are dealing with a shorter time periods, one day return frequency, the difference between absolute and relative VaR will be fairly small.

In the multivariate framework it is required to shift from an individual asset/or portfolio position to a portfolio case where multiple positions affect VaR estimation. Not only the volatilities of individual returns, but also their covariances need to be taken into account. Thus, estimating VaR of the portfolio of asset positions which are sensitive to several different market risk factors therefore requires an additional input i.e. covariance matrix among market factor returns. Thus the equation (7) becomes:

$$VaR_{t,\alpha} = Z_{1-\alpha} \cdot \sqrt{\mathbf{w}^T \mathbf{V} \mathbf{w}} \cdot P_t \quad (8)$$

where the vector of asset weights in portfolio is  $\mathbf{w} = (w_1, \dots, w_n)^T$ ,  $P_t$  denotes the current portfolio value and  $\mathbf{V}$  represents the corresponding covariance matrix of the portfolio's assets returns.

Another alternative way of calculating VaR using multivariate framework employs vector of position values  $\mathbf{P} = [P_1, P_2, \dots, P_n]^T$  of portfolio constituents instead of vector of corresponding assets weights  $\mathbf{w}$ : Thus we have multivariate form of a relative VaR denoted by the equation:

$$VaR_{t,\alpha} = Z_{1-\alpha} \cdot \sqrt{\mathbf{P}^T \mathbf{V} \mathbf{P}} \quad (9)$$

Empirical evidence has shown that the assumption of normally distributed returns is usually not justified. Unlike the predicted ‘normal’ behavior, observed distributions of asset returns sometimes show a significant degree of skewness and high kurtosis. The property of having more weight in the tails than would be expected under the normal distribution has significantly large impact on VaR estimation. When the data are ‘heavy tailed’, the true probability of a large negative return is greater than the one predicted by the normal distribution. This implies that VaR calculated using the assumption of normally distributed re-

turns can significantly understate the risk of a high loss, especially at high confidence levels. Consequently in this paper, we also considered one of the most commonly used alternatives which take into account non-normality of asset returns, namely we also applied the Student's  $t$ -distribution as the underlying assumption of assets returns behavior.

The expression for VaR assuming Student's  $t$ -distribution can be easily derived by altering  $\alpha$ -quantile of Normal distribution defined as  $Z_{1-\alpha}$ , with corresponding  $\alpha$ -quantile of the Student's  $t$ -distribution denoted as  $\chi_{\alpha,v}$ , with „degrees of freedom“, into corresponding VaR equations previously considered. The Student's  $t$ -distribution is closely related to the Normal, but generally it has fatter tails depending on the value of an „degrees of freedom” parameter. By adopting the “degrees of freedom” the level of kurtosis can be modeled to match the kurtosis present in the observed time series. As a result, univariate  $t$ -VaR equation becomes:

$$VaR_{t,\alpha} = \chi_{1-\alpha,v} \cdot \sqrt{(v-2)/v} \cdot \sigma_{p,t} \cdot P_t \quad (10)$$

By inspection, it can be inferred that the  $t$ -VaR formula includes the additional multiplier term  $\sqrt{(v-2)/v}$  which moderates the effect of the standard deviation term of the previous VaR equation.

In multivariate framework we have to assure that each of assets return series is modeled separately according to assumed Student's  $t$ -distribution. As a result, there is a need to accommodate variance covariance matrix with additional multiplier term for each asset in portfolio. The number of different multipliers applied equals the number of different portfolio assets time series. Thus, the idea is to affect each component of variance covariance matrix:

$$VaR_{t,\alpha} = \sqrt{\tilde{\mathbf{P}}^T \mathbf{V} \tilde{\mathbf{P}}} \quad (11)$$

The accommodation is done through adjusted vector of position values  $\tilde{\mathbf{P}}$  where additional multiplier term which includes the effect of taking into account estimated degrees of freedom separately for each corresponding asset in portfolio:

$$\tilde{\mathbf{P}}^T = \left[ \chi_{1-\alpha,v_1} \cdot \sqrt{(v_1-2)/v_1} \cdot P_1 \quad \dots \quad \chi_{1-\alpha,v_n} \cdot \sqrt{(v_n-2)/v_n} \cdot P_n \right] \quad (12)$$

The quantile terms for denoted by  $\chi_{1-\alpha,v_1}, \chi_{1-\alpha,v_2}, \dots, \chi_{1-\alpha,v_n}$  now depend on the chosen confidence level,  $\alpha$ , as well as on the number of degrees of freedom of portfolio component. Since the Student's  $t$ -distribution converges to the Normal distribution as  $v$  gets large, we can regard the Student's  $t$  VaR with a finite  $v$  as a generalization of the normal VaR. As  $v$  gets large, approaches its normal equivalent  $Z_{1-\alpha,v}$ , and the additional multiplier term approaches one.

The analytical VaR models discussed above are the simplest ones among VaR framework. These models consider volatility and correlations as constant parameters over time and assume the relevant portfolio assets returns to be characterized by a stable distribution over time. This assumption is clearly in contrast with the empirical evidence, which shows that volatility and correlations vary over time.

### 3. The multivariate garch modeling of value-at-risk

The phenomenon which is often referred to as “volatility clustering” indicates that asset returns often experience periods of low and high volatility. The Figure 1. shows that the assumption that volatility is constant over time, which is a hypothesis for unconditional VaR models<sup>4</sup>, may be misleading.

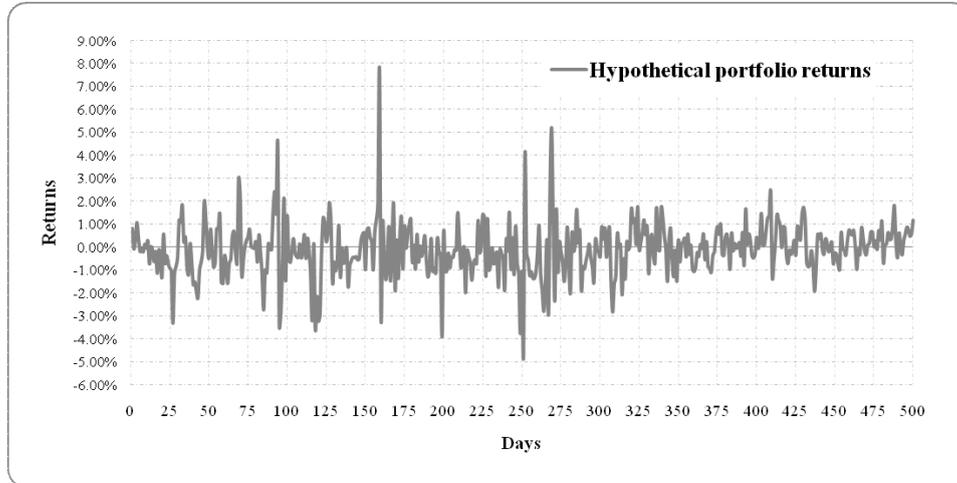


Figure 1: Periods of high and low volatility

The volatility clustering effect can be explicitly handled by GARCH i.e. generalized autoregressive conditional heteroskedasticity models<sup>5</sup>. The GARCH models are able to capture the sophisticated effects in the volatility behavior. Beside already mentioned volatility clustering effect GARCH implies another important property referred to as mean reversion. In this context, mean reversion means that in the absence of innovation variance tends towards some long-run equilibrium level.

**Univariate GARCH (1,1).** Assuming that the residuals are conditionally normally distributed, a GARCH (p,q) model can be specified as follows:

$$r_t = \mu_t + \varepsilon_t \quad (13)$$

$$\varepsilon_t \sim N(0, \sigma_t^2) \quad (14)$$

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2 \quad (15)$$

where  $\alpha_1 < 1$ ,  $\beta_1 < 1$  and  $\alpha_1 + \beta_1 < 1$ . The Equation (13) indicates that the return at time  $t$ ,  $r_t$ , is composed of deterministic part  $\mu_t$ , and a random one  $\varepsilon_t$ . The  $\varepsilon_t$  stands

for the ‘innovation’ at time  $t$  and it represents a sequence random shocks with mean zero and variance shown in Equation (14). As a result conditional variance at time  $t$  represented by Equation (15) is specified as a function of three factors: constant  $\omega$  the variance estimated in the previous period  $\sigma_{t-1}^2$  and the squared  $\varepsilon_{t-1}^2$  innovation at  $t-1$ . Thus the conditional variance estimate in a certain period is a weighted mean of long-term variance, the expected variance for the previous period, and a shock for the last period. The estimate of the unconditional, i.e. “theoretical” long-term, value of variance is implied by the model. If such a value exists, it will represent the unconditional expected value such that  $\sigma^2 = E[\varepsilon_{t-1}^2] = E[\sigma_t^2] = E[\sigma_{t-1}^2]$  and the following will be obtained:

$$\sigma^2 = \frac{\omega}{1 - \alpha_1 + \beta_1} \quad (16)$$

The majority of applications of the GARCH models are based upon the GARCH (1, 1) which is the most widely used GARCH model in practice. The main reason for this is that, most often, GARCH (1, 1) fits the data acceptably well.

<sup>4</sup> the key difference between unconditional and conditional models is related to the fact that the former gives a constant as an estimates while the latter needs a specification model and regression technique dependent on time for an estimate to be done.

<sup>5</sup> *Heteroskedasticity* means time-changing variance and it is in contrast to the constant variance notion. *Conditional* indicates that the predictions obtained are based upon the information available in the previous period, so for example, the current level of volatility reflects the current level of uncertainty generated by past shocks. *Autoregressive* refers to the method used to model conditional heteroskedasticity which is based on variance self regression. Finally, *generalized* refers to a particular type of model which was introduced as a generalization of the first autoregressive conditional variance (ARCH) model. Thus, the autoregressive conditional heteroskedasticity models therefore allow predicting future volatility by using a regression based upon the past values of volatility estimates.

Multivariate GARCH (mGARCH) models are in spirit very similar to their univariate counterparts. The main difference is in fact that mGARCH models specify equations for how the covariances move over time. Several different mGARCH formulations have been proposed in the academic literature, including VEC, diagonal VEC, DVEK, CCC-GARCH<sup>6</sup> and orthogonal GARCH models. Since the complexity of majority of models is emphasized, the deliberate consideration with respect to theoretical propositions and practical issues is needed.

**VECH multivariate GARCH (1,1).** A common specification of the VEC model according to [8] is given as:

$$\mathbf{r}_t = \boldsymbol{\mu}_t + \boldsymbol{\varepsilon}_t \quad (17)$$

$$\mathbf{V}_t = \mathbf{W} + \mathbf{A} \boldsymbol{\varepsilon}_{t-1} \boldsymbol{\varepsilon}_{t-1}^T + \mathbf{B} \mathbf{V}_{t-1} \quad (18)$$

where  $\boldsymbol{\mu}_t = [\mu_{1,t}, \dots, \mu_{n,t}]^T$  is the vector of mean returns and  $\boldsymbol{\varepsilon}_t = [\varepsilon_{1,t}, \dots, \varepsilon_{n,t}]^T$  is the vector of random shocks which conditional variance is represented by the  $n$ -by- $n$  matrix  $\mathbf{V}_t$ . In the multivariate GARCH specification, the model parameters  $\mathbf{A}$  and  $\mathbf{B}$  are positive definite,  $n$ -by- $n$  matrices and  $\mathbf{W}$  is  $n$ -by-1 matrix. The art of building multivariate GARCH models is to specify the dependence of  $\mathbf{V}_t$  on the past in such a way that  $\mathbf{V}_t$  always remains symmetric and positive definite. The Equation (18) can be represented in a VEC operator form as:

$$VECH(\mathbf{V}_t) = \mathbf{W} + \mathbf{A} VECH(\boldsymbol{\varepsilon}_{t-1} \boldsymbol{\varepsilon}_{t-1}^T) + \mathbf{B} VECH(\mathbf{V}_{t-1}) \quad (19)$$

where the VEC operator takes the ‘upper triangular’ portfolio of a matrix and stacks each element into a vector with a single column [14]. For example, in the two asset case we have  $VECH(\mathbf{V}_t) = [\sigma_{1,1}, \sigma_{1,2}, \sigma_{1,3}]^T$  where  $\sigma_{i,i,t}$  represents conditional variances at time  $t$  of the each asset in portfolio. The terms  $\sigma_{i,j,t}$  for  $i \neq j$  denotes the conditional, time dependent, covariances between the asset returns. The Equation (19) in the matrix form for the two variable becomes:

$$\begin{bmatrix} \sigma_{1,t}^2 \\ \sigma_{21,t} \\ \sigma_{2,t}^2 \end{bmatrix} = \begin{bmatrix} \omega_1 \\ \omega_2 \\ \omega_3 \end{bmatrix} + \begin{bmatrix} \alpha_{11} & \alpha_{12} & \alpha_{13} \\ \alpha_{21} & \alpha_{22} & \alpha_{23} \\ \alpha_{31} & \alpha_{32} & \alpha_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t-1}^2 \\ \varepsilon_{1,t-1} \varepsilon_{2,t-1} \\ \varepsilon_{2,t-1}^2 \end{bmatrix} + \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \end{bmatrix} \begin{bmatrix} \sigma_{1,t-1}^2 \\ \sigma_{21,t-1} \\ \sigma_{2,t-1}^2 \end{bmatrix} \quad (20)$$

Equivalently,

$$\sigma_{1,t}^2 = \omega_1 + \alpha_{11} \varepsilon_{1,t-1}^2 + \alpha_{12} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + \alpha_{13} \varepsilon_{2,t-1}^2 + \beta_{11} \sigma_{1,t-1}^2 + \beta_{12} \sigma_{21,t-1} + \beta_{13} \sigma_{2,t-1}^2 \quad (21)$$

$$\sigma_{21,t} = \omega_2 + \alpha_{21} \varepsilon_{1,t-1}^2 + \alpha_{22} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + \alpha_{23} \varepsilon_{2,t-1}^2 + \beta_{21} \sigma_{1,t-1}^2 + \beta_{22} \sigma_{21,t-1} + \beta_{23} \sigma_{2,t-1}^2 \quad (22)$$

$$\sigma_{2,t}^2 = \omega_3 + \alpha_{31} \varepsilon_{1,t-1}^2 + \alpha_{32} \varepsilon_{1,t-1} \varepsilon_{2,t-1} + \alpha_{33} \varepsilon_{2,t-1}^2 + \beta_{31} \sigma_{1,t-1}^2 + \beta_{32} \sigma_{21,t-1} + \beta_{33} \sigma_{2,t-1}^2 \quad (23)$$

It can be inferred that conditional variances and conditional covariances depend on the lagged values of all of the conditional variances of, and conditional covariances between, as well as the lagged squared shock values and the error cross-products [19].

A major problem with most multivariate GARCH specifications is that the number of parameters tends to explode with the dimension of the model, making them unsuitable for analyses of many risk factors. The number of parameters in VEC model is  $(N \times (N + 1) + N^2 \times (N + 1)^2) / 2$ . In the two variable case presented above the number of parameters of this model is 21. Furthermore, the specification of  $\mathbf{V}_t$  is not guaranteed to be positive semi-definite. In practice it is therefore usually necessary to restrict the model both to contain the curse of dimensionality and ensure positive definiteness. Trying to estimate such a model is bound to be difficult, not only may it take a time to estimate parameters, but there are multiple local optima in the likelihood function used which requires the use of multiple different starting values. Thus, in general, a simplified version of the model, for the practical purposes, is used. [11]

**Diagonal VEC multivariate GARCH (1,1).** In the further VEC development, according to [8], the diagonal VEC (DVEC) has been suggested. The most common simplification has been to restrict attention to cases when matrices  $\mathbf{A}$  and  $\mathbf{B}$  of the Equation (19) are diagonal matrices. This special case can be written as:

$$VECH(\mathbf{V}_t) = \bar{\mathbf{W}} + \bar{\mathbf{A}} VECH(\boldsymbol{\varepsilon}_{t-1} \boldsymbol{\varepsilon}_{t-1}^T) + \bar{\mathbf{B}} VECH(\mathbf{V}_{t-1}) \quad (24)$$

where and the and must all be symmetric matrices such that has positive diagonal elements and all other matrices have non-negative diagonal elements. This reduces the number of parameters to be estimated to  $3N \times (N+1) / 2$ , or 9 parameters in the two asset and we have:

$$\begin{bmatrix} \sigma_{1,t}^2 \\ \sigma_{21,t} \\ \sigma_{2,t}^2 \end{bmatrix} = \begin{bmatrix} \omega_1 \\ \omega_2 \\ \omega_3 \end{bmatrix} + \begin{bmatrix} \alpha_{11} & 0 & 0 \\ 0 & \alpha_{22} & 0 \\ 0 & 0 & \alpha_{33} \end{bmatrix} \begin{bmatrix} \varepsilon_{1,t+1}^2 \\ \varepsilon_{1,t-1}\varepsilon_{2,t-1} \\ \varepsilon_{2,t-1}^2 \end{bmatrix} + \begin{bmatrix} \beta_{11} & 0 & 0 \\ 0 & \beta_{22} & 0 \\ 0 & 0 & \beta_{33} \end{bmatrix} \begin{bmatrix} \sigma_{1,t-1}^2 \\ \sigma_{21,t-1} \\ \sigma_{2,t-1}^2 \end{bmatrix} \quad (25)$$

Equivalently,

$$\sigma_{1,t}^2 = \omega_1 + \alpha_{11}\varepsilon_{1,t-1}^2 + \beta_{11}\sigma_{1,t-1}^2 \quad (26)$$

$$\sigma_{21,t} = \omega_2 + \alpha_{22}\varepsilon_{1,t-1}\varepsilon_{2,t-1} + \beta_{22}\sigma_{21,t-1} \quad (27)$$

$$\sigma_{2,t}^2 = \omega_3 + \alpha_{33}\varepsilon_{2,t-1}^2 + \beta_{33}\sigma_{2,t-1}^2 \quad (28)$$

By doing this, model implies that we return a uGARCH (1,1) model for each of the volatility terms, but there is also a covariance term that has to be estimated by maximum likelihood method underlying multivariate distribution. Especially, this may lead to time consuming process, when huge covariance matrices are imposed by number of positions in portfolio. Moreover, in some cases, the covariance matrix in DVECH model may be not positive definite. [19]

**Constant Conditional Correlations multivariate GARCH (1,1).** The convergence and estimation problems of time-varying covariances in multivariate GARCH models lead to the so called Constant Conditional Correlations multivariate GARCH (1,1) or CCC-mGARCH(1,1) model for practical purposes usage. According to [8] there is a possibility to retain the time varying properties by using conditional variances and keeping correlations constant through the time. Consequently, conditional covariance matrix is of the form:

$$\mathbf{V}_t = \mathbf{D}_t \mathbf{R} \mathbf{D}_t \quad (29)$$

$$\mathbf{D}_t = \begin{bmatrix} \sqrt{\sigma_{1,t}^2} & 0 & 0 \\ 0 & \ddots & 0 \\ 0 & 0 & \sqrt{\sigma_{k,t}^2} \end{bmatrix}, \quad (30)$$

$$\mathbf{R} = \begin{bmatrix} 1 & \rho_{1,2} & \cdots & \rho_{1,k} \\ \vdots & \ddots & \cdots & \vdots \\ \rho_{k-1,1} & \rho_{k-1,2} & 1 & \rho_{k-1,k} \\ \rho_{k,1} & \rho_{k,2} & \cdots & 1 \end{bmatrix}$$

where  $\mathbf{R}$  is constant, positive-definite correlation matrix and  $\mathbf{D}_t$  is a diagonal volatility matrix with elements satisfying univariate GARCH (1,1) given by Equation

(15). This constant conditional correlation specification represents a simple way of combining univariate GARCH processes with multivariate logic. By this, each asset volatility term follows univariate GARCH (1,1). As a result, this model has  $K(K+5)/2$  parameters, moreover this specification guaranties positive definiteness and identification of  $\mathbf{V}_t$ . [11]

The CCC-mGARCH(1,1) model is often a useful starting point from which to proceed to more complex models. In some empirical settings it gives an adequate performance, but it is generally considered that the constancy of conditional correlation in this model is an unrealistic feature and that the impact of news on financial markets requires models that allow a dynamic evolution of conditional correlation as well as a dynamic evolution of volatilities.

**Orthogonal GARCH (1,1).** So called, ‘‘Orthogonal GARCH’’ (OGARCH) represents the solution for the problem of huge number of covariance matrix parameters and multivariate maximum likelihood estimation difficulties. For any application, the covariance matrix may be large and hence difficult to work with. The *principal components analysis* (PCA) is method for extracting the most important independent sources of information in the data. This approach is computationally efficient because it allows an enormous reduction in the dimensionality of the problem, whilst retaining a very high degree of accuracy. This also allows an enormous reduction in number of parameters that has to be estimated applying multivariate GARCH logic. By this idea, we can find and use linear combinations of principal components, which are, by definition uncorrelated, and by using only them we reduce problem dimensionality during parameter estimation process.

Let us denote by  $\mathbf{r}$  the  $T$  observations of matrix which comprises of  $n$  assets. PCA will give up to  $k$  uncorrelated stationary variables, called the principal components, where each component is being a simple linear combination of the original returns. At the same time it is stated exactly how much of the total variation in the original system of risk factors is explained by each principal component. Each principal component is ordered according to the amount of variation it explains [1]. The results of PCA are sensitive to rescaling of the data and so it is standard practice to normalize the data before the analysis, for example assuming Normal distribution we subtract the sample mean and divide it by the sample standard deviation. If we define the diagonal matrix  $\mathbf{V} = \{\sigma_1^2, \dots, \sigma_n^2\}$  as a matrix of the empirical variances of vector  $\mathbf{r}_t$  the standardized returns  $\mathbf{z}_t$  are given as:

$$\mathbf{z}_t = \mathbf{V}^{-\frac{1}{2}} \mathbf{r}_t, \quad \mathbf{E}[\mathbf{z}_t] = 0, \quad \mathbf{E}[\mathbf{z}_t \mathbf{z}_t^T] = \mathbf{V} \quad (31)$$

then the  $\mathbf{V}$  represents unconditional covariance matrix of  $\mathbf{z}_t$  matrix. This matrix can be decomposed as:

$$\mathbf{V} = \mathbf{P}\mathbf{\Lambda}\mathbf{P}^T \quad (32)$$

where  $\mathbf{P}$  is the orthonormal eigenvectors matrix which each column corresponds to the eigenvalue  $\lambda_i$  where  $i = 1, \dots, n$ . Matrix  $\mathbf{\Lambda}$  is the diagonal matrix of the eigenvalues of  $\mathbf{V}$  such that  $\mathbf{\Lambda} = \text{diag}\{\lambda_1, \dots, \lambda_n\}$  is ranked in descending order  $\lambda_1 > \lambda_2 > \dots > \lambda_n$ . Hence  $\mathbf{V}$  can be written as:

$$\mathbf{V} = \mathbf{P}\mathbf{\Lambda}^{\frac{1}{2}}\mathbf{\Lambda}^{\frac{1}{2}}\mathbf{P}^T = \mathbf{L}\mathbf{L}^T \quad (33)$$

where  $\mathbf{L} = \mathbf{P}\mathbf{\Lambda}^{\frac{1}{2}}$  denotes *Cholesky* decomposed component of matrix  $\mathbf{V}$ . Matrix  $\mathbf{L}$  satisfies:

$$\mathbf{L}^T\mathbf{L} = \mathbf{I}_N = \mathbf{L}\mathbf{L}^T \quad (34)$$

According to [9], denote by  $\mathbf{y}_t$  the vector of principal components of  $\mathbf{z}_t$ , which is defined by:

$$\mathbf{y}_t = \mathbf{L}^{-1}\mathbf{z}_t \quad (35)$$

This expression can be interpreted as the return of a portfolio that assigns weight  $y_{ij}$  to the  $j$ -th security. Since principal components have the property that they are uncorrelated, this implies that during the modeling of the covariance matrix we can ignore the covariance terms and hence model the variance by each principal component separately. Consequently the problem reduces to a series of univariate estimations using GARCH (1,1) model. Another important property of this analysis is that the variance of each principal component is the corresponding eigenvalue. Note that:

$$E(\mathbf{y}_t) = \mathbf{L}^{-1}E(\mathbf{z}_t) = 0 \quad (36)$$

The unconditional covariance matrix of Equation (35) becomes:

$$E(\mathbf{y}_t\mathbf{y}_t^T) = \mathbf{L}^{-1}E(\mathbf{z}_t\mathbf{z}_t^T)\mathbf{L}^{-1T} = \mathbf{L}^{-1}\mathbf{V}\mathbf{L}^{-1T} = \mathbf{I}_n \quad (37)$$

since Equation (33) holds,  $\mathbf{y}_t$  is cross-sectionally uncorrelated and each component has a unit variance. Since each  $\mathbf{z}_t = \mathbf{L}\mathbf{y}_t$  coordinate of  $\mathbf{z}_t$  can be written as a linear combination of the principal components:

$$z_{t,i} = \sum_{j=1}^n l_{i,j}y_{t,j} \quad (38)$$

where  $i=1, \dots, n$  and  $l_{i,j}$  and are the elements of  $\mathbf{L}$ .

On the other hand, conditionally on the information available at  $t-1$ , the vector of standardized residuals  $\mathbf{z}_t$  has a zero mean and a covariance matrix  $\mathbf{V}_t$ . That is:

$$E[\mathbf{z}_t | \Psi_{t-1}] = E[\mathbf{z}_t] = 0, \quad E[\mathbf{z}_t\mathbf{z}_t^T | \Psi_{t-1}] = \mathbf{V}_t \quad (39)$$

where, for any  $t$ , the matrix  $\mathbf{V}_t$  is positive definite and measurable with respect to the information set  $\Psi_{t-1}$  so we have that:

$$\tilde{\mathbf{V}}_t = E[\mathbf{y}_t\mathbf{y}_t^T] = \mathbf{L}^{-1}\mathbf{V}_t\mathbf{L}^{-1T} \quad (40)$$

Assuming that the conditional covariance  $\mathbf{V}_t$  follows Equation (18) the multivariate VEC process, we can employ the orthonormal basis of principal components

by applying the linear transformation Equation (35) to the conditional residuals  $\mathbf{z}_t$ . In the orthonormal basis of principal components Equation (18) then reads:

$$\tilde{\mathbf{V}}_t = \tilde{\mathbf{W}} + \tilde{\mathbf{A}}\tilde{\mathbf{y}}_{t-1}\tilde{\mathbf{y}}_{t-1}^T + \tilde{\mathbf{B}}\tilde{\mathbf{V}}_{t-1} \quad (41)$$

Where  $\tilde{\mathbf{y}}_{t-1} = \mathbf{L}^{-1}\mathbf{y}_{t-1}$  and  $\tilde{\mathbf{M}} = \mathbf{L}^{-1}\mathbf{M}\mathbf{L}^{-1T}$  for  $\mathbf{M} \in \{\mathbf{V}, \mathbf{A}, \mathbf{B}\}$  and for . The purpose of stated equation is the ability to estimate separately each principal component of the conditional covariance matrix of principal components with respect to information set  $\Psi_{t-1}$ . Since the principal components are orthogonal, it is reasonable to assume that the matrix  $\tilde{\mathbf{V}}$  is diagonal. In this case, the process given by Equation (18) can be estimated separately for each principal component which gives a set of  $n$  independent scalar equation of the GARCH (1,1) form.

Once we estimate the set of parameters in Equation (41) we can apply the inverse transformation:

$$\mathbf{V}_t = \mathbf{L}\tilde{\mathbf{V}}_t\mathbf{L}^T \quad (42)$$

to retrieve the series of conditional covariance matrices in the original basis of standardized returns. This allows us to estimate VaR in multivariate framework in most efficient way with losing no information. [22]

The estimation of the elements of  $\tilde{\mathbf{V}}$  is computationally much simpler and faster than the original conditional variance-covariance matrix  $\mathbf{V}_t$ . The dimensionality of the problem is thus reduced to estimation of only  $n$  parameters.

**Fitting Multivariate GARCH Models.** In practice, the most widely used approach to fitting GARCH models to data is maximum likelihood estimation (MLE) method<sup>7</sup>. In this paper, we consider application of MLE method with Normal and Student  $t$  distribution as an underlying assumptions. Since fitting model parameters underlying multivariate distributions with higher dimensions, by applying MLE may not be feasible and it is not recommended, we combine apply estimation of multivariate GARCH models which may be treated as a set of univariate GARCH counterparts. In an ideal factor model we would have a diagonal covariance matrix. This means that we fit both CCC-mGARCH model where the constant conditional correlation matrix is the identity matrix and O-mGARCH model with its diagonalized form of principal components. The log-likelihood function underlying standard Student's- $t$  distribution reduces to:

$$L_s = -\frac{1}{2} \sum_{t=1}^T \left[ \ln \sigma_t^2 + (v+1) \ln \left( 1 + \frac{r_t^2}{(v-1)\sigma_t^2} \right) \right] \quad (43)$$

and for Normal distribution it reduces to:

$$L_n = -\frac{1}{2} T \cdot \ln(2\pi) - \frac{1}{2} \sum_{t=1}^T \left[ \ln \sigma_t^2 + \frac{r_t^2}{\sigma_t^2} \right] \quad (44)$$

<sup>7</sup> The maximization is performed by using a modified Newton-Raphson procedure

#### 4. Empirical study and results

This empirical study consists of applying VaR techniques described in previous chapters on a practical, real life financial data. The VaR estimate for each methodology is based on the same underlying hypothetical portfolio. The constructed hypothetical portfolio consists of stocks, treasuries and foreign exchange rates from the Serbian capital market that could be hypothetically held by any Serbian bank. The graphical representations of the VaR estimation results are presented and compared with daily profits/losses incurred by holding this hypothetical portfolio. The Basel II backtesting<sup>8</sup> procedure, together with Kupiec test, is used to decide which model is the most appropriate to use on day-to-day basis for assessing VaR and therefore determining the market risk capital requirement.

The required input data for this empirical study includes necessary information about financial instruments of the portfolio considered. Data on portfolio constituents such as: time history of prices, positions values, denomination currency for each portfolio position was necessary to form the whole portfolio and portfolio constituent's returns. All those data represents the main input for the VaR analysis. In order to evaluate the models, equally weighted hypothetical portfolio, that has been constructed and used in VaR estimation analysis, comprises of:

- ✓ 5 stocks, denominated in RSD, continuously traded on Belgrade Stock Exchange, namely: AGBN, AIKB, ENHL, PRBN and TIGR.

- ✓ 3 foreign exchange positions: EUR, USD and CHF position. The exchange rate for these foreign exchange currencies, with respect to RSD.
- ✓ 2 zero-coupon treasuries bonds continuously traded on Belgrade Stock Exchange: A2010, A2011. Each treasuries bond is EUR denominated. The first matures at 31. may 2010 and the second matures at 31. may 2011.

The price time series for those 10 portfolio positions are obtained from BELEX data feed stream (www.belex.rs). Data price time series ranges from 20. September 2007 to 11. September 2009. This data range has been chosen for the risk estimation purpose to emphasis the bullish period of the economy due to financial global crisis and to assess the VaR for this harsh period for the Serbian economy. In total we have 501 price observations for each portfolio position which are sorted in ascending order with respect to date. For the multivariate VaR estimation purposes each of 10 price time series is used and transformed in 500 corresponding return observations according to Equation (1). The day-to-day positions values are calculated assuming approximately equally weighted portfolio. This means that each of ten portfolio positions approximately captures 10% of total portfolio amount on the daily basis. Moreover, since the portfolio is constructed upon components denominated in different currencies, the arithmetic return is calculated after price time series of each portfolio components were transformed to be expressed in RSD currency. In other words, time series of daily prices were firstly calculated to be RSD denominated and then corresponding returns have been calculated.

Count	Date	AGBN	AIKB	CHF	EUR	USD	ENHL	PRBN	TIGR	A2010	A2011	PORTFOLIO
1	21/09/2007	0.313%	4.356%	0.013%	-0.223%	-1.016%	1.984%	1.079%	-1.598%	-0.488%	-0.223%	0.811%
2	24/09/2007	1.697%	0.399%	-0.721%	-0.588%	-0.687%	-2.645%	-0.194%	1.578%	-0.565%	-0.637%	-0.074%
3	25/09/2007	4.170%	-0.468%	-0.771%	-0.753%	-0.563%	1.499%	0.331%	-2.056%	-0.501%	-0.487%	0.342%
4	26/09/2007	0.292%	0.106%	-0.116%	-0.249%	-0.721%	1.077%	3.374%	2.099%	-0.249%	-0.249%	1.069%
5	27/09/2007	0.444%	0.053%	0.058%	0.325%	0.332%	-0.152%	1.332%	0.046%	-0.219%	0.044%	0.378%
6	28/09/2007	-1.915%	0.062%	0.168%	0.532%	0.390%	-0.915%	0.703%	-0.913%	0.812%	0.532%	-0.194%
7	01/10/2007	0.454%	0.000%	-0.119%	0.043%	-0.651%	-0.062%	-0.717%	0.691%	-0.188%	0.043%	-0.072%
8	02/10/2007	-0.458%	-0.991%	-0.267%	-0.237%	0.057%	-1.016%	0.352%	0.686%	-0.237%	-0.237%	-0.213%
9	03/10/2007	-0.078%	1.028%	-0.222%	-0.102%	0.243%	-0.093%	-0.369%	0.455%	0.813%	-0.102%	0.125%
10	04/10/2007	-0.203%	0.557%	-0.404%	-0.500%	0.043%	0.498%	-0.926%	1.357%	-0.832%	-0.573%	-0.055%
⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮	⋮
491	31/08/2009	-0.255%	5.646%	0.068%	-0.228%	0.296%	1.139%	0.000%	1.883%	-0.123%	0.433%	0.614%
492	01/09/2009	-3.809%	0.445%	-0.328%	-0.150%	-0.616%	3.041%	-1.460%	2.826%	0.340%	-0.238%	0.001%
493	02/09/2009	-2.135%	-1.693%	0.279%	0.186%	1.159%	-1.639%	-3.111%	0.529%	-0.637%	0.219%	-0.337%
494	03/09/2009	0.339%	0.082%	0.501%	0.309%	-0.113%	-1.222%	2.294%	0.000%	0.645%	0.309%	0.289%
495	04/09/2009	0.383%	2.786%	0.016%	0.062%	0.209%	2.475%	0.149%	1.472%	0.114%	0.029%	0.562%
496	07/09/2009	7.484%	4.544%	-0.275%	-0.097%	-0.648%	0.439%	0.000%	1.658%	-0.003%	-0.097%	0.864%
497	08/09/2009	1.629%	3.889%	-0.255%	-0.117%	-0.159%	2.732%	4.627%	0.815%	0.029%	-0.424%	0.757%
498	09/09/2009	-1.726%	-0.550%	0.254%	0.056%	-0.987%	0.957%	9.130%	1.112%	-0.048%	0.331%	0.471%
499	10/09/2009	1.160%	6.531%	0.106%	0.060%	-0.531%	0.738%	4.444%	-2.100%	0.133%	0.027%	0.585%
500	11/09/2009	1.447%	6.339%	0.230%	0.138%	-0.143%	3.766%	3.129%	0.919%	0.325%	0.138%	1.169%

Table 1: *Periods of high and low volatility*

<sup>8</sup> Backtesting represents the routine of comparing daily profits and losses, the trading outcomes, with model generated VaR estimate to gauge the accuracy of it. Results, or in other words outputs, of backtesting are recognized as the number of exceptions i.e. VaR breaches. The exception is captured each time when the amount of loss in trading portfolio of the bank exceeds the estimated VaR for that day. Backtesting routine involves systematically comparing the history of VaR forecasts with their associated portfolio profits and losses

The whole data range shown in the Table 1 is divided into two parts:

## I. Initial estimation period

## II. VaR estimation period.

**Initial estimation period** comprises of the first 250 returns, from 1<sup>st</sup> to 250<sup>th</sup> return i.e. from 20. September 2007 to 16. September 2008. Consequently, the first VaR results, with different multivariate GARCH methods, are calculated underlying the data from the initial estimation period, since those returns are used as an initial input for the first estimate of VaR. Moreover,

the equal weights of portfolio constituents used are imposed with respect to prices of positions on the last day, 16. September 2008, of initial estimation period. The portfolio returns and summary statistic are given in the following Table 2. The table below provides summary statistics as well as the Jarque-Bera statistic for testing normality. For all portfolio assets including portfolio itself, the null hypothesis of normality is rejected at any level of significance, as there is evidence of significant kurtosis and negative skewness. From Table 2, relatively low values of degrees of freedom (DoF) for all portfolio components including portfolio itself are provided, which confirms that there is a relatively high kurtosis observed in data.

	<i>AGBN</i>	<i>AIKB</i>	<i>CHF</i>	<i>EUR</i>	<i>USD</i>	<i>ENHL</i>	<i>PRBN</i>	<i>TIGR</i>	<i>A2010</i>	<i>A2011</i>	<i>PORTFOLIO</i>
Position*	100	300	26,300	16,600	23,600	900	1,000	1,300	18,600	19,700	12,945,751
Mean	-0.0034	-0.0030	0.0000	-0.0002	-0.0002	-0.0030	-0.0049	-0.0026	0.0000	-0.0001	<b>-0.0024</b>
Median	-0.0023	-0.0019	-0.0009	-0.0003	-0.0004	-0.0028	-0.0020	0.0000	-0.0005	-0.0006	-0.0025
St. Deviation	0.0262	0.0230	0.0075	0.0065	0.0086	0.0295	0.0338	0.0327	0.0070	0.0072	<b>0.0126</b>
Kurtosis	7.0192	11.3229	5.3011	7.9607	4.6473	4.6927	8.0507	4.9855	6.2435	6.8521	9.8930
Skewness	0.4425	0.2308	0.3045	0.2447	-0.0529	0.3920	1.0467	0.1347	0.2762	0.4914	0.8791
Minimum	-8.69%	-12.91%	-2.84%	-2.83%	-3.11%	-9.24%	-11.18%	-9.71%	-2.83%	-2.83%	-3.91%
Maximum	12.70%	12.79%	2.94%	2.96%	2.53%	10.02%	18.18%	10.00%	2.96%	2.96%	7.76%
Jarque-Bera stat.	176.43	723.7	59.02	258.8	28.38	36.25	311.36	41.82	112.76	164.63	527.13
<i>p-value</i>	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Student's- <i>t</i> DoF	2.356	2.074	4.142	5.210	3.835	3.137	2.248	7.022	2.588	2.729	<b>3.454</b>
Count	250	250	250	250	250	250	250	250	250	250	250

\*Stocks: indicates the number of stocks held. Treasuries: indicates the face value in foreign currency. Foreign exchange: indicates position in foreign currency.

Portfolio: position is expressed in RSD. Evaluation date: 16.september 2008.

Table 2: Summary statistics of the initial estimation period

**VaR estimation period** comprises of the second part of 250 returns in Table 3 ranging from 251<sup>st</sup> to 500<sup>th</sup> return i.e. from 17. September 2008 up to 11. September 2009. Consequently, this is the observation period where VaR estimates are iteratively calculated on day to day basis. The VaR estimation, through this period, is done by applying “rolling window” concept. This means that the first VaR results are calculated underlying the data from the initial estimation period from 1<sup>st</sup> to 250<sup>th</sup> observation; then, the 1<sup>st</sup> observation (from the initial estimation period) is dropped out and the 252<sup>nd</sup> is included in “rolling window”. Consequently, for the second VaR estimate we deal with range which captures returns from 2<sup>nd</sup> to 252<sup>nd</sup> and VaR is recalculated for each considered methodology according to newly imposed range. This procedure repeats iteratively until we estimate the VaR for last “rolling window” ranging from 251<sup>st</sup> to 500<sup>th</sup> return observation. The “rolling window” concept enables to deal with last 250 return observations in each period for which VaR is calculated. In this paper, there are 250 VaR estimates for 250 imposed rolling windows in range that denotes VaR estimation period.

Table 3. provides summary statistics for the VaR estimation period calculated on last day in observation period. The Table 3 shows that the average daily return is about zero percent, or at least negligibly small compared to the sample standard deviation. This is why the mean is often set at zero when modeling daily assets and portfolio returns. The Jarque-Bera statistic for testing normality indicates that in this period there is only one portfolio component ENHL whose returns followed Normal distribution.

For all other portfolio assets including portfolio itself, the null hypothesis of normality is rejected at any level of significance. Moreover, there is again an evidence of significant kurtosis and negative skewness. Again, from relatively low values of DoF is observed which confirms that there is a relatively high kurtosis observed in data. Furthermore, the maximum and minimum statistics are quite large in absolute value indicating the presence of extreme returns.

	AGBN	AIKB	CHF	EUR	USD	ENHL	PRBN	TIGR	A2010	A2011	PORTFOLIO
Position*	100	300	26,300	16,600	23,600	900	1,000	1,300	18,600	19,700	12,935,346
Mean	0.0000	-0.0006	0.0011	0.0008	0.0008	-0.0005	-0.0008	0.0004	0.0012	0.0012	<b>0.0001</b>
Median	0.0000	-0.0005	0.0007	0.0004	-0.0001	-0.0021	0.0000	0.0000	0.0011	0.0008	0.0007
St. deviation	0.0444	0.0478	0.0095	0.0067	0.0127	0.0404	0.0458	0.0299	0.0082	0.0076	<b>0.0103</b>
Kurtosis	5.4526	4.9877	8.5446	8.0631	4.2339	3.1247	4.6752	4.2895	10.2635	6.9532	7.5034
Skewness	0.1811	0.0782	-0.6077	-0.5650	0.2012	-0.0071	0.2818	0.2881	-0.2036	-0.3024	0.0866
Minimum	-16.43%	-18.91%	-5.32%	-3.60%	-3.94%	-10.02%	-13.28%	-9.00%	-4.22%	-3.83%	-4.78%
Maximum	18.75%	19.33%	3.49%	2.34%	4.80%	10.06%	17.14%	10.13%	4.59%	2.54%	5.18%
Jarque-Bera	64.02	41.41	335.6	280.32	17.54	<b>0.16141</b>	32.5408	20.778	551.3	166.6	211.56
<i>p-value</i>	0.001	0.001	0.001	0.001	0.0033	<b>0.500</b>	0.001	0.002	0.001	0.001	0.001
Student's- <i>t</i> DoF	2.7164	4.2697	2.3693	2.1119	5.6813	22.4680	3.1941	2.6883	2.4930	2.9426	<b>3.9368</b>
Count	250	250	250	250	250	250	250	250	250	250	250

\*Stocks: indicates the number of stocks held. Treasuries: indicates the face value in foreign currency. Foreign exchange: indicates position in foreign currency.

Portfolio: position is expressed in RSD. Evaluation date: 11 september 2009.

Table 3: Summary statistics of the VaR estimation

It is important to note that for each of 250 “rolling windows” summary statistics, DoF for Student-*t* distribution, together with all required VaR parameters such are recalculated to include return innovation effect from each “rolling window” into VaR estimates.

Empirical results are given for multivariate GARCH VaR techniques that has been discussed in previously chapters and which is possible to implement in practice. VaR measure has been calculated with respect to

99% confidence level and one day holding period. The tables below provide a graphical insight of calculated VaR methods.

Each of these methods has been implemented and fully programmed by authors in MATLAB version R2009a. The only toolbox used was Optimization toolbox for MLE maximization purposes. All other functions have been fully developed by the authors.

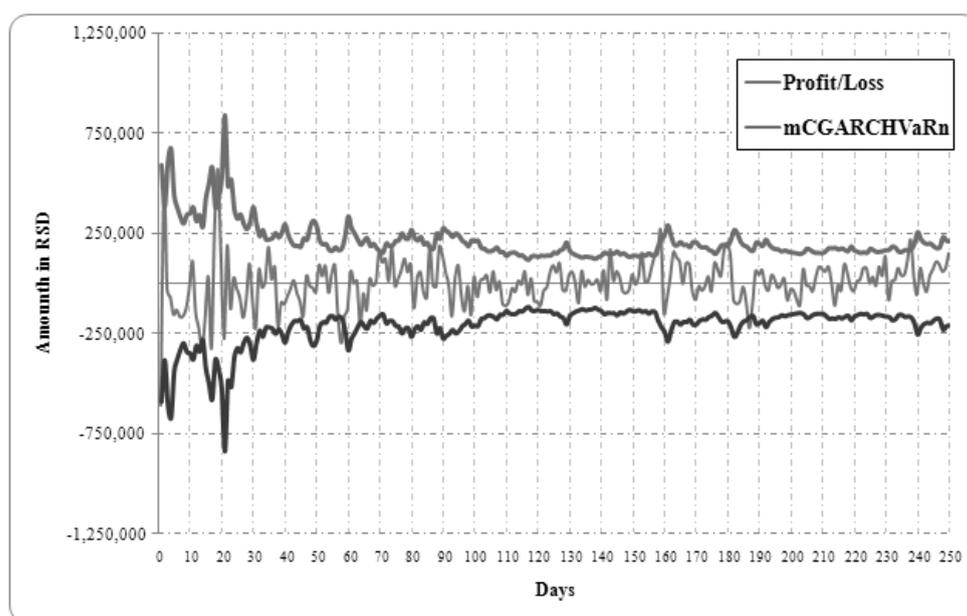


Figure 5: *mCGARCHVaR* – multivariate constant correlation GARCH (1,1) assuming normally distributed returns

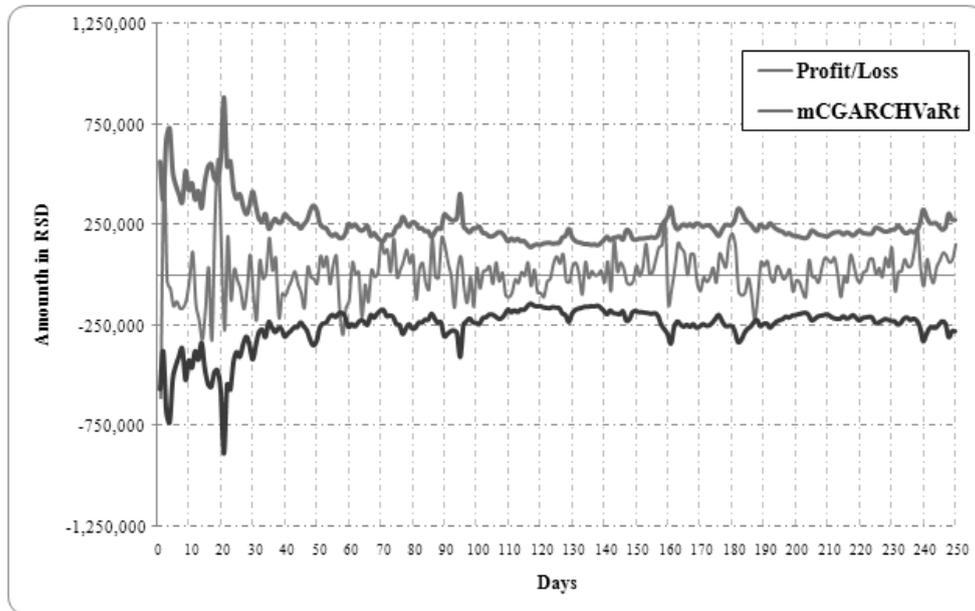


Figure 6: *mCGARCHVaRt* – multivariate constant correlation GARCH (1,1) assuming Student's-t distributed returns

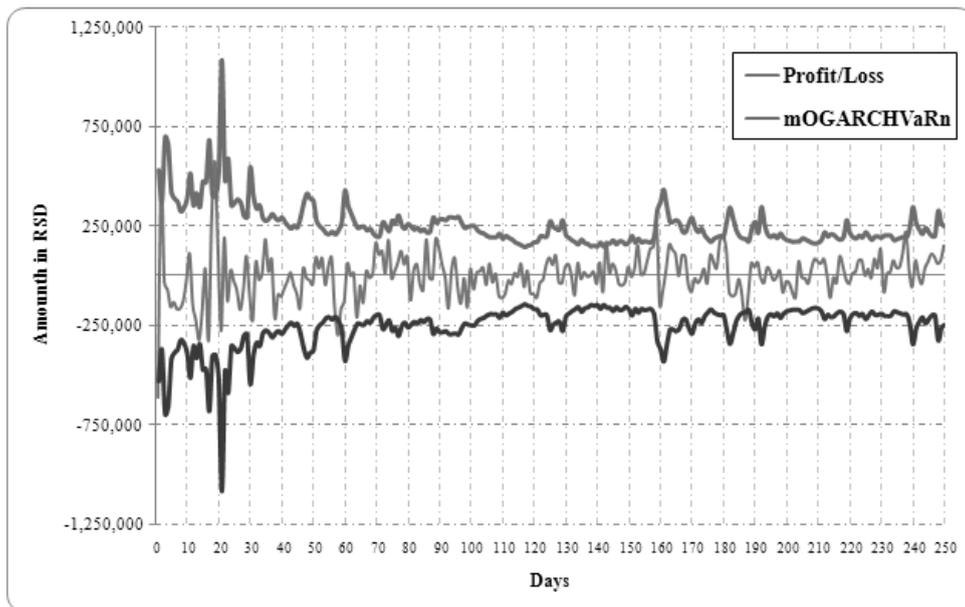


Figure 7: *mOGARCHVaRn* – multivariate constant correlation GARCH (1,1) assuming Student's-t distributed returns

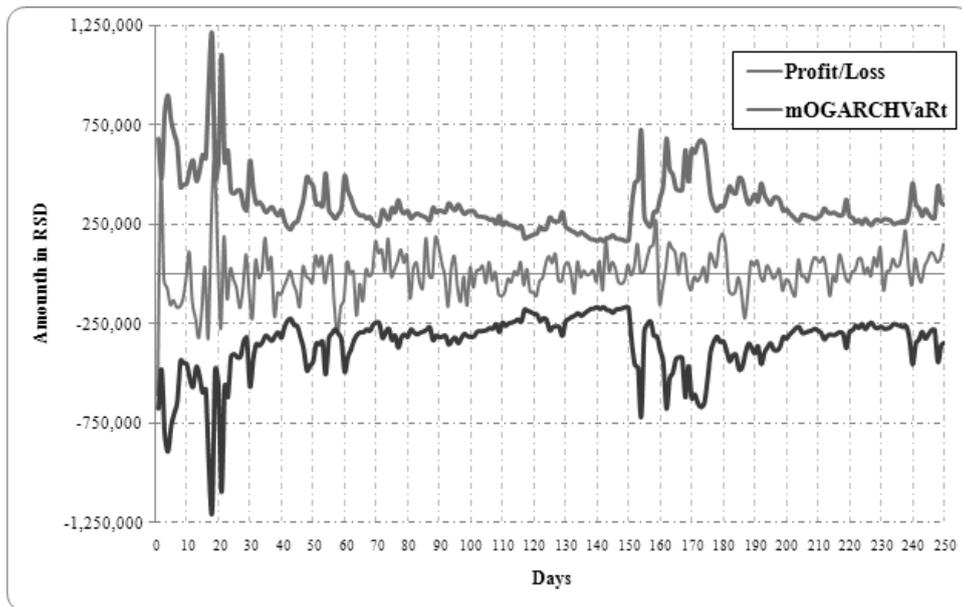


Figure 8: *mOGARCHVaRt* – multivariate constant correlation GARCH (1,1) assuming Student's-t distributed returns

The graphical results are shown above depict the evaluated VaR models together with the incurred profits/losses of the hypothetical portfolio. As it was discussed in previous chapters, VaR for the day  $t$  is compared with profits/losses for the day  $t + 1$ . VaR esti-

mates are shown as a two envelope red lines which stand on the both, profit and losses side of each figure. Breach is seized each time when blue line representing profit/loss, breaks through lower VaR envelope on the loss side.

<i>VaR method</i>	<b>VaR exceptions</b>					
	day 1	day 14	day 57	day 58	day 64	day 187
<b>mCGARCHVaRn</b>	-22,817	-43,833	-2,573	-127,342	-18,927	-59,534
<b>mCGARCHVaRt</b>	-45,227	0	0	-115,236	0	0
<b>mOGARCHVaRn</b>	-80,488	0	0	-71,010	0	-41,707
<b>mOGARCHVaRt</b>	0	0	0	-3,053	0	0

Table 4: *VaR breaches in the empirical analysis*

The number of exceptions with respect to 99% VaR ranges from 0 to 6 out of 250 observations, which is approximately close to expected number  $250 \cdot 0.01 = 2.5$ , imposed by confidence level. At the 1<sup>st</sup> day and 58<sup>th</sup> day of VaR calculation, the breaches are reached in almost each multivariate GARCH VaR technique. In the period ranging from 16. December 2008 to 16. June 2009 no ex-

ceptions were recorded. Consequently, it can be noticed that exceptions with respect to presented VaR models occur frequently around the same dates, which raises a doubt that there could have been some external market shocks. However, to get a better insight into the performance of the risk models, we proceed with formal statistical testing and interpretation of the obtained VaR results.

<i>VaR method</i>	Number of exceptions (NoE)	Basel II zone	Kupiec (accept for $p > 0.05$ )	Average VaR	Average breach
<b>mCGARCHVaRn</b>	6	YELLOW	ACCEPT (0.0593)	212,597	45,838
<b>mCGARCHVaRt</b>	2	GREEN	ACCEPT (0.7419)	255,119	80,232
<b>mOGARCHVaRn</b>	3	GREEN	ACCEPT (0.7579)	255,650	64,402
<b>mOGARCHVaRt</b>	1	GREEN	ACCEPT (0.2780)	351,057	3,053

Table 5: *VaR backtesting analysis*

Table 5 shows the classification of VaR models according to the Basel II three-zone approach as required by the Basel II standards. From the Table 5 we also see that the minimum average VaR is calculated for mCGARCHVaRn method and minimum average breach magnitude for mOGARCHVaRt method. The three out of four examined models are in green zone, but one VaR model is qualified to fall in yellow zone. This indicates that additional examination is needed in order to reveal potential the problems with their risk assessment. In order to test whether the occurrence of exceptions covered by VaR is in line with its confidence level and whether the losses occur independently of each other author applies Kupiec test. The decision making rules concerning the acceptance or rejection of the null hypotheses are based on the corresponding likelihood ratio test statistics and a significance level of 5%. In Table 5 the  $p$ -values, shown in brackets, are the probabilities which indicate failure rates significantly different from probability of one percent, at 95% Kupiec test level. Rejections arise if the frequency of violations produces  $p < 0.05$ .

According to Basel II, since VaR results have been statistically validated it should be used for determining the minimum regulatory capital against market risks. The bank must meet, on a daily basis, a *market risk capital requirement* expressed as the higher of:

- a) its previous day 10-day VaR number measured according to the specified parameters
- b) an average of the daily 10-day VaRs measures on each of the preceding sixty trading days multiplied by a multiplication factor  $(k+p)$ . Where  $k$  is usually set to 3, whereas  $p$  stands for potential increase in multiplication factor due to poor backtesting results<sup>9</sup>.

For the capital requirements purposes “square root of time” rule is used to approximate 10-day VaR from the obtained 1-day VaR estimate.

$$\text{VaR}_{\alpha,10\text{day}} = \sqrt{T} \cdot \text{VaR}_{\alpha,1\text{day}} \quad (45)$$

Day	Date	Capital requirement for market risk			
		mCGARCHVaRn	mCGARCHVaRt	mOGARCHVaRn	mOGARCHVaRt
1	17/09/2008	5,589,355	5,376,750	5,042,241	6,424,427
2	18/09/2008	4,606,742	4,479,332	4,290,507	5,490,305
3	19/09/2008	4,986,717	5,149,385	5,061,876	6,217,878
4	22/09/2008	5,329,657	5,601,625	5,360,787	6,785,079
5	23/09/2008	5,093,278	5,459,442	5,088,295	6,884,537
...	...	...	...	...	...
246	04/09/2009	549,597	715,950	625,292	887,451
247	07/09/2009	564,750	752,481	633,164	884,895
248	08/09/2009	726,373	967,517	1,031,379	1,394,188
249	09/09/2009	671,286	879,224	832,200	1,138,735
250	10/09/2009	659,041	874,804	780,262	1,091,479

Table 6: Capital requirements for market risk

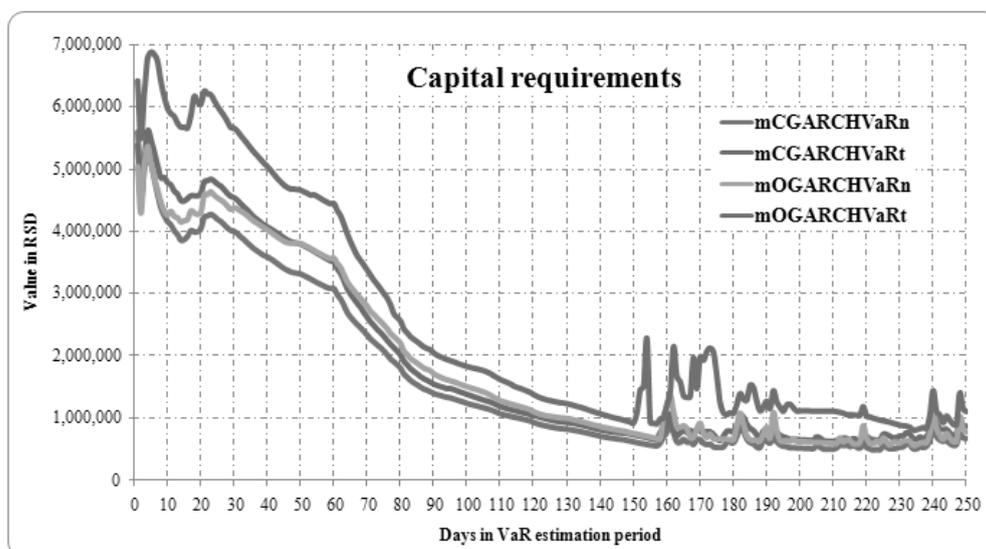


Figure 5: Capital requirements comparison

<sup>9</sup> For more details see [3]

The capital requirements time expansion is gathered on the Figure 5. The comparison shows, that within first 60 days, there are a higher capital requirements revealed then in the period after 60th day. The period after 60th day indicates stable decrease in capital requirements for all four methods. The mCGARCHVaRt keeps its volatile nature and there are a few outliers captured around 152nd, 170th, 185th and 240th day. By inspection mCGARCHVaRn has the lowest capital requirement for market risk. Its time line is stable up to the last VaR estimation day which indicates that some reasonable theoretically imposed limit on the market risk capital requirement would not be exceeded. On the other hand, there is an evidence, for all four methods, of a slight upward increase of the capital requirement trend lines which would perhaps indicate commencement of another volatile period for hypothetical portfolio profits and losses.

## Conclusion

Value-at-Risk model evaluation represents a crucial part of market risk management practice. Its recognition and practical implementation is mainly motivated by the wide adoption of regulatory standards proposed by the Basel Committee on Banking Supervision. Theoretically, risk managers have abundance of which Value-at-Risk methodology to choose but there are a plenty of peculiarities that have to be dealt with during this decision making process. For example, from the perspective which VaR measure is the most relevant, there are different criteria that have to be satisfied such as model validation, regulatory compliance and internal bank's standards. Therefore it is necessary to test and compare VaR estimates on the actual portfolio and to indicate its validity. In Serbia, for example, there is an emphasized need for choosing the appropriate VaR model due to convergence and compliance with Basel II standards.

In this paper a set of multivariate GARCH models, which represent advanced quantitative VaR estimation techniques, is discussed, empirically evaluated and tested. Furthermore, Normal and Student's  $-t$  distributional assumptions are met and investigated within those VaR techniques. Finally, the whole set of methods is used and examined in order to find the most appropriate VaR models for 99% confidence level and 1 day holding period. Regulatory recommended backtesting procedures are used in order to validate the considered VaR models and to choose the most appropriate. Two approaches to backtesting are followed since the validation of results has direct implications on decision making process concerning

election of adequate VaR method within a bank, as well as, on the level of capital requirements for market risk. Basel II "three zone" test has been applied as well as the Kupiec tests based on the frequency of tail losses. The global objective of this paper was to determine and improve the accuracy and adequacy of risk modeling in emerging market, such Serbia is, for the practical banking purposes concerning market risk capital requirements calculations.

## REFERENCES

- [1] Alexander, C. (2000). A Primer on the Orthogonal GARCH Model. University of Reading: ISMA Centre, The business School for Financial Markets.
- [2] Bank for International Settlement. (1996). Supervisory framework for the use of "Backtesting" in conjunction with the Internal models approach to market risk capital requirements. Basle Committee on Banking Supervision.
- [3] Bank for International Settlement. (2005). Amendment to the Capital Accord to incorporate market risks. Basel Committee on Banking Supervision
- [4] Bank for International Settlement. (2006). International Convergence of Capital Measurement and Capital Standards: A Revised Framework. Basel Committee on Banking Supervision .
- [5] Berkowitz, J., & O'Brien, J. (2002). How Accurate Are Value-at-Risk Models at Commercial Banks? *The Journal of Finance*, Vol. 57, No.3 , 1093-1111.
- [6] Bollerslev, T., & Engle, R. (1993). Common Persistence in Conditional Variances. *Econometrica* , 31: 307-327.
- [7] Bollerslev, T. (1986). Generalized Autoregressive Conditional Heteroskedasticity. *Econometrics* , 307-327.
- [8] Bollerslev, T., Engle, R., & Wooldridge, J. (1988). A Capital-Asset Pricing Model with Time-Varying Covariances. *Journal of Political Economy* 96(1) , 116-31.
- [9] Božović, M. (2009). PhD thesis: Risks in Commodity and Currency Markets. Barcelona: Universitat Pompeu Fabra.
- [10] Brooks, C. (2002). *Introductory Econometrics for Finance*. Cambridge: Cambridge University Press.
- [11] Danielsson, J. (2006). Risk Modelling: Lecture Notes MS. [risk.lse.ac.uk/upf](http://risk.lse.ac.uk/upf) .
- [12] Dowd, K. (2002). *Mearusing Market Risk*.

Chichester: John Wiley & Sons Ltd.,

- [13] Engle, R. (2001). GARCH (1,1): The use of ARCH/GARCH models in Applied Econometrics. *Journal of Economic Perspectives*, Volume 15 , 157-168.
- [14] Engle, R., & Sheppard, K. (2002). Theoretical and Empirical Properties of Dynamic Conditional Correlation Multivariate GARCH. San Diego: University of California.
- [15] Hendricks, D., & Hirtle, B. (1997). Bank Capital Requirements for Market Risk: The Internal Models Approach. *Economic Policy Review* .
- [16] Jorion, P. (2007). *Value at Risk: the new benchmark for managing financial risk*. Third Edition. New York: McGraw-Hill.
- [17] Kupiec, P. (1995). Techniques for Verifying the Accuracy of Risk Measurement Models. *Journal of Derivatives* .
- [18] National Bank of Serbia. (2008). Decision on Risk Management by Banks. *RS Official Gazette* , No.129/2007, 63/2008 and 112/2008.
- [19] Silvennoinen, A., & Terasvirta, T. (2008). Multivariate GARCH models. Working Paper Series in Economics and Finance No. 669 .
- [20] Simone Manganelli, R. E. (2001, August). Value at risk models in finance. European Central Bank: Working paper no.75 .
- [21] Tsay, R. (2002). *Analysis of Financial Time Series*. Canada: John Wiley & Sons, Inc.
- [22] Weide, R. v. (2002). GO-GARCH: A Multivariate Generalized Orthogonal GARCH Model. *Journal of Applied Econometrics*, Vol.17, 549-564.

# Three-dimensional (3d) Contribution Matrix of Mustainability Strategy, Brand Value and Financial-market Results in Car-industry

UDC: 005.51:629.33

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*Financial and world economic crisis from the end of 2008 and the past 2009 had, without doubt, a very bad impact on the world's automotive giants, with significant reduction in demand. As the crisis slowly passing, again car-industry is to the front imposed by two problems: a) re-increase movement of oil prices and b) strict legal decisions about gas emissions (or fuel consumption depending on the country). The question of whether the car industry should/must invest in "green technologies" through greater or lesser commitment to the sustainability strategy, no longer sets, because the two mentioned "problems" certainly forced them, but the question is in what kind of correlation are sustainability strategy with brand value and financial-market results.*

*Therefore in this work using the triple approach, while at the same time we measure the impact (contribution) of three (3) factors in the car-industry, the impact of: 1) the sustainability strategy (Z axis), 2) brand value (Y axis), 3) Financial- market results (X axis), we'll give a one new three-dimensional (3D) matrix. This new matrix using the integral and simultaneous observations of the impact of these three factors, give answers on: what kind of position can take the car manufacturers in the car-industry, what solutions are impose to them, and what are the risks.*

## 1. Introduction

Economy and the largest companies are generally considered to be the "major culprits" for any social and economic problems, which has, on the other hand, directly led to the establishment of a large number of movements, campaigns, and citizens' initiatives to keep these "culprits" under control. Two movements are most prominent in these activities. One is consumerism (English: consumer, consumerism), the other, more important for our topic, is environmentalism (English: environment, environmentalism) which is in fact an organized campaign of citizens and government agencies oriented towards the protection and improvement of the environment.

The social movement organization has had three waves or phases. The first was started by the agencies and scientific centres for environment monitoring and protection. The second was conducted by governmental agencies and states by adopting laws and regulations to force companies to be more committed to environmental protection.

Since environmental protection is increasingly becoming a subject of both academic analyses and practice, the sustainable development has in numerous economic sectors become a *sine qua non* of further economic development. The notion of "sustainable development" was first mentioned at the UN meeting held in Rio de Janeiro in 1992; however, it was interpreted in a way that the "sustainable development" can by no means hinder the economic growth. Rather, it is to be its inte-

gral part, and the balance between the two should be possible and unavoidable. [1]

It was then that the two waves joined into one new – the third wave, called ecological sustainability. A number of companies then realised that they should lead in the environmental improvement by more cautious and more positive activities, rather than oppose the regulations and legislation.

On the micro level, the reputation and corporate responsibility are the factors that usually impact the company's business and the consumers' behaviour. On the basis of the research conducted in North America in 2001, Peter Drucker maintains that 42 percent of interviewed customers claimed that they punished socially irresponsible companies by not buying their products. [2] In the modern circumstances, the era of passive consumers has long gone, and they assume more and more power.

The response to this is the rise of the concept of a holistic marketing, to replace the traditional marketing approach. The concept of holistic marketing recognizes the "everything matters" conception and consists of four (4) integral parts: 1) relationship marketing that includes the creation of long-term relationships with clients and all other factors in the marketing chain; 2) integrated marketing, consisting of connecting marketing activities with all other activities for the purpose of creating an ultimate value for the customer; 3) internal marketing, demanding that marketing principles be adopted by all the employees, and especially by the manager; 4) socially responsible marketing, an

integrated approach in simultaneously meeting economic, ethical, moral, and ecological principles, in order to satisfy the consumers as social beings. [3]

This concept requires managers to rethink the role they play or could play and to realize that the “socially responsible business practice is becoming a source of competitive advantage“. [4] The aim is that the organization should obtain a status of a “good citizen“ and devise a strategy which protects environment and simultaneously brings profit to the organization. It is for this reason that the ecological sustainability concept, as the third wave in customer protection, is an integral part of holistic marketing.

The major problem of inconsistency in the holistic marketing implementation, primarily in the area of socially responsible marketing, lies in a potential collision between economic and social goals, as these activities are rarely adjusted to the organizational strategic goals.

Observed from the aspect of the two methodological approaches, the neoclassical (neoliberal) and interventionist, the problem of impact upon environment assumes an interesting dimension. “Every entrepreneurial decision that includes financial expenses and incomes into its calculations inevitably takes into account the undesirable effect which is not part of these calculations, but refers to the third party. Thus the building of factories causes damages to the environment and the population ... The impact of new railways or highways that makes all companies close to them profitable, can be classified as positive external effects. The negative impacts of market economy, however, prove to be dangerous especially for the so-called “no-man’s-land“, that is, the situation when there is nobody who could submit a claim for damage compensation. The mass impacts of spontaneous industrialization upon the environment, upon ecological balance, and, finally, upon man’s biological stability and adaptability have gradually grown into global issues, the most difficult the mankind has encountered so far. These issues call for organized interventions in the spontaneous market process. But then, is it always possible to differentiate between the market and non-market side effects, concerning their impact upon the environment and upon man himself? It has gradually become clear that even the most carefully planned campaigns may end into a negative effect. The problem of monitoring and regulating “external effects“ of human activities on Earth has, therefore, assumed both the national and the global character, which the market cannot solve by itself.“ [5]

One of the major weaknesses and most frequent criticism of a neoclassical or neoliberal approach in which the market can use the demand and offer leverage to

“regulate absolutely everything“, therefore, refers to the companies not being in a position to autonomously and willingly undertake steps towards solving social problems, and especially to reducing pollution.

Hence an increasing tendency towards interventionism, that is, towards adopting a set of strict legal provisions by which the corporations, both global and local ones, are forced to recognize the importance of “sustainable development“. One industry that is the first to be affected by such provisions is certainly the automobile industry.

## 2. Impact of legal provisions and oil market upon automobile industry

Stricter legal provisions related to car exhausts, i.e., gases emissions are predominantly characteristic of the European Union, however, similar measures have been undertaken by the government of the American state of California, which has in turn resulted into higher prices of products, i.e., cars. [6] Thus on 12th December, 2008 the European Parliament adopted a climate and energy package of six items, one item being that the CO<sub>2</sub> emissions from individual cars be reduced to 130 g/km by 2015. The procedure was planned to be gradual, which means that by 2012, the manufacturers should be limited to 65% of the planned maximum emission in 2015. It is important to note that 559 members of parliament voted in favour of the proposition, 98 were against and 60 abstained from voting. The same document “proposed“ that the maximum limit of CO<sub>2</sub> emission be 95 g/km by 2020, which will be subject of further debate in 2013. [7] How strict the emission limit to 130 g/km is can be understood on the basis of the statistical data for the previous years that show that a large majority of cars emitted more than 180 g/km, and even more than 300 g/km.

The reasons for such a strict legislature can be found in the demands that a better environmental protection be ensured, but also in the endeavours that the EU dependence on the petroleum market be reduced and a better energy efficiency be achieved.

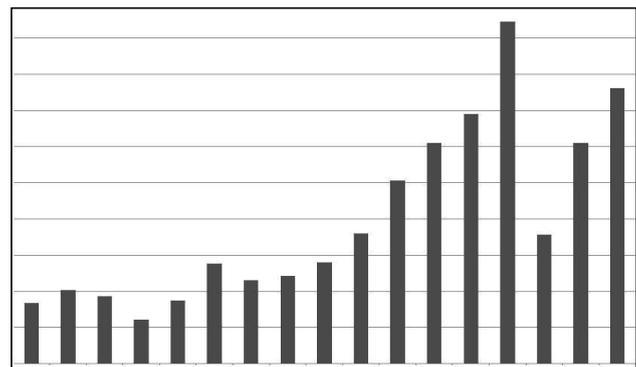


Figure 1. Oil prices in US dollars per barrel, prior and during (after) the “financial crisis“ [8]

It is evident that the normalization of the economic crisis effects results in the rise of oil price. Such a trend certainly worries the automobile industry giants, and sooner or later they will be forced to search for new alternatives.

In order that the automobile industry should keep up with strict legal requirements and constraints, but also be less dependent on oil prices, it is necessary that we think ahead and allocate ample budgets to RI (resource investigations) in the process. If the “green technologies” were taken as a factor of the company’s positioning in the branch, the manufacturers could be classed as:

1. Sustainable leaders – those who are the first to invest into new technologies, who work out new solutions and who spend large sums of money for that purpose. Such are BMW, GM, Toyota.

2. Sustainable challengers – those manufacturers who are not the leaders in investing into new technologies, who do not come up with new solutions, but copy successfully implemented and adopted solutions, striving not to let the competition gain too big and unattainable a competitive advantage, such as Daimler, i.e., its brand, Mercedes.

3. Sustainable followers – those manufacturers who are not the leaders in investing into new technologies, who do not come up with new solutions, but copy successfully implemented and adopted solutions, in an attempt to satisfy only certain standards, such as Honda.

4. Sustainable niche suppliers – those manufacturers who are not the leaders in investing into new technologies, who do not work out new solutions, but copy successfully implemented and adopted solutions, in an attempt to “enrich” only some segments of their offer with technical and technology solutions in order that they should be competitive in a niche segment, such as a B segment of small city cars, for example Fiat.

5. Potentially sustainable competitors [9] – the manufacturers such as Volkswagen who meet only the “legal” provisions regarding the CO<sub>2</sub> emissions, but do not plan any significant investments into RI, nor any “green” solutions. Thus, for example, according to the chairman of the Volkswagen group Martin Winterkorn, who gave a statement at the most prestigious Geneva Motor Show in 2009, the company would launch their first electric car in the next decade. He explained that the announcement of a new technology never means the readiness to immediately place such a solution on the market. He maintains that there is still a long journey to make towards a safe vehicle in the electric class of cars, hence one should not rush with announcements. On this occasion Winterkorn explained that Volkswagen was searching for the best, not the fastest solution.

The extent to which the ecological sustainability strategy is implemented is increasingly becoming an instrument for ranking and tracking corporations. Thus the corporations are increasingly ranked according to the indicators of their social responsibility.

### 3. Sustainability strategy contribution to business

As the world indices also show modern demands for a desirable corporate behaviour, the Dow Jones Sustainability Index (DJSI) was established in 2000, by Dow Jones, Stoxx and SAM, mutually. This is the index showing the willingness of a corporation to implement the sustainability concept and compare it to the corporations from the same branch. Thus the peak of the BMW holistic approach to strategic marketing with an ultimate compliance with the set ecological sustainability strategy came in the period after the year 2005. According to the World DJSI index, BMW was an absolute leader from 2005, until 2008, which can be seen in Table 1.

Position by DJSI world index	2002	2003	2004	2005	2006	2007	2008	2009
1	Volkswagen	Toyota	Toyota	BMW	BMW	BMW	BMW	BMW
2	/	BMW	Volkswagen	DaimlerChrysler	DaimlerChrysler	DaimlerChrysler	DaimlerChrysler	Daimler
3	/	Ford	BMW	Ford	Ford	Ford	Ford	Fiat
4	/	Volkswagen	Ford	Toyota	Renault	Renault	Nissan	Ford
5	/	DaimlerChrysler	Renault	/	Toyota	Toyota	Renault	Nissan
6	/	/	/	/	/	Volkswagen	Toyota	Renault
7	/	/	/	/	/	/	Volkswagen	Toyota
8	/	/	/	/	/	/	/	Volkswagen

Table 1. Positions of car manufacturers according to DJSI index from 2002 to 2009 [10]

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Toyota	14	12	11	9	9	7	6	6	8
Mercedes Benz	12	10	10	11	11	10	10	11	12
BMW	22	20	19	17	16	15	13	13	15
Honda	21	18	18	18	19	19	19	20	18
Ford	8	11	14	19	22	30	41	49	49
Volkswagen	35	38	42	48	56	56	54	53	55
Audi				81	79	74	68	67	65
Hyundai					84	75	72	72	69
Porsche				74	76	80	75	75	74
Ferrari								93	88
Lexus						92	92	90	96
Nissan			89	90	85	90	98		

Table 2. Brand positioning of car manufacturers as regards 100 best known brands in the world in the 2001-2009 period, according to InterBrand. [11]

It is evident that the DJSI index gains in importance and includes more and more manufacturers in all segments. It is also clear that some manufacturers depart from the sustainability concept, at least as far as large and pioneer investmants are concerned; for example, Volkswagen was the leader by this index in 2002, but at the bottom of the list in the past three years.

The question is, however, how does “the sustainability strategy affect the brand value”? We can prove that there is a direct implication of the sustainability strategy and a holistic marketing concept upon the brand position if we visit the web sites of the associations engaged in measuring and assessing the brand positions on the global market. Table 2 shows the trend in the brand positioning of the car manufacturers in the 2001 to 2009 period as regards 100 best brands in the observed years, and on the basis of the InterBrand data.

The methodology used by this consulting house consists of the comparison between a) corporate earnings; b) income the brand itself earns; and c) the strength of the brand position, to obtain the brand value in the end.

Due to the holistic marketing concept and the sustainability strategy, BMW managed to come from the 20th position on the list in 2001 to the 13th position in 2007 and 2008, to finish in 2009 as the 15th on the list.

The InterBrand explains the BMW positioning in 2008 as follows: “BMW responded to an increased demand by cleaner cars which are less expensive to drive, by investing into the workshops which are more efficient in (saving) expenses, such as the Efficient Dynamics system ... The brand stresses the efficiency as a future, with a promise that the satisfaction in driving will not

be endangered ...”. The BMW position, the fall from the 13th to the 15th position among the 100 best brands is explained in the following way: “BMW remains relatively healthy, although its income has fallen by about 5% ... The Bavarian manufacturer continues the strategy of developing highly efficient cars that promise satisfaction in driving and supplies the niches with innovative vehicles, such as a large SUV vehicle X6 ... Their innovative Efficient Dynamics concept that includes the equipment such as the Brake Energy Regeneration or the High Precision Injection proved to be an impetus to a rise in sales to more than 1,000,000 vehicles worldwide. With their Connected Drive concept, BMW introduced another future innovation, by turning the automobile into a mobile communication platform in order to increase safety, comfort and service quality. A large number of visits to the BMW newly-built temple Welt (motor show) shows that BMW continues to impress their customers.”

According to InterBrand, Mercedes has not drasticaly lost its position either, falling from the 11th position in 2008 to the 12th position in 2009, although Daimler suffered a loss of €2.6 billion in 2009, while they ended the year 2008 with a profit of €1.4 billion. [12]

On the other hand, Volkswagen is an example of a manufacturer who did not want to invest large amounts into the RI and the sustainability concept, so in Figure 2 we can see that they fell from the 35th position in 2001 to the 55th position in 2009. It is, however, worth mentioning that Volkswahen’s brand Audi moved from the 81st position in 2008 to the 65th position in 2009, without investing significantly into RI nor into sustainability concept. This is only a short-term affair, though, and the trend will continue until the

moment when “stricter“ laws have been enacted, and, on the other hand, as we have already stated, this brand will, as a member of a “prospectively sustainable competitor“, certainly just adopt the technical solutions of their competition and surpass any complications. The example of Honda, described as a “sustainable follower“, is also interesting. Due to mainly the sustainability concept, this manufacturer managed to jump from the 20th position in 2008 to the 18th position in 2009.

All the above-mentioned leads to a conclusion that there is a direct implication of the sustainability strategy and the holistic marketing upon the brand (trade mark) position on a global level, on the example of BMW at least. Despite the fact that InterBrand assigns highest rates and starts from the financial results, and then computes the brand value, in case of Mercedes, i.e., Daimler and its loss in 2009, this brand did not lose much in its positioning among the 100 most valuable brands, thanks to the sustainability concept. On the contrary, Volkswagen, a manufacturer that does not pay much attention to this concept, experienced a serious fall in the last nine years (Table 2).

On the other hand, disrespect of the sustainability strategy may cause serious problems to the corporation (brand), both in the field of demand and in the field of returns on investments for the owners. Thus General Motors (GM) announced in 2010 that they were discontinuing the production of their brand Hummer, after the negotiations on the \$150 million worth takeover by the Chinese manufacturer Sichuan Tnegzhong had failed. The reason the Chinese manufacturer did not acquire Hummer are most intriguing. Namely, the government of the People’s Republic of China stopped the negotiations with the explanation that the brand (Hummer) and its products consume enormous quantities of fuel (about 30 litres) at the moment the government promotes a higher energy efficiency policy and the reductions of emissions.

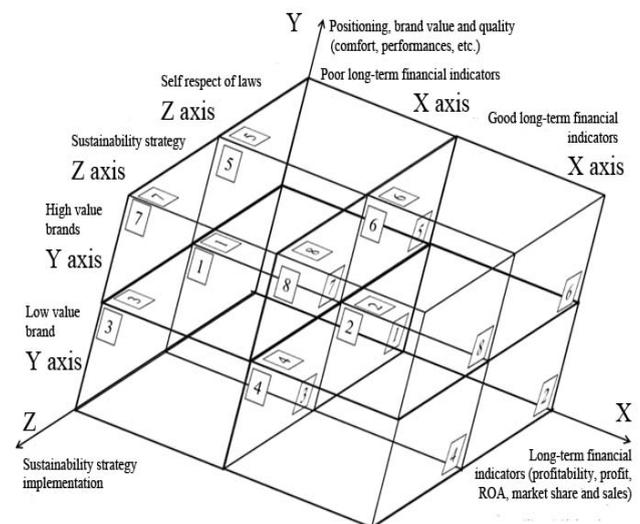
The sustainability concept is being gradually introduced by the manufacturers who want to comply to the future laws regulating the gas emissions, even in situations when this procedure is opposite to their major competitive advantage (performances) that used to be essential in their positioning on the market. A most characteristic example is Ferrari, who introduced its first electrically driven product at the Geneva Motor Show, and also changed their brand red colour into green for this model, so that the colour itself indicated that this is an eco model.

#### 4. Three-dimensional (3D) matrix

On the basis of all the above stated on the example of the automobile industry we can conclude that it is wrong or at least superficial to measure the contribution of the sustainability strategy by comparing it exclusively with the brand (trade mark) value or the financial and market results.

It is for this reason that we need a triple approach which will simultaneously measure the impact (contribution) of three (3) factors upon the company, namely: 1) the sustainability strategy (Z axis); 2) the brand value (Y axis); and 3) the financial and market results (X axis). Such an integral simultaneous approach to the observations of the impacts of these three factors upon the company is presented in Figure 2, on the example of the business and opportunities the automobile industry encounters.

Figure 2. Three-dimensional (3D) matrix of the sustain-



ability strategy, brand value and financial and market contributions to the company

In the presented matrix of the interrelations of the three mentioned factors and the possible two conditions of each of them, 8 factual positions (cubes) can be identified in which the company may find itself. Each cube presents a strategic position of a condition. Each of these eight (8) conditions will be explained in detail in this paper.

Cube 1: Represents the first strategic position which is extremely unfavourable and is not sustainable in a long term.

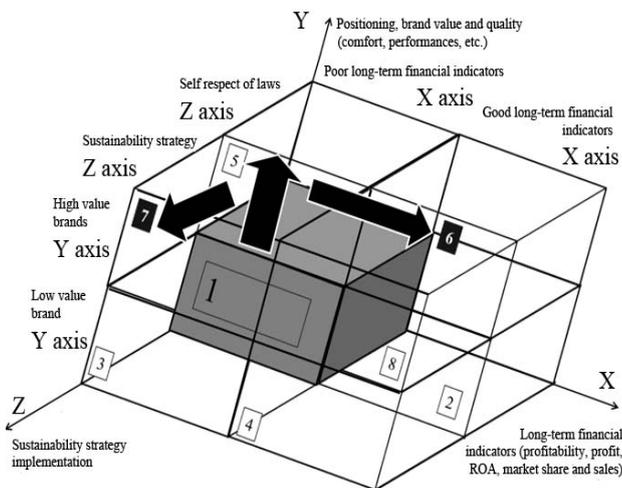


Figure 3: Strategic position (cube) 1 in the 3D matrix

The company observes only the margin of legal regulations as regards “social responsibility“ and consequently does not invest much into resources and RI. Due to low investments, solid financial results are achieved in the short term, however these results are not sustainable in the long term.

The brand has a poor position and value as perceived by the consumers, therefore it is necessary that the company should undertake steps to first move towards cube 5, for a short-term period, and towards cubes 7 or 6 for a long-term period, otherwise it may encounter serious problems.

Cube 2: This is a rather rare strategic situation in business practice, and means that the company’s brand value is low (poor quality and services etc.), that there are no significant investments into RI, hence the minimum of legal regulations is barely satisfied. However, on the other hand, the company achieves good financial and market results, even in the long term.

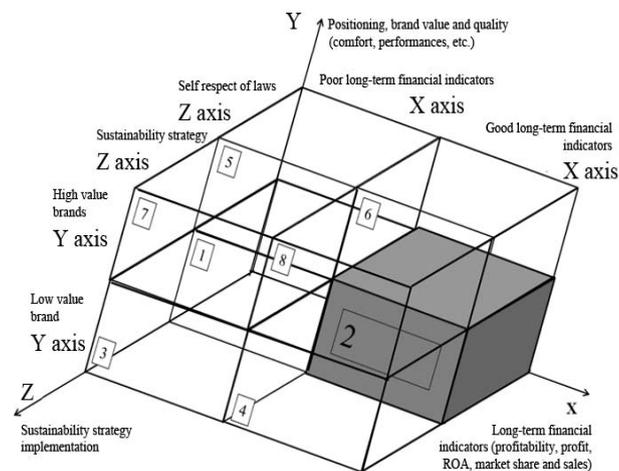


Figure 4: Strategic position (cube) 2 in the 3D matrix

This is possible only in case the company is under the umbrella of the state protectionism and is thus given a monopoly position on the market, so it does not fear either competition or the possibility that the legal regulations may be made stricter. The examples are the manufacturers on the Russian Federation market, where the state protects national manufacturers.

Cube 3: Presents a strategic position in which the company invests significantly into RI, thus being ahead of the legal regulations, but due to these large investments it achieves poor financial results. Besides, the company is working on some future solutions and pays little attention to the brand value and its own image improvement.

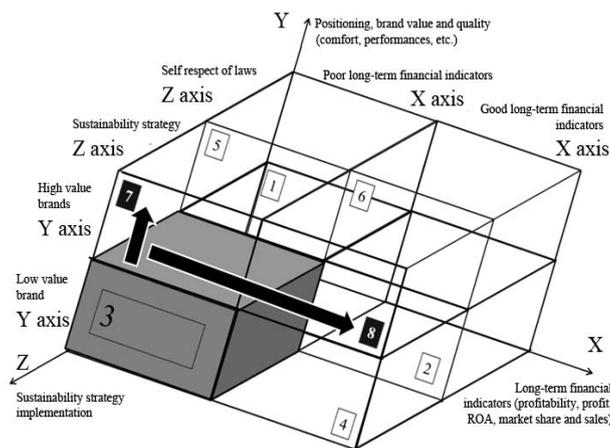


Figure 5: Strategic position (cube) 3 in the 3D matrix

In such a situation the company should invest more into a better positioning and brand value in order to move into cube 7. An example of such a strategy is the Honda business, although Table 2 shows that Honda has a highly valuable brand, according to InterBrand. Such a statement, however, cannot be universally accepted if we consider only the automobile segment.

Cube 4: Presents a strategic position that means that the manufacturer achieves good financial results with a large scope of production.

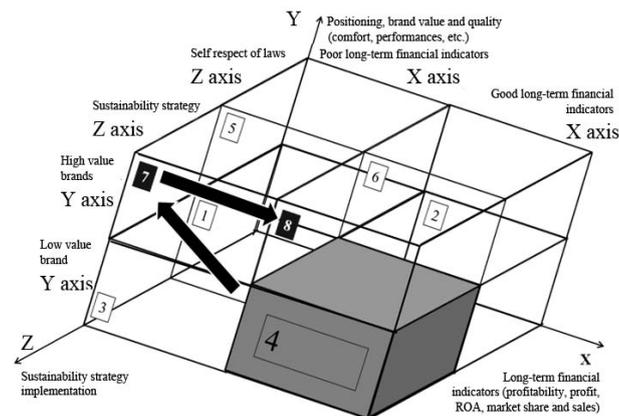


Figure 6: Strategic position (cube) 4 in the 3D matrix

The company invests large assets into RI and works out the solutions with which it goes ahead of the legal regulations, however, it has an “unfavourable“ reputation with the customers and has to devote itself to the brand value and the quality of service, that is, to move to cube 7 for a short time period, since due to larger investments into quality, image and reputation it will lose some of the profit. Thus conditions will emerge that the company should move to cube 8 for a long-term period. Citroen is one company that can represent such a strategic position.

Cube 5: This is a rather frequent strategic position in terms that the company does not invest much into RI and hence achieves good financial results in the short term, however not in a long-term period, since in the conditions of “stricter “ laws the company will find itself in problems.

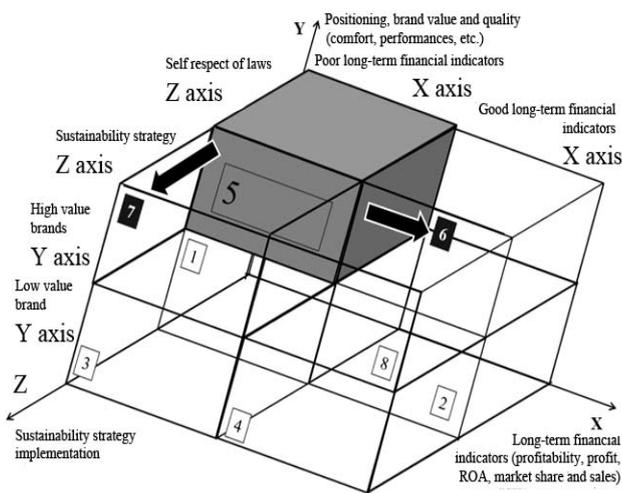


Figure 7: Strategic position (cube) 5 in the 3D matrix

The company meets only the legal regulations, but, contrary to cube 1, this company has a valuable brand, therefore it must invest more into RI and move to cube 7. This position can be identified in the business operations of Porche, who introduced numerous technical solutions to reduce emissions in 2010, however, still not enough to fully comply with the coming legal provisions (130 g/km of CO<sub>2</sub> in 2015).

Cube 6: This is a frequent state of affairs where the company invests poorly into RI and therefore meets only the minimum legal requirements for environmental protection.

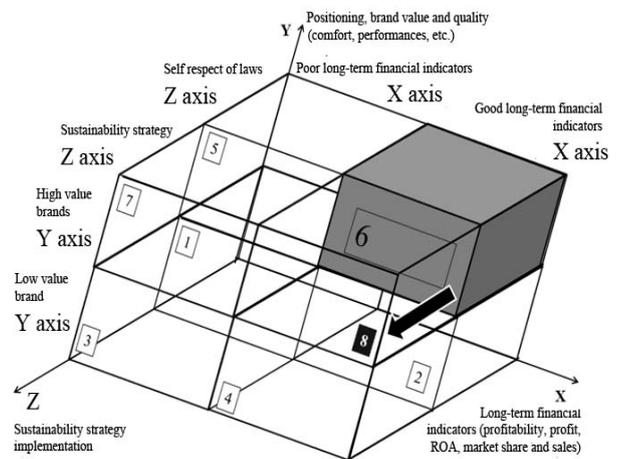


Figure 8: Strategic position (cube) 6 in the 3D matrix

The company is not much interested in investing significantly into RI since it earns good financial results implementing a strategy of scope, and the company brand is also well positioned with the customers. The company may move to cube 7 for a short-term period, due to investments into RI (i.e., copying successful solutions worked out by the competition), and then it can move to cube 8 for a long-term period. Moving to cube 7, however, means larger investments into RI, which would cause a fall in the financial results, therefore it is unlikely that companies will opt for such a step. They will rather copy from the competition and remain on the edge of the legal regulations (i.e., in cube 6). The clearest example is the behaviour of Volkswagen.

Cube 7: This is a situation where the company invests large assets and resources into RI and thus goes ahead of the legal regulations, however, this significantly burdens its financial results.

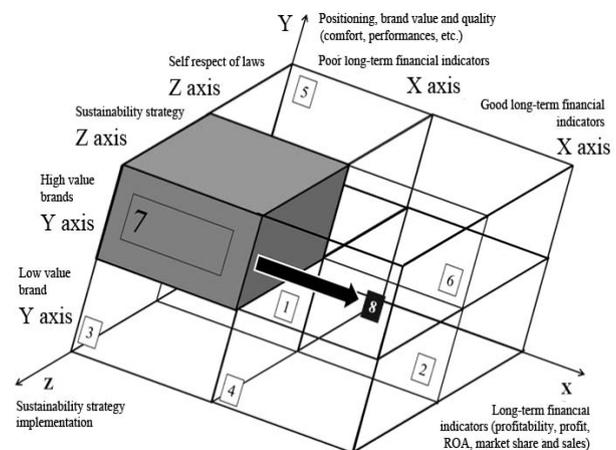


Figure 9: Strategic position (cube) 7 in the 3D matrix

The company has a valuable brand and a necessary solution is that it should increase its market share and thus achieve better financial results, i.e., a move to cube

8. The examples of such a position can be found in the business operations and the strategic positioning of BMW and Daimler (Mercedes). It must, however, be clear that these companies are forced to invest largely into RI, otherwise they could encounter the problems similar to those Porche has.

Cube 8: This is an ideal, but a most risky position. The company has a highly valuable brand and invests large assets and resources into the sustainability strategy, i.e., into RI.

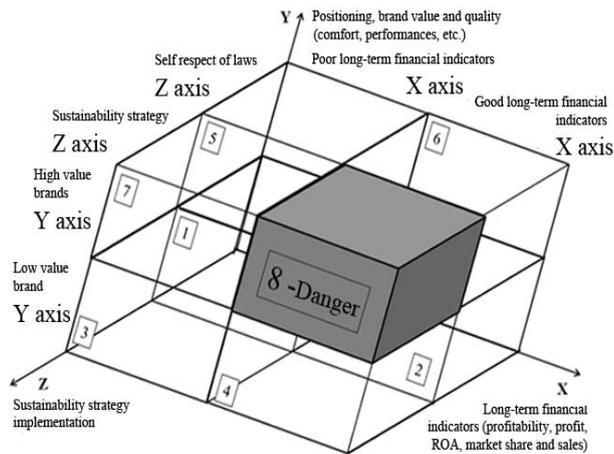


Figure 10: Strategic position (cube) 8 in the 3D matrix

The company achieves good financial results supplying a large market. This strategic position, however, carries a great risk in case of fall in global demand, when the high costs of supplying the large market and the high investments into RI will burden the financial results and threaten to bring the company to the verge of collapse. The example that ideally reflects this strategic position is that of the Japanese Toyota who ended the business year 2008 with a loss of \$4.41 billion, due to a fall in demand, to earn US \$2.344 billion by the end of the fiscal 1020 (April 2009 till March 2010). [13]

## 5. Conclusion

Regardless of the temporary disagreements as to the crucial international treaty on the reduction of gases emission, but also as regards a large number of other issues crucial to the environment, it is certain that we will reach a period of consensus and adopt stricter regulations, if not in the countries that “hinder“ the treaty (the USA and others who did not sign the Kyoto Treaty or the countries that block new climate negotiations), then among the member states of the European Union.

As information reaches the prospective consumer faster and faster, due to the use of the modern ways of communication, the corporate success will increasingly be di-

rectly related to the corporate responsibility to the environment. The automobile industry is the first to be affected by both the stricter legal provisions and the keener consumer awareness, however, it will be additionally exposed to the impacts of the oil market and the activities of the competition. In such an environment the automobile industry has to take into consideration a near and turbulent future, either by investing into RI or by copying successfully implemented solutions.

The automobile industry, however, has to become a more responsible “citizen of the global society“ by implementing a concept of holistic marketing and the pertaining socially responsible marketing, with a well defined and successfully implemented sustainability strategy.

In the given circumstances, the holistic marketing approach and the sustainability strategy can help the auto-sector, but also any other organization, to differentiate from the competition and meet these stricter regulations readily, retaining all its qualities in the consumers’ perception. With an adequate implementation of marketing tools, the company can employ the sustainability strategy and the socially responsible marketing concept to achieve key competitive advantage.

The sustainability strategy also imposes a tremendous risk on financial indicators as a basic, although not the only goal the company pursues. The said strategy means ample investments into RI that, on the other hand, impose a necessity that a marketing sector ensure that the company can serve as large a market as possible and thus make way for a further success of the company. Hence the sustainability strategy and the holistic marketing approach in the segments such as automobile industry carry an enormous risk in case the demand for these products falls. This happened to Daimler and Toyota in 2009, and almost happened to BMW who ended the year 2009 with a modest €210 million net profit.

The implementation of the sustainability strategy and the holistic marketing approach resulted into significant savings in manufacturing and succeeded increasing both the corporate reputation and the reputation with the consumers. Contrary to these, the failure to implement the sustainability strategy may bring the manufacturer into a position that his brand is no more profitable and that it has to be cancelled, as was the case of the GM’s brand, Hummer.

It is for this reason that a simultaneous measuring and tracking the implications and contributions present in the interactions of the factors of the sustainability strategy, the brand value, and the financial and market re-

sults are necessary. In this interaction and the results of the above-mentioned factors the company has to find the position that would be most suitable and really sustainable in a long-term period, and it was but the aim of this paper to prove that the “Three-dimensional (3D) contribution matrix of sustainability strategy, brand value and the financial and market results in the automobile industry“ may be implemented as a useful tool for that purpose. The matrix described may also be implemented in numerous other sectors that are confronted by strict legal regulations in relation with environmental protection.

## REFERENCE

- [1] Uvod u Europsku Uniju, Mate, Zagreb, str. 246, 2006
- [2] Drucker, P. B2B brend menadžment, Asse, Novi Sad, p. 312, 2007
- [3] Kotler, F. Upravljanje marketingom, Mate, Zagreb, p. 17, 2008
- [4] Stanković, Lj., Marketing, Ekonomski fakultet u Nišu, p. 24, 2008
- [5] Koshevrin, I. „The Neoclassical Theory of Production and Distribution“, Problems of Economics, pp. 19-20, 1988
- [6] Richard, Dž. Poslovna Etika, Filip Višnjić, Beograd, pr. 243, 2003
- [7] „European Parliament Adopts Climate and Energy Package“ (2008), <http://www.ieep.eu/>, pristupljeno 20.02.2010
- [8] Graph plotted on the basis of the data from <http://www.opec.org/home/basket.aspx>, accessed 26.06.2010
- [9] Classification on the basis of the classification in Milisavljević M., Strategijski marketing, Ekonomski fakultet u Beogradu, Beograd, p. 198-199, 2006
- [10] Table drawn on the basis of the data for the period 2000-2009, <http://www.sustainability-index.com>, accessed 11.4.2010
- [11] According to InterBrand data, [http://www.interbrand.com/best\\_global\\_brands.aspx](http://www.interbrand.com/best_global_brands.aspx), accessed 24.2.2010
- [12] „Annual Report 2009“, [http://www.daimler.com/Projects/c2c/channel/documents/1813321\\_DAI\\_2009\\_Annual\\_Report.pdf](http://www.daimler.com/Projects/c2c/channel/documents/1813321_DAI_2009_Annual_Report.pdf), accessed 28.06.2010
- [13] „FY2010 Financial Results“, [http://www.toyota.co.jp/en/ir/financial\\_results/2010/year\\_end/presentation.pdf](http://www.toyota.co.jp/en/ir/financial_results/2010/year_end/presentation.pdf), accessed 28.06.2010

# You Tube: Knowledge Management and New Media Services

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*This work is about the acquisition, sharing, and dissemination of knowledge using information technology and new media services. This is a landscape whereby collaborative and (co)creative spaces are emerging for engaging in the creation, critical assessment and personalization of "New Media" that can be used for sharing and disseminating knowledge. YouTube, an example of New Media, is a free video-sharing website that has rapidly become a popular way to upload, share, view, and comment on video clips. With more than 100 million people visiting the site per day and more than 65,000 videos uploaded daily, it provides a rich visual resource. This paper will focus on the possibilities of integration New Media services such as YouTube, and creating and sharing knowledge (as an illustrative example of New Media) within a pragmatic framework. Suggestions for the effective integrating of New Media will be researched.*

## Introduction

Knowledge management deals as much with people and how they acquire, exchange and disseminate knowledge as with information technology and New Media.

New Media and Learning 2.0 approaches can be used as a means to increase academic achievement. Web 2.0 supplies learners and teachers with a wide variety of didactical and methodological tools that can be fitted to their respective learning objectives and individual needs with a positive effect on their performance and achievement. Research evidence suggests that Learning 2.0 strategies can be used successfully to enhance individual motivation, improve learner participation and foster social and learning skills. They can further contribute to the development of higher order cognitive skills like reflection and meta-cognition, increase self-directed learning skills and enable individuals to better develop and realise their personal potential.

Web 2.0 more engaging and playful approaches, provides new formats for creative expression, and encourages learners to experiment with different, innovative, ways of articulating (decoding) their thoughts and ideas. The Learning 2.0 landscape itself is also shaped by experimentation, collaboration and empowerment, allowing learners and teachers to discover new ways of actively and creatively developing their individual competences.

Why should the notion of incorporating New Media and interacting with for example socially distributed and user-created videos (e.g. from www.youtube.com) be important within education? In what ways has the rapid development of digital technologies associated with the

terms New Media and Web 2.0 and their use in education enabled individuals to interact differently within existing and new ecologies of learning? How can we as educators engage with New Media possibilities presented by websites such as YouTube?

## 1. Knowledge management

Knowledge management is "any process or practice of **creating, acquiring, capturing, sharing and using knowledge**, wherever it resides, to enhance learning and performance in organizations" (Scarborough *et al*, 1999). They suggest that it focuses on the development of firm-specific knowledge and skills that are the result of organizational learning processes. Knowledge management is concerned with both stocks and flows of knowledge. Stocks included expertise and encoded knowledge in computer systems. Flows represent the ways in which knowledge is transferred from people to people or from people to a knowledge database. Knowledge management has also been defined by Tan (2000) as: 'The process of systematically and actively managing and leveraging the stores of knowledge in an organization'. Knowledge management involves **transforming** knowledge resources by identifying relevant information and then **disseminating** it so that learning can take place. Knowledge management strategies promote the **sharing of knowledge by linking people with people**, and by linking them to information so that they learn from documented experiences.

Knowledge can be stored in databanks and found in presentations, reports, libraries, policy documents and manuals. It can be moved around the organization through information systems and by traditional methods such as meetings, workshops, courses, "master classes", written publications, **videos**. The Internet provides an

additional and very effective medium for creating, sharing, communicating knowledge.<sup>1</sup>

Since 2003, the Internet has seen impressive growth in end user-driven applications such as *blogs, podcasts, wikis, social networking websites, search engines, auction websites, games, Voice over IP and peer-to-peer services*. Together, they are referred to as *social computing* (or “Web 2.0”), as they exploit the Internet’s connectivity to support the networking of people and content. The user is an integral part and co-producer of all the elements of the service delivered, whether it be content (blog, wikis, Flickr), taste/emotion (Amazon, de.li.cious), goods (eBay), contacts (MySpace), relevance (Google pagerank), reputation/feedback (eBay, TripAdvisor), storage/server capacity (P2P), connectivity (wifi sharing, mesh networks) or intelligence (business social computing).<sup>2</sup>

## 2. New media

New Media is a buzz word that refers broadly to an emerging convergence of digital communications technologies within co-creative online social spaces. A consideration of the term “New Media” can also be framed within a contrast to “old media”. Old media defined as incorporating forms of communication prior to the digital world such as radio, television and printed material and being predominantly linear in nature.

The term New Media has also become to a degree a catch-all phrase and as such is defined within the context of this paper to be inclusive of two consistent characteristics. Uniquely individualized information that can simultaneously be delivered or displayed to a potentially infinite number of people, and, all authors involved (e.g. publishers, broadcasters, students, educators, consumers) share equal or reciprocal control over content. Also noted as central to a *P. Duffy* consideration of the term New Media is that it is often associated with and considered to be a superset of emerging technologies relating to Web 2.0.

### 2.1 Web 2.0

Web 2.0., a phrase coined by O’Reilly Media in 2003, refers to a perceived second generation of web-based interactions, applications and communities. It is considered to be inclusive of a shift from a World Wide Web that is “read only” to a Web that is being described as the

“Read Write Web” (Gillmor, 2007). Instead of content that was for the most part static, we are now seeing the ability by users to remix content in different ways, in order to suit contextual needs. The Web is evolving to become more like an area for social and idea networking. Students negotiate meanings and connections within Web 2.0 social spaces or idea networks, exchanges bits of content (media), creating new content, and collaborating in new ways in the individual and authentic creation of New Media.

In summary, O’Reilly (2005) states that, .Web 2.0. stands for the idea that the Internet is evolving from a collection of static pages into a vehicle for software services, especially those that foster self-publishing, participation, and collaboration.<sup>3</sup>

“Web 2.0” refers to the range of digital applications that enable interaction, collaboration and sharing between users. These digital applications are used for blogging, podcasting, collaborative content (e.g. wikis), social networking (e.g. MySpace, Facebook), multimedia sharing (e.g. Flickr, YouTube), social tagging (e.g. Deli.cio.us) and social gaming (e.g. Second Life) (cf. Pascu, 2008).

Asian countries lead in the usage of social computing with more than 50% of Internet users across all applications, followed by the US (with about 30% of Internet users) and Europe (with about 20-25%). Creation, use and adoption of social computing applications have been growing strongly since 2003. However, growth has slowed down lately, indicating that the diffusion of social computing is entering the maturity phase. (Pascu, 2008)

“Web 2.0” applications allow users to communicate and collaborate in diverse ways and in a variety of media, which also helps learners to act together and build knowledge bases that fit their specific needs (cf. Owen *et al.*, 2006). The following applications are the most relevant for learning.

### 2.2 Social Networking Services

**Social Networking Services.** Social networking services can be broadly defined as internet- or mobile device-based social spaces, designed to facilitate communication, collaboration and content sharing across networks of contacts (Childnet International, 2008; Cachia, 2008). They enable users to connect to friends and colleagues, send mails and instant messages, blog, meet new people and post personal information profiles, which may com-

<sup>1</sup> Armstrong, M., (2006), *A Handbook of HRM practice*, 10 th Edition, London and Philadelphia: Kogan Page, p. 174

<sup>2</sup> Redecer, C., et al. (2009), *Learning 2.0: The Impact of Web 2.0 Innovation on Education and Training in Europe*, Luxembourg: Office for Official Publications of the European Communities, p. 19

<sup>3</sup> Kwan, R., et al. (2008), *Enhancing Learning Through Technology, Research on Emerging Technologies and Pedagogies*, London: World Scientific Publishing Co. Pte. Ltd., p 33/35

prise blogs, photos, videos, images, and audio content (OECD, 2007; Cachia, 2008). Prominent examples of social networking services include:

- **Facebook and MySpace** (for social networking/socialising),
- **LinkedIn** (for professional networking), and
- **Elgg2** (for knowledge accretion and learning).

**Social networking systems** allow users to describe themselves and their interests, connect and communicate with others, and set up groups on dedicated topics.

In October 2007, there were over 250 million profiles on social networking sites. On a monthly basis, using social networking sites is the third most popular online activity in Europe (Pascu, 2008). Recent surveys in the US found that 55% of US online teens have created personal profiles online, and 55% have used social networking sites like MySpace or Facebook; 9-17 year-olds reported spending almost as much time on social networking sites and other websites as they do watching television (9 compared to 10 hours per week) (Attwell, 2007; Childnet International, 2008). Interestingly, the findings indicate that education-related topics are the most commonly discussed, with 60% of the young people surveyed talking about education-related topics and 50% discussing their schoolwork (Childnet International, 2008).

**Blogs.** “Weblogs” or “blogs”, a term coined by Jorn Barger in 1997, are online public writing environments, which enable a single author or a group of authors to write and publicly display articles (called posts), which are listed in reversed chronological order (Ellison & Wu, 2008; Anderson, 2007). Depending on the author’s wishes, blogs can include **visual, audio and video content**, as well as features such as **links to other blogs**, information about the author, and comments from readers (Ellison & Wu, 2008; OECD, 2007). The large number of people engaged in blogging has given rise to its own term – blogosphere – to express the sense of a whole ‘world’ of bloggers operating in their own environment (Anderson, 2007). For searching within the blogosphere, an array of blog and RSS search services have appeared, with different foci depending on user needs and information architecture (Alexander, 2006).

**Wikis.** A wiki is a website that allows users to collaboratively add, remove and otherwise edit and change content, usually text (Owen *et al.*, 2006; OECD, 2007). The most prominent example of a wiki is Wikipedia, a collaboratively - created online encyclopaedia. Since its creation in 2001, Wikipedia has grown rapidly into one of the largest reference websites, attracting at least 684 million visitors yearly by 2008. There are more than

75,000 active contributors working on more than 10,000,000 articles in more than 250 languages. The English version of Wikipedia is the biggest, with 2,573,854 articles in October 2008.<sup>4</sup>

### Tagging and social bookmarking

**Tagging and social bookmarking.** A **tag** is a keyword that is added to a digital object (e.g. a website, picture or video clip) to describe it, but not as part of a formal classification system. One of the first large - scale applications of tagging was seen with the introduction of Joshua Schacter’s del.icio.us website, which launched the ‘social bookmarking’ phenomenon.

**Social bookmarking** systems share a number of common features (Millen *et al.*, 2005): They allow users to create lists of ‘bookmarks’ or ‘favourites’, to store these centrally on a remote service (rather than within the client browser) and to share them with other users of the system (the ‘social’ aspect). These bookmarks can also be tagged with keywords, and an important difference from the ‘folder’- based categorisation used in traditional, browser-based bookmark lists is that a bookmark can belong in more than one category. Using tags, a photo of a tree could be categorised with both ‘tree’ and ‘larch’, for example.<sup>5</sup> This process of organising information through user-generated tags has become known as ‘folksonomy’.

The types of content that can be tagged vary from:

- blogs (Technorati);
- books (Amazon);
- pictures (Flickr);
- podcasts (Odeo);
- videos (YouTube), to even tagging of tags (Pascu, 2008; Anderson, 2007).

Different social bookmarking sites encourage different uses: some sites encourage more playful and personal tagging, for example **Flickr**, the phototagging site; while others afford a more deliberate style of tagging with a very clear idea of a specific audience, such as the academic sites Connotea or CiteULike (Owen *et al.*, 2006; Vuorikari, 2007).

### Media Sharing Services

**Media Sharing Services.** Media sharing devices store user-contributed media, and allow users to search for and display content. Examples include:

<sup>4</sup> Redecer. C., et al. (2009), **Learning 2.0: The Impact of Web 2.0 Innovation on Education and Training in Europe**, Luxembourg: Office for Official Publications of the European Communities, p 19 -20

<sup>5</sup> Anderson. P., **JISC Technology and Standards Watch**, Feb. 2007, p 10

- Flickr (photos);
- iTunes (podcasts and vodcasts);
- Slideshare (presentations);
- DeviantArt (art work);
- Scribd (documents) and
- YouTube (video).

**Posting photographs** online is one of the most popular online content creation activities, driven by increasing popularity of digital cameras and mobiles with cameras. More than 1 billion photos (1 million updated daily) are uploaded in photo sites. Social tagging is rising and millions of photos have been tagged in Flickr (1 million tags are added per week in Flickr) (Pascu, 2008).<sup>6</sup>

**Podcasts and Vodcasts.** Podcasts are audio recordings, usually in MP3 format, of talks, interviews and lectures, which can be played either on a desktop computer or on a wide range of handheld MP3 devices<sup>7</sup>( example - [http://www.eslpod.com/website/index\\_new.html](http://www.eslpod.com/website/index_new.html)), while vodcast are online delivery of video (example - <http://www.vodcasts.tv/vc.php>).<sup>8</sup>

Podcasting allows listeners to conveniently keep up-to-date with recent audio or video content; vodcasts are video versions of podcasts (online delivery of video). The estimated number of podcasts in 2007 was over 100,000, when only three years earlier, there had been fewer than 10,000 (Pascu, 2008). **Apple iTunes** hosted over 82,000 podcasts in 2006, representing a 10 fold increase from 2005 (Pascu, 2008; OECD, 2007).

**Mobile-casting**, i.e. receiving video and audio podcasts on mobile phones, is expected to develop rapidly (OECD, 2007). Compared to other social computing services, however, podcasting is less popular: only around 2% of Internet users in Europe used it in 2007 (Pascu, 2008).<sup>9</sup>

**Slideshare (presentations)**, <http://www.slideshare.net/> allow us to upload and share your PowerPoint & Keynote presentations, Word & PDF documents on SlideShare.<sup>10</sup>

**DeviantArt (art work)**, <http://www.deviantart.com/> is an online community showcasing various forms of user-made artwork.<sup>11</sup>

**Scribd (documents)**, <http://www.scribd.com/> is a document - sharing website which allows users to post documents of various formats, and embed them into a web page using its iPaper format. Scribd currently has more than 50 million monthly users and more than 50,000 documents are uploaded daily. All major document types can be formatted into iPaper including Word docs, PowerPoint presentations, PDFs, OpenOffice documents, and PostScript files.<sup>12</sup>

### 3. You tube

There were an estimated 42.5 million *videos* on YouTube, 3 million on Yahoo Video, and around 2 million on Google Video and MySpace in 2007. In June 2006, 2.5 billion videos were watched on YouTube, and more than 65,000 videos were uploaded daily.

**Online video “consumption”** (either streaming and downloading) is one of the most popular online activities worldwide, besides photo-sharing. In Europe, 1 in 3 French people visited a video-sharing website in 2006. Some 70% of the online population downloads video streams, the majority of which, however, comprise professionally produced videos. Below 1% of the visits to popular video sharing sites result in content creation; **only some 0.16 % of visits to YouTube are from “those creative people uploading their videos”**.<sup>13</sup>

YouTube is a popular video sharing website where users can upload, view, and share video clips. Videos can be rated, and the average rating and the number of times a video has been watched are both displayed. YouTube has become an enormously popular form of web 2.0 New Media. A recent article in Wired cites an average of 65,000 uploads and 100 million videos viewed per day on YouTube (Godwin-Jones, 2007). The article explores some examples of the wide variety of video content available on the site and searching through the site will provide ample examples of that diversity.<sup>14</sup> You

<sup>6</sup> Redecer. C., et al. (2009), *Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe*, Luxembourg: Office for Official Publications of the European Communities, p 21

<sup>7</sup> Anderson. P, *JISC Technology and Standards Watch*, Feb. 2007, p 10

<sup>8</sup> Anderson. P, *JISC Technology and Standards Watch*, Feb. 2007, p 10

<sup>9</sup> Redecer. C., et al. (2009), *Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe*, Luxembourg: Office for Official Publications of the European Communities, p 21

<sup>10</sup> Slideshare, Retrieved April 15, 2010 from: <http://www.slideshare.net/>

<sup>11</sup> Deviantart, Retrieved April 15, 2010 from: <http://www.deviantart.com/>

<sup>12</sup> Scribd, Retrieved April 15, 2010 from: <http://www.scribd.com/>

<sup>13</sup> Redecer. C., et al. (2009), *Learning 2.0: The Impact of Web 2.0 Innovations on Education and Training in Europe*, Luxembourg: Office for Official Publications of the European Communities, p 21

<sup>14</sup> Kwan. R., et al. (2008), *Enhancing Learning Through Technology, Research on Emerging Technologies and Pedagogies*, London: World Scientific Publishing Co. Pte. Ltd., p 33/35

Tube base is broad in age range, 18-55. 51% of users go to YouTube weekly or more often, and 52 percent of 18-34 year-olds share videos often with friends and colleagues (YouTube Fact Sheet).<sup>15</sup>

## Using YouTube

Video can be a powerful educational and motivational tool. However, a great deal of the medium's power lies not in itself but in how it is used. Video is not an end in itself but a means toward achieving learning goals and objectives. Effective instructional video is not television-to-student instruction but rather teacher-to-student instruction, with video as a vehicle for discovery.

YouTube is increasingly being used by educators as a pedagogic resource for everything from newsworthy events from around the world to "slice-of-life" videos used to teach students within an ESL (English as a Second Language) course. From instructional videos to an online space to share student authored New Media.<sup>16</sup>

Example and illustration:

Many higher education institutions are embracing social networking services to present their institution to society and to connect with current and prospective learners.<sup>17</sup> In December 2008, there were 1,360 university channels on YouTube and many learning-related topic groups.<sup>18</sup>

The University of California, Berkley, USA, was the first to make full course lectures freely available through YouTube. It runs its own channel as a YouTube partner and provides over 500 video lessons (hours of content),<sup>19</sup> like in iTunes.<sup>20</sup>

In addition, on You Tube exist edu channels from different University<sup>21</sup>, and, if FON (Sumorg 2010) have channel on You Tube, then we could record and share our presentation (video) on You Tube, with three simple steps using Camtasi Studio<sup>22</sup> (with Bluetooth headset connections).<sup>23</sup>

- Record
- Edit
- Share<sup>24</sup>, or in the future, production of HD lessons in full HD format and designing of a system for broadcasting over network distribution from youngest Microsoft system engineer Marko Calasan.<sup>25</sup>

## Conclusion

Like the early days of the Internet, there is an optimism driving experimentation and exploration across the learning associated with terms like, "New Media", and "Web 2.0". New Media presents educators with shifting frames of reference to consider in relation to teaching and learning. Students and educators now have access to a ubiquitous learning environment where its possible to search for, locate, and quickly access elements of learning that address immediate needs. It is possible to use the New Media to construct and organize personalized, unique interactions with an educational context.

The instructional design and content elements that form a learning must ideally be dynamic and interdependent. The learning environment should enable instructional elements designed as small, highly relevant content objects to be dynamically reorganized into a variety of pedagogical models. This dynamic reorganization of content into different pedagogical models creates a learning system adaptive and personalized to varying student needs.

YouTube is not necessary for good teaching. Within an examination of New Media sites such as YouTube and the discourses that frame their use educators should consider: how do we engage with these technologies, and, how do we teach students to think critically about their potential uses? How do video sharing sites such as YouTube reshape our participation in and out of the classroom? Such questions, of course, do not have simple answers. Suggested is that educators need to go beyond treating video sharing sites as only virtual libraries and instead emphasize the features more aligned with

<sup>15</sup> YouTube Fact Sheet, Retrieved April 15, 2010 from: [http://www.youtube.com/t/fact\\_sheet](http://www.youtube.com/t/fact_sheet)

<sup>16</sup> Kwan, R., et al. (2008), *Enhancing Learning Through Technology, Research on Emerging Technologies and Pedagogies*, London: World Scientific Publishing Co. Pte. Ltd., p 33/35

<sup>17</sup> Barkley, The University of California, Retrieved April 15, 2010 from: <http://berkeley.edu/>

<sup>18</sup> Redecer, C., et al. (2009), *Learning 2.0: The Impact of Web 2.0 Innovation on Education and Training in Europe*, Luxembourg: Office for Official Publications of the European Communities, p 21

<sup>19</sup> Barkley, The University of California, Retrieved April 15, 2010 from: <http://berkeley.edu/>

<sup>20</sup> Barkley on iTunes Retrieved April 15, 2010 from: <http://itunes.berkeley.edu/>

<sup>21</sup> You Tube Edu, Retrieved April 15, 2010 from: [http://www.youtube.com/channels?s=ytedu\\_mv](http://www.youtube.com/channels?s=ytedu_mv)

<sup>22</sup> TechSmith, Camtasia Studio product tour Retrieved April 15, 2010 from: <http://www.techsmith.com/camtasia/features.asp>

<sup>23</sup> 'Bluetooth' is a proprietary open wireless technology standard for exchanging data over short distances (using short length radio waves) from fixed and mobile devices

<sup>24</sup> TechSmith, Camtasia Studio product tour Retrieved April 15, 2010 from: <http://www.techsmith.com/camtasia/features.asp>

<sup>25</sup> Future trends [http://www.youtube.com/watch?v=bEDK00vydik&feature=player\\_embedded](http://www.youtube.com/watch?v=bEDK00vydik&feature=player_embedded)

social interactivity and participation irrespective of place or time. To advocate sharing and discussion of comments, video responses to existing content, flexible possibilities for collaborative assessment and other possibilities of media sharing knowledge and collaboration.

## REFERENCES

- [1] Armstrong. M., (2006), A Handbook of HRM practice, 10 th Edition, London and Philadelphia: Kogan Page
- [2] Anderson. P., JISC Technology and Standards Watch, Feb. 2007
- [3] Barkley, The University of California, <http://berkeley.edu/>
- [4] Barkley on iTunes, <http://itunes.berkeley.edu/>
- [5] Deviant art, <http://www.deviantart.com/>
- [6] Kwan. R., et al. (2008), Enhancing LearningThrough Technology, Research on Emerging
- [7] Redecer. C., et al. (2009), Learning 2.0:The Impact of Web 2.0 Innovationson Education and Training in Europe, Luxembourg: Office for Official Publications of the European Communities
- [8] Slideshare, <http://www.slideshare.net/>
- [9] Scribd, <http://www.scribd.com/>
- [10] Technologies and Pedagogies, London: World Scientific Publishing Co. Pte. Ltd.
- [11] Tech Smith, Camtasia Studio product tour, <http://www.techsmith.com/camtasia/features.asp>
- [12] YouTube Fact Sheet, [http://www.youtube.com/t/fact\\_sheet](http://www.youtube.com/t/fact_sheet)
- [13] You Tube Edu, [http://www.youtube.com/channels?s=ytedu\\_mv](http://www.youtube.com/channels?s=ytedu_mv)

# External Measures of Manager's Success to Create Shareholder Value

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*External value measures are the favorite tools of modern investors and managers to assess current and prospective company's ability to achieve the goal of maximizing shareholder value. They provide a market assessment of intrinsic value of a company, and management's performance and strategy. The aim of this paper is to examine the applicability of some external value measures for assessing the success of management to create shareholder value. The paper points out that managers can only partially affect the market share price, hence the amount of these measures. Therefore, a particular problem is to determine the part of shareholder value, which was created thanks to management of a company.*

## 1. Introductory notes

The prevailing attitude in both the financial theory and practice is that the changes in the share prices are among the most reliable indicators of the actual value of the company. Simultaneously, the managers are believed not to be in a position to affect the share price to any significant extent, that is, that the share price is determined exclusively by the general economic conditions and the investors' expectations. Some studies find that managers can affect only 25 percent of the share price, while 70-80 percent is under the impact of the macroeconomic, industry branch and other factors the managers cannot affect [15]. The fact is, however, that in the same conditions, different companies achieve different results, reflected in different percentage changes in the share prices, as well as that investors do not invest only into promising industries, but also into promising companies with a good management. A number of studies have found that the investors in the U.S.A. and the UK are willing to pay up to 18% more for the shares of the companies with reliable management, rather than for the shares of the companies with similar performances, but with a weak corporate management [4]. Similar findings were obtained in the developing countries, where the investors are ready to pay 20-40% more for the shares with a good corporate management [2].

Modigliani and Miller studied the impact of managers upon the share prices. They have found that the market value of the company is affected by six factors, two of which are beyond the managers' control. Managers can only partially affect the cost of capital, primarily the desired shareholder return rate, as well as the length of the term in which the shareholders expect to achieve above average returns. The following four factors are under the exclusive impact of managers:

1. Financial structure, i.e., the amount of financial indebtedness;
2. Capital expenses;
3. Net operating profit after taxes or NOPAT;
4. Returns rate to new investments [15].

Especially important is the last factor, since together with the amount of new investments, it determines the prospective capacity of the company to create value.

If the assumption that managers affect the share prices by their decisions on the organizational structure, raising and using the capital is accepted as correct, what remains to be solved is the assessment of the value whose creation the management contributed to. The measure of the management success is the extent to which it manages to prosper better than its competition in the conditions of prosperity, or decline less than its competition in the conditions of recession. As the market (external) estimations of managers' activities are generally an underlying factor in the system of management rewards and bonuses and an important factor that conditions the managerial structure, several external value measures have been developed over time.

## 2. Market value added

The market value added, or the MVA for short, is a measure that was developed and registered as a trade mark by the Stern Stewart & Co. The MVA is the difference between the market value of the company and the book value of the capital invested into the company, and is calculated using the following model:

$$\text{MVA} = \begin{array}{c} \text{Market value} \\ \text{of the} \\ \text{company} \end{array} - \begin{array}{c} \text{Invested} \\ \text{capital} \end{array} \quad (1)$$

The MVA allows for the assessment of the effects the management of the company achieves investing the capital it is entrusted. The positive side of this measure points to the fact that the management has succeeded in creating value for the shareholders. The negative side of the MVA leads to a conclusion that the management made investments that caused value destruction.

If the company raises capital by issuing bonds and shares to trade on the stock exchange, then the market value of the company equals the sum of the market values of the issued securities. The market value of the issued securities is defined as the output of price multiplied by the number of securities of a certain type. The company's market value can also be established implementing the method of discounted free cash flow, using the corresponding rate of the investment criterion (e.g., cost of capital) as a discount rate. Since the market value of the borrowed capital in practice generally approximates its book value, the following method can also be implemented to establish the MVA:

$$\text{MVA} = \frac{\text{Market value of shares}}{\text{Capital subscribed by shareholders}} \quad (2)$$

As to the invested capital, it is generally defined as a sum of financial assets obtained from a variety of external sources, as well as by the profit accumulation, for the purpose of investing into further business operations of the company. The full amount of capital is taken into account, regardless of when it was obtained, that is, the entire capital since the moment the company was started. In practice, the value of the capital invested is calculated on the basis of the accounting data that rarely, except when the company is being established, display a really invested capital. The reasons for this departure from economic reality should be sought in accounting conventions, especially in the principles of historical expenses and realization.

The MVA is often said to be a reliable measure of the shareholder value created, as it takes into account the market estimation of the effectiveness of the management in the resources use, as well as the estimate of the success the management has in the long-term positioning of the company. Some research shows that the MVA approximates to the value that would be determined implementing the net present value method [16]. It is therefore believed that managers, whose rewards and bonuses depend on the MVA value, are not much in favour of deciding upon operations with a negative net present value. As it measures the value in absolute monetary units, the MVA takes into account the differences in the amounts of the capital invested, i.e., the fact that larger capital generates more value.

The criticism that is usually directed to the MVA is related to its feature of the absolute measure of value from the moment the company is established. Alistair Blair described this problem in the following way: "The MVA takes into account the historical and now irrelevant results, combined with the results of the previous year and the today's hopes or disappointments, mutually expressed in the current share price. The fact is that we are interested solely in the current achievements, or, more precisely, time-defined, for the achievements from the moment the presently ruling management took office in the company [according to 1, p.860]". This statement can be interpreted as a request that the MVA be converted into a measure to assess the achievement not from the moment the company was started, but over a given time, in order to identify the contribution of the current management to the shareholder value creation.

Close to the previous criticism is the fact that the MVA is a relevant information only for those shareholders who bought the stocks when the company was established. The investors who buy the stocks later, on the primary or secondary markets, earn the MVA only from the moment they invest. Some studies have shown that half of the shares of an average company change their owners every second year, and that only 3 percent investors hold their shares for a period longer than 10 years. Hence we can maintain that each shareholder have their own MVA, while the MVA calculation for the shareholders who bought their shares on several occasions remains a specific problem to be solved. It is for this reason that we cannot talk about the MVA adequate for all shareholders [9].

The MVA is an important external measure to assess the performance of the whole company and the value of the past and the intended investments, however, it is not really useful in everyday business-decision making and long-term planning. Since it is only the company that can issue stocks, the MVA cannot be calculated on the level of divisions, business units or production lines; hence it is difficult to directly affect its increase. For the purpose of daily running the company to maximize the MVA, the managers must therefore rely on internal measures of value. The internal measure, found by numerous studies to be in strong correlation with MVA, is the economic value added, shortened as EVA [13]. In the Stern Stewart & Company they maintain that the MVA is equal to the present value of all the future EVAs, namely:

$$\text{MVA} = \sum_{i=1}^n \frac{EVA_i}{(1+k)^i} \quad (3)$$

Starting from the formulae 1 and 3, it is clear that the market value of the company may be maximized if the present value of the future EVA is maximized, which can be seen in the following formula: The first research

$$\text{Market value} = \text{Capital invested} + \sum_{i=1}^n \frac{EVA_i}{(1+k)^i} \quad (4)$$

into the correlation between the EVA and the MVA was conducted by the Stern Stewart Company analysts in 1989, on a sample of 613 companies from the list of 1000 most successful companies in the U.S.A. They found that the correlation degree between the EVA and the MVA for the companies with a positive EVA was very high, whereas for the companies with a negative EVA the correlation was weak. Stewart attempted to explain the weak correlation in the companies with a negative EVA by the fact that the market share price reflects at least the net value of the assets, regardless of the company's returns (namely, the market value of the company does not fall significantly below its book value, except in cases of serious problems in business) [5].

Numerous studies, however, pointed to a much higher degree of correlation between the MVA and the accounting indicators such as the rate of return on business assets, business profit, and NOPAT [13]. Thus Kramer and Pushner conducted a performance analysis of 1000 companies on the Stern Stewart list and found that the changes and the level of the MVA are defined by the level and changes of the NOPAT to a much larger extent compared to that of the EVA. On this same sample Dodd and Chen found a 20% correlation between the MVA and the EVA, however a significantly greater between the MVA and the ROA (25%) [5].

Two weaknesses of the MVA are frequently pointed out:

1. The MVA does not take into account the cost of capital, that is, the opportunity to employ the capital with a more favourable investment MVA/risk ratio. It is likely that a company with a positive MVA achieves the rate of returns on investments lower than the cost of capital, i.e., that the market value of the company covers the value of the invested capital, but not the cost of that capital.
2. The MVA does not take into account the impact of the dividend policy upon the shareholder welfare. Between two companies that achieved the same amount of MVA, the one that pays the dividends regularly contributes to the shareholder value to a greater extent.

One way to surpass these problems is to compute the excess returns (ER) using the following formula:

$$ER = \text{Value created} - \text{Value expected} \quad (5)$$

The created value is equal to the present value of all money inflows the shareholders achieved (e.g., dividends), accrued for the current market share value. The expected value represents the present value of the initial and all the subsequent investments into the company. The discount rate is taken to be the investment criterion rate for a respective risk class. Hence the ER takes into account the possibility that the shareholders may have invested not only the invested capital, but also the dividend, into some other alternative and achieve the rate of returns larger than the one provided by the company. A lower than zero ER indicates that the company failed to achieve the minimum rate of return, i.e., that it destroyed the shareholder value.

### 3. M/B RATIO

The relationship between the market and the book values, market-to-book ratio (MBR) follows the MVA. While the MVA is an absolute expression of the value created, established as a difference between the market and the book value of the company (capital), the MBR is an indicator that measures the created value in a relative way, using the same inputs. The MBR is most frequently computed using the following formula:

$$MBR = \frac{\text{Market value of the company}}{\text{Capital invested}} \quad (6)$$

Similarly to the formula used to compute the MVA and due to the assumption that the market value of the borrowed capital approximates its book value, the MBR can in practice be computed using the following formula:

$$MBR = \frac{\text{Market value of shares}}{\text{Capital subscribed by shareholders}} \quad (7)$$

Regardless of the formula employed, this indicator is considered to be the expression of the market estimation of the company prospects, namely, the managers achievement on the value creation plan. Higher than 1 ratio (a positive MVA) indicates that the market estimates the company's capability to create shareholder value positively.

Although both MVA and MBR employ the same inputs, these measures can be differently ranked in companies from the point of view of their contribution to

value creation. The MVA expresses the value in its absolute amount, therefore it is likely that larger companies, or the companies that invested larger capital, will be at the top of the list of value creators. It is for this reason that the MVA is usually said to be under the impact of the company size to a larger extent than under the impact of its capacity to create value, and therefore an unbiased comparison of companies of different size is extremely difficult. Pointing out that the MVA does not take into account a systematic correlation between the investments and the created value, Keef and Roush listed examples of small investments that resulted into creating large amounts of value created (Microsoft, Dell Computers), but also large investments with a meagre effect (General Motors, Ford). On the list of the greatest value creators (measured by the MVA level) of the Fortune magazine 1998, the Dell Company ranked as only 42nd, although their MBR amounted the unbelievable 50 (\$25.7 billion MVA, created by investing \$0.5 billion) [9].

As the value is expressed in the form of the rate of returns and is not under the impact of the amount of the capital invested, it happens that the MBR ranks larger companies rather low, despite their creating large amounts of the MVA. This happens because the MBR shows how much value the company created per unit of invested capital, therefore it is possible that the companies with a larger amount of invested capital show a lower return per unit. This way of expressing value solves the problem of comparing the companies of different sizes, however, it raises another type of problems. The problem with the MBR may arise in its implementation in performance measuring and in defining objectives, as it may happen that projects whose net present value is positive be rejected, only because they reduce the average MBR of the company.

The financial theory often stresses the correlation between the the MBR and the ROE (rate of returns on equity). Consequently, the MBR can be calculated in the following way:

$$MBR = \frac{ROE - g}{k_e - g} \quad (8)$$

where  $k_e$  = the cost of equity, and  $g$  = the anticipated growth rate of the company (profits and/or dividends). It follows from the formula 8 that the MBR will increase with the growth of ROE and the anticipated growth rate, or decrease with the growth of the business operation risk expressed in  $k_e$ . It is also clear that the MBR grows when the ROE is bigger than  $k_e$  (a positive range of returns upon the invested equity) as the share prices are expected to rise in such situations. This means that the MBR rises when a company with a pos-

itive range of returns on equity grows. Namely, in order that the MBR be higher than 1, the management should invest on a return rate higher than the cost of capital.

The correlation between the MBR and the P/E ratio is also stressed, which is evident in the following formula:

$$MBR = ROE \times P/E \text{ ratio} \quad (9)$$

The MBR can be expected to rise with the rise of the ROE and the P/E ratios. It is interesting that Fama and French have found that the companies with lower MBR values earned higher returns (dividends and capital gain) to shareholders, and vice versa [8, p.99]. The research that earlier pointed to a high degree of correlation between the MVA and EVA, also revealed a high level of correlation between the MBR and the EVA [3, pp. 671-672]. This is not unusual if we have in mind that the MVA and the MBR, although they rank companies differently as regards their capacity to create value, mark these same companies as creators or destructors of value.

Above mentioned are a number of theoretical and in practice partially proven views as regards the power of the MBR to create value, or success of the management. Outstanding among them are those referring to the MBR being conditioned by the range of returns and the growth of the company. Much convincing as they seem, the fact remains that there is little empirical evidence to prove them, as well as the fact that the MBR, at least explicitly, does not take into account the cost of capital. Also, the MBR depends on the book value of the capital invested. This value is in turn intrinsically defined by the accounting standards, therefore it is possible that high-technology companies achieve a higher MBR due to large investments they make into assets whose activating is prohibited or is not recommended (software and pharmaceutical companies have, by a rule, a high MBR).

#### 4. Total shareholder return

The total shareholder return (TSR) is generally calculated using the following formula:

$$TSR = \frac{\text{Dividend per share} + \left( \frac{\text{Current share price} - \text{Initial share price}}{\text{Initial share price}} \right)}{\text{Initial share price}} \quad (10)$$

Two basic elements of the total shareholder return (value) can be identified in the above formula: a) the dividend rate, as a ratio between the dividend and the price per share, and b) the percentile change in the share price (percentage of capital gain or loss). Hence the TSR is often said to be the favourite measure of value with the shareholders since it directly indicates the percentage by which the shareholders increased or de-

creased their wealth by leaving their capital with a certain company. In order that the conclusion on a real contribution of the company to the value creation should be made, it is necessary that we have appropriate standards. The basis for estimating the TSR company consists of three branches the company belongs to. The companies that manage to achieve a TSR larger than the average achieved by the industry branch may be ranked as real creators of value. This is meaningful, since holding shares of a company pays to the shareholders only if they use them to earn some returns, at least to the amount they would earn if they invested into the securities of another company.

The modern approaches to the TSR calculation and analysis are more comprehensive, as they take into account a somewhat larger number of factors. Within an integral approach to value creation developed by the consulting company BCG (Boston Consulting Group) it is possible to identify a number of crucial relations and links, important in the process of a value-oriented strategy creation and implementation. There are three basic dimensions of the value creation system of the BCG company:

1. **Intrinsic value**, understood as the present value of the future cash flow of the company;
2. **Shareholders' expectations**, expressed in the form of the expectation premium. We talk of the expectation premium when the market value of the company differs from its intrinsic value and often makes a significant portion of the total market value of the company.
3. **Free cash flow (FCF)**, directly returned to the investors in the form of debt repayment, or share or dividends buyout [11].

In order to maximize the TSR the managers have to understand the interrelations of these dimensions (Figure 1).

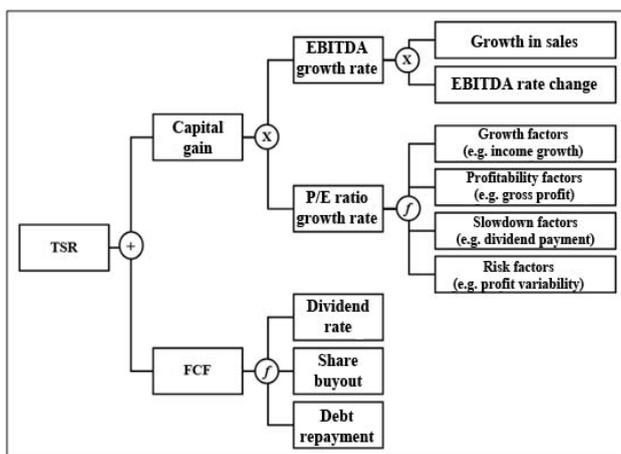


Figure 1. Value creation system

As the BCG consultants point out, the majority of activities within the system of value creation which are presented in Figure 1 directly or indirectly affect the TSR. Thus the managerial decision to increase the dividend payment ratio will directly lead to increasing the FCF, and indirectly it will reduce the risk for shareholders, increase the company's credibility as well as the shareholders trust in the management's commitment to achieve the goal to maximize the value, which will, in the long run, have an impact upon the increase in both the P/E ratio and the TSR [12].

As regards the above stated dimensions of value creation, the TSR is possible to decompose in order that the impact of certain value factors upon the TSR should be identified. This extended TSR formula consists of three elements:

1. **The rate of earnings before interest, taxes, depreciation and amortization, EBITDA** for short, as the output of the sales growth and the profit growth rates, points to the changes in the company's intrinsic value.
2. **The P/E ratio change percentile** shows how the changes in the shareholders' expectations affect the TSR.
3. **The FCF change percentile**, as a sum of the dividend rate and the percentage of the value of the shares bought from which the percentage of the repaid debt is subtracted, measures the impact of cash payments and the capital changes upon the TSR [11].

The TSR is therefore possible to calculate using the following formula:

$$\frac{TS}{R} = \frac{\text{Growth rate of EBITDA}}{\text{EBITDA}} + \% \text{ change of P/E ratio} + \% \text{ change in FCF} \quad (11)$$

Although they seem to be meaningful, both the system of value creation and the formula 11, developed by the BCG company, have certain flaws. They do not allow for a sufficiently detailed insight into the factors that contributed to value creation. Namely, it is important to know whether the EBITDA growth is a result of investment into the projects with a high returns rate (e.g., the development of a new market segment for the existing products) or is the consequence of a low rate of returns (e.g., acquisition of a highly reputed company). Actually, the analysis must include the amount of the invested capital as well. It is also important to know what financial structure was employed to achieve the growth of EBITDA, since two companies achieving the same amounts of shareholder value may have different TSRs only because they differ in their financial structure and risk. The dividend payments, although a direct

return for the shareholders, can hardly be viewed as a value creation factor of a TSR growth factor, since they diminish the prospects of value creation. Hence the McKinsey consulting company (McKinsey&Co.) proposes a slightly more detailed decomposition of the TSR calculations in order that the impact of the following four factors should be observed:

1. **The percentage of the growth of the company's business results (EBITDA)**, which can, for the analysis purposes, be disassembled to a part achieved due to the net growth of returns (the growth of the rate of returns reduced for the growth rate of the capital required to support the return growth), the growth in the profits rate and/or the growth in the capital productivity. It is therefore the rate of returns to the equity (ROE) that should be taken into account, not the rate of profits.
2. **The company's growth rate, under the assumption of the zero growth**, is possible to calculate as inverse value of the P/E ratio (regardless of the indebtedness). This element reveals the market estimate of the company's value at the beginning of planned growth (the measurement period), and the estimate of the rate of returns the company would achieve even if it did not additionally invest into its growth.
3. **The percentage of the P/E ratio change**, as a measure of the change in market expectations as to the future company's performance. In this case, the P/E ratio has to be calculated under the assumption that the company is not in debt (the ratio of the market value of the company reduced by the value of debt and the profits gained), in order that the impact of the financial structure upon this indicator be excluded.
4. **The impact of company's indebtedness**, measured by the difference between the P/E ratio of the indebted company and the P/E ratio of the company that is not in debt [6].

Such a detailed calculation allows for a clear insight into the basic orientations of the real growth of TSR – the actual improvement of business performances (the growth rate of results reduced by the growth rate of the capital invested) and the real increase in market expectations (the P/E ratio regardless of the level of indebtedness). The increase in financial indebtedness and the dividend payment affects the nominal growth of the TSR, however, it does not mean that they affect the value creation; just the opposite.

The real importance of certain factors in the process of value creation and the TSR maximisation can be seen in Figure 2. Here we have a comparative analysis of the im-

port of the factors from the system of value creation upon the TSR of the 25 most powerful EU banks (their share amounts to 80% in the total assets of all the banks in the EU) in the 2002-2997 period, according to the BCG and McKinsey companies. If in the situation presented in Figure 2 the conclusions were drawn on the basis of the BCG analysis, the impression might be that the banks achieved a TSR of 15% due to high growth rates. The McKinsey analysis shows that the banks achieved the TSR due to a high rate of return on equity. The result in either case is the same, however, the McKinsey company approach is more beneficial for the managers, as it can help them identify the value factors that in the past affected the growth of the TSR, as well as the factors whose impact will be felt in the future.

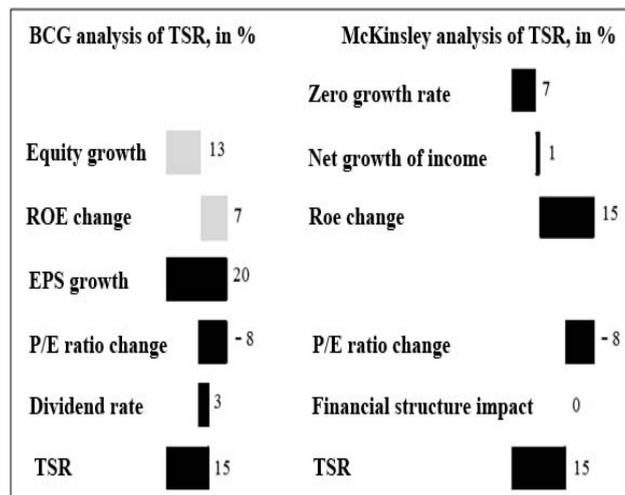


Figure 2. Analysis of the TSR of 25 most powerful EU banks

Regardless of the approach to the calculations and the analysis of the TSR, the market expectations are generally believed to crucially determine the TSR, especially in a short-term period. The BCG company implemented its approach to the TSR calculations to analyse the performance of the most successful companies in the S&P index, in the 1988-2006 period. The aim of the research was to determine the relevant importance of certain TSR factors for the market value of the companies in the periods of one, three, five and ten years. The research showed that, although the returns growth is the key impact factor upon the company's market value in the long term (can serve to explain about 60% of the TSR value), the short-term market value of the company is primarily determined by the market expectations (affect 39% of the TSR value) [11].

This can prove to be a serious problem for the companies that achieve a high performance level on a regular basis. Namely, although the market rates the company and its management as very good, this rating might already be included in the share price. This problem is

possible to explain on the example of an assembly line on which a company tries to maintain or improve its position. The market expectations contained in the share price are here recognized in the speed of the line. If the management succeeds in exceeding the expectations, the share price will rise, however, the speed of the line will increase too (market expectations increase). The more successful the management, the higher the market expectations from them (figuratively, the management have to run faster and faster so that the line should not drag them backwards). This explains why the successful companies often achieve an average TSR in the short term, while less successful ones create high amounts of TSR (good companies need not be good investments, and vice versa) [7].

The TSR is a measure that is related exclusively to corporations, as well as to the corporate top. Namely, it cannot be used by those companies whose shares are not traded, nor the business units, which is a significant constraint to this measure. Since it is within the jurisdiction of the corporate top, the TSR can serve as a reliable basis for strategic goals definitions, for guiding the business unit activities, and for adjusting internal goals. This value measure forces the managers to make decisions bearing in mind the key value factors, the risk level they are willing to accept, and the changes necessary for the goals to be achieved. The TSR is often said to summarize and intersect the impacts of several value measures, such as earnings per share and the P/E ratio, whose individual importance and reliability are relatively small or limited.

The primary reasons for the popularity of this measure are its direct relation with the explicit shareholder wealth flows, as well as the simplicity of calculation and interpretation. The TSR, however, has a number of weaknesses that bring in question its capacity of measuring the value created for the shareholders. Outstanding among these are the following:

- The TSR does not bring together the capital invested into the company and the shareholder returns. This is because it does not take into account the investments during the measuring period, but only the amount of investments at the beginning and at the end of the period of measuring. It is for this reason that companies that had different amounts of equity at disposal and achieved the same shareholder returns may have the same TSRs.
- The TSR does not take into account the cost of the employed capital, that is, the desired shareholder return rate. Thus it is possible that the company that created a large TSR, did not actually create value, as it failed to achieve percentage returns

larger than the cost of capital. This problem is especially evident in comparing the companies with the same TSR, but belonging to different risk classes.

- It is difficult to estimate to what extent the movements of share prices and the TSR are the result of the management decisions and activities, and how much they are under the impact of other factors, especially the investors' expectations that could be over-optimistic or over-pessimistic. The question then is to what extent the TSR is capable of measuring the performance of management and the intrinsic value of the company.
- The TSR is under a strong impact of the length of the selected period of observation, i.e., the TSR defined for a one-year period may significantly differ from that defined for a longer period of time. Hence it may happen that, if the rewards for the management are determined on the basis of a one-year TSR, the manages may be rewarded for the results they could not contribute to.

Regardless of the weaknesses, the TSR is a value measure that closely corresponds with the goal of maximising the shareholder value, simultaneously allowing for the assessments of the company's capability of creating value in the future and the expected business risk. In accordance with the regulations in the U.S.A., the companies are obliged to publish their TSR data. The companies whose stocks are traded in the UK are obliged to publish a five-year review which will make it possible to compare the company's TSR with the respective index.

## 5. The wealth added index

The Wealth added index, or WAI for short, is another value measure developed by the Stern Stewart company. It is defined as the shareholder wealth created in an amount larger than expected. The shareholder wealth consists of capital gains and dividend payments, and included are all shareholders, regardless of when they bought the company shares. The shareholders' expectations depend on the risk of investing into shares, and are expressed in the form of equity cost. Therefore, the company creates value for its shareholders only when the rate of shareholder returns is higher than the cost of capital. It is obvious that the WAI is an attempt to correct at least two TSR weaknesses – the neglect of investment during the measuring period and the cost of capital.

Two methods are used to calculate WAI. According to one, WAI is calculated in the following manner:

$$\frac{WAI}{I} = \Delta MC - \frac{E}{P} + \text{Dividende} - \Delta EC \quad (12)$$

Some elements of the formula 12 require a brief explanation:

- The change in the market capitalization of the company ( $\Delta MC$ ) is defined by comparing the market capitalisations at the end and at the beginning of the measuring period.
- The expected return (EP) is determined by multiplying the market capitalization at the beginning of the measuring period by the cost of equity.
- The “new issues of shares“ ( $\Delta EC$ ), that is, shares issued during the measuring period, are calculated as an output of the values of the shares issued and the cost of equity. Namely, if the company issues shares during the measuring period, the new shareholders are assumed to have an expected rate of returns that is necessary to include into the calculations from the moment of new issuing.

The other approach to calculating WAI is presented in formula 13:

$$\frac{WA}{I} = (TSR - k) \times MC_0 \quad (13)$$

where  $k$  = cost of capital, and  $MC_0$  = market capitalization at the beginning of the day.

This approach requires fewer data, however, it requires that the WAI be calculated daily. If, employing this formula, the WAI should be calculated for longer periods of time, the information on the value created would be only approximately accurate, since the formula does not take into account the expected returns of new shareholders. Regardless of the formula chosen, WAI expresses the value in its absolute amount, not in percentages, in the way the TSR does.

The WAI is defined by four factors: 1) **profitability value**, i.e., the present value of the cash flow created in the current period; 2) **prospective value**, as an expression of market expectations as regards the future yield of the company; 3) **financing**, which specifies the flows of financial returns (issued owners' and debt securities, retained profit) and financial outflows (dividends, share buyout, capital expenditure); 4) **expected shareholder rate of returns** [15]. The shareholder wealth grows with an increase in profitability, in prospective value of the company and in the flowout to the benefit of shareholders (dividends, share buyout), and declines with the increase in the sources of financing and the expected shareholder rate of returns.

Due to its capacity to measure not only the past, but also the future performance of the company, the WAI

can be implemented in strategic and financial planning and guiding the activities of the top management and the business units. It can also be used as basis for setting up a system of manager rewards and bonuses. Thus the managers can be said to be successful if they manage to create a positive WAI, i.e., a WAI higher than that of their direct competition. Due to the close correlation between the WAI and the value factors, it is possible to identify and use concrete opportunities for value creating in the company.

Although WAI is developed in answer to the TSR flaws, the assumption that the capital market is efficient is viewed as a problem with this measure too. Besides, critics point out that it often happens that the WAI is not a better value measure compared to the relative TSR (TDR of the company compared to TSRs of direct competition, industry branch average, etc.) [1, p.857]. For example, it is likely that the companies will achieve negative WAIs in the periods of economic recession, due to the decline in the returns in such period, while the cost of capital remains unchanged or rises. It is then that the rigour of this measure is evident, since even those managers who are much more successful in managing the company than their competitors will get poor estimates (due to a negative WAI).

Finally, since it measures value in an absolute amount, the WAI gives precedence to larger companies, with a larger investment basis.

## 6. Concluding remarks

The recent global economic crisis that escalated in the second half of 2008, again brought into focus, in addition to inadequately high manager reward and a poor regulatory framework, the decision making and performance measuring processes. This time the criticism is aimed at the value concept that Jack Welch terms “the stupidest idea in the world“, while Roger Martin insists on “rejecting the shareholder value theory“ [10]. They maintain that the problem arose because the value concept equals the rise in prices with the rise in shareholder value and hence encourages the implementation of measures that should make managers undertake only those activities that will maximise the share price.

Mauboussin, however, claims that a successful implementation of the value concept should result into the rise in the share price, but should be a result of the rise in the present value of the future expected cash flows of the company. He points out that the share prices are the result of the growth in the intrinsic value of the company, not vice versa, and that it is not the value concept that is inadequate, but its implementation [10]. The problems arise when managers set the share price max-

imization as their primary goal and work on maximizing the accounting and market measures, such as MVA and TSR. They should instead focus upon money flows, and the price will rise as a natural consequence of these. The share price and the external value measures are the expression of the intrinsic value of the company and the factors determining that value, not a goal the manager will blindly pursue, regardless of long-term consequences. Similar attitude is that of Shapiro, who insists that the financial market observes financial performance of the company and the quality of corporate management, since it is they that determine the long-term shareholder returns [14].

The external value measures are favourite instruments modern investors implement in assessing the current and the prospective capacity of the company to maximize value for its shareholders. They provide the market with a market estimate of the intrinsic value of corporate organizations, as well as performances and strategies of the top management. These measures cannot, however, be used for the companies whose shares are not publically traded, for the business units and lower organizational levels, nor do they allow for a direct assessment of the intrinsic value of the company based on discounting the current and the expected cash flows of the company. These are serious constraints to external measures, but then, one or a number of measures can hardly be expected to meet all the requirements of various interest groups, management levels and the concrete legal forms of the company.

## REFERENCE

- [1] Arnold, G., *Corporate Financial Management*, Pearson Education Ltd., 2005.
- [2] Barton, D., Wong, S.C.Y., „Improving board performance in emerging markets“, *The McKinsey Quarterly* 2006, no. 1: 35-43.
- [3] Bodie, Z., Kane, A., Marcus, A.J., *Investments*, McGraw Hill, 2005.
- [4] Coombes, P., Watson, M., „Three surveys on corporate governance“, *The McKinsey Quarterly* 2000, no. 4: 74-77.
- [5] De Wet, JHvH, „EVA versus traditional accounting measures of performance as drivers of shareholder value – a comparative analysis“, *Meditari Accountancy Research*, Vol. 13, no. 2: 1-16.
- [6] Deelder, B., Goedhart, M.H., Agrawal, A., „A better way to understand TRS“, *McKinsey Quarterly* 2008, no. 28: 26-30.
- [7] Dobbs, R., Koller, T., „Measuring stock market performance“, *The McKinsey Quarterly* 2005 special edition: Value and performance: 17-27.
- [8] Fernandez, P., *Valuation Methods and Shareholder Value Creation*, Elsevier Science, 2002.
- [9] Keef, S., Roush, M., „Does MVA measure up?“ *Financial Management*, vol. 31, issue 4: 20-21.
- [10] Mauboussin, M.J., „In Defense of Shareholder Value“. [www.lmcm.com/pdf/InDefenseofShareholderValue.pdf](http://www.lmcm.com/pdf/InDefenseofShareholderValue.pdf), accessed 20.07.2010.
- [11] Olsen, E., Plaschke, F., Stelter, D., „Avoiding the Cash Trap“, *The 2007 BCG Value Creators Report*, accessed to [www.bcg.com](http://www.bcg.com), on 01.06.2010.
- [12] Olsen, E., Plaschke, F., Stelter, D., „Missing Link: Focusing Corporate Strategy on Value Creation“, *The 2008 BCG Value Creators Report*, [www.bcg.com](http://www.bcg.com), accessed 01.06.2010.
- [13] Ramana, D.V., „Market Value Added and Economic Value Added: Some Empirical Evidences“, *Social Science Research Network Working Paper Series (December, 2005)*.
- [14] Shapiro, A., „In Defense of Shareholder Value“, *L.E.K Consulting Shareholder Value Insights*, Vol. 22. (January 2003):1-8.
- [15] Stern, E., Pigott, J., „Introduction to the Wealth Added Index: A New performance Measurement and Strategic Planning Platform“, [http://www.sternstewart.com/research/Introduction\\_to\\_the\\_Wealth\\_Added\\_Index\\_A\\_New%20Performance\\_Measurement\\_and\\_Strategic\\_Planning\\_Platform.pdf](http://www.sternstewart.com/research/Introduction_to_the_Wealth_Added_Index_A_New%20Performance_Measurement_and_Strategic_Planning_Platform.pdf), accessed 10.07.2010.
- [16] Velez-Pareja, I., „Value creation and its measurement: a critical look at EVA“, *Social Science Research Network Working Paper Series* (August, 2001).

# Manual for Authors

## TITLE OF PAPER IN ENGLISH ( two lines at the most )

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**Abstract** - *These are instructions for preparing papers that will be included in the journal. Your papers should be prepared according to the instructions.*

### 1. INTRODUCTION

Papers have to be written in English. Original papers should be typed one sided A4 format (210x297mm). Use margin 2,5 upper, 2 cm lower, left and right.

Maximal length of paper is 8 pages including tables, text, pictures, literature and other appendices. Pages are numbered with graphite pencil in upper right corner.

Send two copies of the paper (original + one copy) and diskette in format MS Word 6.0.

If the last page of text is not filled up, the columns on the last page should be even, of the same length.

### 2. SUBTITLE (SIMULATION MODEL) (example: SIMULATION MODEL)

In the middle of the first page, after one empty line, insert English title of the paper. Use font Times Roman Bold 14 pt.

The name of authors and the names of their institutions in font Times Roman 10 pt. should be centered as in the model given at the beginning of this instruction..

Other parts type in two columns 0,5 cm in between. Paper is typed normal space and double space between paragraphs. Font Roman 10 pt is recommended. Beginning of the paragraph is typed at the very beginning of the columns.

The title of the paper and names of authors are followed by short abstract in Italic. All subtitles are typed in Bold, capital letters same sized as in the previous text (not smaller than 10 pt).

### 3. SUBTITLE (example: COMPARATIVE ANALYSES)

$$\sigma^2(r_p) = E\left(\sum_{i=1}^n [r_{p,i} - E(r_p)]^2\right) \quad (12)$$

All equations type in one column, numerated at the right side, as illustrated.

### 4. CONCLUSION

All figures, tables or graphic presentations are adapted to the width of one column. If necessary, when the figures do not fit in one column, use the width of the page, and then continue as previously, in two columns. See the figure below.

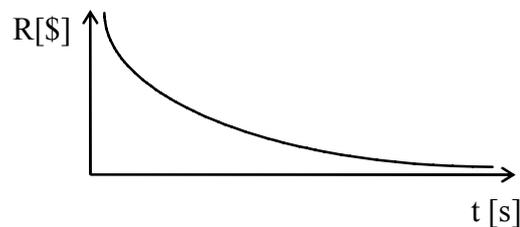


Figure 1. Graphic presentation of results

### REFERENCES

Only the literature related to the problems and main ideas presented in paper should be including and ordinal numbers of the references type in angular brackets.

Literature in text has to be quoted in angular brackets to the order of their quotation. For example in [5] it is shown that. The example of literature is shown below.

- [1] Banks, J. and S.J. Carson., Discete - Event System Simulation Prentice - Hall, New - Jersey, 1984.
- [2] Bodily, S., "Speadsheet Modeling as a Stepping Stone", Interfaces, vol. 16, No.5, pp 34-52 1986.
- [3] Protic D., Simulation of work on Airport Belgrade. Proceedings of work, SINFF-N, page 75 -81. Zlatibor 19