



SERBIAN PROJECT MANAGEMENT JOURNAL

Volume 1 • Issue 2



» Moving PM Competence Forward

The IPMA four level certification program is world leading and professionally demanding.

By the end of 2012 there were more than 170,000 IPMA certificants worldwide, with over 57, 000 of them Advanced, Competence-based, professionally-assessed certifications in IPMA's 4-L-C, Four-Level Certification system.

These include: **IPMA Level A® (Certified Projects Director)**, **IPMA Level B® (Certified Senior Project Manager)** or **IPMA Level C® (Certified Project Manager)**. These certificates are noteworthy, as the demand from executives, strategic leaders, managers and stakeholders for individuals with **demonstrated Project, Programme and Portfolio Management competence** spreads globally.



The remaining 65% of our certified individuals are IPMA Level D® (Certified Project Management Associate). This designation is similar to the exam-oriented, knowledge-based certifications of other major Project Management associations. In the IPMA approach, this certification is the best first step towards a professional project or programme manager role demonstrating the individual's ability to understand the basics of project management.

Does your organisation demonstrate the PM Competence Difference? Do you?

www.yupma.rs/yupma/sr/sertifikati

SERBIAN PROJECT MANAGEMENT JOURNAL

Volume 1, Issue 2
December 2011

Publisher:

Serbian Project Management Association-YUPMA

Editor in chief:

Prof. dr Petar Jovanović, Project Management College, Belgrade, Serbia

Editorial board:

Prof. dr Dejan Petrović, Faculty of organizational sciences, University of Belgrade, Serbia

Prof. dr Nino Grau, Fachhochschule Giessen-Friedberg University of Applied Sciences, Germany

Prof. dr Brane Semolič, Faculty of logistics, University of Maribor, Slovenia

Prof. dr Vladan Devedžić, Faculty of organizational sciences, University of Belgrade, Serbia

Prof. dr Mladen Radujković, Faculty of Civil Engineering, University of Zagreb, Croatia

Prof. dr Kevin Kane, University of Salford, United Kingdom

Vladimir Voropaev, Projects Management Faculty, State University of Management

Sergey Bushuyev, Kiev National University of Construction and Architecture, Kiev, Ukraine

Prof. dr Živan Živkovic, Technical faculty in Bor, University of Belgrade, Serbia

Prof. dr Evica Petrović, Faculty of economic, University of Nis

Prof. dr Radoslav Raković, Project Management College, Belgrade, Serbia

Technical editor:

Dragana Stevanović

Language editor:

Sladana Tanasijević

Journal will be available online at www.spmjournal.rs two times per year.

ISSN 2217-7256 (Online)

CONTENTS

Developing a balanced project portfolio for a social enterprise - the case of SIFE in Salford UK	3
<i>Kevin Kane, Mariusz Andreasik</i>	
Communication management in virtual project environment	11
<i>Marko Mihić</i>	
Project management system integration with company's business system	20
<i>Tomaž Kern, Matjaž Roblek, Benjamin Urh</i>	
Key elements of information support for innovation projects realization	29
<i>Biljana Stošić, Sonja Išljamović</i>	
Application of problem structuring methods in an international organization	35
<i>Amadeo Watkins</i>	
Capacity and design for project change management	41
<i>Vladimir Obradović</i>	
Distribution of business rules in software project management	54
<i>Ljubica Kazi, Ofelia Stanciu, Madhusudan Bhatt</i>	
The system for monitoring and evaluation of innovation projects	60
<i>Đuro Kutlača, Zorica Mitrović, Marija Mosurović</i>	

WORD OF THE EDITOR

On the occasion of celebrating an important anniversary of the Serbian Project Management Association (YUPMA), its 25 years, we are proud to launch a Serbian Project Management Journal, a specialized journal that is to present the most recent knowledge in the fields of project management and other specialized management disciplines.

The development of project management in Serbia, since its beginnings in 1970s, to the establishment of the Project Management Association in the 1980s, until today, went through many a difficulty. Regardless of severe problems that this country and the Project Management Association encountered, project management gradually developed and was implemented in this country, and today it is evident that the implementation of project management is a sine qua non in almost all the areas of human life and work.

It is our genuine wish in launching this journal to contribute to the further project management development and implementation in Serbia.

Petar Jovanovic

President of Serbian Project Management Association YUPMA



DEVELOPING A BALANCED PROJECT PORTFOLIO FOR A SOCIAL ENTERPRISE - THE CASE OF SIFE IN SALFORD UK

Kevin Kane^{*}, Mariusz Andreasik

Salford Business School, University of Salford, Manchester, United Kingdom

Abstract: In the UK, Social enterprises are organisations whose existence is predicated on a social model where both commercial and charitable sources of income are used to achieve social aims such as education, the improvement of local communities and the relief of poverty. Such social enterprises are in essence project based organisations which select, develop and operate projects in accordance with their internal motivation to achieve social aims and goals. Social Enterprises tend to be small and are often lacking in managerial skills such as project management, consequently they often select projects based solely on social need or other arbitrarily determined factors and ignore other important criteria. This approach increases the likelihood of project overload and unbalanced project portfolio development and may lead, over the longer-term, to strategic failure. This research uses an expert survey to identify factors used by social enterprise managers to determine project selection in order to develop the framework for an Analytic Hierarchical Process approach to help structure decision making. These factors are then utilised to guide a small group of social enterprise managers from the SIFE social enterprise organisation to score and rank three specimen projects. These managers proved adept at using this approach and could analyse the specimen projects effectively, however, they proved less able to select a suitable portfolio of projects. This research, although small in scale, suggests that social enterprise managers can improve their selection of suitable projects through clarification of the decision criteria to be used, but find it considerably more difficult to develop a balanced portfolio of projects.

Key words: Balanced portfolio management; Social enterprise; Analytic Hierarchical Process; Project selection

1. INTRODUCTION

Social Enterprise, project selection and portfolio management

Social enterprises are independent businesses *that provide services, goods and trade for a social purpose and are non-profit distributing* (Cabinet Office, 2008). In social enterprises *profits are used to create more jobs and businesses and to generate wealth for the benefit of the community* (Cheng & Ludlow,

2008). There are at least 62,000 social enterprises operating in the United Kingdom, with a turnover of £24Billion and a total workforce of around 800,000 (Cabinet Office, 2008; National Audit Office, 2009). The UK Government strongly favours the development of social enterprises and provides support and guidance for those who wish to start this type of enterprise (Dearden- Phillips & Griffiths, 2011; Cabinet Office, 2011).

Many social enterprises focus on winning grants from public and private charitable

*Corresponding author. Email: k.kane@salford.ac.uk

sources in order to carry out projects that create change in the local community and improve individual lives in order to increase the social capital of the nation (Cheng & Ludlow, 2008; National Audit Office, 2009). In addition to gathering grants and gifts to help with their work, social enterprises can apply to undertake projects with social aims that are funded by central government: for example, helping people in a community such as Salford in Greater Manchester to reduce or cease smoking tobacco is funded by Central Government as a means of improving general public health (Dearden- Phillips & Griffiths, 2011). Such projects are advertised by the Government and other funding organisations and are subject to competitive tendering by social enterprises and private businesses.

Having social rather than financial objectives means that the selection of projects in such organisations is not based solely, or generally, on financial criteria. Traditional for-profit businesses are concerned mostly with selecting projects from a range of possible opportunities using a ranking of calculated possible financial returns with the criteria for choice being the maximisation of profit (Ridley-Duff, 2008). In contrast, social enterprises tend to select on a more eclectic range of criteria (Cheng & Ludlow, 2008). These criteria may include opportunism (where a project happens to be offered to the management), political influence (where local politicians or powerful individuals ask for their favoured project to be undertaken), attractiveness of the project to the social enterprise management, and for other non-financial reasons. The lack of clear, central criteria for project selection (in essence, the lack of the profit motive), means that social enterprises can accumulate a range of projects which, whilst being worthy in themselves, are sub-optimal in terms of the overall organisation's successful achievement of its social mission (Kendall & Rollins, 2003; Levine & Widelman, 2005).

Given Governmental and general public support for Social Enterprises and the great deal of social problems in a society such as the UK, these organisations face the problem of having many project opportunities which cannot be

completed due to their limited resources (Cabinet Office, 2011). Many project tenders are unclear, with uncertain or complex sets of success criteria and with benefits that are not visible from the beginning, making it hard for social enterprise managers to assess whether they should accept or reject such project proposals. Many projects are offered to social enterprises by funding bodies with little regard to how these projects will be managed by the social enterprise. Accordingly, social enterprises struggle to choose the appropriate projects to carry out, and to determine which will benefit them and the community they serve. At the same time these social enterprises find it difficult to select projects; they find they are subject to continuous demands to take on projects from funding bodies, particularly given the present financial problems of central government which wishes to transfer more social activities from the state to social enterprises (Cabinet Office, 2011).

Associated with the problem of project selection is the issue of portfolio selection, that is, the selection of projects that are not only likely to be successful in themselves but which are also likely to be successful together and which complement rather than conflict with each other (Martino, 2003; Rad & Levin, 2006; Hunt & Killen, 2008). Social enterprises tend to have managers who have great enthusiasm for their social goals but who have limited managerial skills – particularly in the realm of project and portfolio management (Cabinet Office, 2011).

SIFE is the case example used in this research and it is a social enterprise based in Salford, UK. SIFE (Students in Free Enterprise) is a student organization which has the mission statement: *To create sustainable value by successfully empowering and educating the local community and students with the necessary financial and entrepreneurial skills needed to improve their standard of living and inspire them to take on real life opportunities* (sifesalford.org, 2009). *This organization is working currently on five projects and receives many applications from local associations, community centres and groups to help on their projects. Due to the lack of project management*

tools and techniques to help with the choice of which projects should be accepted and which will benefit the organization and community, SIFE, according to its Chief Executive, adopts projects randomly and does not assess them adequately enough to determine whether those that are accepted are the optimum ones or whether those that are rejected could be more beneficial (personal communication). There is a lack of understanding of project management in small social enterprises in general and SIFE is a representative case of this type of organisation (Cabinet Office, 2011).

Project and Portfolios

The definition of a project is fairly clear: a project is a sequence of unique, complex, and connected activities having one goal or purpose that must be completed by a specific time, within budget, and according to specification (Wysocki, 2012); the Project Management Institute states (PMI, 2004) that a project is a temporary endeavour undertaken to create a unique product, service, or result; and for PRINCE2 (OCG, 2005) a project is a management environment that is created for the purpose of delivering one or more business products according to a specified Business Case. In essence, a project should have a purpose and is limited by time, budget, resources and specifications. The management of projects may be a complex business in practice, but organisations such as the UK Association of Project Management (APM) are fairly clear on how they should be managed in theory (APM, 2006). However, most of these definitions rest on the notion of selecting projects based on clear financial criteria, i.e. the business case; and, in addition, do not provide clear practical evidence of the efficacy of such approaches.

However, once we group projects into groups of projects they become programmes and portfolios and definitions and agreement over how these should be designed and organised becomes more problematic (Armstrong, 2004; Bridges, 2003). This is, in essence, because agreement on how to define and to manage a project may be fairly settled but defining and managing programmes or

portfolios of projects is more contentious. A simple definition is that a *project portfolio is a collection of projects that share some common link to one another (Wysocki, 2012)*. The statement of common link may mean, for example, that all the projects in a portfolio may exist to help local community development or aim to develop new products for a business. On the other hand, Miguel (2008) suggests that the notion of project portfolio derives from the need to select projects; and it is the case that many see portfolio management as a type of multiple project management (Levine & Widelman, 2005). Additionally, Cooper (2001) argues that in all project portfolios new projects need to be introduced, while existing projects can be completed, cancelled or suspended. In other words, given that project portfolios are not set for all time, but change constantly, adjusting to the current situation and objectives of the company, a portfolio represents the strategic choices of the business in project form.

Once we move beyond seeing portfolios as simple collections of projects, we have to tackle the issue of whether managing such collections need particular skills or approaches. According to Bridges (2003) there is an art to project portfolio management (PPM), which involves *scrutinizing each potential project, selecting the right mix of projects, and adjusting them as time passes and circumstances unfold*. Additionally, Cooper et al., (2001) argues that *portfolio management is a process in which projects for the development of products or services are continually evaluated, selected and prioritized; new projects are introduced and existing projects might be suspended, cancelled, or de-prioritized*. Hunt and Killen, (2008) add that *project portfolio management is a decision process that oversees the resource allocation and ongoing decisions related to a strategically oriented portfolio of projects*. Wysocki (2012) suggests that *Project portfolio management includes establishing the investment strategy of the portfolio, determining what types of projects can be incorporated in the portfolio, evaluating and prioritizing proposed projects, constructing a balanced portfolio that will achieve the investment objectives, monitoring the*

performance of the portfolio, and adjusting the contents of the portfolio in order to achieve the desired results.

Thus the selection of projects represents a key managerial activity that rises above the individual assessment of a project into a more complex judgement of how a collection of projects contribute to organisational success and how such individual projects may interact and react with each other within the organisation and its strategy (Cooper, Edgett & Kleinschmidt, 2001; Gray & Larson, 2002). The decisions made regarding project portfolios must take into consideration the strategic imperatives of the organisation as well as operational demands. This implies that projects which do not correspond to the mission and objectives of the organization should not be included in its portfolio. According to Miguel (2008), if the projects do not correspond with the business strategy and capabilities, there is a risk that projects will be delivered ineffectively so the requirement must be that project portfolio management should lead to acquisition of only those projects, which will maximize the value, balance and strategic position of the company (Morris & Pinto, 2007).

Selecting appropriate projects for a portfolio is consequentially more difficult than selecting individual projects on the basis of their probability of success (Morris & Pinto, 2007). There are few projects that guarantee high rewards with high probability of success (Cooper et al., 2001); in general, risk and reward are inversely related where high rewards are generally associated with lower chances of success and a high chance of success normally brings less reward. In a balanced project portfolio, projects that guarantee success with low rewards can be matched against those projects which are more risky but more profitable. It is not an easy task to build a balanced project portfolio nor are there any clear and agreed guidelines on achieving such a balance (Levine & Widelman, 2005). Kendall and Rollins, (2003) argue that there must be a correct mix of projects balancing the supply side of organization with its market side - such balance would ensure that a business would be

able to deal with environmental changes with greater robustness than the organisation without such balance. In addition to the notion of a balanced portfolio of projects making an organisation more stable in turbulent times, there is also the notion that a balanced portfolio would ensure an optimum utility of resources and people (Bridges, 2003).

2. RESEARCH DESIGN

Given the problems social enterprises have with both selection of projects and with the development of their portfolio of projects, this research aims to determine whether the use of a more structured approach to project selection may help social enterprise managers in optimising project selection and in developing an effective portfolio of such projects.

The approach selected for this work is a form of Analytic Hierarchy Process (AHP) which is a method of structuring and organising complex decisions by way of identifying a framework for understanding the elements in a problem using the knowledge of a group of experts involved in the decision making process (Al Khalil, 2002; Saaty, 2001; Mota et al., 2009). In this study, once the decision framework is created it was used to guide the scoring and ranking of a group of three specimen projects by social enterprise managers selected from SIFE, a social organisation based in Salford UK. The scores and ranks of the managers were derived using the decision framework and were then reviewed. Consequently, the managers were brought together as a group in order to compare results. They were then asked to select two of the three specimen projects on the basis that they were to constitute a suitable pair in a portfolio of projects. In this way it was hoped that the social enterprise managers would be able to improve on their managing of both project selection and in portfolio development.

3. RESULTS

The project management problem faced by social enterprise managers and addressed by this research is, in essence, how to improve the selection of social projects and to achieve the portfolio benefits which would come from a

better matching of projects within their organisations. For a manager operating outside of commercial business, the lack of the profit motive as a guide to selecting projects means that many projects are adopted due to fairly arbitrary reasons and there is a lack of clarity and rationality, leading to project failure and sub-optimal operation.

The Analytic Hierarchical Process (AHP) approach to decision making suggests that optimal decision making requires clear criteria for selecting one decision option over another (Al-Harbi, 2001). This research study applies this notion to the decisions required in selecting one project amongst many possible projects for adoption by a social enterprise – given that financial returns are not the sole or key factor – means generating or uncovering the set of factors that should be considered.

In order to develop an agreed set of criteria for project selection, a survey was conducted with social enterprise project managers recruited from local social enterprises, who were asked to score on a scale of 0 to 5 a list of possible criteria that they might find helpful in assessing projects: 0 represented the criteria as having no relevance at all, and 5 as the criteria having great relevance with 1 to 4 representing the intermediate levels of relevance. The list of 18 criteria was developed by the research team by reviewing literature on project selection. Twelve social enterprise managers responded and scored the list. The responses were summed and averaged to arrive at an average score per criteria. The criteria were then ranked in order with the highest score ranked first down to the criteria which received no score from the social enterprise project managers.

Position	Criteria	Rating Average
1	Financial stability (of an external organization)	4.5
2	Payback (time needed to recover the investment)	4.25
3	Social Return on Investment (Value in £)	4.2
4	Risks Analysis (Number of risks and their probability/impact)	4
5	Budget (The size of the total project budget)	3.75
6	Volunteers (number required)	3.67
7	Profit (generated for the organization)	3.2
8	Sustainability of the impact	3
9	Impact (the number of people impacted and scope)	2.88
10	Feasibility of implementation	2.75
11	Learning benefits (for the organization and volunteers)	2.5
12	Time (Duration of the project and hours required)	2.2
13	Cost (obtained by the organization)	2
14	Security of the project	2
15	Training and Support (Available to volunteers from external organization)	1.5
16	Prospect to hand down the project	1
17	Partners (Number of partners involved)	0
18	Net Present Value (NPV)	0

List of social enterprise project selection criteria – scored and ranked.

The top five criteria were identified and then used to guide decision making by four managers from the SIFE social enterprise who had not been part of the process of generating the list of criteria or scoring the criteria.

4. PROJECT CASE SCORING AND PORTFOLIO SELECTION

In order to test whether the structured categories of project selection criteria that were

developed in the first stage of this research were useful, coherent and useable by social enterprise managers, three synthetic specimen project cases were developed. These were titled Case A, Case B and Case C. Each of the cases was carefully designed in order to present to the social enterprise managers a differing profile keyed around the five categories of payback, risk, social return, total budget and financial standing. Thus, for example, Case C was a synthetic specimen project that suggests SIFE

would offer training to people in the community, this would have a duration of 3 years; from an organisation with low debt; it would have a £15,000 social return; a budget of £20000 and risk analysis were scored as medium. Case A, in contrast, was the delivery of training to a difficult to access and handle youth group, with a two year duration; for a financially weak organisation; with a greater than 3 year payback, a low budget and high risk; however, social returns were consequently much higher than for project C.

It can be seen that the three projects were carefully structured so that the profiles of each was different with Case A scoring lower than Case B and Case C in terms of an overall assessment using the five criteria for project selection determined earlier. If each project was correctly scored, project A would come out as the lowest, with C the highest and B in the

second place. Given the opportunity to select only two projects, the natural selection would be Project B and C. However, the social enterprise managers were informed that the selection of projects was limited to two of the three and that they should select on the basis of developing a balanced portfolio.

In terms of designing these synthetic specimen projects, care had been taken to ensure that the two projects B and C were high scoring but not complementary given that they were additive within the five selection criteria – e.g. they have similar levels of risk but rewards were also similarly low. With project A and C, the cases were designed so that they would be balanced with complementary project selection criteria so that the high risk of project A would balance the lower risks of project C; and the high social returns of project A would balance the lower returns of C.

SIFE social enterprise manager project scores

	Project A	Project B	Project C
Manager 1:	43	71	72
Manager 2:	55	60	64
Manager 3:	34	60	57
Manager 4:	52	73	82
Total score	184	264	275

All four of the social enterprise managers scored the three projects fairly similarly. When they were asked to select two projects from A, B and C, they opted for the two projects with the highest scores, that is, project B and project C and then ignored the portfolio advantages which would have accrued from the selection of the more complementary project A and C.

A discussion of the results and scores determined by the social enterprise managers’ assessment of the three specimen projects, indicated that they were happy with the structuring and scoring process. Given that the SIFE managers had not used any explicit criteria for project selection in the past, this requirement to use a structured set of criteria was novel to them. They felt that it would be useful in all social enterprises contingent on it being a low cost and easily operated process.

However, one of the managers considered the five criteria overly restrictive and felt that they should be extended and adjusted to take into consideration the nature of the particular social enterprise. Another concern was over the availability of time and information to make appropriate decisions and whether this would be available in practice given the short time frames and small projects with which social enterprises were generally concerned. The notion of a balanced portfolio of projects was not one that found resonance with the social enterprise managers and they did not feel it was a particularly helpful or necessary step for them in their organisation.

5. CONCLUSION

This research was designed as a small case study of project selection and portfolio development in a specialised organisational

form – the social enterprise. Social enterprise represents, at least in the UK, a new and growing business structure that has both a need for traditional management tools and techniques such as project and portfolio management, but which also requires these techniques to be adjusted and developed for the particular needs of the not-for-profit sector.

Generalisation of the results of such a small study to all social enterprises or to all organisations is fraught with the danger of building too much theory on too small an evidence base. That said, the results of this study do have resonance with the practical experience of project management of the participants. Project selection can very likely be improved by having clearly articulated criteria that relate closely to organisational objectives and strategies; and the tools of the analytic hierarchical process are helpful with this task. In this way, projects may be selected which have a clear match against the capabilities and objectives of the organisation and its managers. At the very least, developing clear criteria allows managers in these organisations to have more clarity about their decision making and to allow more discussion of those projects where managers give differing weights to the accepted criteria. Hopefully this will allow for better, or at least more transparent, decisions to be made. This research also shows that managers with little understanding or experience of more sophisticated project selection methods can become competent in their use in a very short time-frame and with only a small investment in training.

This study also shows that project portfolio selection is much more problematic as a concept and as a practical method of improving the organisation's balancing of projects and their profiles of risk and reward. The social enterprise managers found it difficult to grasp the notion that a set of what seem to be optimum projects may, once they are brought together, be sub-optimal in strategic terms. The managers, even when given synthetically developed project profiles, could not see how projects need to be matched so that low risk projects were balanced against high risk and where low return projects were matched against

high. It is likely that this unwillingness to manage projects strategically through the design of an appropriate portfolio structure is not uncommon in many commercial as well as social enterprises.

More research certainly needs to be undertaken in this area, firstly in the study of project portfolio selection and balancing and its relation with successful project completion and with organisational strategic goal achievement; and secondly in the training of project and other managers in the theory and practice of portfolio selection and management. A larger scale research study could uncover much useful material in the relatively new discipline of projects and portfolios; and more work on the social enterprise sector could improve the success and competence of the management in this sector of growing importance and influence.

REFERENCES

- Al Khalil, M. I. (2002). Selecting the appropriate project delivery method using AHP, *International Journal of Project Management*, 20, 469-474.
- Al-S. Al-Harbi, K.M. (2001). Application of the AHP in project management, *International Journal of Project Management*, 19, 2001, 19-27.
- APM Body of Knowledge, (2006). Association of Project Management, UK.
- Armstrong, C. (2004). *Project Portfolio Selection methods*, University of Wisconsin-Platteville, USA.
- Belton, V., & Gear, T. (1983). *On a shortcoming of Saaty's method of analytical hierarchy*, Omega, 11(3), 228-230.
- Bridges, N.D. (2003). *Portfolio management in practice*, Handbook of Business Strategy, 4(1), 65-72.
- Cabinet Office, *Social Enterprise action plan*, (2009, April 29). Retrieved from http://www.cabinetoffice.gov.uk/third_sector/social_enterprise/action_plan.aspx.
- Cabinet Office, *Business Support for social enterprises*. (2011). Cabinet Office, UK.

- Cheng, P., & Ludlow, J. (2008). *The Three Models of Social Enterprise*. London: Venturesome.
- Cooper, R.G., Edgett, S.J., & Kleinschmidt, E.J. (2001). *Portfolio Management for new products: Picking the Winners*, Working Paper No.11, Product Development Institute, Ontario, USA.
- Dearden-Phillips, C., & Griffiths, M. (2011). *Guide to leading a mutual or social enterprise. Stepping Out, UK*.
- Gray, C.F., & Larson, E.W. (2002). *Project management: the managerial process*, 2nd ed., McGraw-Hill, USA.
- Hunt, R.A., & Killen, C.P. (2008). Best practice project portfolio management, *International Journal of Quality & Reliability Management*, 25(1).
- Kendall, G.I., & Rollins, S.C. (2003). *Advanced project portfolio management and the PMO: multiplying ROI at warp speed*, J. Ross Publishing.
- Levine, H.A., & Widelman, M. (2005). *Project Portfolio Management: A Practical Guide to Selecting Projects, Managing Portfolios, and Maximizing Benefits*, Wiley, India.
- Martino, J.P. (2003). *Project Selection* [in:] Milosevic, D.Z. *Project Management Toolbox Tools and Techniques for Practicing Project Manager*, John Wiley and Sons, Inc., USA.
- Miguel, P.A.C. (2008). Portfolio management and new product development implementation: A case study in a manufacturing firm, *International Journal of Quality & Reliability Management*, 25(1), 10-23.
- Mota, C. M. M., Almeida, A. T., & Alencar, L. H. (2009). A multiple criteria decision model for assigning priorities to activities in project management, *International Journal of Project Management*, 27, 175-181.
- Morris, P.W.G. & Pinto, J.K. (2007). *Project Program and Portfolio Management*, John Wiley and Sons Inc., Hoboken, USA.
- National Audit Office, (2009). *Building the Capacity of the Third Sector*. London: National Audit Office.
- OCG, (2005). *Managing Successful Projects with Prince2*. Office of Government Commerce, UK.
- Project Management Institute. (2004). *A Guide to Project Management Body of Knowledge (PMBOK® guide)*. Newtown Square: Project Management Institute.
- Rad, P.F., & Levin, G. (2006). *Project Portfolio Management Tools and Techniques*, IIL Publishing, New York, USA.
- Ridley-Duff, R. (2008). Social enterprise as a socially rational business, *International Journal of Entrepreneurial Behaviour & Research*, 14(5), 291-312.
- Saaty, T.L. (2001). *Decision Making for Leaders: The Analytic Hierarchy Process for Decisions in Complex World*, 3rd ed., RWS Publications, USA.
- Triantaphyllou, E., (2000). *Multi-criteria decision making methods*, Springer, USA.
- Wysocki, R. K., Beck Jr., R., & Crane, D. B. (2000). *Effective Project Management*, John Wiley & Sons, Inc., USA.
- Wysocki, R.K. (2002). *Effective Project Management*, 6th ed., John Wiley & Sons, Inc., USA.

COMMUNICATION MANAGEMENT IN VIRTUAL PROJECT ENVIRONMENT

Marko Mihić*

Faculty of Organizational Sciences, University of Belgrade, Serbia

Abstract: This paper focuses on the benefits of virtual project management implementation, as well as on the importance of communication management in a virtual team. The main goal is to show how to manage communication in a virtual project team in order to improve business performance and provide a long-term stability. Attention is paid to the communication channels, the management of technology, and the management of differences in culture and language.

The paper offers answers to the questions of how to ensure that the communication is conducted successfully and regularly, and what the new rules of communication, specific for the virtual age, are. These rules allow for an efficient project execution, designed to satisfy business needs. In addition to the many advantages of virtual project management, there are disadvantages which are also the subject of this paper and refer to the social interaction of the project team, the cultural differences, the language barriers, and the technologies implemented.

Key words: virtual project, communication, management, team work

1. INTRODUCTION

Project management is a complex and challenging task of searching for the best solutions within the defined budget and time. Virtual project management, however, is an even more demanding task. Project management entails planning, organizing and managing resources for the purpose of a successful completion of projects and realization of the project goals. The task of virtual project management is the same, only in this type of management the human resources, that is, the members of the team working on the project execution, are geographically dispersed. Furthermore, the team members are most frequently individuals that are situated in different cities, countries and even continents. Virtual project management is recognized as a new discipline of project management, i.e., a new manner of managing a project that owes its

evolution primarily to the Internet and various software tools that facilitate the project execution.

Virtual project management has its specific features, though. Here the team members differ in the manner they work, in the culture and even in their expectations, due to the country, the city, or the continent they come from. Project managers often collaborate with people they have never had any previous experience in working with, hence their task is to learn about the specific characteristics of their employees and define an appropriate method of work as well as an appropriate organizational culture. Virtual project management makes it rather difficult to the manager to get to know the team members well, as these are spatially dispersed, therefore the task of the manager as a creator of an atmosphere is often far from easy, and may even be impossible to accomplish.

*Corresponding author. Email: mihicm@fon.rs

What the members of a virtual project team rely on in accomplishing their task is certainly the technology, as well as various software tools that are meant to meet the needs of the virtual project management. The main task of any tool is to ensure an unobstructed communication among the team members given their geographical distance from one another and the complications this may cause. The purpose of these tools is to ensure that the team members collaborate in a virtual environment which is the only place they meet. These tools should also ensure that project managers manage the project more easily, which includes resource management as well as monitoring the project execution, among other things.

2. BACKGROUND: VIRTUAL PROJECT TEAMS

The concept of a virtual team is not easy to describe, partly because various theoreticians attached importance to various aspects of the team. Parker (1994) describes the team as a group of people with a high degree of autonomy directed towards achieving a certain goal or accomplishing a certain task. Katzenbach and Smith (1994) describe the team as a small group of people with complementary skills, committed to a certain goal and approach for which they are mutually accountable. Generally, virtual teams surpass the distances, the time zones and any organizational boundaries. Delisle et al. (2001) describe a virtual team as a set of members oriented to task accomplishment, acting as a temporary group, divided by geographical distance or in time. A majority of organizations take a project team, and therefore a virtual project team, to be an executive part of the organization. This is especially characteristic of the organizations that adopted a project management approach.

Indications are that virtual project organizations will be the next level of organizational structure evolution. Mayer (1998) maintains that virtual organizations are models the companies will use in the future. Only several years later, this vision has become a reality for a large number of companies. A survey into project managers' salaries reveals that virtual teams and global

projects surpass the boundaries of many a company, government or culture. The findings have shown that as many as 21% of respondents are engaged in the projects that include a number of countries, and that 15% of them work on projects including more than one continent (the Project Management Institute, 2001). One reason for this transformation is that customers, suppliers and employees are no longer located in the same city, but in different time zones and on different continents. It is fairly probable that in the next decade a majority of project managers will be engaged in virtual project teams for at least a part of their work time.

The culture of project management can be said to suffer important changes due to the development of virtual teams. It is interesting, however, that, while the virtual team concept is an important strategic tool for advanced organizations, little information is available on how this team should be maintained properly.

The reasons a majority of companies decide in favour of a transition to virtual teams are the following:

- Financial (transport and property costs reduction);
- Human resources (finding the right person for the job regardless of the location he/she is, a balanced business and private life of the employed);
- Organizational (decentralized organization, regional representatives, innovation).

The trends contributing to an ever stronger demand for forming virtual teams are as follows (Goncalves, 2005., Stoehr, 2002):

- Globalization
- Strategic alliances
- Telecommunications
- Downsizing
- Trend of outsourcing

The above listed are strongly supported in the analyses conducted by Visitacion (2003) and the Cutter Consortium (2005) in which the following is given:

- 50% of new software projects are Web based;
- 20% of them are critical;
- 31% of an organization's IT budget is spent on Web projects; and
- 95% of these projects are to be accomplished "within a year."

A primary advantage of virtual teams is the selection of most educated and most adequate resources, as the project manager has access to a large database of resources. An additional advantage is in that the people at certain locations have access to sophisticated technologies required that the project is properly completed, not available at other locations. The result is that virtual teams allow for the engagement of adequate people and technologies, both at reasonable prices.

On the other hand, one weakness of virtual teams is that their members do not have so much chance to get promoted, due to a lack of informal communication with their seniors. A large number of problems in virtual teams result from the fact that the management does not have much trust in the team that is not under constant supervision. Certain people prefer personal contacts and will never feel confident and at ease working in a virtual team. Others are more flexible and are willing to work in a virtual team in order to improve and move on in their job.

According to Goncalves' research (2005), the basic tasks accomplished by virtual teams as a percentage of their participation in the project manager's working hours are as follows:

- Business relations and communication with clients (35%);
- Defining, planning and organization of the project (25%);
- Measuring progress and quality control (15%);
- Coordination and communication within the team (10%);
- Technical problems solving (10%); and
- Managing virtual working environment (5%).

The data show that the project manager pays considerably more attention to the

communication with clients in comparison with the communication with team members and other stakeholders. This may lead to problems in communication, alienation among the team members, loss of team spirit and the synergy effect, which is one of the most important cohesive factors, regardless of the type of the team.

As well as any change in the organization, the implementation of virtual project management solutions brings, however, numerous challenges (Archibald, 2003). The first group of challenges refers to the capacity and competence of human resources in the organization to accept and implement the designed solutions, especially if these exceed the domain of their expertise (Burke, 2002, Gareis, 2003). A second group is related to fear, tradition or suppressed personal interests that may surface as a result of facing the change (Jovanovic et. al, 2007). A third group of challenges includes the work of virtual teams and discusses the problems in communication that result from dehumanization of work and alienation among the team members (Kimble, 2000; DeMarie, 2000; Ramachandran, 2005).

One of the biggest problems in virtual project management is the maturity of an organization to adopt and implement IT and e-PM solutions (Kloppenborg, 2002). Since project managers are professionals from various fields of expertise, often outside the IT sector, a clash may occur between the velocity in the development of e-PM support in the organization and the capacity of individuals to adopt and implement it in an adequate way (Petrovic et al., 2009). Therefore the importance of trainings in raising e-PM capacities of managers gains an ever increasing importance. The challenge is greater in that the technologies develop very fast, so it is possible that the acquired knowledge may become obsolete at an equally fast rate.

3. MANAGING VIRTUAL COMMUNICATION

Communication is a key success factor of any project. An increasing number of virtual projects create a need for better communication and collaboration among team members.

Traditional ways of communicating fail to meet most of the requirements of virtual project environment. Therefore, new technologies are implemented in a way that can support the transition to a virtual environment.

Talking about the work of virtual teams, it is necessary to mention that communication among the team members becomes significantly aggravated, primarily due to physical distance characteristic of them. Since body language is part of everyday communication, the recipient of the message will not be in a position to understand it properly.

Birdwhistell claims that 65% of the meaning of a message is conveyed by non-verbal communication (Birdwhistell, 1970). Nowadays, certain authors maintain that this percentage is significantly higher. Fromkin and Rodman, for example, claim that as much as 90% of the meaning of a message is conveyed non-verbally (Fromkin and Rodman, 1983).

When a person reads an e-mail, they receive only a small portion of the message they are to receive; consequently, chances are that misunderstanding among the team members may occur due to the very lack of personal interaction.

Similarly, informal communication is a major source of information. This type of communication is not present in virtual organizations. Members of the team do not have coffee together during the break, hence they cannot turn to their colleague to ask about his previous experience without using an e-mail or a telephone, which is far from being as efficient and as effective as it is in case of a traditional organization.

The most common types of communication in virtual teams include the following modalities:

Same time, different place

Synchronous communication is one that is conducted simultaneously. Telephone conversations, instant messages, as well as teleconferences are some of the typical examples of synchronous communication that is conducted from different places, but at the same point in time. Both the sender and the recipient of the message take part in the conversation at

the same given moment, while physically they can be at different places. Synchronous communication is effective in that the sender of the message gets it from the recipient immediately, hence it is considered to be a form of personal communication which is at the same time the most complete and the most natural type of communication.

Different time-different place communication

Asynchronous communication, that is, communication that is not conducted at the same point in time is ever more present in virtual teams, as the team members are dispersed over different geographical areas. The reason that the members of a virtual team have only a few hours a day when they can conduct a synchronous communication are the time zones.

This type of communication bears a serious risk that a sent message is read too late or is misunderstood, all of which can result in unreasonably prolonged communication that may last for several days. This delay in communication gradually results in tasks not being completed within the designed time, which can endanger the completion of the entire project.

Another characteristic of asynchronous communication is that the sender of the message can never be absolutely sure that his message reached its destination. It often happens that it takes several days for the reply to a sent e-mail to arrive, which renders the sender uncertain about whether the other party has received the message at all. This situation may result in a confusion and frustration among the members of a virtual team, which may be risky for a further execution of the project.

Different time-same place communication

This is a type of asynchronous communication which occurs when the team members use chat rooms or shared documents to communicate. Although communication is conducted at the same place, the unfavourable effects resulting from the lack of personal communication, i.e., a "face-to-face" communication are not diminished; nevertheless, this type of communication is considered to be a less complex and easier type of communication in

comparison with the different time-different place communication.

4. COMMUNICATION TOOLS IN VIRTUAL PROJECT ENVIRONMENT

There are a number of tools that enable communication to be established when working in a virtual team. Some of these tools are the following: e-mail, forums, telephone, video conferences, chat, PM portals and face-to-face conversations. In addition to the listed tools of communication, there are fax, websites, instant messages, etc.

E-mail. As a communication tool, e-mail has several advantages, mainly due to its being non-synchronized by nature. On reading an e-mail, people have more time to think about how to reply, as well as about the contents of their message, especially if the message is sent in a foreign language. In such a case, they will have time to look into the dictionary and find the appropriate translation equivalents for certain words or phrases. The basic drawbacks of e-mail are the lack of verbal interaction among the team members and a slow feedback.

Forums. Their advantages are the same as in case of e-mail, and besides, the posts can be changed, some offer the opportunity of search, they are well structured, they offer the opportunity of revising the message and do not oblige anybody to reply to the posts. Similarly to e-mail, the major disadvantage is the lack of verbal interaction and a slow feedback.

Telephone. As a communication tool, telephone is mainly used in personal and direct communication. Its advantages are many in comparison with e-mail, when there is a need for a dialogue. Using the telephone as a communication tool may be difficult since during the conversation one has no knowledge of the interlocutor's visual signs, and besides, one may find it difficult to understand the interlocutor if he/she comes from a different speaking area.

Videoconferences. This type of communication may be effective in case of a number of people having a conversation. In comparison with the telephone, in videoconferencing everybody has

an insight into what another one is saying. The drawback of this type of communication is that the transmission quality may be poor, which diminishes its usefulness and sometimes leads to frustrations. Videoconferences are mainly used when complex tasks, such as product development, are to be accomplished.

Chat. Chat is an informal type of communication, easy to use and useful in establishing better relations among the members of a virtual team. One advantage is also a prompt reply. On the other hand, there is a problem in using it, especially if people are slow in typing or do not have a full grasp of the communication language on a project.

Project management portals. The project management portals supply the centralization and coordination of project activities, which is a primary function of the Project Management Office. It is for this reason that in the last years the application of PM portals has been increasing in numerous companies that carry out various, complex and often geographically distant projects, i.e., possess a developed project organization, based on the implementation of the Project Management Office and on the application of temporary organizational structures (projects and programs) (Block, 2001).

Project management portals include Extranet or Intranet corporative portals. They represent developed user applications, completely integrated into the web environment. Their basic function is the centralization of all project information with an aim to work out and publish quality project documentation, project teams and their members' collaboration, sharing ideas and information related to the project, easier management and tracking of certain project aspects, such as risk, time, budget, resources etc.

The PM portal, integrated with scheduling applications, provides a powerful solution to the stakeholder's needs. Through a common interface, team members can submit reports on progress in a timely manner (accessible from anywhere that has Internet access), project managers can promptly verify progress and update schedules, and all project participants

can access the very latest status information in a controlled environment.

The basic advantages of virtual teams that coordinate their work via portals are the flexibility of access, the possibility of choice of the extent to which the stakeholders will be included into the work of the team, the creation of the so-called knowledge tanks and the establishments of the contacts going beyond the time and space limits. The disadvantages are generally reflected in the language and culture barriers (Jovanovic et. al, 2007). Problems related to words, accents or ways of expressing oneself are successfully solved by the use of electronic translators. These have proved to be a more efficient and less expensive means compared to language courses and training interpreters. The understanding of the message context is a much greater problem than the knowledge of foreign languages. The dialogue between different cultural groups allows for mutual understanding, thereby coming to a consensus about a common frame of work that would be flexible enough to give credit to each member of the team.

Face-to-face conversation. This type of communication is considered to be a most powerful communication tool as it adds a personal note to a conversation. When we talk face-to-face with a person, we can clearly see our interlocutor's reaction to our words. It is also one way to establish closer personal relations. A possible disadvantage is that it may take a lot of time and money to have such a meeting or conversation.

5. CULTURAL ASPECTS OF VIRTUAL COMMUNICATION

Why do authors tend to avoid cultural issues in project management? There are a number of reasons for this, among them the difficulty in measuring culture (Schein, 2004), the lack of research on leadership of multinational teams (Makilouko, 2004; Chevrier, 2003) and the lack of understanding of what culture is (Teerikangas, 2002).

Multinational cultures have serious issues that have to be addressed when implementing a certain project management methodology

(Kerzner, 2004). Some of these issues are: culture impacted by a country's legal system, different calendars concerning holidays and vacations, inadequate skills and levels of training, decisions based upon customs and dietary considerations, increased barriers and filters, and misinterpretation of the body language (Jovanovic et. al, 2009).

Cultural differences are always present when talking about virtual teams; consequently, it is of great importance that attention should be paid to this aspect during the team coordination, since these differences may cause problems in communication among the members. Some are of opinion that communication via modern technology significantly reduces the cultural differences that exist among the team members. One example is using the forum that allows the foreigners more time to study certain issues. Using the Intranet, portals and other collaborative systems makes it possible to disseminate information to all the team members in a much faster manner. Also important technology is the translation software for turning messages into other languages.

On the other hand, some people believe that modern communication technologies increase the conflicts and raise cultural barriers. The problem in working with technologies, together with a lack of personal communication, reduces the trust and the commitment of the team members. The barriers in the communication among people coming from different cultures and speaking different languages is believed to rise even higher when using communication technology, which results into misunderstanding and a loss of important information. In addition to the manner of communication, it may happen that a more dominant culture will assume a prevailing position, thus making people from other cultures withdraw. It is, however, important to point out that regardless of all the problems that may occur, certain cultures rely on technology, hence this type of communication may prove to be genuinely useful for them. Three major dimensions that can aid understanding cultural differences and ways of communication in virtual teams (Nataatmadja I., Dyson L.E., 2005) are the following:

Group I: Individualism-collectivism. Those members of a team that belong to the collectivist culture prefer synchronous technologies (chat, teleconferences, video conferences) as these allow for an instant communication where the participants feel closer to one another, which results in the feeling of belonging to the team and to better relationships among the members. In individualist culture, on the other hand, the members of a team prefer to work autonomously, hence they concentrate upon autonomous work that flows alongside the work of the others and they prefer asynchronous technologies (e-mail, forums, etc.).

Group II: Directness-avoidance. Synchronous technologies allow for a higher level of interaction among the members, hence they are preferred by the members that favour direct communication.

Group III: High exposure - low exposure to publicity: Synchronous technologies are preferred by those members of a team who enjoy being exposed to publicity; this is the way they maintain a verbal or a non-verbal relationship with people, they can read the body language and this is what matters to them. On the other hand, there are members who do not like to be exposed to publicity; they prefer to focus upon concrete information and, consequently, their choices are asynchronous technologies.

Which communication channels should be used in the absence of a classical face-to-face conversation and in which manner is an issue that occurs frequently. Normally, in order that the communication via these channels be effective, it is necessary that the members of the team should command certain knowledge and skills. In order that communication be conducted unobstructed, however, it is necessary that a solid base for it should be ensured, and this is obviously a developed technology. According to Gross (2002), the most challenging task in the management of communication and virtual teams is actually the technology management, but also the management of the cultural differences that exist among the team members. Similarly, one

of rather difficult tasks for the virtual team managers is to build mutual trust and relations (Jarvenpaa i Leidner, 1999).

When selecting the technology to be implemented with the virtual team, attention should be paid to three factors (Nataatmadja I., Dyson L.E., 2005):

1. Cultural and language differences

It is necessary to designate the major communication language, and besides, technology should allow for the translation into other languages. The manner of communication is also very important: whether people talk in turns, or whether interruptions are allowed is something that has to be decided upon, as different cultures bring different customs. Visual presentation, i.e., the colours to be used etc., has to be adapted as well.

2. Technology

The technology to be implemented must be defined in accordance with different infrastructures and technological logistics in different countries.

3. Time and geographical location

Time zones have to be taken into account, as well as holidays observed in different countries. The same goes for the working hours and breaks.

6. CONCLUSION

An analysis of this paper may lead to a conclusion that virtual teams will be the method in which the business will be conducted and projects will be executed in the future. It is through virtual teams that the best experts from all over the world can be engaged, which means that we need not be confined to only the best from our own region; also, the operations costs are significantly reduced, and, most important, the time required for the project to be completed is significantly shortened.

On the other hand, using virtual teams in work bears certain risks that are worth paying attention to and devoting enough time to in order that they should be timely avoided. Here

we primarily have in mind the members of the team that come from different cultures, the selection of communication technology, the language barriers and the method in which the knowledge is spread.

Fortunately, these shortcomings can be surpassed in that a competent person will be appointed to coordinate the team members and their communication. When the first problems in communication emerge, adequate measures have to be undertaken to resolve them. This is by no means an easy job, however, it is crucial in a successful execution of the project in a virtual environment. The person responsible for the coordination of the members and the communication among them has to be able to create such a relationship among the members that they all feel they are part of the team, that they work towards a common goal.

An increasing number of companies embark on conducting projects in a virtual environment, as they become aware of the advantages such an approach offers. With a further development of technology, the communication in virtual teams will become both more effective and more efficient. Such an approach has broad prospects; in the near future an ever larger number of projects will be conducted employing virtual teams, and the importance of the persons managing the virtual communication will increase. Hence, the companies whose employees efficiently adapt to the dynamic development of modern technologies are certainly in an advanced position, therefore an increasing importance is expected to be assigned to education and trainings in the fields of communication management, virtual project management and project management software tools.

REFERENCES

- Archibald D. R. (2003). *Managing High-Technology Programs and Projects*, John Wiley & Sons, New York
- Birdwhistell R.L. (1970). *Kinesics and context*, University of Pennsylvania Press
- Block, T. R., & Frame J. D. (2001). *Today's project office: Gauging attitudes*. PM Network, 15(08), 50-53.
- Burke, W. (2002). *Organization change: Theory and practice*. London: Sage Publications
- Chevrier, S. (2003). Cross-cultural management in multinational project groups. *Journal of World Business*, 38(2), 141-149
- Cutter Consortium. (2005). Retrieved from <http://www.cutter.com>
- Delisle, C., Thomas, J., Jugdev, K., & Buckle, P. (2001). Virtual project teaming to bridge the distance: A case study. Paper presented at the 32nd annual Project Management Institute Seminars & Symposium, Nashville, Tennessee.
- DeMarie, S. M. (2000). Using virtual teams to manage complex projects: A case study of the radioactive waste management project. Department of Management, College of Business, Iowa State University
- Fromkin, V., Rodman, R. (1983). *An introduction to language*. London: Holt-Saunders.
- Gareis R. (2003). Competencies in the Project-oriented organization, IPMA World Congress, Moscow
- Goncalves M. (2005). *Managing Virtual Projects*, McGraw-Hill, New York
- Gross, T. (2002). Ambient Interfaces in a Web-Based Theatre of Work. In Proceedings of the Tenth Euromicro Workshop on Parallel, Distributed, and Network-Based Processing - PDP 2002 (Jan. 9-11, Gran Canaria, Spain).
- Jovanovic P, Mihic M, Petrovic D, (2007). Social Implications of Managing Project Stakeholders in Social Implications and Challenges of e-Business. (ed. Feng Li). Information Science Reference, Hershey, USA, 130-144.
- Jovanovic P., Obradovic V., Petrovic D., Mihic M., Jovanovic A. (2009). Cross-cultural aspects of project management: Serbia goes to Iraq for Jordan project, *International Journal of Industrial Engineering*, 16(4), 318-330.

- Katzenbach, Smith, (1994). *The Wisdom of Teams*, HarperBusiness
- Kerzner, H. (2004). *Advanced Project Management: Best Practices On Implementation*. 2nd edition. John Wiley & Sons, New York, USA
- Kimble, C., Li, F., & Barlow, A. (2000). Effective virtual teams through communities of practice. Strathclyde Business School
- Kloppenborg, T., & Opfer, W. (2002). The current state of project management research: Trends, interpretations and predictions. *Project Management Journal*, 33(2), 5-18.
- Makilouko, M. (2004). Coping with multicultural projects: The leadership styles of Finnish project managers. *International Journal of Project Management*, 22(5), 387-396.
- Mayer, M. (1998). *The Virtual Edge: Embracing Technology for Distributed Project Team Success*, Project Management Institute.
- Nataatmadja I., Dyson L.E., (2005). *ICT And Its Impact On Managing Global Virtual Teams*, University of Technology, Sydney
- Parker, G.M. (1994). Cross-functional collaboration, Training and Development, October, 49-52.
- Petrovic, D., Mihic, M., Stosic, B. (2009). *Strategic IT Portfolio Management for Development of Innovative Competences in Handbook on Strategic Information Technology and Portfolio management* (eds. Tan A, Theodorou P), Information Science Reference, Hershey, USA, 150-169.
- PMI Project Management Salary Survey, Project Management Institute, 2001
- Ramachandran, S. (2005). *Effect of cultural protocols on media choice in global virtual teams*. San Antonio: Department of Information Systems, The University of Texas
- Schein, E. H. (2004). *Organizational culture and leadership*. John Wiley & Sons, Inc., San Francisco, USA
- Stoehr T. (2002). *Managing e-Business Projects*, Springer, Berlin
- Teerikangas, S. (2002). *Managing the impact of cultural diversity on inter-organizational encounters: A literature review*. 2nd Annual Conference of the European Academy of Management. Stockholm, Sweden
- Visitacion, M. (2003). *Project management best practices: Key processes and common sense*. Giga Information Group Inc.

PROJECT MANAGEMENT SYSTEM INTEGRATION WITH COMPANY'S BUSINESS SYSTEM

Tomaž Kern*, Matjaž Roblek, Benjamin Urh

Faculty of Organizational Sciences, University of Maribor, Slovenia

Abstract: Projects are no longer isolated processes. They are fully integrated into the corporations in the modern business environment. Projects are mostly even incorporated into more than one company. They are connected to each other and to other business processes in the business system. This is why they need special preparation, management, precise project organization, adapted information support, correct documentation, a special organizational culture, etc. The special "Project System" (Prosis) was developed to support those demands. Prosis is composed of four subsystems (organizational, human resources, information and documentation). These subsystems have to be implemented gradually into the company, but always as a whole.

Key words: Project Processes, Project Information System, Project Management, Project Office

1. INTRODUCTION

Projects can be specified and defined in various ways (PMI, 2008). Each definition is appropriate and correct from a certain point of view. Each definition underlines a certain project's features or aspects. However, projects are rarely or never isolated from the business environment. To include a project in the business systems it is therefore necessary to define projects, especially in terms of organization. In the past many attempts were made to introduce projects into the existing organizational structure in the form of a special organizational unit or in another (mostly matrix) form. However, it has been noted lately that projects are not static and they must be introduced into the organization in a different way.

We have realized that projects are processes. Their main characteristic, in comparison with the other business processes running in the company or institution, is that projects are non-

repetitive processes. Due to this, they require special preparation each time; they also require adjusted management, specific definition of the organizational roles of everyone involved, adjusted information and documentation support and an organizational culture developed specially for their purpose.

Because the projects are implemented in interaction with the other processes and not in isolation and separated from the rest of the business world, they require the co-operation of people already involved in other processes. They use the same resources, take place in the same environment and time as other business processes and require (usually limited) funds.

2. PROJECT PROCESSES

Projects can therefore be specific (non repetitive) processes, on the one hand, while, on the other, they have to be integrated into a business environment. The question that arises here is how to manage this interconnected diversity. Projects must be managed and led in

*Corresponding author. Email: tomaz.kern@fov.uni-mb.si

a special way and everyone involved must be allowed to fully express their innovation and creativity while using their expert knowledge from the project's field. On the other hand, one must establish and manage a system that will provide certain rules that must be followed by participants in the project within a regulated business system. In order to achieve this processes are divided into two groups, i.e. the main project processes and the business project processes.

2.1. Main Project Processes

The project includes main processes or »working processes« or »transformation processes«. These are separated into activities and phases, which help achieve the goals of the project. This is actually the work that must be carried out during the project. Of course the work is organized in an appropriate way. Activities are time limited, interdependent and their implementation requires resources and creates expenses. The project must follow the determined ceilings. At the same time, within the individual activities, the self-initiative and creativity of the implementing team are encouraged and their full responsibility is expected in order to achieve the results desired.

2.2 Project Management Processes

In order for the implementing teams to have the possibility of »substantive freedom within individual activities«, »organizational rules« must be introduced to prevent chaos. These rules can be implemented via the »project management processes«. As part of these processes, projects are first initiated, then a concept and finally a plan are prepared (Trevor, 1996). Progression to each further preparation phase must be approved by the project sponsor. On approval of the plan, project implementation is also authorized. Project management processes also take place during the project. These are processes of project modification and project management. They are repeated periodically, their frequency depending on the duration of one period. Following the termination of the final activity, when the project reaches its goal and is basically complete, the final project management act is

carried out. The project must be formally closed and it is necessary to organize the project output and data storage etc.

Projects are actually divided into a substantive and organizational part. This gives a lot of freedom to the service providers, allowing managers to prepare and direct the project, while on the management level this approach allows the management of the projects as a whole and in unison with other processes.

All these present a major problem when considering substantial change dynamics and the high requirements of a business environment in many businesses and institutions. At the same time it is also a challenge and an opportunity for companies capable of accepting this organizational challenge. Lately, many practices have shown that success in project management cannot be expected without a system approach.

3. THE PROJECT INFORMATION SYSTEM

In the past there have been many attempts to support projects. In the majority of cases, the authors stayed focused only on information support for the projects. Usually the solutions are separated into individual modules covering the financial aspect, the scheduling aspect, the burden calculation etc. In terms of process, the support is mostly dedicated, i.e. developed for a certain type of development, investment, information projects, etc. These solutions (modular, informational and dedicated) are extremely difficult to transmit between various environments, and also it is not possible to support all the projects in a selected business system.

In general there are various approaches to information support for projects (Kern et al., 2004). The selection of the support depends on the project type, the project scale, the participants, their knowledge and experience, etc. The solution depends to a large extent on the environment where the projects are carried out.

In the simplest case no information technology is used to support a project information system.

Such a »**completely manual**« solution is maybe adequate for simple projects or for projects that take place in an environment where such technology cannot be implemented fast enough and cost-efficiently. Usually the reasons for this are the lack of time, knowledge or dedication of those involved. Problems can arise through long waiting and searching for appropriate documents. Mostly they cause delays and unnecessary administration costs. Such a solution is frequent even though it is not efficient.

Lately it has been possible to use a very simple solution. The development of a **static website** that allows the satisfactory management of individual simple project implementation (Hung, 1999). This solution was developed especially for circumstances that require an extremely fast establishment of the working environment (maybe in just a few hours), where the possibility of insight into the project and the technical documentation is essential, where many people from various locations are involved in an unstructured environment and where only basic information and communication technology is accessible. The disadvantage of this solution is that it must be prepared individually for each project. It does not allow interconnection of several projects and it requires a lot of maintenance. Usually it is linked only vaguely to tools for network planning. Documentation management also presents a major issue.

One of the possibilities it is to create or use a **dynamic website** – portal (Hung, 1999). This possibility is especially interesting for companies with several minor projects, but with an environment that is not structured enough for more advanced solutions. Websites by commercial providers supporting project management have been available on the market for quite some time. The advantage of these solutions lies mostly in their simple use, as they guarantee simpler maintenance and a certain amount of control. Linking to tools that support network planning is possible, though it is rather complicated.

Advanced special information solutions supporting project information systems use

various documentation or “**workflow systems**” as a basis (Bařna et al., 2006) (for example: Notes, MS - SP Portal Server). The advantages of these solutions lie in their support for every level of the project work. They also allow insight into a project from any place, the governance and management of a number of projects, strong data protection, connection with tools for network planning and considerable flexibility. The disadvantage is mostly the fact that these solutions are rather complex and therefore expensive. They require system administration (obligatory project office or project secretary) and are especially appropriate for well-structured environments (companies) with appropriate formalization (for example: organization regulation for project work) and for projects that are similar at least in structural terms.

The most complex integral solutions are linked to modern **ERP systems** in companies. From this a conclusion can be drawn that they allow for the management of major or well-structured projects in a regulated environment (Furlong, & Al-Karaghoulı, 2010). More time is needed for implementation and the systems are rather expensive. On the other hand, they have several advantages: they are an integral part of the companies information system or institution (an example is »MySap.com« and its »PS« module), they allow project planning, analysis and monitoring, enable systematic resources, costs and time management; allow project and technical documentation management, various reporting methods and connections to the entire business system and to other processes in the business system. Of course this makes them very complex and often they are not appropriate for managing all the projects in a business system. Along with this they are also somewhat rigid, inflexible and relatively difficult to implement.

4. PROSIS: SYSTEM FOR PROJECT SUPPORT

Analysis of the needs of companies and institutions with various processes, including projects, showed that it is vital to establish an integral project system that is also well integrated into the company’s business system

(Kern et al., 2007). It must also provide all the functions of dynamic web portals and integrate them with the functions of special project that are usually introduced gradually into a company or institution, however always in entirety. Prosis is not only an information support for the project system, but is also designed as a project system as a whole. Subsystems connected to Prosis allow integration and integral project management in a business system. These subsystems are:

- the organizational subsystem;
- the project human resource subsystem;
- the information subsystem and
- the documentation subsystem.

The **organizational subsystem** includes:

solutions. To support these efforts we have developed a project system called Prosis. Prosis consists of several interconnected subsystems

- the introduction and development of project culture in a business system;
- confirmation of the management, governance and implementation level of projects,
- the connection of projects and business processes into a single process web;
- the development of dynamic, process and project adjusted organizational structures;
- the development of system regulations and project work guidance in line with various quality standards and their efficient implementation.

The screenshot shows the 'Projektni sistem' (Project System) interface. On the left, there is a navigation menu under 'Administracija' (Administration) with options: 'Uporabniki' (Users), 'Črpanje podatkov' (Data extraction), 'Nastavitve' (Settings), and 'Dokumentacija' (Documentation). The main area displays a table with columns: 'Naziv' (Name), 'Org. vloga' (Organizational role), 'e-Mail', and 'Telefon' (Phone). The table lists various users and their roles, such as 'KOKALJ Špela' as 'Vodja projektne pisarne' (Project office manager) and 'KERN Tomaž' as 'Svetovalec' (Consultant) with email 'tomaz.kern@fov.uni-mb.si'.

Naziv	Org. vloga	e-Mail	Telefon
KOKALJ Špela	Vodja projektne pisarne		
ROBLEK Matjaž	Vodja projektne pisarne		
URH Benjamin	Vodja projektne pisarne		
ŠTENTA Mario	Vodja proizvodnje športne opreme		
BIZJAK Luka	Vodja proizvodne skupine		
KONDIČ Tatjana	Vodja proizvodne skupine		
ŠMID Marko	Vodja proizvodne skupine		
MESTEK Gregor	Vodja prodaje športne opreme		
LAŠIČ Vanja	Vodja montaže		
GODEC Tadeja	Vodja HR		
KRISTANC Sonja	Vodja FRS		
KLISARIČ Željka	Vodja - organizator dela		
KERN Tomaž	Svetovalec	tomaz.kern@fov.uni-mb.si	
AHČIN Tatjana	Referent za izobraževanje		
MAHKOVEC Tea	Referent za izobraževanje		
DJAKOVIČ Jelena	Razvojni tehnolog		
PETERCA Anita	Razvojni tehnolog		
GLUŠIČ Marko	Razvojni inženir		
KRALJ Nina	Razvojni inženir		
SEVER Matic	Razvojni inženir		
BOGATAJ Anja	Računovodja		
MARKUN Matic	Računovodja		
TREVEN Jurij	Računovodja		
COF Tim	Projektant športne opreme		

Figure 1: Review of Prosis part for organization and roles definition

The **HR subsystem** includes:

- the introduction of project roles in every organizational level of the business system,
- training the people who perform individual project roles and the gradual creation of appropriate competence profiles of individuals;
- the introduction of appropriate project awards into a business system.

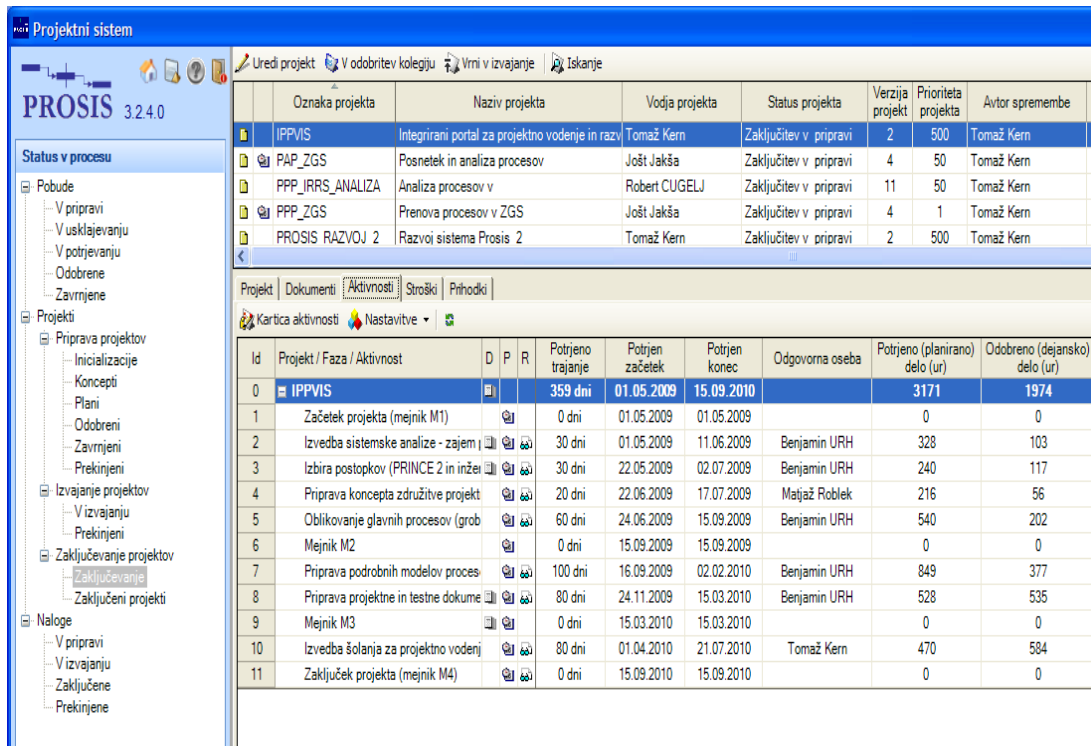


Figure 2: Review of individuals roles in selected project

The **information subsystem** allows:

- the use of all the possibilities offered by a renovated organizational and HR systems;
- support for the collection, processing and selection of project initiatives;
- support for the project initialization, conception, planning, implementation and finalization processes;
- support for the managers in decision making (figure 3) in a multi-project environment when determining goals, restrictions, priorities and output acceptance;
- support for project managers in the preparation and distribution of work, promotion monitoring, change management and work completion;
- support for the service provider's burden management, project schedule and costs management,
- support for the service providers in collecting the information required to carry out activities, in periodical reporting and when reporting on the output of activities.

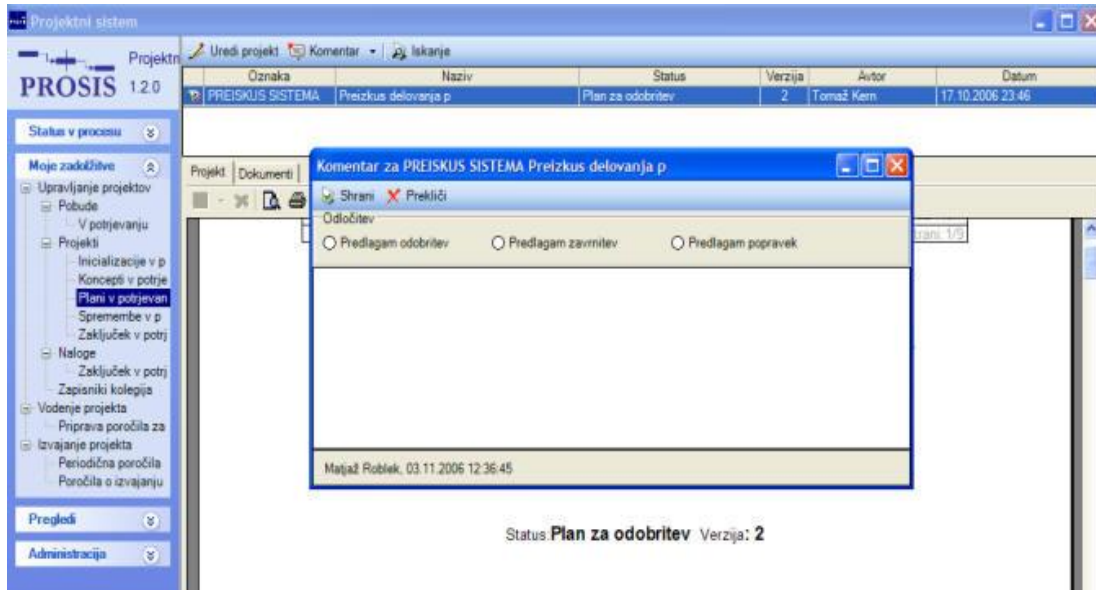


Figure 3: Review of Prosis part for manager's decision support

The **documentation subsystem** allows:

- the production, storage and distribution of technical (substantive) and project (organizational) documentation without considering the content and form,
- the management of various documentation statuses;
- the management of various documentation versions;
- the management of the archive of all documents;
- a complete security scheme when accessing data and documents for various project roles.

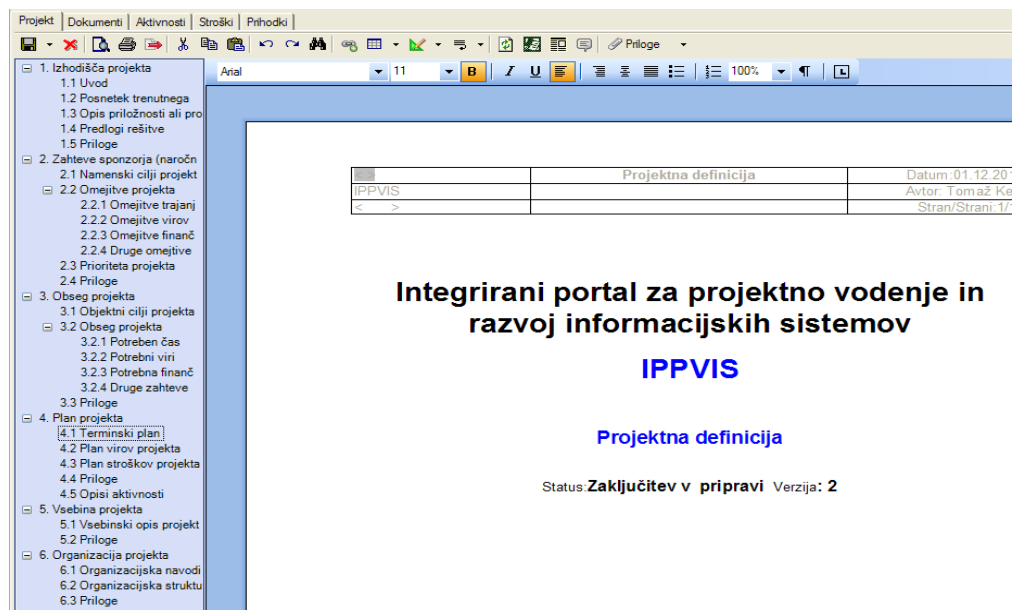


Figure 4: Review of »Project definition« document in a Prosis project system

5. STRENGTHS OF INFORMATION COMPONENT OF THE PROSIS

Organizational and HR subsystems by Prosis depend on the specific needs of the individual company. As a consequence, the information and documentation subsystems are subject to these requirements. The information and documentation core can therefore be adjusted each time to the requirements and integrated with the business information system of a chosen company. Therefore some innovative solutions are integrated. Some of them are described below:

- Project data are stored to one server and can be accessed anytime anywhere, which can be achieved using two types of access. Server-client access enables complete working, connection with tools for network planning and system administration. Access via the Internet allows access from secured computer networks as well. It is also possible to develop and establish access via mobile devices.
- The user work in the project is not restricted by system licenses for software. This can be achieved by integrating the extended software tools that are available to the majority of project participants. The documentation subsystem is part of the proper solution. The text editor is an adjusted »add-on« solution. The only software package that requires a license is the MS-Project. This requires local installation, but only on the project manager's computer. Other participants in the project do not need this software package.
- The basis for the Prosis information subsystem is a software solution, a so called »Project portal«. The user interface and its access to project information can be adjusted for the various needs of the project participants. This can be achieved by an appropriate definition of the »project roles«. These must be subject to the rules that regulate project work.
- Projects are not led by data but by documentation. Therefore users require all the advantages they are used to having at disposal when working with word editors. However, free-text is often unstructured. The project involves much precise data, for example: duration, start and end dates, the number of hours, costs, detailed goals, responsible persons etc. These data must be included in the database because they depend on a network plan and change frequently. Prosis solves the connection of a database and a free-text in an innovative way by using and adjusting a special word processor (TX Text Control, 2011).
- People in projects need simple, immediate and structured access to project documentation and project output documentation. This can be done through an electronic archive that forms part of Prosis. Its advantage is that the document structure is in line with the project structure. In such a way, documents are kept in activity files, phase files and project files. Documents can be pre-defined as a form, they can be unstructured or can have annexes attached. Forms are easy to change in terms of structure as well as content.
- Project preparation is one of the most important project management processes. Preparation is usually divided into initialization, conception and planning. Project information are transferred from one status to another status where they are complemented with new information. Unfortunately this means a lot of work copying data and project documents are therefore multiplied. In Prosis we need only one document during the preparation phase. It is called the »Project definition«. The solution is based on the fact that this document is automatically upgraded with new chapters when the project moves to the subsequent status. When transferring from a concept status into a plan, the document is upgraded with schedules, resource burden plans and costs tables.

The document is stored as a “new status” with the previous document always being accessible through the “document history”.

- Confirmation of the adequacy of an idea, concept or plan (and also of project modification and conclusion) must be done by a project sponsor.
- An important part of the project system is also the network planning. This is supported by the MS-Project. The data from the MS Project are integrated within a single database. This enables the above mentioned transformation of data into structured documents. This solution

enables updated data to be available at any time to every participant in the project.

- The system enables reporting at every project level. On the implementation level it provides a simple recording of hours spent (according to a plan) and of the work done. Each member of the project only sees the activities that he or she is intended to work on according to the plan and only during a determined period. A system to confirm the work reported using the so-called »periodic reports« has also been developed. Reporting on the project level is also supported.

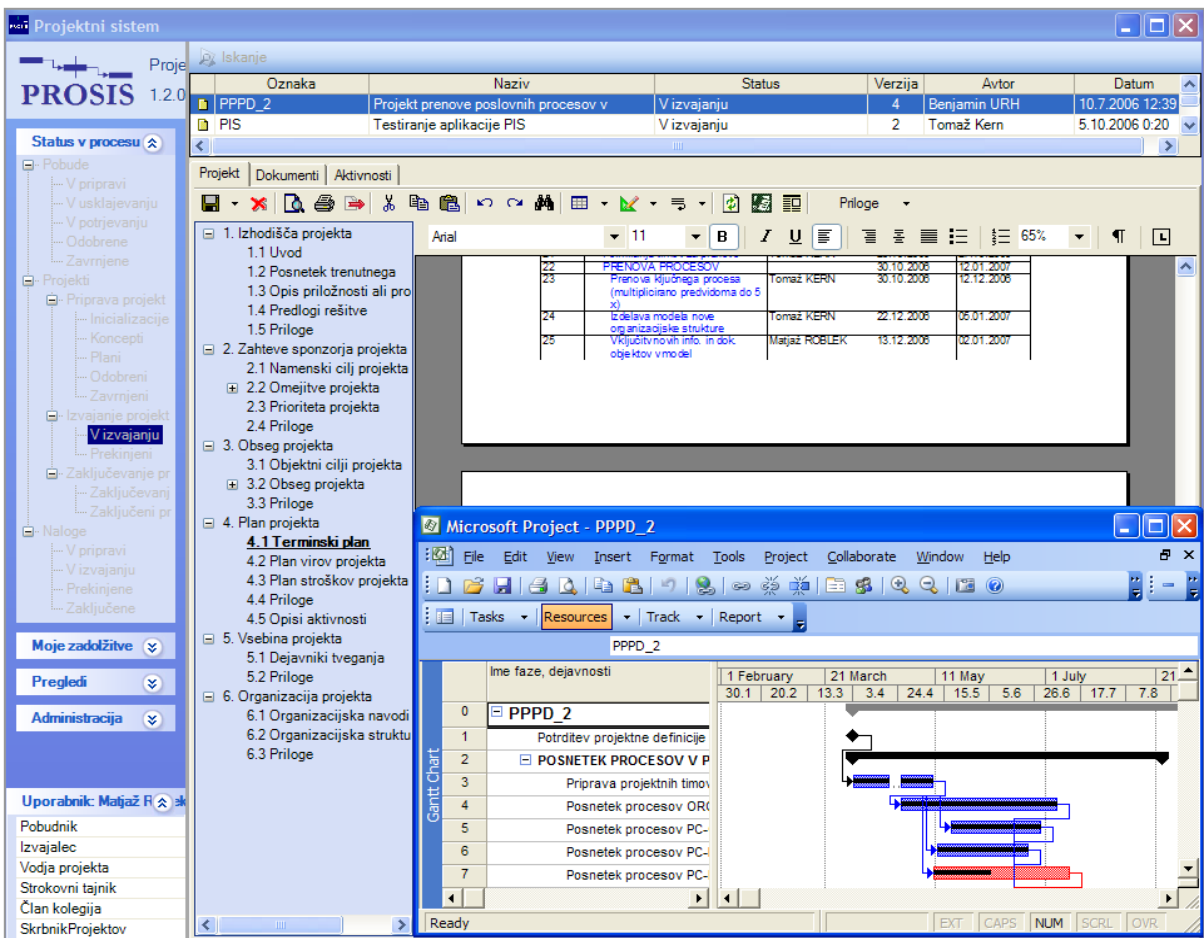


Figure 5: Review of selected project realization state, at the selected moment, in the Prosis

6. CONCLUSIONS

The conclusion can be drawn that projects need integrated documentation and information support. However, they must be completely adjusted to the needs of company projects and only implemented when a company is ready to carry out a project in terms of the organizational and personnel requirements in order to exploit all the possibilities offered by the technology. Project management is not possible without the appropriate information and documentation support, though, at the same time, experience shows that an incorrect implementation of such a system or even an inappropriate system can cause more harm than good.

REFERENCES

- Baïna, K., Benali, K., & Godart, C. (2006). DISCOBOLE: A service architecture for interconnecting workflow processes. *Computers in Industry, Vol. 57, No. 8/9*, p. 768.
- Furlong, S., & Al-Karaghoul, W. (2010). Delivering professional projects: The effectiveness of project management in transformational e-government initiatives. *Transforming Government: People, Process and Policy, Vol. 4, No. 1*, 73-94.
- Hung, K. (1999). Using the Project Portal Web Site to efficiently manage the disarray of business projects on the Web. M.S. dissertation, California State University, Long Beach, United States -- California.
- Kern, T., Urh, B., & Roblek, M. (2004). Projektni informacijski sistemi. Proceedings of the 23rd International Scientific Conference on organizational Science Development. Slovenia. Portorož. Management, knowledge and EU. Moderna organizacija.
- Kern, T., Urh, B., & Roblek, M. (2007). Prosis: Opis sistema in navodilo za uporabo. Protal. Interno gradivo.
- Project Management Institute. (2004). *A Guide to Project Management Body of Knowledge (PMBOK® guide)*. Newtown Square: Project Management Institute.
- Trevor, L. Y. (1996). *The Handbook of Project Management*. Kogan Page Limited. London.
- TX Text Control (2011). Retrieved from <http://www.textcontrol.com/>

KEY ELEMENTS OF INFORMATION SUPPORT FOR INNOVATION PROJECTS REALIZATION

Biljana Stošić*, Sonja Išljamović

Faculty of Organizational Sciences, University of Belgrade, Serbia

Abstract: The paper is related to an area of innovation projects information support i.e. description of an information system for continuous monitoring of present innovation projects realization. Starting from a theoretical concept, technical inventiveness and commercial exploitation of innovation can be considered both as a process and the output of the overall process of innovation. Given that innovation projects are identified as the first idea realization in certain conditions, with primarily loosely defined goals at the start together with high-level risk taking, it should be more than important to establish a system for managing these projects efficiently. On the other hand, Information and Communication Technology (ICT) has become a strategic tool that provides the possibility for the company to gain competitive advantage, and this should be especially the case in innovation management field. In that sense, the example of key elements of information system developed for innovation projects realization monitoring has been given, in order to enable the up-to-date insight into project status, phases, type and nature, risk level and other attributes relevant for successful implementation.

Key words: *Innovation project, Information system, Project realization*

1. INTRODUCTION

Starting from the most comprehensible definition of innovation project as a process of the first idea realization in given conditions including high-risk and multidisciplinary innovative teams, the importance of having a system for managing such a project efficiently becomes more than evident. Innovation is often used to signify something new, while the word *innovo* is traceable to Latin and could be translated as to renew (Brady and Soderlund, 2008). Innovation is one of the most important challenges, vital to the survival and prosperity of modern corporations (Ko et al., 2011). Among an extensive number of different innovation classifications, one that should be considered as standard can be found in the guidelines for collecting and interpreting innovation data, well-known in the innovation field as the "Oslo Manual" (Eurostat, 2005). According to this innovation definition, it can

be said that innovation projects represent a special project category which aims at development and implementation of a new or significantly improved product (goods or service), or process (implementation of a new or significantly improved production or delivery method), or a new marketing (implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing), or organizational method (implementation of a new organizational method in the firm's business practices, workplace organization or external relations).

The example here presented has been given of information system for innovation projects realization monitoring, developed to enable the up-to-date insight into project status, phases, type and nature, risk level and other attributes relevant for successful implementation.

*Corresponding author. Email: biljst@fon.bg.ac.rs

Nowadays, we have a growing number of software packages supporting the idea generating (ideation) phase, meaning collecting and evaluating ideas for new product/service development. Today, many companies have understood that systematic and structural approach to success needs support through an adequate information system. For example, the emerging information technologies (ITs) offer construction organizations great potential to develop collaborative work management information systems in architecture, engineering and construction (A/E/C) projects (Xue et al., 2012).

As the projects and their environments get more complex, subject to uncertainty, time and money pressures, the need for a really helpful and smart system to support the decision making and manage project information systematically, is accentuated. Generally, the project management information system can be defined as a system which supports and facilitates the delivery of any project, particularly those which are complex, subject to uncertainty, and under the market, time and money pressures or otherwise difficult to manage (Jaafari and Manivong, 1998). They can support project managers in their planning, organizing, control, reporting and decision making tasks, while evaluating and reporting at the same time (Raymond and Bergeron, 2008).

Information systems for supporting project realization have to be flexible and comprehensive in order to monitor and control project data, and they should also have the ability to evaluate individual projects, partial projects, or multiple projects. Nowadays, the acceptable number of software solutions - packages that can be used to manage projects can be found, among which the most notable may be considered to be the MS Project (Microsoft) and Primavera (Oracle). These solutions provide significant support in the project management filed, by following the time, costs and resources in an efficient way. Also, the importance of software for supporting project management can be indentified through a large number of open source software tools and project management packages developed in recent years, such as: Gantt Project, OpenProj,

and TaskJuggler. As well a large number of web applications have the ability to view project plans, provide resource, communication and cost management between projects (dotProject, Wrike, LiquidPlaner).

In contrast to some of the existing software solutions that provide the ability to manage projects, the main goal of the developed information system presented in this paper is to achieve the establishment of accurate, up-to-date, comprehensive and always available records on the implementation of innovation projects (Stosic et al., 2010). The aim of the proposed information system is to monitor the whole process of realization of the innovation projects and engaged resources, with the possibility of storing required information in the database and updated reporting. Also, the information system should help executives and project managers during the process of innovation project implementation to carry out project professionally and effectively, by using proven and reliable methods.

2. SELECTED INFORMATION SYSTEM COMPONENTS FOR INNOVATION PROJECT REALIZATION

Information and Communication Technology (ICT) has become a strategic tool that provides the possibility for the company to gain competitive advantage that should be especially the case in innovation management field. The information system can be defined as a set of interconnected elements that work together to collect, store, process and distribute information, to provide analysis, decision making, coordination and control in the organization (Lazarevic, 2006). The aim of the information system is to provide an efficient interaction of organization with the environment, customers, suppliers, competitors, government agencies, as well as continuous achievement of business goals.

The major idea of developing information systems for supporting the implementation and realization of innovation projects was to identify the project and business processes, where information systems modelling has been

done by using the structural system analysis and an extended entity-relationship model.

The information system includes a relational database (13 tables and 50 attributes), 10 screen-forms for data entry, 9 reports and 20 SQL queries, designed to keep a record of innovation projects, their type, success, innovation project team members, organizations implementing the project, forms of project legal protection, and for the propose of this paper we present selected components, concerning 4 key elements:

- Innovation Project;
- Organization;
- Employees;
- Legal protection.

Considering innovation projects to be a special project category, successful implementation requires keeping track about project start and

finishing date, project phases, financial and human resources, and the resulting overall social and economic effects. In this regard, presented information system can keep records about innovation project and its attributes such as project name, project ID, start and finish date for the whole project, and can also store information about each phase of innovation project, as it is shown in Figure 1. Date evidence about innovation project also includes possible risk and overall effect to market, society and company. As an indicator of project financial performance a parameter ROI (R2I) - return on investment was used, and this represents the measure of financial performance of innovative projects. According to a well-known innovation classification (Oslo Manual), information system can follow the innovation project within the certain nature and type of innovation (Figure 1).

Project item ID	Innovation project stage	Cost	Stage start date	Stage finish date
2.1	Discovery Stage	19.000,00 Din.	1.2.2009	13.2.2009
2.2	Scoping	24.000,00 Din.	14.2.2009	25.2.2009
2.3	Build Bussiness Case	87.000,00 Din.	26.3.2009	9.3.2009
2.4	Development	44.000,00 Din.	10.3.2009	23.3.2009
2.5	Testing and Validation	180.000,00 Din.	24.3.2009	5.4.2009
2.6.	Launch	95.000,00 Din.	6.4.2009	30.6.2009

Figure 1 – Innovation project entity form

Observing the organization as a generalized entity that in some way participates in the realization of innovation projects (i.e.

stakeholders), specialization can be made to the following organizations:

- Customers, Implementers - innovative organizations;

- Competitors - either in implementing the innovation project or in using innovation project results;
- Suppliers - providing support for implementation of the innovation project,
- Government - State authorities, government and ministries providing legal and financial

support necessary for successful implementation of the innovation project.

Figure 2 shows entity form of innovation project implementers, which characterizes the special type of organization that is responsible for project realization.

Figure 2 – Project stakeholder entity form

One of the key resources in process of innovation project realization represents people employed in the organization that performs innovation projects. In the process of ideas generating and implementing, employees' knowledge and experience, talents and personal character have the largest impact. Having that in mind, the information system also allows monitoring of all participants in the

implementation of the innovation project. The model is designed in a way that allows employees who participate in the realization of innovation projects to have an advisory role and the possibility of simultaneous work on more than one innovation projects. The user interface entity form that connects employees with innovation projects they work on is given in Figure 3.

Figure 3 - Employee on Project entity form

The organization that owns the intellectual property rights of the implementation of their innovation projects has the right to prevent any unauthorized use. For this purpose, in the developed information, system intellectual

property rights are observed only in the field of industrial property, which includes patents, technical innovation, know-how, industrial design, trademarks and service marks and geographical indications, as shown in Figure 4.

Figure 4 – Intellectual property for innovation project entity form

3. CONCLUSION

The information system for supporting innovation projects realization presented in this paper is based on the crucial characteristics of innovation projects models and elements. Managing and monitoring the implementation of innovation projects in the business and project portfolio has become a necessity for any

successful project-oriented organization. Especially, with the implementation of modern information and communication technologies, small and medium enterprises make the opportunity to increase their competitiveness.

In brief, the presented information system meets the following features:

- 1) Creating and saving information about innovation projects in the database;
- 2) Creating and saving information about organizations (customers, suppliers, competitors, government), and employees in the database;
- 3) View and print reports on innovative projects, employees, legal protection, etc. ..

Working with an information system enables improvements in effectiveness and efficiency in managerial tasks that are observed in terms of better project planning, scheduling, monitoring and control. Planning for organizational success assumes that the project manager is able to build alliances with key stakeholders in order to ensure that the innovation project results are successfully adopted on market. We can conclude that a developed information system should make a significant contribution to project success and should continue to be the subject of project management research.

By developing information system with aforesaid elements, structure and functionality, the opportunity arises not only to support ideation process, but to have the information considering other phases and attributes of innovation project as a whole. Keeping an accurate reports and having a review of achieved results creates an appropriate basis for successful innovation portfolio management in general.

REFERENCES

Brady, T., Soderlund, J. (2008). Projects in innovation, innovation in projects selected papers from the IRNOP VIII conference,

International Journal of Project Management, Vol: 26, 465–468.

Jaafari, A., Manivong, K. (1998). Towards a smart project management information system, *International Journal of Project Management*, Vol. 16, No. 4, 249-265.

Ko, K.K.B., To, C.K.M., Zhang, Z.M., Ngai, E.W.T., Theresa L.K. Chan, T.L.K. (2011). Analytic collaboration in virtual innovation projects, *Journal of Business Research*, Vol: 64,1327–1334.

Lazarević, B., et al. (2006). *Baze podataka*, Fakultet organizacionih nauka.

Organization for Economic Co-operation and Development, Eurostat. (2005). *Oslo Manual - Guidelines for Collecting and Interpreting Innovation Data*, Joint Publication, 3rd ed., OECD Publishing.

Raymond, L., Bergeron, F. (2008). Project management information systems: an empirical study of their impact on project managers and project success. *International Journal of Project Management*, Vol: 26, Iss:2, 213–220.

Stošić, B., Išljamović, S, Veselinović, I. (2010). Elements of information system for realization of innovation projects, *XII International Symposium Faculty of Organizational Science, SYMORG2010*, Zlatibor, Serbia.

Xue, X., Shen, Q., Fan, H., Li, H., Fan, S., (2012). IT supported collaborative work in A/E/C projects: A ten-year review, *Automation in Construction*, Vol: 21, 1–9.

APPLICATION OF PROBLEM STRUCTURING METHODS IN AN INTERNATIONAL ORGANIZATION

Amadeo Watkins *

*Senior Visiting Fellow at the Centre for Military Educational Outreach, King's College London,
and Director of INNDEGO Ltd.*

Abstract: Decision making within International Organisations (IO), especially those present on the ground within a developing country, acting to assist transition or reform processes, are problematic and complex. This paper looks at the application of more complex methodologies, which might assist these decision making processes. It fundamentally addressed the question of utilisation of strategic management in the public – diplomatic sector.

Key words: Problem Structuring Methods, Strategic Options Development, Oval Mapping Technique, System Dynamics

1. OVERVIEW

Problem Structuring Methods (PSMs) can be regarded as a strategic management tool usually applied to unstructured problems characterized by multiple stakeholders, multiple perspectives, conflicting interests, and high levels of uncertainty, which is exactly the working environment within many IOs. Hence their application would perfectly fit into the above mentioned, and would be a welcome novelty at this time of desirable change, despite the unfortunate fact that they are seldom used within the IO political and diplomacy context.

If it is decided to implement a PSM event, it is recommended that in the initial phase it is planned as a one time event which will aid the decision-making process as regards our short to medium term way forward, including the investment of resources. Aside from being an aid to decision making, the first exercise will also serve to obtain a buy in from those who have not been exposed to such challenging tools before.

Some of the issues a PSM exercise could address include: multi-national & cultural setting including difference values and work

methodology among the different units and departments within the IO, external stakeholder analysis, overall objectives and strategic direction, as well as possible re-organisation and eventual exit from the country (Keeney, 1996).

In terms of benefits of utilising a PSM exercise, issue definition is important as often the same terms or even words, mean different things to different people. This is particularly highlighted in an IO where many different nations are represented, not to mention the diplomatic mandate of the organisation, where this can be crucial (Dutton & Ottensmeyer, 1987; Smith, 2002). As in all organisations, managers tend to interpret issues as they affect them directly, or in terms of their national policy framework, especially in terms of personal interest and effect. The matter is further exacerbated by the frequent turnover of managers, especially at mid level.

The above directly impacts *mental models* within the IO. In terms of the IO mandate, these different mental models impact our work, including that of strategic management because they define our key issues and interpretation of the environment – ultimately dictating the

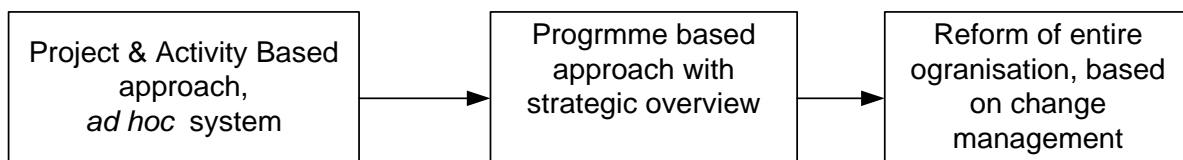
*Corresponding author. Email: amadeowatkins@btinternet.com

nature of change (Morecroft & Sterman, 2000). This also relates directly to *values* among all the staff within the IO. This is particularly important if we accept the well known change management rule that 'organisations never change, people do'. Values are fundamental in any decision making process, as it is they that define alternatives and thus policy options, when viewed holistically (Keeney, 1996).

Success or failure will depend on the ability to mobilise all relevant stakeholders for sufficient periods of time and allow for an open discussion to take place. Challenges in this respect must not be sidelined and those not performing to standards should be clearly challenged. The above mentioned disparity in values resulting from a multi-national working environment, while offering benefits in terms of broad professional knowledge, is also a negative factor as far as certain management

aspects are concerned. However, it is hoped that the high professional standards would enable a solid debate in terms of cognitive mapping. Moreover, it is exactly the use of PSMs which could aid this process and help develop it further, especially in terms of the development of New Public Management, an approach to managing public services that prioritises managerial, as opposed to professional skills (Osborne & Brown, 2005).

Going back to issue definition, the main problem is the methodology applied by the IO towards key interlocutors, i.e its mandated tasking. As clearly demonstrated in the chart below, this implies less reliance on project based management and more emphasis on a holistic and coordinated methodology at a strategic level. Hence, the PSM exercise will allow for a proper problem definition.



Furthermore, considering the IO is part of a wider system in most cases consisting of a HQ with country delegations, the suggested PSM models will enable a closer look at the way interaction takes place most importantly in terms of how interaction and communication take place vertically (and horizontally). Such an exercise will thus aid inter/intra IO strategies, long term planning and other strategic processes, such as intervention or exit strategies.

A further important benefit for the IO is likely to be consensus building, which is often lacking. Improved communication resulting from PSMs in an open format will also improve commitment, i.e. supportability of decisions (Franco). By mapping IO organisational issues, senior managers will be able to get further insight into their own areas and also be able to establish linkages between different programme areas, possibly opening new business opportunities (Vennix, 1999). This is likely to

impact future work methodology and diminish the box approach currently in existence, where units and departments within the IO do not fully coordinate and cooperate in project and programme outputs set.

Considering the above, it is suggested that a moving target approach be utilised, where the issue is open to further change as the PSM progresses (Jaques, 2004). Looking at the five case studies examined, not all cases - in terms of lessons learned and model utilisation - are applicable for our IO. Hence, in terms of a short brief, arguments will be presented only for those PSMs which could be deemed applicable to most IOs.

2. RELEVANT PSM APPLICATION

Introduction of strategic management into the public sector has evolved over the past 20 years, with the concept of New Public Management. The 5 case studies examined

below include several models relating to various operational research methods (OR). However, as mentioned, not all are relevant to all IOs considering the nature of business, including the various mandates IO can have. No doubt, the wider the IOs mandate, the more applicable these will be.

For IOs where a PSM has not been used before, a simple cognitive model is recommended in the first instance, using a facilitator who is experienced but neutral (Vennix, 1999). The *Strategic Options Development & Analysis* (SODA) is the method that most closely meets the cognitive mapping capacities within the IO's management landscape, as a problem structuring method particularly suited to problem identification (Eden & Ackermann, 2001). In other words, it is a general problem identification method that uses cognitive mapping as a modelling device for eliciting and recording individuals' views of a problem situation.

The mapping can in the first instance be done individually through individual interviews with managers (Ackermann & Eden, 2005). However, a group mapping model is recommended as the ideal next step, usually referred to as the *Oval Mapping Technique* (OMT) (*Wall ovals (post-its) are often used as a manual start to computer-based mapping using Banxia's Decision Explorer*). The development of a more regular framework, such as COLA in the case of the UK construction industry is unlikely to materialise, mainly as a result of the above mentioned management landscape (Franco, Cushman & Rosenhead, 2004).

The OMT can help in simple terms to identify issues, problems and challenges, i.e. strategic issues facing an organisation (Bryson, 2004). By using connecting arrows this technique links the operational level with the strategic issues in a very straightforward manner – based on subjective views of the individuals involved (Eden & Ackermann, 2001). As such it will help at e.g. unit or department level to make sense of situations or issues, especially to those who are new to the organisation, as well as those whose programmes and projects are

having difficulty at a unit implementation level. The informality of the process often means that it is easier to initiate the process and open up the discussion, thus helping to bring about relationships in the wider sense (Eden & Ackermann, 2002). Specifically, it would help those organisational units and managers who are 'boxed in' in their own issues to understand the perspectives of others in the process. In other words, people often see issues connected by one-way cause and effect relationships, failing to realise the holistic nature that is usually relevant.

The OMT is more than simply an assessment or analysis, as mapping is a dynamic learning process (Hickling, 2001). Hence, it is important at this stage to emphasise the importance of the fact that the top management not only endorses the mapping process, but also actively participates in it when ever required. This is especially important when a more holistic nature of factors comes into play and the complexity of issues becomes much larger, as argued below. Difficulties that can be anticipated include time management and availability due to day to day issues and frequent turnover of staff with little institutional memory.

The more complex the organization, the more chances there are of the existence of a specialized organizational unit separated from day to day pressures and dedicated to longer term planning and coordination (Friend & Hickling, 1997). The role of organisational units which have the tasking for strategic coordination or planning is seen as crucial, at least in terms of facilitation and linkage between various layers of management, as well as the management problem raised above. This is reinforced considering the bottom-up nature of the process (top-down visions and missions are defined by the IO's mandate).

The SODA methodology has recently developed further into *JOURNEY Making* (Jointly Understanding Reflecting and Negotiating strategy). In practice, these two PSMs comprise a number of interlinked elements: a neutral facilitator using cognitive mapping as a technique and computer software

(Decision Explorer) as a supporting tool if required to handle the complexity revealed by members of a working group. However, as time passed and as SODA was used for problem solving and issue management, management teams used the process and substantive outcomes as an influence on their overall strategy. Consequently, the theories and principles that inform SODA led to a significant extension of the methodology so that it became a ‘process oriented/management science strategy making and delivery methodology’. So, JOURNEY Making is designed to deal with two sorts of complexities: the complexity of the organisational environment within which to formulate a strategy, and internal complexity of formulating a strategy given a wide variety of views and interests (Eden & Ackermann, 2004). ***Strategic coordination or planning units within IOs can act as a positive link in these processes and are likely to positively contribute to the PSM exercise, when conducted.***

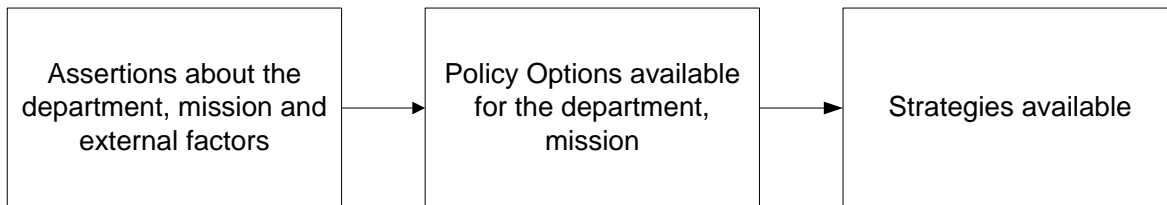
In this sense, JOURNEY Making is ultimately a useful tool for many IO in terms of looking at the new programme area related to assisting a beneficiary government Ministry. As noted above, it may take time to implement, depending largely on the successful implementation of the initial SODA/OMT workshops.

From an allocation of resources point of view, the engagement of a facilitator as well as possible computer software needs to be budgeted for, but represents a positive investment opportunity, especially if the PSM is to be repeated.

3. MIXING PSMS

This paper argues that more demanding PSMs – in terms of complexity of process and time required - can be considered as well, for those IOs which need to look at demanding questions. Top management support, in concluding that from HQ is a requirement, important in terms of the already highlighted problem relating to frequent turn over of staff within the IO as well as the highlighted multi-national breakdown of staff, expertise lying in the professional rather than management area of competencies, as well as the overall political mandate of the IO.

Cognitive/OMT maps take the form of a set of connected options-outcomes chains. Assertions about the world imply possible policy options which (taken in coherent bundles) in turn imply strategies for the organisation. These are often linked to the overarching goals of the organisation as shown in the chart below.



As mentioned above, SODA is recommended in our instance mainly as a problem identification method, to formulate key issues. To advance findings further as we move beyond lower organisational units of an IO up to the HQ level, in line with the above stated overarching goal setting, the utilisation of a ***System Dynamics*** (SD) model could be applied, based primarily as a qualitative model (*It is not likely that a quantitative PSM model*

will be supported, with significant institutional resistance at least in the short term)

Just like JOURNEY Making, the SD model can build on the initial SODA findings. Thus a combination of the two different PSMs is possible if a more holistic approach is desired (Rosenhead, 1996). This is also supported by the examined case study relating to the channel tunnel case found in INTERFACES No 27

(Ackermann, Eden & Williams, 1997). There are advantages to using two combined PSM methods. The initial SODA SPM (cognitive/OMT model applied with the COPE computer software) provided a blueprint for the subsequent application of SD. As argued in this case study 'using mixed methodologies in a decision-making process can provide a richer and more informed model, thus providing more validation' if required (Ibid).

The SD model, even in a qualitative mode, is interesting for two reasons. It takes into account feedback cycles, which are complex tasks to address (Sterman, 1994). Furthermore, SD is argued to address the deficiencies relating to flaws in human mental models, such as limited processing ability, perceptions, biases and so on (Vennix, 1999). Despite all these advantages, such a complex (and costly) PSM methodology is advised only if all conditions are right for its utilisation.

4. CONCLUSION

As a strategic management tool, PSMs can positively impact IOs which strive to assist reform processes in developing countries. Through the usage of a facilitated SODA PSM, and possibly the group model building SD exercise, IOs can aim to manage internal issues, including those in relation to their own political and diplomatic hierarchy as a whole. As such, PSM represent a value for money investment to be recommended.

However, despite the value added of such methods, there is little usage and they are not common practice within IOs. The organisational culture inherent from the past has not managed to introduce such innovative solutions, despite the fact that the complexity of challenges in face of globalisation, public demand and the information revolution has increased exponentially over the past decade or so.

Even in cases where senior civil servants and public managers apply PMS in their home government bodies and agencies, they do not take the practice on secondment or deployment to an IO. It is as if they enter a new organisational culture, and passively adopt the

set practices and methodologies present on the ground. An example is a national police force within an EU country. Many police forces use such methodologies to help them in decision-making in their home countries, but when deployed abroad within an international organisation, there is little PSM usage to resolve similar questions.

Hence, while PSM are highly recommended as a cost-effective tool, it is difficult to see their usage in terms of innovation and modernisation of the work practices within the IO community.

To give full justice to the argument, it must be said that PSM are not a panacea in all cases. IOs do operate within a unique working environment, dictated by political and diplomatic agreements, interests and so on. Also, it must be realised that such methods are only tools with limits, mostly used on an on-off basis. They are not ultimate solutions to all situations and problems, with many questions remaining over their utilisation (*For example, for a discussion on the merits of the SD model, as compared to Systems Thinking System Dynamics NEWSLETTER, Volume 21 – Number 4, October 2008.*)

This paper ends with the proposition that IO must modernise and reform just other state administration, of which members it consists, especially in the light of the modern world crisis. Terms such as New Public Management from the 1980s and Governance from the 1990s have only partially penetrated the IO business model. An open question to prompt further discussion and research is how best to achieve this?

REFERENCES:

- Ackermann, F., & Eden, C. (2005). *The Practice of Making Strategy: A step by step guide*, SAGE, 27
- Ackermann, F., Eden, C., & Williams, T. (1997, March-April). *Modelling for Litigation: Mixing Qualitative and Quantitative Approaches*, INTERFACES 27 (2), 48-65.

- Bryson, J.M. (2004). *Strategic Planning for Public and Non-profit organisations*, 3rd edition, Jossey-Brass, 203.
- Dutton, J.E., & Ottensmeyer, E. (1987). Strategic Issue Management Systems: Forms, Functions, and Contexts, *The Academy of Management Review*, Vol. 12, No. 2, 355-365
- Eden C., & Ackermann, F. (2004). Cognitive mapping expert views for policy analysis in the public sector, *European Journal of Operational Research*, No 152, 593
- Eden, C., & Ackermann, F. (2002). *A Mapping Framework for Strategy Making*, Anne S. Huff & Mark Jenkins, eds, Mapping Strategic Knowledge, SAGE, 175.
- Eden, C., & Ackermann, F. (2001). *SODA—the principles*, J. Rosenhead & J. Mingers, Eds., Rational Analysis for a Problematic World Revisited: Problem Structuring Methods for Complexity, Uncertainty and Conflict, John Wiley & Sons Ltd, 23, 43–60.
- Franco, A. *Managing Complexity and Uncertainty Module, Summary and Conclusions: Why are PSMs successful?*
- Franco, L.A., Cushman, M., & Rosenhead, J. (2004). Project review and learning in the construction industry: Embedding a problem structuring method within a partnership context, *European Journal of Operational Research*, No 152, 2004, 586.
- Friend, J., & Hickling, A. *Planning under Pressure: the Strategic Choice Approach*, Oxford 1997 (2nd edition): Butterworth & Heinemann, 3
- Hickling, A. (2001). *Gambling with Frozen Fire*, Jonathan Rosenhead & John Mingers, eds., Rational Analysis for a Problematic World Revisited, John Wiley & Sons; 2nd Edition, 152.
- Ibid, p. 62.
- Jaques, T. (2004). Issue definition: The neglected foundation of effective issue management, *Journal of Public Affairs*, Volume 4, No 2, Henry Stewart Publications, 194.
- Keeney, R.L. (1996). Value-focused thinking: Identifying decision opportunities and creating alternatives, *European Journal of Operational Research*, No. 92, 537.
- Morecroft, J.D.W., & Sterman, J.D. (2000). *Modeling for Learning Organisations*, New York, Productivity Press, 7.
- Osborne, S.P., & Brown, K. (2005). *Managing Change and Innovation in Public Service Organisations*, Routledge, 4.
- Rosenhead, J. (1996, Nov.- Dec) *What's the Problem? An Introduction to Problem Structuring Methods in INTERFACES*, Vol. 26, No. 6, 123.
- Smith, R.D. (2002) *Strategic Planning for Public Relations*, London, 21.
- Sterman, J.D. (1994). Learning in and about complex systems, *System Dynamics Review*, Vol 10, Summer-Fall, 303-309.
- Vennix, J.A.M. *Building Consensus*, 350, 351
- Vennix, J.A.M. (1999). Group model-building: tackling messy problems, *System Dynamics Review*, No 15, Vol 4, 381-385, 389.

CAPACITY AND DESIGN OF ORGANIZATION FOR PROJECT CHANGE MANAGEMENT

Vladimir Obradović*

Faculty of Organizational Sciences, University of Belgrade, Serbia

Abstract: Changes are all around. If the organization wants to survive it has to change constantly. However, a simple application of one of the many change management models is not enough. What is needed is organizational adjustment. This paper presents the importance of organizational capacity for change and steps on how to improve it. Also, the paper proposes three organizational change units which would help organizations manage numerous and continuous change management projects.

Key words: Change, Project, Organization, Capacity, Design

1. INTRODUCTION

Modern organizations can survive in a competitive environment only on condition they manage projects in an appropriate manner (Obradović, 2010). The inevitability of change is something that need not be talked about nor is it necessary to insist on its importance. If organizations accept the necessity of change, the right question is whether they are capable of changing and whether their changes are appropriate and fast enough.

In view of turbulent change in the environment, both profit- and non-profit sector organizations strive to learn how to manage change, developing their individual and organizational capacities and fostering innovativeness and leadership. Gartner estimates that less than 10% organizations have attempted to introduce change management at least in its most elementary form: by training managers, by building change management units or in some other manner. Similarly, 66% of change projects are either not timely completed or they exceed the budget (2006). The results of the

research conducted in 2006 are still more dramatic and reveal that only 6% projects are successfully completed and 32% are partially completed (Green, 2009). Despite a large number of change management models (Obradović, 2010), special attention has to be paid to organizational adjustment to implement these models and change implementation in general.

This paper is an attempt to elaborate two basic premises of organizational preconditions of change: capacity and organizational adjustment. The organization that is really oriented towards change management has to have mastered a certain capacity for such a management concept. This very important question has not been paid due attention to either by modern theory or by practice. Hence the first chapter of this paper will describe the basic components of organizational capacity for change as well as concrete suggestions for its improvement.

Another very important factor of change success is organizational adjustment. Traditional and certain modern organizations

*Corresponding author. Email: obradovicv@fon.rs

are still rigid, and do not permit even a slightest amount of flexibility for a spontaneous change implementation. Since strictly structured and formalized models make an indispensable portion of the managerial “*mindset*“, the paper proposes a formalization of new organizational units whose predominant goal would be an efficient and effective change management.

2. ORGANIZATIONAL CAPACITY FOR CHANGE

Generally, organizations are not really ready for change; therefore, this section of the paper will present a short review of what can be done to get closer to this goal. Important in the context of organizational capacity for change is their readiness for change, as well as the measures used to increase this readiness, i.e., improve the organizational adaptability to change.

2.1. Organizational readiness for change

In his approach, Harvard (2003) lists three basic steps in the process of improving the organization’s readiness to change:

- Assess a unit-per-unit readiness for change;
- Develop more participational approaches to the method in which the daily job is performed;
- Give people a voice.

Assess a unit-per-unit readiness for change

Organization as a whole may not be ready, nevertheless, certain units are often ready to move – they have reputable and effective leaders, they are motivated for change and the people in these units are used to working together and collaborating. The program of change should be commenced in these units and they should be used as basis for testing the initiative for change.

Develop a more participative approaches to the method in which the daily job is performed

Do what can be done to develop “habits“ of participation at work. Especially:

- Shift decision-making downwards, to the lowest possible levels;
- Start a free information exchange;
- Create a two-way communication
- Eliminate unnecessary symbols of hierarchy and unequal status – dining rooms and parking sites for managers, offices meant for either a higher or a lower status employees;
- Enhance participative management;
- Get into the trenches with the front line employees – and encourage other managers to do the same;
- Train people in working together and cross-function collaborating, addressing projects and problems through cross-functional teams; and
- Help people understand “why“ the change and work with them to discover “what“.

Give people a voice

Voice authorises people to act. Richard Axelrod says that the cornerstone of any democratic process is voice – power to be heard and affect the outcomes. Voice maximization means the expansion of the range of engagement to include those that can be affected by the change process, including those opposing to change, or those who have a different opinion. When people really believe that their voice counts, the critical mass/body for change is really created. However, in the companies where interactive communication is lacking, energy is more difficult to activate (Axelrod, 2001).

John Kotter stresses that employees do not generally help – or cannot help – in the efforts towards change if they feel they are relatively powerless or without the right of voice. He also identified the barriers for encouraging people that the others usually overlook (Figure 1). One barrier is a formal organizational structure. If, for example, the goal or vision is to “focus upon the consumer“, the organizational structure that fragmentizes resources and responsibilities into disconnected components will be a barrier to change. Similarly, the

structure built on the middle-level manager junctions will probably block any plan to encourage the managers of lower levels.

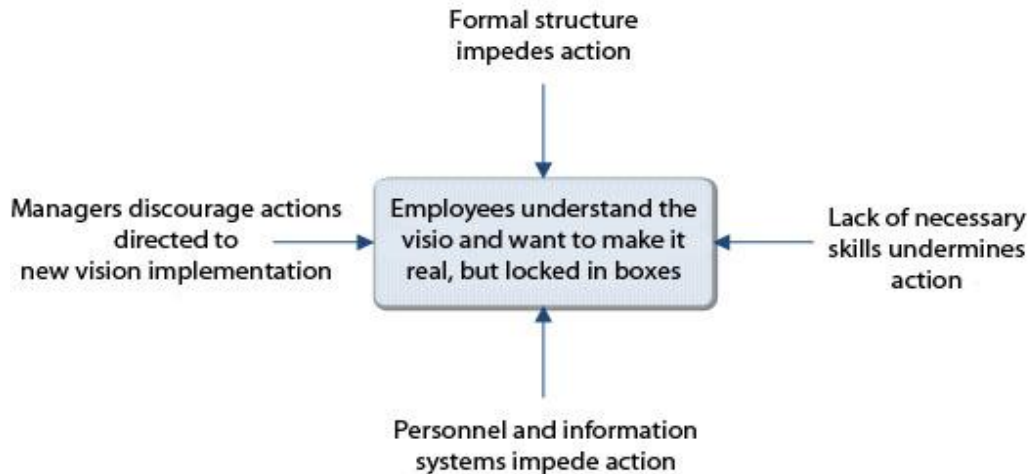


Figure 1. Barriers to strengthening (Kotter, Leading Change, 1996)

Dispel fear

The quality methodology developed by W. Edwards Deming includes fourteen points for an effective management. One of these points encourages managers to dispel fear at work posts. An organizational culture dominated by fear is incapable of substantial change. Fear makes people avoid risks, squat and be silent – even conceal disappointing results.

Inspired employees are essential for the success of organizational change. Suggestions that may be useful in encouraging employees are the following (Harvard Business Essentials, 2003):

- Encourage innovative thinking;
- Show respect for employees – and do it regularly;
- Delegate, but don't follow each step;
- Expand trust. In case there is dissatisfaction as regards results, identify causes and work on them;
- Be flexible and show this flexibility to others;
- Encourage taking risks and be tolerant of failures;

- Delegate decision-making authority.

Obviously, change cannot occur in a fear-stricken environment. For example, people in despotic nations know that the best way to survive is to keep silent, follow orders and cover errors when necessary. These countries have, however, been overcome by their more open rivals. Companies are no different. Employees on all the levels have to feel free to reconsider the status quo, identify problems and propose solutions – even if their attitudes are not consistent to the leader's attitude. They can also feel free to try new things without fear of being punished if they fail.

2.2. Increase organizational adaptability

The organization that can change frequently and effortlessly is well positioned for success in the 21st century (Greenfield, 2008). In an everchanging environment, organizations that can innovate and change faster than others are those that will survive and prosper in the long run. Can a large, inflexible organization make itself more prone to change? Can it learn to be flexible and to bend and even transform when necessary? The answer to these questions is "yes", although this may require a fundamental shift in the culture and a certain time to

accomplish it. Of course, the organizations that train their people, especially their leaders according to the principles of an effective change management will eliminate numerous difficulties related to the major change.

Greenfield proposes certain steps the organization has to undertake to improve its adaptability to change:

1. training leaders for leading change,
2. developing understanding of change within organization,
3. establishing open communication,
4. establishing project discipline,
5. establishing the culture of learning and development,
6. establishing performance-based management,
7. establishing the purpose and value system,
8. empowerment,
9. establishing change as organizational root.

Certain changes can be performed promptly, while others, those that require fundamental change, require more time. The route one will take in improving the organizational adaptability to change depends on the starting point. If the organization is already prepared for change, some of the above listed steps may prove to be redundant.

1. Training leaders in change leading skills

Training (educating) managers and directors in how to lead change is perhaps the most efficient and effective method of improving organizational adaptability. If the leader is motivated and capable of leading the change, of participating in an open communication, empowering his people and supporting and encouraging them through success and failures of organizational change, there is a real chance that the change will succeed. Leaders who appreciate the change consequences also frequently design and implement change in a manner that is more customer-friendly.

Leaders are, naturally, only people. They are pressed by the same forces that deter people from adopting substantial changes, hence orienting them towards the purpose of the given change is equally important as developing their skills in change leading.

Educating leaders about change may actually help achieve the double goals of increasing their personal tolerance to change (through a more sincere acceptance of the change process) with a simultaneous fostering of their capabilities of leading others through change.

2. Developing understanding of change within organization

The first step in helping people cope with change is to help them understand why change will be difficult to them. If they understand the forces of change, they will not be surprised if they feel upset or frustrated, they will realize that this is only a part of the change process and that it is normal that they fight with abandoning the old ways in leading change. They will also develop a common language to express their frustrations or solve problems. For example, they can ask the leader about success factors after change or require a degree of autonomy in implementing change in their own manner. Once this understanding of change has been established throughout the organization, people will feel they have greater control over the situation and will be more relaxed as regards transition process. Shortly, this will make possible to just open the door instead of knocking at the locked door.

3. Establishing open communication

Open communication is critical in helping people feel included into change (instead of being the victims of change). It helps people understand the purpose of change, as well as its advantages and weaknesses. A regular, open and sincere communication nurtures trust, increases certainty and thus reduces anxiety.

Introducing a succession of communication mechanisms into the everyday life of the organization and building a culture of open, two-way communication is one of the most important factors in developing adaptability to change. Poor communication means that people

have to rely on rumours and assume that the leader team actively conceals things from them. Poor communication is a way to mistrust, especially during the change period.

4. Establishing project discipline

Every substantial change requires an effective project management if it is to be introduced with as few errors as possible. A good project manager ensures that the efforts of different people are efficiently controlled, that problems and risks are identified and treated in an appropriate manner and that the overall effort is supervised and led by an adequate group of senior managers. Good project managers will build the elements of change management, such as communication with stakeholders and post-implementation support, into their plans. A strict project discipline allows for monitoring the past records on successful changes, raising the level of trust among those affected by change and reducing the uncertainty and anxiety levels.

It is just what Greenfield and other authors advocate that contributes to the importance and justifiability of the model presented in this paper.

5. Establishing the culture of learning and development

At the very idea of having to learn something new, especially in a formal environment such as the training room, some people feel as though they were sent back to school or being told that they were not good enough in their work. Other view it as a "day off work". Organizations that regularly train their people can overcome these prejudices and establish a culture in which people expect to learn and improve their performance. Hence, when the change comes, the process of learning new skills and behaviours will be direct and well-known.

On the organizational level, learning culture means that organizations are ready and able to reconsider the past failures and success and systematically improve their performance on the basis of the lessons learned. Failures are very often either put aside as unfortunate incidents which are best to forget, or become a focus of shame. In view of this, the

organizations that view failure as an important opportunity to learn and improve diminish their chances to make mistakes in the future. Perhaps a greatest surprise is the proneness to forget the success in search of a new challenge. People and organizations that learn systematically from their success and failures will learn something new from each change they encounter (through a process of a group post-project review) and improve their collective skills in change implementation.

6. Establishing performance-based management

Even after the change is launched, people can still choose not to let change happen. They may choose not to adopt new principles of customer service or not to follow a new, more efficient, business practice. They may also choose not to use the new computer systems to their full potential or not to accept their roles in a new organizational structure. Hence, if the benefits from change are to be understood and recognized, some time has to be devoted to its embedding into the organization after it has been launched. Perhaps the most important tool for this is performance management.

If people are aware of the goals they have to achieve and of behaviour they have to show, and if managers deem people responsible and teach them how to improve, then an effective performance management is established. When change comes, it is relatively simple to educate people on changed behavior and new goals, and it is easy for managers to support them in adopting new behaviours for achieving new goals.

7. Establishing the purpose and value system

A strong feeling of purpose and a well established set of values gives people a feeling of certainty (and even control) during the period of extensive change. In case these are missing, a strong will is required on the top level to establish them, not to mention the large amount of effort and time. Those organizations that establish a strong feeling of identity and strict culture, however, have proved to be more successful in the long run in comparison with the organizations that fail to do that. This is not

surprising, since these organizations have what they need to survive the storm that faces any organization that lasts for any longer period of time.

8. Empowering

The people on the top hierarchy level of the organization often feel happy about important changes. The truth is, it is they who participated in the discussion that led to change and made the decision to take this course. They usually care more about whether their managers and staff will implement their decisions and they are sometimes feel impaired when their enthusiasm for a certain initiative is not reflected on the lower levels in the organization.

In the organizations that nurture the empowering practice, people are trusted and expected to make decisions autonomously and act accordingly. They are granted ownership over change, hence their tendency to feel victims to it is reduced. People in such organizations cannot rely on their manager to tell them what to do, they get used to employing their own initiative in coping with new situations. Hence the demolition of organizational hierarchy makes people and organizations more adaptable to change.

9. Establishing change as organizational root

Small entrepreneurship organizations with a clear sense of purpose, in which everything is new and where everybody is oriented in the same direction, can often get better of their slower, clumsier, risk-averse competitors. In such organizations, change is accepted as an indispensable component of growth. A successful change is celebrated, while failure is used as an opportunity to learn how to succeed the next time. Risk is not used as an automatic excuse not to do anything, nor is it ignored. Instead, it is managed as best as possible.

This is not a picture the people in a larger, more mature organization will probably recognize. They believe that their organization is not used to change and that they have to fight and scream to introduce new ideas. They feel a fear of risk that results into a slower decision making and avoiding any danger. Instead of promptly responding to change in the

environment, their organizations have become rigid and, consequently, unable to go in step with time.

As well as people, organizations need regular practice to remain fit and swift. Instead of doing exercises of stretching and go to the gym regularly, organizations need a regular change to build up their flexibility and endurance. Only by practicing change can people and organizations get used to it. Finally, change becomes an accepted norm and people make a big step forward.

3. ORGANIZATIONAL UNIT FOR PROJECT CHANGE MANAGEMENT

Many organizations perform their business operations in the manner best known to them or in the manner they have traditionally done it. All faster changes in the environment lead to business processes being transformed into projects. A majority of successful organizations have understood the importance of projects upon the overall success and adopted project management as an exceptionally valuable discipline. This new approach to business requires certain organizational regrouping and adjustments. Project management within the organization also requires a certain support in terms of standards, practice and technology that define the method of project management in an organization.

The organization that manages its business through projects requires organizational support in all the phases of project management: planning, execution and control. This organizational support actually means setting up of a new organizational unit that is generally called the project management unit.

Project management units (PMU) may be of varied sizes and forms. They can appear in a virtual form or in the form of a formal group with a powerful impact throughout the organization. The PMU are sometimes confined to planning and control of a specific project; on the other hand, they may be responsible for the implementation of a multitude of strategic projects (England, Graham, & Dinsmore, 2003). The project management unit is an organizational form designed to support the

project manager in his job (Kerzner, 2006). The *Project Management Institute* (PMI) defines the project management unit as an organizational unit that centralizes and coordinates project management in its domain (Project Management Institute, 2008). The *International Project Management Association* (IPMA) distinguishes between the design office and the project management unit. The project management unit or a project portfolio office is part of a permanent organization whose tasks are to provide standards and guidelines for project managers of various projects, to collect data from various projects, to process them and, on the basis of these data, to report the hierarchally defined management body. It is also in charge of the consistency of certain projects with the organizational vision and strategy. The design office, according to the IPMA, is part of the organization of a large project whose goal is to support project management (IPMA, 2006).

Regardless of a large number of definitions offered by various institutions and authors, all of them basically mean the same. The project management unit is an organizational unit engaged in planning, execution and control of programs, projects and subprojects from the organization's or client's portfolio.

It is important to bear in mind that the project management unit may appear under a host of different names, which all present a generic syntagms which refer to different things in different environments. A large number of names for a project management unit mean that this organizational form is widespread and that each project management unit is unique. Regardless of their definite uniqueness, project management units can be classed into several groups or categories. The project management unit forms, as well as their names, are most often related to the level of project maturity and competence. Different forms actually mean different phases in the organizational development of the project unit.

Similarly to the project management units that refer to the management of a number of projects and programmes from different business areas, a program management unit can be defined.

An increasing number of changes in the environment and in organizations, documented in the empiric research results, highlight the importance of the change process for the organizational survival and requires that respective organizational units should be formed. The permanent presence of a change management unit in the organizational design context is a necessity, since changes are no longer a sporadic phenomenon, but rather a phenomenon that defines not only the manner in which organizations will do business, but how they will survive at all.

The form of a change management unit, as well as its size, structure, durability, positioning, etc., depend on a large number of factors, among them:

- organizational size;
- existing organizational structure;
- organizational maturity;
- organizational culture;
- awareness of change, etc.

In accordance with the above listed factors, and taking into account the experience related to the project management units, three basic forms of change management unit can be defined:

- Change Project Office – CPO
- Change Management Office – CMO
- Strategic Change Management Office – SCMO

The listed change management unit forms with basic characteristics are presented in Figure 2.

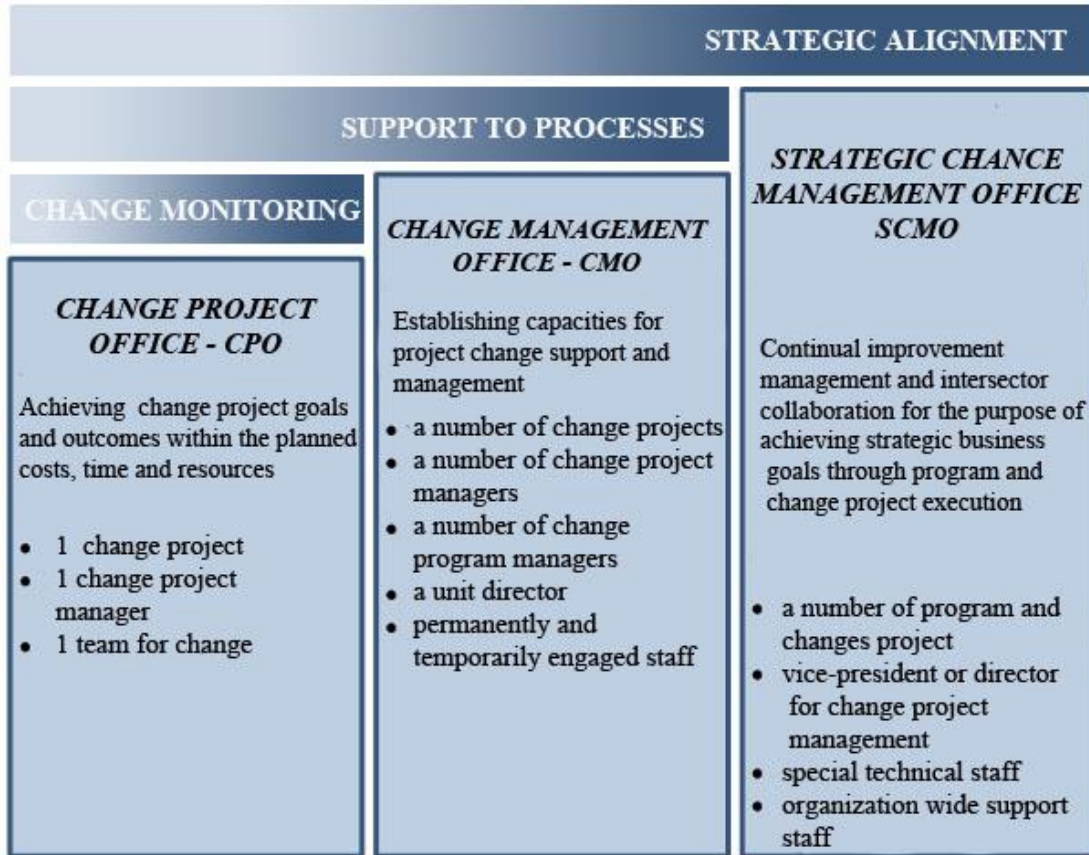


Figure 2. Forms of change management organizational unit

Hereinafter, the basic characteristics of each of the proposed forms of units will be presented.

3.1. Change Project Office – CPO

According to the classification above, the *Change Project Office – CPO* is a basic unit for the supervision of change project execution. It is actually a work environment of the change project manager and the team for change responsible for a successful execution of change.

There can be one or more change project offices within one organization, which requires a synchronization of approaches and methodologies implemented in management. The higher management levels should give support in forming individual units of this type and provide guidelines for their operations.

In this context of organizational development, the competencies of the change project office

are really small. By definition, it does not affect the activities of more than one manager and is not competent for the change program management, nor for any relevant issue related to strategic management. Nevertheless, it performs essential functions related to the project management implementation and monitoring and is responsible for an effective and efficient management on the level of one change, i.e., one change project.

The change project office is in charge of a number of different activities, among them:

- The implementation of principles and techniques of modern change management and project management, through knowledge and skills of the change project manager in order that a successful execution of change be ensured. This unit concentrates upon the outcomes resulting from the goals

of change and manages the vital elements of each change project – costs, time and resources. Management of these elements indispensably leads to the performance improvement as well as to coordination of corrective actions in case problems are identified.

- It is a direct connection between the team for change and the project performance (performance of change project). The majority of project team members are technically focused, hence the change project office has to introduce the elements of change management and project management. Accordingly, the difference is stressed between technical requirements that are to create technically perfect change and the requirements of general management responsible for the project and business success of the change.
- The implementation of organizational guidelines in the forms of policies, standards, executive decisions, etc. The change project office also has competence in the supervision of the implementation and integration of business processes in an environment of constant changes.
- Most often represents the highest level of technical supervision and the first level of business supervision. The task of the change project office is to implement technical standards, methods and procedures in the concrete change project environment. On the other hand, its role as regards organizational business issues is less pronounced, because it is primarily in charge of the realization of one definite change project.

The role of the change project office, therefore, is to implement a majority of functions in change management and project management. It implements policies, practice and guidelines generally administered by upper-level management. Its functionality, however, includes only one change, that is, one change project it supports.

3.2. Change Management Office – CMO

The *Change Management Office – CMO* is also engaged in supervision and control of a number of different change projects. Furthermore, it focuses upon support that optimizes the business and project performance of change.

The change management office can evolve from the change project office. Due to creating one or more change management offices, parallelly or successively, there arises the need within the organization to pass to a higher organizational level, that is, pass from a temporary into a permanent organizational unit. Similarly, the change management unit can be created as an entirely new unit, which requires a greater initial effort in the selection of staff, defining the work procedures, setting standards in project and change management.

The establishing of change management offices is a solution for organizations that wish to implement change management as their core business competence, improve their capabilities of change project management or improve the organizational maturity level.

The change management office requires a permanently employed director and at least two permanently and several temporarily hired assistants for the purpose of a successful implementation and functioning of the office. With growth and development, the need for staff will increase, especially in view of administrative staff. The increased level of resources and the support to this business endeavour should result in partial functionality of the office in a space of time of several months. To be completely functional will take a period of two to three years.

The change management office is generally engaged in activities of change project supervision and control, with a special focus upon introducing support for change management in the organization. The standard office:

- Serves as central point of support to change management in the organization: resource for other business units, support in professional

practice of change managers and teams for change, coordinator and collaborator in the activities of including stakeholders (resource manager, customers and suppliers).

- Functions as mediator between business environment and change projects. Transmits policies and executive guidelines for change performance and is engaged in activities related to business interests and change project goals.
- Helps design processes and is a catalyser of excellence in change management. This is achieved on the basis of a wide range of activities – from change management methodology implementation based on project management and practice meant to ensure the project success, to establishing a system of reporting and collaboration, to support in the context of change leading and business performance management.
- Plays a role of change promoter before the upper-level management. Participates (or summons and presides) in the work of control boards that include sector directors and senior managers. As such, the change management office is also a promoter of change management before the business collaborators, partners and other institutions.
- Operates as recognized organizational unit that directly or indirectly affects the human resources participation in project changes, through qualifications, trainings, assessments, etc.

The change management office is in charge of the implementation of all the functions of change management and the respective project management. Besides, its responsibility is to reconsider the needs for the unit functions and implement those that will suit the given organization in the function of business success.

3.3. Strategic Change Management Office – SCMO

The *Strategic Change Management Office – SCMO* is a specific business unit responsible for all the changes in the entire organization. There may be other units in the organization, too, however, they have to be subordinate to the strategic change management office. The basic functionality of this unit is oriented towards strategic business interests in the given organization.

The work of the office is most often the responsibility of the manager who has a direct access to the managing director. The office can be set up, as any other business unit, within one to two years, with the essential commitment of the top management.

Although it represents the highest level in the development of a change management unit, the strategic change management office may, but need not perform all the change management functions. It can be established in two ways. One way is by building up on one of the existing forms of change management units, which is a more logical step, especially in case of small and medium-sized enterprises. The other way is creating the office independently of other existing organizational change management offices in the organization, the method most commonly used by large multinational and global corporations where the responsibility of this office is to coordinate, supervise, control and support the regional change management offices.

The task of the strategic change management office is to strategically coordinate and implement change towards a permanent improvement. It is engaged in:

- Giving directions and affecting the activities of change throughout the organization. It can also supervise subordinated organizational units that have developed their own change related activities, in accordance with the business and geographical foci.
- Building an environment for change as well as raising awareness of the

stakeholders in the context of business units, customer relations, supplier relations and relations with other partners.

- Conducting studies and assessing the functionality of change management, the respective project management and business effectiveness, with a special focus on those operations that depend on the lower-level change management offices, if any.
- Promoting business interests in the change environment and vice versa.

The strategic change management office performs a number of management functions in coordination with subordinate units within the organization.

In order that change be efficiently managed, it is necessary that such a business environment be created that will recognize change management and project management as two separate but closely connected disciplines. A structured organizational entity should be created that will be a meeting point of basic skills, standards and expertise in the change project management area. Hence it is necessary that the needs such an organization should meet, that is, the functions it should perform, be clearly identified.

The strategic change management office can perform a variety of functions. On the basis of the model presented in his paper and the forms of the offices proposed, the following competencies can be identified as most important:

- Change portfolio management or support implementing the change management methodology based on the project management;
- Change management methodology development and management;

- Implementation of best practices;
- Monitoring, evaluation and control of the change project execution against individual changes and the strategic orientation of the organization;
- Coordination of organizational and other resource allocation;
- Provision of the system of internal support to change portfolio;
- Creating a system of knowledge management in the area of change management;
- Support to change management personnel development;
- Support to change culture and raising awareness of change; etc.

The functions of the change management organizational unit are clearly founded on the strategic and project management activities, however, even more than that. There is a wide range of activities oriented towards the promotion of the change management system in organizations, towards raising awareness, personnel development, change in the organizational culture, reducing resistance, etc. They are related to other business functions and organizational units and affect organizational business goals.

The research that included 327 respondents, was conducted in 2010 among Serbian firms with an aim to highlight the need to create organizational support for change project management and support the concept proposed in this paper.

The results of the research show that a majority of organizations is characterized by a line organizational structure, as many as 53%, followed by project (15%), matrix (11%) and divisional organizational structure (8%) (Figure 3).

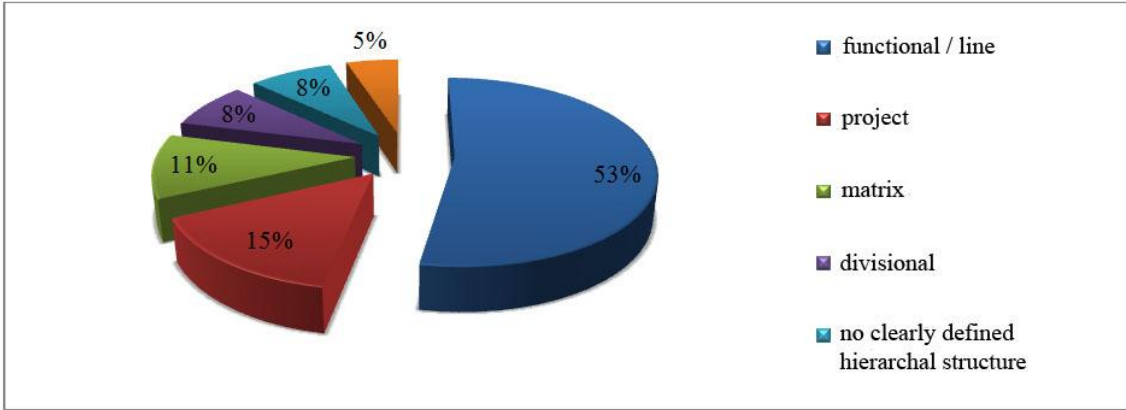


Figure 3. Type of organizational structure

The above presented results clearly show that organizations use predominantly traditional models of organizational structure, hence a logical need to innovate organizational design and implement new forms, which corroborate the need for organizational units described in this paper.

highlight the functional needs of proposed new organizational forms. The analysis of the data presented clearly shows that the phases in the development and the proposed activities in the change management organizational units are well coordinated with the needs of modern organizations.

Table 1 presents the results of the research into the elements of organizational structure that

Table 1. Elements of organizational structure

	Yes	No	Partially
there is some form of project management organizational unit	37%	20%	43%
there is some form of change management organizational unit	14%	38%	48%
roles and responsibilities of managers of certain changes are defined and coordinated	24%	15%	61%
roles and responsibilities of members of team for change are defined and coordinated	26%	17%	57%
there is an open and effective bottom-up, top-down and organization-wide communication	38%	13%	49%
information on the goals and outcomes of planned change projects is available to all stakeholders	33%	29%	38%
there is an information system for planning and monitoring of all projects	25%	29%	46%
there are records of successful past change projects	27%	25%	48%

4. CONCLUSION

Everything changes; only change is permanent. If organizations wish to respond to permanent change in the environment, they must continually, however successfully, conduct various change projects. Practice shows that a simple implementation of one of a large number of change management models does not result in favourable outcomes. It is necessary that organizations should adapt in an appropriate manner. It is necessary that they should develop their capacities so that they be ready and well-trained for a permanent and intensive execution of varied change projects. Change management units are already largely present and provide satisfactory results. The organizations that have already implemented this type of organization are more successful in their endeavours and achieve more favourable business results. The focus of business operations today is on change, hence projects in themselves are not meaningful. The basis of any well defined project is change. Since change by its nature is a broader concept in comparison with the project, organizations have to pay attention to certain other management aspects too in the project execution. It is for this reason that modern organizations should be oriented towards creating change management organizational units/offices, which would also be competent in conducting of a range of other activities besides project management, in accordance with the models and the approach described in this paper.

REFERENCE

(2006). *CIO Australia's Magazine for Information Executives*.

- Axelrod, R. (2001, November). Democratic Approaches to Change Make a Big Difference in Turbulent Times. *Harvard Management Update*.
- Englund, R., Graham, R., & Dinsmore, P. (2003). *Creating the Project Office: A Manager's Guide to Leading Organizational Change*. San Francisco: Jossey-Bass.
- Green, M. (2009). *Change Management Masterclass: A Step by Step Guide to Successful Change Management*. London: Kogan Page.
- Harvard Business Essentials. (2003). *Managing Change and Transition*. Boston: Harvard Business School Publishing Corporation.
- IPMA. (2006). *International Competence Baseline version 3.0*. Nijkerk: IPMA.
- Kerzner, H. (2006). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling*. New York: John Wiley & Sons.
- Kotter, J. (1996). *Leading Change*. Boston: Harvard Business School Press.
- Obradović, V. (2010). Model upravljanja promenama primenom metodologije projektnog menadžmenta. *doktorska disertacija*. Beograd: Univerzitet u Beogradu, Fakultet organizacionih nauka.
- Project Management Institute. (2008). *A Guide to Project Management Body of Knowledge (PMBOK® guide) (4th izd.)*. Newtown Square: Project Management Institute.

DISTRIBUTION OF BUSINESS RULES IN SOFTWARE PROJECT MANAGEMENT*

Ljubica Kazi^{1**}, Ofelia Stanciu², Madhusudan Bhatt³

¹University of Novi Sad, Technical faculty "Mihajlo Pupin" Zrenjanin, Serbia

²Tibiscus University, Faculty of Economics, Timisoara, Romania

³University of Mumbai, R.D. National College, Mumbai, India

Abstract: Business rules system is a module of an enterprise information system. These systems enable automated enforcing of business rules by constraints to data access and transactions over database. In this paper we propose an integration of business rules management systems with project management software with the aim to include enforcing business rules during project implementation. Special issues that are described are related to distribution of business rules within the distributed development environment.

Key words: software project, business rules, automation, integration, distribution

1. INTRODUCTION

Software project management deals with issues such as change management (staff changes, technology improvement, changes of business rules and business procedures for project implementation) and distributed development (physically dislocated staff and resources). Application of information technologies in project management and implementation brings integration, automation and standardization that enable higher quality, lower costs and less time for project implementation. Applying management (business rules management system - BRMS) in project management additionally decreases costs and implementation time.

Automated systems for business rules were primarily developed for faster adaptation of information system to changes of business rules in organizations (Tortolero, 2008) BRMS enable setting business rules by management staff without the need for technology staff

engagement. "With a BRMS, the total cost of ownership for managing business applications software is lowered by (both) reducing programming requirements and delays in implementing operational rules" (Byron, 2010).

Applying the BRMS in software project management brings adaptability, stability and transparency of project management across many different projects implemented during time. In distributed development environment the special issues are related to distribution of business rules that should be applied during software project management and within software development.

2. BUSINESS RULES

A business rule (BR) is a declarative statement that defines or constrains some aspect of the business (Business rules group, 2000):

- From the business perspective - constraints that apply to the behavior of people in the enterprise; these rules are

*Presented at International symposium on project management YUPMA 2011

**Corresponding author. Email: ljubicakazi@ptt.rs

also called "operative BR", since they guide the actions of people working in the organization, and are enforced by the organization as a matter of policy (Madden, 1996);

- From the information system perspective - constraints on what data may be recorded in the information system; these rules are also called "structural BR", since they structure and categorize the knowledge and information found in the organization.

A business rule is typically expressed as follows:

“IF certain events occur or conditions exist,
THEN certain events (actions) should happen,
ELSE other events (actions) should happen.”

Each IF-THEN-ELSE statement inferring some action is a business rule (Byron, 2010).

A condition is a true/false (Boolean) expression that consists of one or more predicates that are applied to facts. If a rule condition is met, a corresponding action or actions are initiated. In Microsoft Business Rules Framework actions are represented by invoking methods or setting properties on objects or by performing set operations on XML documents or database tables.

The key characteristics of business rules (Business rules group, 2003) are: the BR describe business practice, motivated by business goals; they define the boundary between acceptable and unacceptable business activity; the BR are expressed declaratively in natural language sentences for business audience, they are validated for correctness by business people, verified against each other for consistency.

3. BUSINESS RULES MANAGEMENT SYSTEMS

The key characteristics of BR management (Business rules group, 2003) are: cohesive and consistent body of rules is enforced across all

business activities; BR are distinct from any enforcement defined for it; software that runs those rules should support continuous change in business rules; BR should be organized and stored in such a way that they can be readily redeployed to new technology platform, the BR management software is able to explain the reasoning by which it arrives at conclusions or takes action.

A typical business rules management system consists of:

- user rule management interface - for adding and editing rules, composing rules and analysis of effectiveness of rules,
- business rules repository
- business rules engine. (Byron, 2010)

The BRMS systems are primarily used by business analysts who are able to compose BR according to management requirements within a specialized user interface. These BR are validated, compared to other rules for consistency and stored in business rules repository. During execution of some business process, certain information system process attempts to read or write data to database. These data requests are validated by business rules engine that combines facts with rules to approve certain action to be executed.

Commercial applications of BRMS include:

- stand-alone solutions (Ohlsson, 2006) like Red Hat JBoss Rules, Quick Rules and Visual Rules
- BRMS tools within business process management systems such as SAP BRMS Netweaver Business Warehouse and Microsoft Biztalk
- integrated with decision management solutions (Taylor, 2009).

4. DISTRIBUTION OF BUSINESS RULES

The standard formats for interchanging business rules are based on XML. These are (Sainte Marie & Taylor, 2007)

- XMI standard - XML Metadata Interchange (by OMG organization) for UML
 - RIF standard - Rule Interchange Format (by W3C organization)
- An example of application and distribution of business rules via XML format in e-business environment (Rosca & Attilio, 2002) is presented at Figure 1.

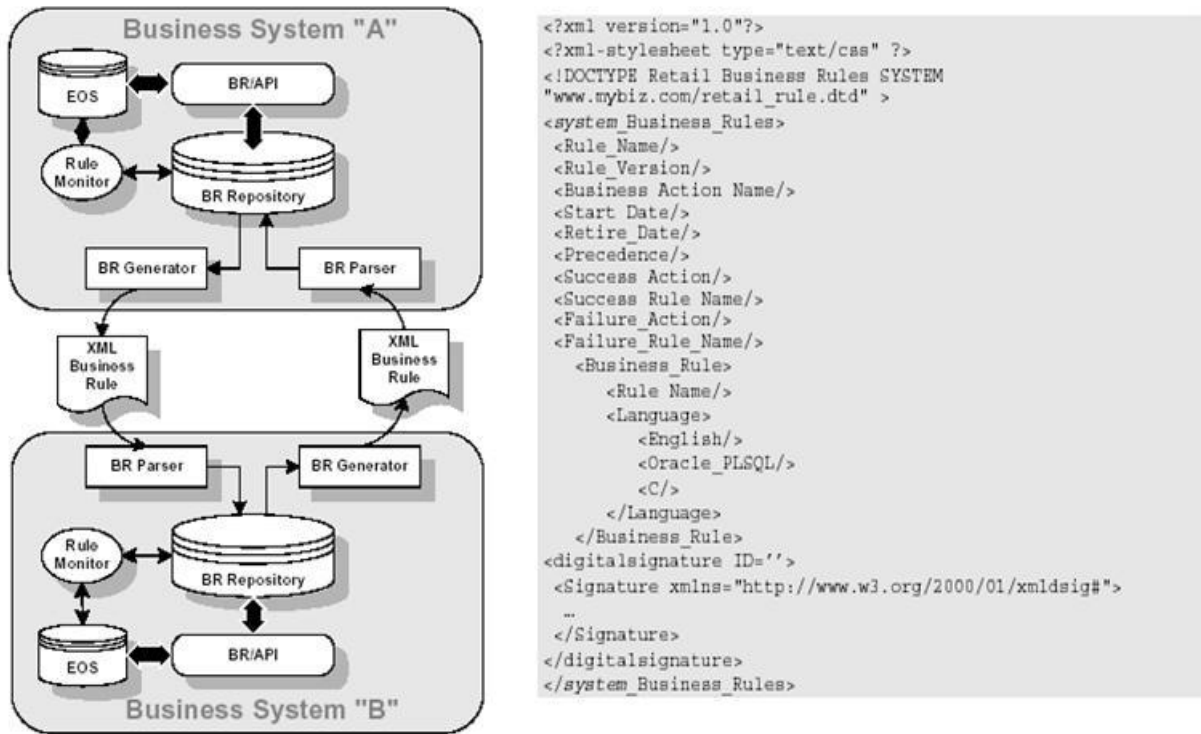


Figure 1. B2B communication via XML with business rules (Rosca & Attilio, 2002)

Recent contributions are in the field of development of RIF standard and connection to other formats, such as RDF (Resource Description Framework) for graphical ontology presentation. (W3C project: RIF to RDF)

5. BRMS IN SOFTWARE PROJECT MANAGEMENT

In the process of software project management business rules management can be implemented at three levels:

1. level - general project management (general rules of any project)
2. level - specific project management (general rules for particular project)
3. level - semantic software product (software problem domain rules (Sagheb-Tehrani & Ghazarian, 2002)).

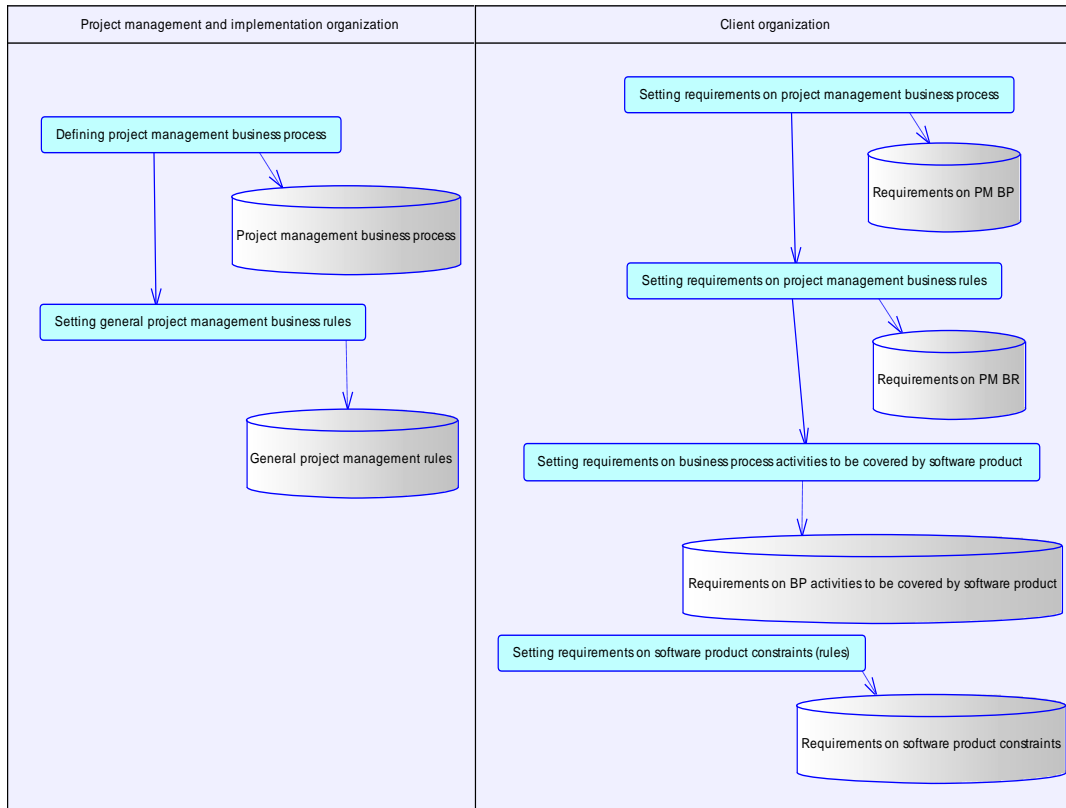


Figure 2. Business process model of definition of business rules in software project management

Project management and implementation organization describes general principles of any project, presenting business process and rules that should be followed at any project. Client organization requires specific software project management business process and business rules and also requires semantic domain business process activities to be covered and constraints to be included in a software product (Figure 2).

6. DISTRIBUTION OF BUSINESS RULES IN SOFTWARE PROJECT MANAGEMENT

Since business rules change over time, clients can be connected to project management and

implementation organization during project implementation, so requirements are distributed remotely. On the other hand, software development team can remotely access central rules repository in the aim to verify artefacts according to project management rules. Distribution of business rules starts with rule definition at the client organization by appropriate software tool for rule capturing. This tool creates a XMI metamodel and it is sent to the project management and implementation organization, where this model should be approved of and transformed from business rule to production rule form. Then those rules are saved in the central rule repository and sent to rule repository of software product at the client organization.

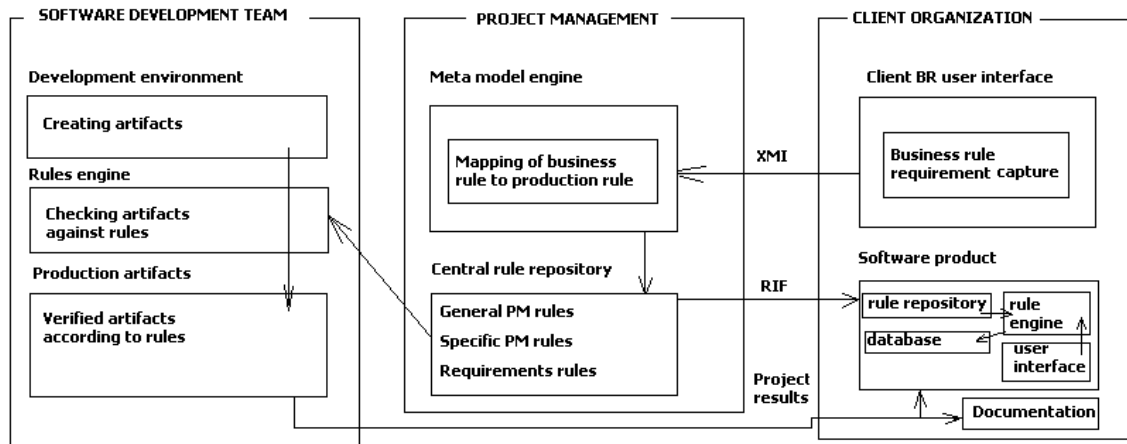


Figure 3. Creating and distribution of business rules in software project management

7. CONCLUSION

In this paper we presented a model for integrating business rules management systems with software project management practice. Distribution of business rules are based on standards XMI and RIF. Business rules are captured by project management and client and distributed to software development team for verification of artifacts they produce as project results. This model presents a basis for implementation of a distributed information system that will present an automated support to software project management, based on the business rules distribution.

REFERENCES

- Tortolero, A. (2008, January). *EA and the Business Rules Life Cycle*, BPTrends.
- Byron, D. (2010). *Understanding the Benefits of Business Rules Management Software in an Open Source Ecosystem*, RedHat.
- Business rules group, (2000). *Defining Business Rules – What Are They Really*, GUIDE business rules project, final report.
- Madden, J. (1996). *One hundred rules for NASA project managers*.
- Microsoft Business Rules Framework. Retrieved from [http://msdn.microsoft.com/en-us/library/aa578170\(v=BTS.70\).aspx](http://msdn.microsoft.com/en-us/library/aa578170(v=BTS.70).aspx)
- Business Rules Group, (2003). *Business Rules Manifesto – the Principles of Rule Independence*.
- Ohlsson, J. (2006). *Enforcing business rules on e-Business systems*, MSc thesis, Institutionen för kommunikation och information Examensarbete i datavetenskap 25p, D-niva, Vartermen, Sweden.
- SAP BRMS Netweaver, www.SAP.com
- Microsoft BIZTalk, www.microsoft.com
- Taylor, J. (2009). *Maximizing your business rules investment*, White paper, Decision Management Solutions, www.decisionmanagementsolutions.com/rules.
- Sainte Marie, C., & Taylor, J. (2007, June). *Production Rules Standards*.
- Rosca, D., & Attilio, J. (2002). *Business Rules Specification, Enforcement and Distribution for Heterogeneous Environments*, Proceedings of the 25th Annual International Computer Software and Applications

- Conference (COMPSAC01), IEEE Computer Society.
- W3C project: RIF to RDF, http://www.w3.org/2005/rules/wiki/RIF_In_RDF
- Sagheb-Tehrani, M., & Ghazarian, A. (2002, March). Software Development Process: Strategies for Handling Business Rules and requirements, *Software Engineering Notes*, vol 27, no 2, ACM SIGSOFT.

THE SYSTEM FOR MONITORING AND EVALUATION OF INOVATION PROJECTS*

Đuro Kutlača **, Zorica Mitrović, Marija Mosurović

Mihajlo Pupin Institute, Belgrade, Serbia

Abstract: The paper identifies the need for the introduction of an efficient and effective system for monitoring and evaluation of innovative projects that are financed from public sources. It points to the potential benefits and gives recommendations for the introduction of such a system.

Key words: monitoring and evaluation system, innovation projects

1. INTRODUCTION

The effects of the 2009 economic crisis upon the world economy were dramatic, and consequently affected the economy of Serbia. The crisis revealed the basic structural problems of both the Serbian society and economy. One serious problem is a low level of investments into research and technological development which are the foundations of a faster economic growth. The investments into scientific infrastructure and equipment have in the past 20 years been scarce, hence their quality today is rather poor. Similarly, the results expressed in a qualification structure of the labour force, their skills, the number of registered patents etc. do not meet the market demand which proves that these scarce resources are inefficiently used. It is therefore necessary that the reforms commenced in these fields be made faster, which will help orient the focus of growth towards the sectors with higher added value (Srbija 2020, 2010). Much has been done in the past years to improve the process

planning and coordinate policies; what is needed is an efficient and effective monitoring and evaluation system. This system would allow for a more effective and a more efficient spending of these scarce resources. The prime benefits from introducing such a system would be felt in the fields of policy creation, budget, management and accountability for achieving results.

2. INNOVATION ACTIVITY IN SERBIA

In order that the need for introducing the system for monitoring monitoring and evaluation of innovation projects should be discussed at all, it is first necessary that the importance of this activity be well apprehended. Today Europe enters the struggle to exit the economic and financial crises implementing the "Europe 2020" strategy in which *smart growth* whose goal is the development of knowledge- and innovation-based economy is one of the three priorities. If this is taken as a starting point, the conclusion can be drawn that

*Presented at Interantional symposium on project management YUPMA 2011

**Corresponding author. Email: djuro.kutlaca@pupin.rs

developing innovative activity is essentially important (EUROPE 2020, 2010). It is also necessary to learn about how the field of innovative activity is defined today, as well as how large the resources invested in its development are and what the plans for the further development are.

In Serbia, innovative activity is regulated by the *Law on Innovation Activity*: *“For the purposes of support to the development of innovative products and services, to fostering the implementation and commercialization of scientific and research results, support to modern technologies implementation and building the infrastructure for innovative organizations, and following the proposition submitted by the minister, the Government adopts the programmes of innovative activities for a current budgetary year. The method of realization of each individual programme of innovation activity is in the jurisdiction of the minister. The programme is carried out via innovation projects and the agents of these projects can be economic partnerships, higher education institutions, scientific research and innovative organizations. Generally, innovation projects are to completed within the period of one year. The records on innovation projects are kept in the Registry of the Ministry. On expiry of the period defined for the project completion, and not later than 30 days, the participants in the project submit to the Ministry the report on the outcomes achieved. The control of the innovation project execution and of the achieved outcomes is the responsibility of the Ministry or specialized licenced legal entities hired by the Ministry“* (Zakon o inovacionoj delatnosti, 2010)

So far, the Ministry of Science and Technological Development has allocated € 6,800,000 through the three public invitations for competitive tendering

published in the 2006-2009 period. In addition to these resources, the Ministry of Economy and Regional Development has also developed a programme of support to the development of innovativeness in small and medium-sized enterprises, through the grant scheme. There are some more instruments and mechanisms of support to innovative activity provided by public funds in Serbia, however, the topic of this paper are the financing programmes of innovation projects conducted by the Ministry of Science and Technological Development.

Similarly to Europe, Serbia has created the *“Serbia 2020“* development concept. The objectives set in the development concept are in line with the Europe 2020 Strategy. One objective is *“investment into knowledge and technology“*. One of the measures taken for the purpose of fostering the roles of science and technology in the development of the Republic of Serbia is the establishment of the Fund for Innovative Activity – for the support to companies that devise projects directly related to the development of products, processes and services and their placement in the home and export markets. The aim is to establish a public-private partnership between direct and indirect budgetary beneficiaries, public companies, international financial institutions, banks, companies and others. The fund and the innovation fostering organizations will provide direct funding to companies that are capable of conducting a project related to the development of products, processes and services, through the selection performed by competent scientific and research (SR) organizations. (Srbija 2020, 2010).

To control the project execution and the expenditures from the public funds, the mechanism of support to the development of innovation activity through financing innovation projects contains a form of

written reports that are submitted 30 days upon the completion of a one-year project. It is evident, however, that there is no integral system for monitoring monitoring and evaluation of innovation projects that would be an instrument for (re)defining the innovation policy. The ministries in charge of science and technological development and of economy and regional development have devised different programmes of support to innovation development. These programmes are not compliant, which, together with the absence of endogenous evaluation capacities for innovative and other technological development projects, significantly hinders the innovation management process in the Republic.

It can be inferred from the above that there is a need to strengthen the monitoring mechanisms and build national capacities for evaluation for the purpose of improving conditions for innovation policies, programmes and projects. A special goal in the process should be the promotion of the evaluation role of the SRs, innovation projects and technological development projects as a crucial precondition for a reflexive learning of the innovation system, the development of the required capacities/competencies for a comprehensive evaluation that should in turn provide procedural and methodological knowledge and tools for both the evaluator and the authorities in charge.

3. NEED TO INTRODUCE THE SYSTEM FOR MONITORING AND EVALUATION INNOVATION PROJECTS AND PROSPECTIVE BENEFITS FROM THE SYSTEM IMPLEMENTATION

The most important benefit gained from the implementation of the system for monitoring and evaluation of projects is the very integrated information on the performance of policies, programmes and

projects. (Keith, 2007). This system is capable of identifying what works and what does not work as well as the reason it does not work. The monitoring and evaluation system also provides information on the performance of individual ministries and assistant organizations, managers and other employees. The value of the system does not lie in the monitoring and evaluation themselves, nor is it in the possession over information that is their result, but in using the obtained information in improving performance. It is also important to mention that information obtained through monitoring and evaluation can be very useful because they serve as: support to creating policies based on information, especially in the context of the budget and planning on the national level; support in the process of making decisions as to the most profitable activities – this is the case of the information-based budgeting; support to competent ministries and specific organizations in managing programmes and projects, which is an output-based management, or result-based management; increase in transparency and support to responsibility relations (Keith, 2007). Besides, the monitoring and evaluation system allows for an additional pressure upon the competent bodies for the purpose of achieving a higher level of performance. It is here that the civil society – in case of innovative activity, the teams of people that submit propositions of innovative projects – can play an important role in the monitoring and evaluation system, in at least four ways. Through analysis and criticism of the work of these bodies, through the budget analysis and reports on the citizens' attitudes, through an independent investigation conducted into the findings of the system, and finally, since the civil society is the user of information obtained from the system, through reporting to the media, as well as activities of universities and non-government organizations (Keith, 2007).

Finally, it can be concluded that it is necessary that there be an awareness of the value of the monitoring and evaluation system, as well as that the system should allow for a better way of learning from the past experience, for the improvement of the service provision process, the process of resource planning and distribution as well as reporting on the results as part of responsibility towards key shareholders (Keith, 2007).

4. RECOMMENDATIONS FOR INTRODUCING THE SYSTEM FOR MONITORING AND EVALUATING OF INNOVATION PROJECTS

It is important to mention that the system for monitoring and evaluating projects a part of the innovation activity development programme has additional specific features in comparison with the systems that monitor other categories of projects. The key specific difference that characterises innovation projects is a significantly high level of risk and human factor impact – creativity and capacity of changing. (Stošić, 2007) This characteristic makes both *ex ante* and *ex post* evaluation rather complex, hence the creation and implementation of this system requires additional effort. The number of tools, methods and approaches, including the data collection methods, analytical frameworks and the types of evaluation and review used in these systems is large. Some most frequently used are the following: performance indicators; the logical framework approach; theory based evaluation; formal investigation; quick estimation methods; participation method; investigations aimed at monitoring public expenditures; impact evaluation; *cost-benefit* and cost efficiency analyses. (Monitoring & Evaluation, 2004)

The first and foremost recommendation is that the precondition of a successful institutionalization of this system is a

crucial requirement of the Government to implement this system. Then, the system is expected to generate information and knowledge for the purpose of improving the work of state institutions. It is important to bear in mind that there is no one best model of what the system should look like; much depends on what is the use of information obtained by monitoring and evaluation. Similarly, it is necessary that a diagnosis be made at the very beginning as to which of the functions of the monitoring and evaluation system are already present, as well as of their strengths and weaknesses, depending on the requirements (the real use of information obtained by monitoring and evaluation) and supplement what is lacking (technical quality of information obtained by monitoring and evaluation reports). The diagnoses can also help raise awareness on the importance that this type of a system should exist. The step following the diagnosis is the elaboration of the action plan and inclusion of key stakeholders (Keith, 2007).

The key components of the action plan include: influential managers; creators of strong initiatives for monitoring and evaluation as well as for using the obtained information; structural arrangements to ensure unbiasedness and the quality of monitoring and evaluation; and a long-term commitment to the institutionalization of the system. There is a large number of lessons from the countries who have developed such systems successfully; there is also a lot of errors that should be avoided. Some of them are: the over-definition of the system – this is not only a waste of efforts, but may even weaken the system; the belief that the system is value specific – the information obtained by monitoring and evaluation are worth only if used intensively; it is a good idea to monitor and evaluate the manner in which the system is developed and how well it

performs, on a regular basis – corrections will probably be necessary. The measure of the bottom-line success is the scope to which the information has been used in improving the managerial performance (Keith, 2007).

5. CONCLUDING REMARKS

A serious problem that hinders the growth of the Serbian economy is a low level of investments into research and technological development, however, also an ineffective spending of already scarce resources. It is necessary to speed up the reforms commenced in the areas of scientific and technological development, nevertheless, it is also important to introduce a system for monitoring and evaluation of projects (Kutlača, 2009). The essential benefits from the implementation of this system would be gained in the fields of creating policies, budget, management and accountability for achieving results. The necessity to introduce the monitoring and evaluation system, inter alia, is one requirement in the process of accession to the European Union. All the countries that have entered the procedure of accession to the EU are required, among other things, to implement the monitoring and evaluation system on all the levels of state administration. Hence, even if the system is not implemented by the Government or individual ministries themselves, it will certainly be implemented in response to the external requirement, from the EU.

REFERENCES

- Srbija 2020: Koncept razvoja Republike Srbije do 2020. godine* – Nacrt za javnu raspravu, 2010
- EUROPE 2020: A European strategy for smart, sustainable and inclusive growth*, European Commission, Retrieved from: <http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf>, 2010
- Zakon o inovacionoj delatnosti*, Službeni glasnik RS, br. 110/2005 i 18/2010
- Keith, M. (2007). *How to Build M&E Systems to Support Better Government*, The International Bank for Reconstruction and Development / The World Bank, Washington, D.C.
- Stošić, B. (2007). *Menadžment inovacija: Ekspertni sistemi, modeli, metodi*, FON, Beograd.
- Monitoring & Evaluation (Some Tools, Methods & Approaches)*, (2004). The International Bank for Reconstruction and Development/The World Bank, Washington, D.C.
- Kutlača, Đ. (2009). *Vrednovanje NI i IR rada kao preduslov za efikasan proces restrukturiranja NI i IR sistema Srbije*, naučno-stručni skup “SNTPI '09 – Sistem naučnih, tehnoloških i poslovnih informacija, sa posebnom temom: SNTPI kao podrška za donošenje odluka u upravljanju i vrednovanju naučno-istraživačkog i istraživačko-razvojnog rada”, Zbornik radova, 21-25, Fakultet informacionih tehnologija, Beograd.



ACCREDITED PROJECT MANAGEMENT COLLEGE

Contact:

Belgrade, Krfaska 7
 +381 11 38 20 979
 pmcollegebeograd@yahoo.com
 www.vspm-bg.com

Project Management College was established in 2007. It has significantly enhanced the education in the project management field and the development of the profession of the project manager. In 2007 this school was accredited

and thus the Project Management College achieved a higher profile. Project Management College offers an accredited three-year bachelor programme and a one-year specialist programme.

UNDERGRADUATE STUDIES

<i>I Semester</i>	<i>II Semester</i>
Management	Project Management Theory
Informatics I	Economy
English Language I	English Language II
Mathematics	Informatics II
<i>III Semester</i>	<i>IV Semester</i>
Strategic Management	Project Management Software
Project Management Methods and Techniques	Marketing Management
Company Organization	Change Management – Opt.
Finance Management	Project Risk Management – Opt.
	Psychology and Management - Opt. (Two subjects can be chosen)
<i>V Semester</i>	<i>VI Semester</i>
Investment Project Management	Project Portfolio Management
Program Management	ICT Project Management
Human Resource Management – Opt.	Business Project Management – Opt.
Project Manager – Opt.	Project Management Organization – Opt.
Entrepreneurship - Opt . (Two subjects can be chosen)	Creating Business Plan – Opt. (Two subjects can be chosen)

GRADUATE STUDIES

<i>VII Semester</i>	<i>VIII Semester</i>
Contemporary Management	Project Management Methodologies
Strategic Project Management	Project Financing – Opt.
Project Leadership	Contracting Management – Opt.
Project Quality Management	Project Communications Management – Opt.
	Public-Sector Project Management – Opt.
	Project Oriented Organization – Opt.
	Project Change Management – Opt. (Three subjects can be chosen)



SERBIAN PROJECT MANAGEMENT ASSOCIATION

Contact:

Belgrade, Krfaska 7
+381 11 38 37 577
info@yupma.org.rs
www.yupma.rs

Serbian Project Management Association (YUPMA) was formed as YUDRUP in 1986. In 1997 it has become a full member of the International Project Management Association (IPMA). YUPMA and its members have so far taken part in a large number of national and international research and other projects in the field of management.

CERTIFICATION

YUPMA offers the international certification through the YUPMA CERT programme based on the IPMA® certification programme. The YUPMA CERT programme objective is to test and verify the competence of candidates in project management.

The YUPMA CERT programme has four levels of certification:

IPMA level A: *Certified Project Director*®

IPMA level B: *Certified Senior Project Manager*®

IPMA level C: *Certified Project Manager*®

IPMA level D: *Certified Project Management Associate*®

SEMINARS

YUPMA also organizes appropriate training in the field of project management via seminars, courses and lectures delivered by both our and foreign experts. Training courses are organized periodically or at the request of a company or another organization. YUPMA's standard offer

includes a number of seminars and courses which can be geared to the specific requirements of the participants. On completion of any seminar the participants receive a certificate.

Listed below are some seminars the Association organizes:

- Project management
- Training for project managers
- Project management in IT
- Managing the EU projects
- Business Plan Preparation
- Project Management in Specialized Fields (health-care, education, public administration,...),
- Project Management Software Packages (MS Project, Primavera)

SYMPOSIUM

One of YUPMA's major tasks is the organization of symposia bringing together the experts engaged in project management and related disciplines. One of the major objectives of these scientific meetings is to describe the position and the development of project management in Serbia and in the region. So far, fifteen symposia on project management have been organized and they are traditionally held every spring on the Mount of Zlatibor.