

Marija Todorović¹, Zorica Mitrović¹, Dragan Bjelica¹
¹University of Belgrade, Faculty of Organizational Sciences

Measuring Project Success in Project-Oriented Organizations

UDC: 005.216.1:[005.72:005.74 ; 005.8
DOI: 10.7595/management.fon.2013.0019

A significant need for flexibility and organizational performance improvement has initiated an increased implementation of the project management concept and a shift from a functional to a project-oriented organization. The need for a flexible, yet integrated management system that will provide both strategic, as well as operational excellence in organizations is caused by the uniqueness of contemporary business environment. The most common issues faced by these organizations are the alignment between projects implemented by an organization and that organization's strategy, and models for measuring project success in terms of its contribution to an organization's strategic goals. The aim of this paper is to analyze the known frameworks and models used for measuring project success and present recommendations for developing conceptual framework that would allow for a systematic selection of key performance indicators (KPIs) to be used as a base for measuring project success. The paper gives an overview of the different characteristics and categories of the KPIs, the links between measurements and KPIs, KPI interdependence, and indicates the possibility of an integrated performance index adapted application. Key recommendations for the development of a conceptual framework for measurement and analysis of project success are to determine KPIs based on project life cycle phases and an analysis of project environment. This is especially important during the formulation of KPIs that will serve as a basis for project success measurement and evaluation in terms of contribution to an organization's strategic goals.

Keywords: project success measurement, performance measures, key performance indicators, project management, project-oriented organizations.

1. Introduction

A contemporary business environment is characterized by openness, complexity and inconsistency, followed by a high degree of instability. In the last quarter of the 20th century business environment became very complex, and that complexity was caused by the changeable nature of work and strong necessity for adapting to customers' requirements, new technologies and new influences from the organizational environment (Mihic, 2011). The consequences of these circumstances have initiated the development of organizational forms that are flexible enough to adapt to unstable environment, enabling the development of management systems that provide operational and strategic excellence.

Webster (1999), Hobday (2000), Mihic (2011) and others noticed that, because of the need for flexibility, decentralization and improvement of performance, organizations are beginning to use the project management concept and are shifting from the functional to the project-oriented organization. Project-oriented organizations could be defined as organizations that perform their activities by implementing projects whose results are determined by requirements of the project customer. These organizations may carry out projects for external clients, their affiliates, other big companies or internal customers (Keegan & Turner, 2001). At the same time, Kerzner (2001) points out that project management in most successful organizations is no longer an operational tool or method that organizations use internally to improve their own performance, but a strategic framework for achieving a competitive advantage in the today's business environment.

However, in many cases, managing project-oriented organizations is a big challenge. Gan and Salter (2000) stated that one of the most common problems faced by these organizations is in aligning projects with the

strategic direction of the organization. Since each project has its own autonomy and can be initiated by various stakeholders, there is a risk of mutual isolation and creating a series of unrelated projects in the organization (Hobday, 2000). Also, one of the key challenges of managing project-oriented organizations is how to measure project success in a manner that will contribute to the success of the entire organization? Kaplan and Norton (1992) wrote "What you measure is what you get" and this is a truth that equally applies to the project-oriented organizations as well as any other type of organization. The best organization whose management models were multiply awarded based their management systems on the model of corporate performance management (Paladino, 2011). However, the key to success is not in a simple definition of performance measures but in defining key performance measures that will serve as a guide for the behavior in the organization. The key performance measures are the basis for obtaining key performance indicators (KPI), which due to their role in decision-making can have a big impact on the efficiency of organizational management.

Kaplan and Norton (1992), Cokins (2004), Paladino (2011), Verweire and Van den Berghe (2004) recommend a model of integrated performance management that links strategy with operational level management. Such models can be used as a conceptual framework for defining KPIs that can be adequate to deal with challenges of managing project-oriented organizations, including issues of aligning projects to the strategic direction of the organization, high autonomy and mutual isolation of projects, meeting the needs of different stakeholders, the need for flexibility due to rapid changes in the environment and so on. To present the process of selection of the right KPIs that could contribute to the success in the project-oriented organization, the paper will use research works of Eckerson (2006), Kerzner (2001), Franceschini et al. (2007), Hubbard (2007) and others who worked on the definition of characteristics and categories of KPIs, interdependence of KPIs, and the possibility of an integrated performance measurement.

2. Measures and KPI

To select the right KPIs it is necessary to understand the relation between measures and KPIs. People tend to use the word measure when they mean a numerical measure that represents the operating results in relation to one or more dimensions. On the other hand, the KPI is a metric that is closely related with the goal or target value. (Kerzner, 2011)

Measures are often categorized by the type of the indicator they represent as well as by the type of users. The first category is the so-called traditional measures. Traditional measures are used to measure project performance, to monitor the project and the level of achievement of previously defined results (cost variance and time variance). These measures are commonly used by the project manager, project team or internal project sponsor. In addition to these measures, performance indicators could be identified that are used as confirmation that the critical success factor defined at the beginning of the project will be achieved (e.g. EAC). They have internal use, but are also used for reporting on the project status to the client and other stakeholders. Of course, very common are the so-called value measures that indicate whether the stakeholders' needs are or will be met (project end date, project value, etc.). They can be used by everyone, but they are mostly used by clients.

Previous categorization of measures by users indicated that the value is no longer perceived only through the quality of products/services, but rather through some significant benefits to the client or his or her organization, which are mostly intangible and difficult to measure (customer satisfaction, goodwill, reputation, etc.). Regarding the abovementioned, a new conceptual framework implies that the selection of the right KPI in project-oriented organizations needs to be based on value measures that reflect stakeholders' needs.

3. Characteristics and categories of KPI

A number of authors have attempted to define the term of KPI, however, there is still no generally accepted definition. Therefore, this paper relies on a definition that is the most suitable for the conceptual framework intended to be proposed by the paper. According to Eckerson (2006), KPIs are measures that show how well the organization or individual is performing the operational, tactical and strategic actions that are critical to the current and future success of the organization. The first step in selecting the right KPIs is to define the general and specific characteristics that KPIs should satisfy. In general, Kerzner (2011) lists the following seven basic characteristics of a project's KPIs:

- Accountability – implies that for each KPI there is a person accountable for its result, without whose assigned accountability measurement is meaningless.
- Empowered – companies need to empower individuals to act on the performance information.
- Timely - KPIs require right-time data.
- Trigger points – effective KPIs sit at the intersection of multiple interrelated processes that drive the organization; when activated, these KPIs produce stunning gains in performance.
- Easy to understand – employees must know what is being measured, how it is being calculated, and, more importantly, what they should do to affect the KPI positively.
- Accurate - it is very difficult to properly measure the result of activities. For example, improved productivity is not necessarily internally improved by employees, but may be the result of changes of revenue, since productivity presents the ratio of revenue and the number of employees.
- Relevant – KPIs have a natural life cycle, they are changing over time, or at least their significance is changing.

On the other hand, for the selection of the right KPI in project-oriented organizations, it is necessary to consider the most important characteristics of project-oriented KPIs. A review of the literature suggests the following six:

- Predictive – the KPI is able to predict the future of this trend;
- Measurable – the KPI can be expressed quantitatively;
- Actionable – the KPI triggers changes that may be necessary for corrective action;
- Relevant – the KPI is directly related to the success or failure of the project;
- Automated - reporting minimizes the chance of human error;
- Few in number - only what is necessary.

In conclusion, this conceptual framework suggests that for the selection of the right KPI in project-oriented organizations it is necessary to apply appropriate attributes in a ratio that matches up the specific organizational management system. In addition to the general and specific characteristics of the KPIs in project-oriented organizations that can help assess the degree of suitability of a specific KPI, it is necessary to consider their categorization in terms of what you want them to show. One of the main KPI categorization is as follows:

- Quantitative KPIs - numerical values;
- Practical KPIs – shows interfacing with company processes;
- Directional KPI – getting better or worse;
- Actionable KPIs – effect change;
- Financial KPIs – performance measurements.

It could be said that the selection of KPIs from a set of measures is an easy task, but choosing the right KPIs is very difficult. In fact, all that is measurable can be considered as an indicator, but the question is the relevance of the measured results and the significance of specific results for the different stakeholders. This means that in the context of the project, each measure can be a KPI, but it is possible that one measure is a KPI for one stakeholder and just an ordinary measure for another.

Notice that a critical factor for assessing the success of any process is not in measure definition but rather in determination of key performance indicators - KPIs. The three key parameters of each key performance indicator are: indicator definition; indicator acceptance by process managers and employees; indicator traceability and verifiability (Franceschini et al. 2007). Also, Franceschini et al. (2007) classified indicators as follows: **initial** indicators – consider available resources, working patterns and all available process inputs; **process** indicators – measure the consistency between process results and process specifications; and **result** indicators – measure process outcomes, the degree of goal achievement, meeting the customer needs and the cost-benefit ratio.

Aiming to propose a conceptual framework for measuring project success it can be concluded that a conversion of measures in KPIs can be performed by reexamining whether the measures meet the KPI criteria (predictable, measurable, actionable, relevant, automated). If all criteria are met, the measure is a KPI. Notice that the rating of met criteria provides key answers in creating the list of the most important KPIs.

What can also be helpful are the following questions (Hubbard, 2007): what is the decision a KPI is supposed to support; what really is being measured with the KPI; why does this thing matter to the decision being asked; what is known about it now; what is the value of measuring it further.

Kerzner (2011) states that the exact understanding of the KPI definition is in the explanation of its every word, and that can be used as a set of criteria for a number optimization and verification of the right KPIs:

- **Key** – a major contributor to the success or failure of the project.
- **Performance** – a metric that can be measured, quantified, adjusted and controlled.
- **Indicator** – a reasonable representation of present and future performance.

Considering the abovementioned for the development of the conceptual framework we can use the performance measurement process model set by Kerzner (2011).



Figure 1. Typical steps in Performance Metrics Process (Kerzner, 2011)

According to this model, at the very start of the performance measurement process on the project, there has to exist a consent of all involved stakeholders about the way of using measures as the project’s success indicators. Selected measures have to reflect the entire project, which can be achieved by selecting key measures combined with value measures. Poor metrics management, especially with value metrics, can lead to a credibility lost with the client and many other challenges.

4. KPI interdependencies

KPIs are a set of interrelated performance measures that are necessary to meet the project’s critical success factors (Kerzner, 2011). Looking at only one indicator one may not be able to determine the actual cause of poor performance and it may be necessary to look at several interrelated metrics. For example, if schedule variance (SV) is favorable and cost variance (CV) is unfavorable, that could mean that you worked overtime and used higher salaried workers. In the latter case, if schedule variance (SV) is unfavorable and cost variance (CV) is favorable, that could mean that you may have insufficient resources on the project. Further, if SV= -\$150,000 and CV= -\$200,000, it may seem that project performances are very poor, but if you consider other measures such as: number of approved scope changes = 30 and turnover of critical skilled workers = 11, it could be concluded that project performances are not so poor after all. Another example: consider what happens if CV= -\$10,000 in April and CV = -\$20,000 in May – it looks like the situation has gotten worse. But if EV(April)= \$100,000 and EV(May)= \$400,000, project performances are not getting worse, in fact they are improving considering that CV(April)= -10% and CV(May)= -5%. In conclusion, for the definition of a conceptual framework for selecting the right KPIs in project-oriented organizations, one of the necessary steps would be checking the KPIs interdependence.

5. Integrated system for measuring project performances

Pillai et al, (2002), based on the active participation and research on R&D projects, proposed an integrated approach for measuring project performance. Their idea came from identifying impacts from the environment, which mainly originate from the organization where the project is implemented and from the expectations and influence of different stakeholders during the project life cycle. In this approach stands the concept of **Integrated Performance Index (IPI)**, which should adequately represent the project performances at any phase of the project life cycle, integrating the key factors in each phase of the life cycle. The integrated performance index can be calculated by identifying the phases of the project life cycle, identifying key factors in each phase and the integrating all key factors in the integrated performance index. The integrated performance index may be specified as follows:

$$Z_i = f(X_{1i} \dots X_{ni}) \tag{1}$$

where: Z_i – integrated performance index of the i th project; $X_{1i} \dots X_{ni}$ = key factor that determinates various phases of the project life cycle for i th project.

The merit of a project represents the expected benefit of the project to the organization. Hence, the performance should be zero when the merit is zero. A certainly expected benefit from the project should be as we predicted or preferably increased as the project moves from inception to completion. As the merit of the project grows or declines it would be directly reflected in its overall performance, as follows:

$$Z = (\text{Merit})^a \times f(\text{other factors}) \quad (2)$$

Traditionally, merits of projects are represented through economic indices such as NPV, IRR etc. However, the project's success cannot be measured with a single indicator; on the contrary, evaluation is usually conducted using multiple criteria that could be combined in different ways. Some of the important criteria could be intangible such as expected utility, strategic need, innovation, potential technical or market interaction with existing product, availability of technology, resources, knowledge and skills etc. During evaluation, projects will be given a score against each criteria and the overall merit rank will be a weighted sum of all these scores.

$$\text{Merit rank for the project} = 1/n = \sum_{i=1}^n W_i S_i \quad (3)$$

where n is the number of criteria used, W_i is the weight of the i th criteria and S_i is the score of i th criteria.

The Integrated performance index take into account the following factors:

The risk of the project. As risk increases, project performances are reduced; in other words, if the risk is completely negative, the performance will equal zero. Risk may be related to the project performance as follows:

$$Z = (1 - \text{risk})^b \times f(\text{other factors}) \quad (4)$$

Project category. Project category could be identified as the key factor of project success considering that all projects are not equally important for the organization, hence one that is more important is automatically prioritized. Other neglected projects need more effort to achieve the same index of project performance. Project performances may be related with project categories as follows:

$$Z = (1 + \text{category})^c \times f(\text{other factors}) \quad (5)$$

Project status. Traditionally, the project status has been taken as synonymous with the project performance. The most used method for tracking and displaying the project status is the earned value method. This system for integrated performance measuring uses a modified earned value method based on two parameters: progress deviation (δp) and cost deviation (δc). This modification is primarily caused by the fact that the traditional earned value method presents the schedule variance ($SV = BCWP - BCWS$) in terms of cost, which means that a behind schedule condition requires a variance amount of cost to get back to schedule. Therefore, delays and cost overruns have adverse effect on the project and for the success of a project both the progress and cost deviation should remain as close to zero as possible. Accordingly, project performances may be in relation with the project status as follows:

$$Z = [1 / ((1 + \delta p)^d (1 + \delta c)^e)] \times f(\text{other factors}) \quad (6)$$

Decision effectiveness. Decision effectiveness represents the effectiveness of the existing project management system in ensuring the success of the project. Effective decisions should have a positive effect on project performances which may be specified as follows:

$$Z = (1 + \text{decision effectiveness})^f \times f(\text{other factors}) \quad (7)$$

Decision effectiveness can be computed as a weighted sum of a number of factors that have an impact on decision-making.

$$\text{Decision effectiveness} = 1/n = \sum_{i=1}^n W_i S_i \quad (8)$$

Where n is the number of factors used, W_i is the weight of i th factor and S_i is the score of i th factor.

Customer commitment. In case of a project where the customer is known in advance, the project success may be related with the involvement and commitment of the customer. For the success of the project, the customer commitment should grow with time.

$$Z = (1 + \text{customer commitment})^g \times f(\text{other factors}) \tag{9}$$

Similarly to the decision effectiveness, the customer involvement could be, if identified through several factors, specified using the following formula:

$$\text{Index of customer commitment} = 1/n = \sum_{i=1}^n W_i S_i \tag{10}$$

Cost effectiveness. According to PMI (2004), one of the functional areas of project management is “Project cost management” and it is primarily concerned with the cost of resources engaged on the project. Besides, project cost management should also consider the effect of project decisions on the project’s cost. Cost effectiveness needs continuous cost estimation throughout the project phases. The relationship between cost effectiveness and the project performances may be defined as follows:

$$Z = (1 + \text{cost effectiveness})^h \times f(\text{other factors}) \tag{11}$$

If cost effectiveness is identified through a number of factors, the index of cost effectiveness may be presented with the following formula:

$$\text{Index of cost effectiveness} = \tag{12}$$

Production preparedness. Development projects in a competitive environment that is changing rapidly, requiring a high level of preparedness / readiness of production process. Production preparedness has a positive effect on the project performances:

$$Z = (1 + \text{production preparedness})^j \times f(\text{other factors}) \tag{13}$$

Factors of production preparedness are: multifunctional team’s formation, institution of mechanisms for technology transfer, common documentation formats as well as quality assurance and quality control systems etc. Therefore, the production preparedness can be computed as a weighted sum of a number of factors:

$$\text{Production preparedness} = \tag{14}$$

Based on the above relationships, the Integrated performance index may be computed as follows:

$$Z_i = \frac{[(x_{1i})^a (1 - x_{2i})^b (1 + x_{3i})^c (1 + x_{6i})^f (1 + x_{7i})^g (1 + x_{8i})^h (1 + x_{9i})^j]}{[2^{(c+f+g+h+j)} (1 + x_{4i})^d (1 + x_{5i})^e]}$$

Where Z_i = Integrated Performance Index; x_{1i} = normalized variable representing the merit of the project; x_{2i} = normalized variable representing the risk of the project; x_{3i} = normalized variable representing the category bias of the project; x_{4i} = normalized variable representing the progress deviation of the project; x_{5i} = normalized variable representing the cost deviation of the project; x_{6i} = normalized variable representing the decision effectiveness of the project; x_{7i} = normalized variable representing the customer commitment of the project; x_{8i} = normalized variable representing the cost effectiveness of the project; x_{9i} = normalized variable representing the production preparedness of the project. The value of x_1 to x_9 may vary between 0 and 1. The coefficients $a, b, c, d, e, f, g, h, j$ represent the relative importance of the various factors and depends on the sponsor’s perception of importance. The value of these coefficients may vary between 0 and 1. The factor $2^{(c+f+g+h+j)}$ is introduced as a denominator to normalize the value of Z between 0 and 1. When a factor is not applicable, the corresponding coefficient is made zero in both the numerator and denominator. In practice, the relative importance of various factors changes during various phases of the project life cycle (Pillai et al., 2002).

One of the biggest disadvantages of the Integrated Performance Index is its complex application. However, this index has an ability to integrate the key elements of the project that can affect both the project and the organizational success. Although this index is predefined for R&D projects, this conceptual framework recognizes the possibility of application of the Integrated performance index with necessary modifications in relation with the project type and the particular organization.

Conclusion

In conclusion, the project success should be measured at the project level by defining a set of performance measures and identifying KPIs. The literature suggests different categorizations of KPIs and models for KPI identification at the project level. As mentioned at the beginning, the most common problems faced by the project-oriented organization are the alignment of all projects with the strategic direction of the organization and choosing the method for measuring and analyzing the project success in terms of contribution of the project results to the organization's goals. One way to comprehensively assess the project success is to use the Integrated performance index that comprise the interaction between the multiple performance indicators and provides an overall analysis of the project success. The Integrated performance index may be too complicated for practical application, which is its biggest shortcoming, but it is also flexible and it can be adapted to a variety of projects with a caution that it is still more suited for R&D projects. The calculation of this index allows for the performance value to vary from 0 to 1, which is extremely important considering that all indicators are not equally important. However, despite this the practice shows that some KPIs are specific for particular phases of the life cycle, so their importance in the subsequent phases of the project could be increased significantly, decreased completely or simply some KPIs could appear in the later stages of the project. For this reason, the first recommendation of this paper is to identify the KPIs for specific phases of the project life cycle in order to reduce the risk of inadequate selection of KPIs and to provide a better assessment of the significance of each KPI. The second shortcoming of known frameworks and models for measuring project success is the lack of consideration of factors from the project environment. The specific project environment is the organization where the project is implemented, its procedures and processes, technology, resources and other capacities, while the wider environment is outside of the organization (competition, business partners, customers, regulations, economic and social impacts etc). With this in mind, the second recommendation considers the analysis of these factors and the need to define a set of project performance measures in terms of influential factors from the project environment. KPIs should be selected from the identified set of measures and they should be in compliance with other KPIs at the project level. In this way the selection of KPIs contributes to a more efficient evaluation of the project success. A new conceptual framework for measuring project success should enable a systematic selection of the right KPIs, which will provide a better assessment of the project's contribution to the success of the organization. Some of the key features of the conceptual framework should be formality, flexibility and integration.

Acknowledgements

This paper is a result of the Project No. 179081 funded by the Ministry of Education and Science of the Republic of Serbia: Researching Contemporary Tendencies of Strategic Management Using Specialized Management Disciplines in the Function of Competitiveness of the Serbian Economy.

REFERENCES

- [1] Cokins, G. (2004). *Performance management - Finding missing pieces (To close the intelligence gap)* (1st izd.). New Jersey, NJ: John Wiley & Sons, Inc.
- [2] Eckerson, W. (2006). *Performance Dashboards: Measuring, Monitoring and Managing Your Business*. New Jersey, NJ: John Wiley and Sons.
- [3] Franceschini, F., Galetto, M., & Maisano, D. (2007). *Management by Measurement*. Torino, To: Politecnico di Torino.
- [4] Gan, M., & Salter, J. (2000). Innovation in project-based, service-enhanced firms: the construction of complex products and systems. *Research Policy*, 29 (7-8), 955-972.
- [5] Hobday, M. (2000). The project based organization: an ideal form for managing complex products and systems? *Research Policy*, 29, 871-893.
- [6] Hubbard, W. (2007). *How to Measure Anything*. New Jersey: John Wiley and Sons.
- [7] Kaplan, R., & Norton, D. (1992). The Balanced Scorecard - Measures that Drive Performance. *Harvard Business Review*, 72-79.

[8] Kerzner, H. (2011). *Project Management Metrics, KPIs and Dashboards*. New Jersey, NJ: John Waley and Sons.

[9] Kerzner, H. (2001). *Strategic Planning for Project Management Using a Project Management Maturity Model*. New Jersey, NJ: John Wiley and Sons.

[10] Mihić, M. (2011). *Strategic Project Management*. Beograd, Bg: Zadužbina Andrejević.

[11] Paladino, B. (2011). *Innovative Corporate Performance Management - Five Key Principles to Accelerate Results* (1st ed.). New Jersey, NJ: John Wiley & Sons, Inc.

[12] Pillai, S., Joshi, A., & Rao, S. (2002). Performance measurement of R&D projects in a multi-project, concurrent engineering environment. *International Journal of Project Management*, 20, 165-177.

[13] Turner, J., & Keegan, A. (2001). Mechanisms of governance in the project-based organization: Roles of the broker and steward. *European Management Journal*, 19 (3), 254-267.

[14] Verweire, K., & Van den Berghe, L. (2004). *Iterated Performance Management - A Guide to Strategy Implementation* (1st ed.). London, Ldn: SAGE Publications.

Webster, G. (1999). Project definition-the missing link. *Industrial and Commercial Training*, 31 (6).

Received: July 2013.
Accepted: September 2013.

About the Author

Marija Todorovic

University of Belgrade, Faculty of Organizational Sciences
todorovic.marija@fon.bg.ac.rs

Marija Todorovic is a lecturer and A.B.D. at the University of Belgrade, Faculty of Organizational Sciences. She is a member of several international scientific organizations. In the Serbian Project Management Association she holds a position of the IPMA Young Crew Serbia manager. Her primary research areas are project management, strategic management and project appraisals. She has published over 30 papers in peer-reviewed conferences and journals and taken part in several research projects.



Zorica Mitrovic

University of Belgrade, Faculty of Organizational Sciences
zorica.mitrovic@fon.bg.ac.rs

Zorica Mitrovic is a Teaching Associate at the University of Belgrade, Faculty of Organizational Sciences. She is a member of the Serbian Project Managers Association. Her primary research areas are performance management, strategic management and project management. She has published over 20 papers in peer-reviewed conferences and journals and taken part in several national and international research projects.



Dragan Bjelica

University of Belgrade, Faculty of Organizational Sciences
bjelica.dragan@fon.bg.ac.rs

Dragan Bjelica is a Teaching Assistant at the Faculty of Organizational Sciences, University of Belgrade. His major areas of interests are Project Management and Investment Project Appraisal.

