



## Selecting Key Performance Indicators in Universities – Academic perspective

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### Abstract

*In recent years, the systems of performance indicators occur in terms of the increasing importance of analyzing performances of Higher Education Institutions in order to increase the effectiveness and efficiency, with the most rational use of resources and greater transparency. In the process of developing a system for monitoring performance, the selection of indicators requires special attention when taking into account different needs of stakeholders. Among different criteria for selection of indicators, a detailed study may be focused on the relevance of key indicators for teaching staff. This paper presents the results of the pilot phase of the research in the field of relevance of performance indicators at the Faculty of Technical Sciences, University of Novi Sad, within the teaching population of the Department of Industrial Engineering and Management. The pilot phase included 59 respondents from a total of 140 teachers who make up the target population. The obtained data were analyzed using Mean-Variance method which is used to rank indicators by relevance and which is basis for further analysis and comparison of results with other groups of stakeholders in determining the common set of key performance indicators.*

**Key words:** Key Performance Indicators, Selection of Indicators, Relevance, University

### 1. INTRODUCTION

Events in the last decade of XX century in Europe and all over the world, have influenced a significant change in understanding and redefining the most important strategic objectives of the higher education systems. Many factors such as: increase in the number of students in the world, the diversification of education, the increasing privatization of higher education, the growing internationalization, regional integration, and so on [1] strongly affected the need to improve the management systems of higher education. Due to increasing complexity of the higher education systems and changing environment, attention is focused on systems for measuring and monitoring the parameters of quality

of business processes of the organization and to the introduction of key performance indicators (KPI - Key Performance Indicators) that are used in the assessment of the real state of the business and determine the main directions of action in the future [2]. Also, Higher Education Institutions are serving the needs of various stakeholders who have different perspectives and interests as the result of their different missions and goals. The problem of student accommodation is an example of these differences, as [3] noticed: students are interested in suitable accommodation of good quality at a reasonable price; Institutions will therefore be interested in the level of profits that flow from student accommodation; while the state is primarily interested in the overall cost-effectiveness and efficiency of

institutions. Therefore it is important to consider the existence of different stakeholders with different needs, expectations and perspectives when developing performance indicators system.

One of the main challenges in the process of developing performance indicators system, is the selection of appropriate performance indicators considering different perspectives of stakeholders. For that reason, the focus of this study was to explore the relevance of set of performance indicators for teaching staff as one of the criteria in the process of selection of appropriate indicators.

## 2. PERFORMANCE MEASUREMENT SYSTEMS

Systems for measuring and managing business performances remained prisoners of the past. The reason for this lies in the fact that in the past, the value was created primarily on the basis of fixed and tangible assets reported in the accounting balance sheet, while in the modern business environment value is primarily or substantially created on the basis of an intangible assets which is not accounted for in the accounting balance sheet, and this is largely related to property resulting from intellectual capital. Therefore, an indicator system that balances the historical financial information with everyday drivers of business success in a way that allows for the effective implementation of the organization's business strategy, is needed [4]. This caused, in the early nineties, development of new systems for measuring the performance of business organizations, that would use balanced approach in monitoring the organization's objectives. One of the most used concepts, called BSC – Balanced Scorecard, was designed by professors at Harvard University Robert Kaplan and David Norton. Models developed for-profit organization, quickly found its application in non-profit and public organizations, where in some cases there is absence of a profit motive for which this model seems very reasonable in measuring performance. Higher education systems fall into this category, resulting in many Western countries facing a strong need for new and different types of monitoring, evaluation and reporting systems that reveal and reflect the effects of public and state organizations [5]. The absence of profit motivation in public Universities is an essential problem that creates the need to find alternative methods to assess the performances of higher education institutions. Therefore, this lack of profit motivation, combined with diversified objectives of higher education, makes the measurement of efficiency in higher education partly problematic [6].

The role of performance indicator system can be different which depends on the purpose for which is designed. [7] have identified four basic roles of indicator system: evaluation, monitoring, planning, and dialogue. Similarly [8] have identified five fundamental roles of performance indicators systems: 1. Monitoring 2. Evaluations 3. Dialog 4. Rationalization 5. Resource Allocation. Also, [1] have identified three purposes for which the system of indicators can be used: 1) to inform the public or the state of the system; 2) monitoring of

policies, strategies or plans that are being implemented, and 3) management of the higher education system and institutions as a whole.

## 3. SELECTION OF INDICATORS

The problem of development and selection of indicators is actually the problem of simplifying the complexity of the real system that is in direct contradiction with the quality of the information provided. The selection of indicators is a direct reflection of subjective assumptions about what is the quality of the entity. A smaller number of indicators mean greater restrictions in an attempt to portray different aspects of quality and vice versa. For this reason it is significant to explore and identify which indicators are, in light of the various stakeholders, the most important in the decision-making process [9]

The different roles of the performance indicator systems require different criteria for the selection of indicators. [7] lists the four most important criteria in selecting performance indicators: the first requirement is that they must clearly be linked to the defined function of the institution. The second requirement is that they represent only what their name says, that is, indicators of the level of achievement of the goals of the institution. The third requirement is that they should represent a valid operationalization of what they refer to and to be measurable and interpreted in a reliable and correct manner. Finally, taking into account that their values are relative and not absolute, the use of indicators in terms of the control tool should be extremely cautious. From the above, it is necessary to use a limited number of indicators that have a high validity.

Systems of performance indicators has some common principles and approaches, although they are guided by different purposes, methodologies and criteria [10]. Systems, which are more commercial in their nature (THE - Times Higher Education Rankings, Shanghai Academic Ranking - ARWU, Leiden rankings), generally consider the availability of information as a basic criterion in the choice of indicators. Some authors [11] take into account several criteria in the development of the performance indicator system, such as: relevance of indicators for different users, multidimensionality, measurement, resistance to manipulation, validity, reliability, comparability, availability of information for calculating indicators, etc.

Within various criteria for selecting indicators, the problem of selection can be directed towards more detailed research of the criteria of relevance of key indicators for stakeholders with a focus on the teaching population.

## 4. DISCUSSION

In this paper, the results of the pilot phase of the research of the relevance of performance indicators at the Faculty of Technical Sciences, University of Novi Sad within the teaching population of the Department of Industrial Engineering and Management will be presented. In order to explore the relevance of key performance indicators among teaching population, a

questionnaire from [11] was taken as a measuring instrument, which was then adapted to the Serbian speaking language as well as the specific characteristics of the domestic education system. Before launching the pilot test, the content of the questionnaire was tested on a sample of 5 professors (Content Validity), providing basic pre-requisites of the comprehensibility of the content and the used measurement scale in the questionnaire. The final questionnaire consists of 64 particles, two of which are control variables (gender and title), and on 62 questions, teaching staff gave their opinion on the relevance of the indicators they have for them in assessing the quality of the institution. Each indicator is classified into one of five dimensions: C – Teaching and Learning; D – Research; E – Knowledge transfer; F – Internationalization; and G – Regional engagement. To measure the relevance of the indicator, a Likert scale was used in which respondents were offered to express their agreement or disagreement with the statement on the scale from 1 to 5, with grade 1 - I completely disagree and grade 5 - I completely agree. During the pilot phase of the research, the questionnaire was distributed to teaching staff in the Department of Industrial Engineering and Management at Faculty of Technical Sciences in Novi Sad using Survey Monkey as a tool for data collecting. Out of a total of 140 teachers identified as populations during the pilot phase, the questionnaire was completed by 59 respondents which made up a representative sample of this phase of the research. Of the 59 respondents, women and men (Table 1) equally participated with 42.4% and 57.6% respectively. Percentage of respondents elected in different titles are given in Table 2.

Table 1 - The ratio of respondents by gender

	Frequency	Percentage	Valid
Male	34	57.6	57.6
Female	25	42.4	42.4
<b>Total</b>	<b>59</b>	<b>100.0</b>	<b>100.0</b>

Table 2 - Ratio of respondents by titles

	Frequency	Percentage	Valid
Professor emeritus	1	1.7	1.7
Full Professor	6	10.2	10.2
Associate Professor	6	10.2	10.2
Assistant Professor	16	27.1	27.1
Lecturer	1	1.7	1.7
Teaching Assistant	20	33.9	33.9
Junior Assistant	4	6.8	6.8
Assistant Researcher	3	5.1	5.1
Junior Researcher	2	3.4	3.4
<b>Total</b>	<b>59</b>	<b>100.0</b>	<b>100.0</b>

The obtained data were analyzed using the Mean-Variance method, which enabled further ranking of indicators in order of relevance. This methodology

allows for the ranking by calculating the mean value and the standard deviation for each question, whereby the mean value reflects the level of relevance of the indicators for the respondents, and the standard deviation, ie deviation from the mean, shows the measure of the uncertainty of the respondents in the relevance of the individual indicator. Indicator whose mean value is higher and the standard deviation is lower is more reliable and relevant to subjects than in the opposite case. Given the limited spread of exposure, the list of 10 most relevant (Table 4) and 5 least relevant indicators is presented (Table 5).

Table 4 - Most relevant indicators

Rank	Indicator	Mean	Variance
1.	E01	4.60	0.349
2.	D01	4.59	0.452
3.	C07	4.63	.548
4.	E04	4.43	0.460
5.	C21	4.42	.524
6.	F01	4.55	0.743
7.	F03	4.48	.675
8.	E03	4.31	0.534
9.	E02	4.40	0.665
10.	F06	4.28	0.554

Table 5 - Least relevant indicators

Rank	Indicator	Mean	Variance
58.	C08	3.73	1.442
59.	G05	3.37	1.130
60.	G02	3.30	1.249
61.	C03	3.46	1.459
62.	C10	3.02	1.638

According to Table 4, the indicators that have the highest relevance for respondents include: E01 - Incentives for knowledge exchange; D01 - Expenditure on research; C07 - Laboratory facilities; E04 - Academic staff with work experience in business/industry; C21 - Student mobility; F01 - Percentage of international students; F03 - International partnerships; E03 - Continuous professional development revenues; E02 - Joint research contracts with private sector; F06 - Joint international projects with HEI's.

According to Table 5, the indicators that have the least relevance for respondents include: C10 - Doctoral completions; C03 - Relative graduate earnings; G02 - Regional participants in Continuing Education Programmes; G05 - Public lectures for external auditorium; C08 - Academic staff with PhD.

It can be noticed that among top ten performance indicators, almost half of them (4) belong to the dimension E - Knowledge transfer (E01, E02, E03 and E04) which indicates a strong commitment of teaching staff at the Department of Industrial Engineering and Management in the faculty of Technical Sciences of Novi

Sad to the, so called, third mission of University – named also Knowledge transfer. This is not surprising fact, considering that the Department has a long history of knowledge transfer to industry which can be seen through more than 170 completed projects in the field of design, development and management of production and organizational structures, improvement of their efficiency, rationalization of material flows, introduction of quality system, etc in the past 50 years within close cooperation with industrial enterprises.

Most of indicators that teachers consider least important belong to the field of regional engagement with public, which may lead to the conclusion that teacher do not recognize them as factors that contribute to the quality of their institution.

Comparing results with [12] it can be seen that the student population at the same Department of Industrial Engineering and Management at the Faculty of Technical Sciences in Novi Sad rated more relevant different indicators compared to the teaching staff of the same institution. Their choice is more oriented towards a group of indicators related to the employment opportunities (C03 - Possibility of employment; G10 - Possibility of employment in companies from the region; and F10 - Possibility of employment in international companies). However, the highest relevance for students has an indicator C17 – Overall possibility to conduct student's internship in enterprises, along with the indicator G09 - Possibility to conduct student's internship in companies from the region.

Although, at first glance, it seems that teaching staff and students rated different indicators as relevant, it may be noted that first ten indicators for both groups of stakeholders are in the wider sense very connected, having in mind that most of them are in line with the so called new Third mission of the Universities. That is, all this, however, points to the need for improvement and development of a long-term relationship between the Faculty and enterprises in order to establish a model of students internship at the highest level of quality for students and, using the same track, establishing knowledge transfer to industry on the level of joint projects.

The limitation of this research in the first place is mainly related to the selected sample of the population. It remains unclear what variations would occur with inclusion of samples from other Departments and other Faculties, which are in the same field of technical sciences but in different sub-fields, which leaves wide space for further research in the field.

## 5. CONCLUSION

Selection of Performance Indicators is a very important stage in developing a system for measuring and monitoring the performance of higher education institutions, and teaching staff, as one of the most important groups among stakeholders, are often neglected in such research. The pilot study indicated the teacher's opinion on what is important to measure and improve at the Faculty. The results show that with the

use of the Mean-Variance method there is a high consistency of the teaching staff in the assessment of the relevance of the indicators, ie there is a clear consensus in the awareness of the respondents about which indicators are relevant and which are not. Also, results are very good basis for future research in this area as they point out that some differences between groups of stakeholders exist and that they should be considered when selecting appropriate performance indicators for measuring quality and progress of Higher education institutions. These differences may look too big at first glance when considering indicators individually, but when looking more wider, they can be classified under the same dimension of Knowledge transfer and they may represent chances for institutions to direct same resources toward common area of interest for different stakeholders.

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