Inženjering modela izvrsnosti na visokoškolskim ustanovama na osnovu Boldridžovih kriterijuma i Hošin Kanri principa

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Apstrakt: Koncept ukupnog upravljanja kvalitetom (TQM) uspešno je primenjivan u industriji od sredine 20. veka. Jedna od najčešće korišćenih metoda poboljšanja kvaliteta u visokom obrazovanju u poslednje dve decenije je TQM, a jedna od često implementiranih metoda inženjeringa izvrsnosti zasniva se na Boldridžovih kriterijumima i Hošin Kanri principima. Rad istražuje postojeću literaturu na temu primene Boldridžovih kriterijuma i Hošin Kanri principa u visokoškolskim ustanovama, analizira percepciju visokoškolskog osoblja (nastavnog i administrativnog) o Boldridžovim kriterijumima i Hošin Kanri principima na Fakultetu za inženjerski menadžment (Republika Srbija) i razvija model izvrsnosti za institucije visokog obrazovanja na primeru Fakulteta za inženjerski menadžment.

Ključne reči: Visokoškolske ustanove, inženjering modela izvrsnosti, Boldridžovi kriterijumi, Hošin Kanri principi.

Engineering an excellence model in higher education based on Baldrige criteria and Hoshin Kanri principles

Abstract: Total quality management (TQM) concept has been successfully applied to the industry since the mid 20th century. One of the used methods of quality improvement in higher education during the last two decades has been the TQM, and one of the often implemented methods of engineering excellence is based on Baldrige criteria and Hoshin Kanri principles. The paper explores the existent literature on the topic of implementing Baldrige criteria and Hoshin Kanri principles in higher education institutions, analyzes perception of the higher education staff (teaching and administrative) at the School of Engineering (Republic of Serbia) on the Baldrige criteria and Hoshin Kanri principles and develops a model of excellence for the higher education institutions on the example of the School of Engineering Management.

Key words: Higher education institutions, engineering the model of excellence, Baldrige criteria, Hoshin Kanri principles.

Introduction

Total quality management (TQM) concept has been successfully applied to the industry since the mid 20th century. The question whether the success achieved by TQM in the industry, and especially in the health sector, could be successfully applied (with the different approach) in the field of education has emerged. Helms and Key have come to the conclusion that the values that TQM carries with them have greater compatibility and usability in the field of higher education than many other systems (Saraiva and Reis, 2006). Higher education in the conditions of globalization is under great pressure to show significant progress and continuous improvement in terms of quality and to somehow reduce the apparent gap between the expectations and what higher education really provides for the students, parents, employers, and legislators (Pariseau and McDaniel, 1997). There is also a pressure on higher

education institutions to create new generations of educated workforce that will meet the needs of the increasingly dynamic world economy, but also to attract the best talent because employees in teaching, scientific, and administrative positions are the key value of any higher education institution (Mazais et al., 2012). One of the used methods of quality improvement in higher education during the last two decades has been the TQM, and one of the often implemented methods of engineering excellence is based on Baldrige criteria and Hoshin Kanri principles (Quinn, et al., 2009; Menezes et al., 2018), even though the universities' administration have been sceptic about the implementation of management tools in education (Cruickshank, 2003).

The goal of this paper is to analyze existent literature on the topic of implementing Baldrige Criteria and Hoshin Kanri principles in higher education institutions, analyze the perception of the higher education staff (teaching and administrative) on the Baldrige Criteria and Hoshin Kanri principles at the School of Engineering (Republic of Serbia) and to develop a model of excellence for the higher education institutions on the example of the School of Engineering Management.

1. Baldrige Criteria and Hoshin Kanri principles in higher education – Literature review

Baldrige criteria

The Malcolm Baldrige Award is a prestigious award for quality established by the US Congress in 1987 and has been awarded for the annual contribution regarding quality made in manufacturing, services, small entrepreneurship, and the non-profit sector (Karathanos and Karathanos, 2005; Ziegler, 2005). In the period from 1994 to 1995 Baldrige's team have started pilot criteria for education (Karathanos, 1999) and in 1995 the National Institute of Standards and Technology (NIS) has adapted the criteria for quality in business so that they can be used in education and health (Moore, 1996). In Figure 1, Baldrige's educational criteria for implementing a framework of excellence are presented.

Figure 1. Baldrige's educational criteria for implementing a framework of excellence: Systems perspective

Source: Baldrige National Quality Program, 2006

Malcolm Baldrige criteria in the field of education are based on the following values:

1. **Visionary leadership** - The management of an educational institution must create a climate-oriented learning environment, with a focus on the student. Leadership is expected to encourage readiness, learning, and creativity among staff, who are expected to be committed and willing to contribute to the goal;
2. **Learning-oriented education** - In the focus of the educational process, the student's real needs must be met. Learning-oriented education is influenced by the market circumstances and society's needs (technological development);
3. **Organizational and personal learning** - The need for permanent education and training of individuals in an educational institution would contribute not only to better educational programs and services provided by the institution, but also to a more efficient way in responding to the needs of the students, markets, and financiers;
4. **Evaluation of staff, faculties and business partners** - Educational institutions must create conditions for internal (staff, trade unions, etc.) and external partnerships (other educational institutions, suppliers, communities, etc.) in order to achieve their goals;
5. **Agility** - Developing mechanisms to quickly and efficiently meet the demands of the students and stakeholders;
6. **Focus on the future** - Creating short-term and long-term plans to make it clearer to all those factors that may have an impact on the organization or the market within which educational institutions function;
7. **Innovation management** - Innovation must become part of the educational culture and is very important for improving the educational and operational process within the institution;
8. **Facts-based management** - The educational institution should pay attention to measuring and analyzing its achievements, which directly influences the improvement of the decision-making process and the development of the educational process;
9. **Social Responsibility** - The goal for an institution is to show that it is the responsible factor of the society in which it operates and that it strictly abides laws and regulations and that it is necessary to support socially useful goals; (improvement of knowledge within the local community, socially useful work, etc.);
10. **Focus on results and value creation** - Results must be directed towards achieving value for the students and stakeholders;
11. **Systemic perspective** - The management of an educational institution must direct decision-making by taking into account the needs of the students and stakeholders. It is necessary to link strategies with the key processes that add value to the students and stakeholders (Kedem and Benshalom, 2014).

Over the years, the quality-setting framework has been changed and adapted. The author Brent Ruben has distinguished seven basic areas that define excellence in higher education:

1. Leadership;
2. Plans and goals;
3. Users;
4. Programs and services;
5. Faculty, staff, and workplace;
6. Evaluation and use of information;
7. Outcomes and Achievements (Ruben, 2006; Brusoni, et al., 2014).

By further developing the Baldrige framework for excellence, Rutgers University has come to the next model of excellence in higher education:

1. A sense of mission and vision that is generally acceptable, understandable and appreciated;
2. Strategic planning, prioritizing, and setting goals in order to pursue a meaningful transformation of predispositions into specific programs, services, and activities with the efficient and effective use of operations and resources;
3. Leadership and effective governance at all levels, taking into account mechanisms that give us feedback and criticism;
4. High quality programs and services that are carefully designed, regularly evaluated and continuously improved in accordance with established goals;
5. Gather information concerning the needs, expectations and experiences of key stakeholders with the aim of incorporating into programs and services, evaluations, promotion programs and making daily key decisions;

6. A satisfactory working environment with qualified and dedicated staff and faculty who believe that evaluations and improvements are key priorities;
7. Comparison with other institutions and leaders for evaluation and improvement process (Brusoni, et al., 2014; Ruben, 2006).

The Baldrige criteria have been implemented in the late 1990's and early 2000's in various US and international higher education institutions (Brusoni, et al., 2014; Grant, et al., 2004). The main focal points of implementing Baldrige criteria in higher education institutions are linking accreditation standards and Baldrige criteria (Ruben, 2007), enhancing the students learning through information technologies (Beard and, Humphrey, 2014).

Hoshin Kanri modelling

Hoshin Kanri is a Japanese managerial expression that can't be literally translated into English or any other language. The term consists of four basic elements: Ho - direction, Shin - focus, Kan - alignment, and Ri - reason. The phrase includes four elements of business management:

1. Vision;
2. Strategy development;
3. Implementation of the strategy;
4. Control of the strategy.

It should be noted that there is a connection with the fifth element that implies TQM, which represents a mean for the realization of Hoshin Kanri elements. In Figure 2, the elements of the Hoshin Kanri model are shown with the emphasis on the following categories:

1. The goals and future scope of the organization are derived from the vision;
2. It is necessary to develop a strategy and key performance indicators (KPIs);
3. The implementation of objectives must be carried out at all levels (this implies creating a strategy at each level);
4. There must be a feedback in terms of the results to complete the Plan - Do - Check - Act or PDCA cycle.
5. There are no values without TQM switching, which includes the "Do" segment of the PDCA cycle

Figure 2. The elements of Hoshin Kanri model

Source: Hutchins, 2008

Hoshin Kanri model is focused on planning and process with an emphasized need for communication and with the absolute absence of an assessment of the results of the work. The emphasis is on motivation, not on structural compliance that results in reward or penalty (McCulloch, 1993; Roberts and Tennant, 2003).

Oregon State University has developed its own model that combines Hoshin Kanri's model of planning and Baldrige's rewarding criteria. The TQM model based on these criteria consists of the following steps:

1. Define the consumer;
2. Define vision and mission;
3. Tackle fear;
4. Develop pilot teams;
5. Training;
6. Develop criteria for measurement;
7. Recognize and reward success;
8. Work continuously on improvement (Michael et al., 1997).

One of the main questions of studying the implementation of TQM methods including the Badrige criteria and Hoshin Kanri principles has been whether those criteria and principles, and the TQM itself, are still applicable to the higher education institutions in the second decade of the 21st century.

2. The scope of study and data collection

Objectives

The goal of the empirical part of the paper is to analyze the perception of the higher education staff (teaching and administrative) at the School of Engineering Management (Republic of Serbia) on the key elements of excellence in higher education based on Baldrige Criteria and Hoshin Kanri principles. The data has been collected in September 2018 through in person semi-structured interviews and the answers have been transcribed by the authors.

Survey design

The interviewees have been given the main Baldrige criteria and Hoshin Kanri principles and have been asked to identify the main focal point regarding quality for higher education institutions. The questions have been stated as follows:

1. Identify the main decisive factors for excellence in higher education institutions among Baldrige criteria;
2. Identify the main values for excellence in higher education institutions among Hoshin Kanri principles.

The participants have also been able to give additional comments on the approaches of achieving excellence in higher education institutions and the main stakeholders.

Description of the sample

For the purpose of this study fifteen professors in different fields, social sciences and STEM - (science, technology, engineering, and maths), and five administrative staff have been interviewed. The interviewees have been from the fields of social sciences and STEM, and the administrative staff from different departments (students' services, legal office, financial office), with various higher education experience.

Two full professors, eight associate professors, five assistant professors, one students' services manager and two students' services officers, one financial manager, and one legal manager have been interviewed. Among the teachers, ten of them were from the field of social science and five from STEM sciences. All of the interviewees have had various higher education experiences. The data on the demography of the sample are given at Table 1.

Table 1. Demographic variables

Code Name	Field or sector	Position	Higher education experience (years)
P1	Social Sciences	Assistant professor	6-10
P2	STEM	Full professor	16-20
P3	STEM	Associate professor	6-10
P4	Social Sciences	Associate professor	11-15
P5	Social Sciences	Assistant professor	<5
P6	Social Sciences	Assistant professor	<5
P7	Social Sciences	Associate professor	6-10
P8	STEM	Associate professor	11-15
P9	Social Sciences	Full professor	>20
P10	Social Sciences	Associate professor	6-10
P11	Social Sciences	Assistant professor	<5
P12	Social Sciences	Associate professor	11-15
P13	STEM	Associate professor	<5
P14	Social Sciences	Assistant professor	<5
P15	STEM	Associate professor	6-10
P16	Administration	Legal Manager	11-15
P17	Administration	Students' services manager	11-15
P18	Administration	Financial officer	6-10
P19	Administration	Students' services officer	<5
P20	Administration	Students' services officer	<5

3. Results

The participants have identified developing the mission, vision, and strategy of an organization as the crucial factor of engineering a model of excellence based on Baldrige criteria and Hoshin Kanri principles. The question of defining the students as the consumers have remained open, because of the dilemma should only the students be identified as the consumers, or that it should be wider community. The participants have also stated the implementation of the strategy and building and education of quality teams, consisting not only of the management and the staff (teaching and non teaching), but of the students, employers, legislators, community representatives as well. Also, the participants identified evaluation of the quality processes and the detection of the possible weak points requesting the immediate action as important elements of the commitment to quality.

The participants have recognized the importance of Baldrige criteria and Hoshin Kanri principles in achieving organizational success, especially regarding higher education institutions, and have identified the students, staff, and the wider community (employers, parents, local government, etc.) as the key stakeholders in higher education. Among the community stakeholders, the employers play one of the most important roles.

As it has been previously said, the crucial starting point for building the quality in higher education is the process of generating a mission, vision, and strategy of an institution. Higher education institutions management (rectors, deans, vice deans) has been recognized as the key factor in developing mission, vision, and the strategy of an institution. The first leaderships' goal is to set suitable strategy and to create SMART (specific, measurable, achievable, realistic, and time bound) goals. They are also the main controlling factor in strategy implementation. They are seen as the leaders whose main role is the motivation of the employees (either teaching or non teaching) for creating organizational excellence. The department heads are seen as the crucial factor in diffusion and implementation of the organizational goals. The teachers have been acknowledged as the crucial factor in creating appropriate curricula based on the strategy and the institution's goals.

Administrative staff has been established as the key factor for creating suitable services assisting the students in achieving their educational goals, but also supporting the teachers in their mission of transferring knowledge to the students and building the students' skills and abilities.

The quality teams have been accentuated as essential elements of higher education institutions' quality and strategic goals development, consisting of the teachers, administrative staff, the students, and

community representatives (employers, etc.). They are also essential for strategy implementation and evaluation.

The question of the methods in awarding the quality initiatives has remained open.

4. The model of excellence based on Baldrige criteria and Hoshin Kanri principles engineered for the School of Engineering Management

In the Republic of Serbia the starting point in developing and implementing a model of excellence for a higher education institution are the standards established by the National Entity for Accreditation and Quality Assurance in Higher Education of Serbia – NEAQA (previously Commission for Accreditation and Quality Assurance – CAQA).

According to Baldrige criteria and Hoshin Kanri principles, the requirements for higher education institutions accreditation, and the results of the interviews with the employees in teaching and administrative positions at the School of Engineering Management, the model of excellence for the higher education institutions on the example of the School of Engineering Management has been developed.

The basis for the model is creation of the mission and the vision of a higher education institution by the managers (rectors, deans, vice deans), upon which the strategy is developed and the organizational goals are set. The leaders of a higher education institution should build staff (both teaching and non teaching) commitment in order for the higher education institution to be able to comply with the set quality standards and for the gathering of all levels of employees for developing the commitment of other stakeholders (the students, parents, employers, legislators, community, etc.).

For the implementation of quality strategies all levels of employees are important, including the students and other stakeholders, especially the employers, legislators, and the community. The management should periodically evaluate the implementation of the strategy, revise basic quality principles if necessary, and suggest changes and the improvements of the implementation process. Successful quality initiatives should be rewarded regardless the “owners” of the proposed initiatives; also stakeholders involved in the implementation of quality initiatives should be rewarded.

Figure 3. Proposed model of excellence for higher education institutions

Source: Authors

5. Discussion

According to Bax, Coate has defined at least six strategies applied by higher education institutions to the TQM implementation process in higher education:

1. Elementary TQM approach (use of key elements of quality management);
2. Guru's approach (application of eminent experts in the field of quality);
3. Japanese model approach (studies analyzing the ranks of Japanese winners of the prestigious "Deming Award");
4. Model of industrial enterprises (adjusted to the achievements of companies that have successfully implemented TQM);
5. Hoshin's approach to planning (focus on successful planning, development, execution and monthly analysis);
6. Access planning based on the Baldrige award (identifying areas for successful application of improvement) (Bax, 1994).

Quality processes based on the Baldrige award and Hoshin Kanri principles have been implemented in various higher education institutions in different countries and national cultures. As the quality processes are the key elements in meeting the expectations of the students, parents, employers, and legislators (Pariseau and McDaniel, 1997), the goal of this research has been to analyze the perception of the higher education staff (teaching and administrative) at the School of Engineering Management (Republic of Serbia) on the key elements of excellence in higher education based on Baldrige criteria and Hoshin Kanri principles. The interviewees have recognized the significance of Baldrige criteria and Hoshin Kanri principles and identified creating mission and vision as the first step in achieving the excellence of the higher education institutions.

The proposed model of excellence is in line with the quality model the Rutgers University implemented on Baldrige criteria (Brusoni, et al., 2014; Ruben, 2006), and with the quality model the Oregon State University has developed, that combines Hoshin Kanri's model of planning and Baldrige's rewarding criteria, (Michael et al., 1997).

The main focal points of implementing Baldrige criteria in higher education institutions are linking accreditation standards and Baldrige criteria (Ruben, 2007), which is also recognized by European Association for Quality Assurance in Higher Education - ENQA (Brusoni, et al., 2014), which has the significance for the building the quality of the higher education in the Republic of Serbia through the National Entity for Accreditation and Quality Assurance in Higher Education of Serbia – NEAQA. From 2006 to 2018, the quality in the higher education in the Republic of Serbia has been standardized through Commission for Accreditation and Quality Assurance – CAQA, which was formed as the body of the National Council for Higher Education.

6. Limitations and scope for further research

Like most studies, this research study has its limitations. The sample size is rather small and the topic requires wider sample and implementation of various statistical methods. Further research is needed in order to additionally explore on a wider sample the perception of the higher education staff (both teaching and non-teaching) on the key elements of excellence in higher education based on Baldrige Criteria and Hoshin Kanri principles.

7. Conclusion

The values of TQM still carry with them greater compatibility and usability in the field of higher education as many other systems of quality assurance. Some of the used methods of quality improvement in higher education have been the methods of excellence engineering based on Baldrige criteria and Hoshin Kanri principles.

According to the literature review and the results of the interviews with the employees in teaching and administrative positions at the School of Engineering Management, the model of excellence for the higher education institutions on the example of the School of Engineering Management has been developed consisting of the key elements such as mission, vision, strategy development, stakeholders commitment, implementation, evaluation, and awarding successful quality initiatives.

As the main focal points of implementing Baldrige criteria in higher education institutions are linking accreditation standards and Baldrige criteria, it can be concluded that the implantation of TQM methods including the Baldrige criteria and Hoshin Kanri principles are still applicable to the higher education institutions.

Literature

1. Baldrige National Quality Program. (2006). *Education Criteria for Performance Excellence*. Baldrige National Quality Program 5. Retrieved August 2, 2017. from http://www3.uma.pt/jcmarques/docs/info/2006_Education_Criteria.pdf
2. Bax, R. M. (1994) An Assessment of the Quality Improvement Climate as Perceived by Community College Leadership in Iowa, Iowa State University, Ames, Ann Arbor, MI, USA, p.33-35.
3. Beard, D. F., Humphrey, R. L. (2014). Alignment of University Information Technology Resources with the Malcolm Baldrige Results Criteria for Performance Excellence in Education: A Balanced Scorecard Approach. *Journal of Education for Business*, 89(7), pp. 382–388.
4. Brusoni, M. et al. (2014). The Concept Of Excellence In Higher Education, European Association for Quality Assurance in Higher Education AISBL 2014, Brussels, Belgium, p.11.
5. Cruickshank, M. (2003) 'Total Quality Management in the higher education sector: a literature review from an international and Australian perspective', *Total Quality Management & Business Excellence*, 14(10), p. 1159. doi: 10.1080/1478336032000107717.
6. Grant, D., Mergen, E. and Widrick, S. (2004). A Comparative Analysis of Quality Management in US and International Universities, *Total Quality Management & Business Excellence*, 15(4), pp. 423–438. doi: 10.1080/1478336042000183613.
7. Hutchins, D. (2008). The Strategic Approach to Continuous Improvement, Gower, Hampshire, England, UK, pp. 2-3.
8. Karathanos, D. (1999). Quality: Is Education Keeping Pace With Business? *Journal of Education for Business*, 74(4), p. 231. doi: 10.1080/08832329909601690.
9. Karathanos, D. and Karathanos, P. (2005). Applying the Balanced Scorecard to Education, *Journal of Education for Business*, 80(4), pp. 222–230. doi: 10.3200/JOEB.80.4.222-230.
10. Kedem, Y., Benshalom, E. (2014). Quality Management In Institutes Of Higher Education: The Baldrige Model, *Journal of International Scientific Publications, Volume 12*, pp. 179-183.
11. Mazais, J., Lapiņa, I. and Liepiņa, R. (2012). Process Management for Quality Assurance: Case of Universities. *Proceedings of the European Conference on Management, Leadership & Governance*, pp. 522–530. Available at: <http://search.ebscohost.com/login.aspx?direct=true&db=bsu&AN=97820906&site=ehost-live> (Accessed: 3 December 2018).
12. McCulloch, M. (1993). Total Quality Management: It's Relevance for Higher Education. *Quality Assurance in Education, Vol. 1, Issue 2*, p. 8.
13. Menezes, P. H. B., Martins, H. C., Oliveira, R. R. (2018). The Excellence Baldrige Criteria in the Effectiveness of Higher Education Institutions Management, *Brazilian Business Review (Portuguese Edition)*, 15(1), pp. 47–67.
14. Michael, R. K., Sower, W. E., Motwani, J. (1997). A Comprehensive Model for Implementing *Total Quality Management in Higher Education, Benchmarking for Quality Management & Technology, Vol. 4 Issue 2*, pp. 114 - 117.
15. Moore, N. (1996). *Using the Malcolm Baldrige Criteria to Improve Quality in Higher Education*. May 96 Forum of Association of Institutional Research. Albuquerque, NM. USA. p. 4.
16. Pariseau, S. E., McDaniel, J. R. (1997). Assessing Service Quality in Schools of Business, *Journal of Quality & Reliability Management*, Vol. 14, Issue 3 204.
17. Quinn, et al. (2009). Service Quality in Higher Education, *Total Quality Management, Vol. 20, No. 2*, p. 139.
18. Roberts P., Tennant, C. (2003). Application of the Hoshin Kanri methodology at a higher education establishment in the UK, *TQM Magazine*, 15(2), pp. 82–87. doi: 10.1108/09544780310461080.
19. Ruben, B. D. (2006). Departmental Effectiveness What Is It? Why Is It Important? How Can It Be Achieved? *Effective Practices for Academic Leaders, Vol. 1, Issue 12*.

20. Ruben, B. D. (2007). Higher education assessment: Linking accreditation standards and the Malcolm Baldrige criteria. *New Directions for Higher Education*, 2007(137), pp. 59–83.
21. Saraiva, M., Reis, E. (2006). *The Paradigm of the Total Quality Management in the Portuguese Higher Education*. International Conference on Quality Assurance in Higher education: Mission (Im)possible? 1. p. 2.
22. Ziegler, M. (2005). It Opens Your Eyes: Transforming Management of Adult Education Programs Using the Baldrige Education Criteria for Performance Excellence. *Adult Basic Education*, 15(3), pp. 169–186. Available at: <http://search.ebscohost.com/login.aspx?direct=true&db=a9h&AN=19162662&site=ehost-live> (Accessed: 29 December 2018).