

Implementing network organization model to universities for improvement of teaching quality

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Abstract: - This paper presents opportunities for introducing network organization model and federalization principles on universities with the goal of raising the quality of learning outcomes and improving the efficiency of universities and its faculties. Organizational analysis was conducted on the example of the University of Belgrade which is the biggest university in the Republic of Serbia. Study suggests the creation of "super departments" and more specialized departments, via outsourcing of teaching staff and their expertise between member units of the university. Proposed solutions are applicable to all of the teaching courses that are organized in more than one study program at different faculties within the university. Described organizational changes can have various positive impacts on both quality of studies and saving costs for the universities.

Key-Words: - Networking, network organization, organizational change, outsourcing, restructuring

1 Introduction

European Commission in its 2013 report on universities predicts that in the next twenty years the number of students will grow exponentially, from the current 99 million to 414 million expected by 2030 [1]. The highest percentages of expected students' growth are from China, India and Brazil. In parallel with the development of new technologies the demands of students are changing, they are expecting to have a choice of where they want to study (at home or abroad), what they want to study and how they want to study (the classic form of lectures, distance learning or blended learning). "The fight for the students", has transcended national boundaries, European and world universities are now competing on a global level to attract prospective students from around the world. At the same time, the internationalization strategy becomes a priority among higher education institutions (HEI). The strategy of internationalization of universities includes: international mobility of students and staff, the internationalization and improvement of the curriculum, distance learning, forming of strategic alliances, partnerships and capacity building. These categories should not be viewed separately but rather as integrated elements of a comprehensive strategy. This also applies to students from the Republic of Serbia (RS). They are getting more and more options for studying, either at home or abroad. Therefore, universities in the RS must continue to

develop and improve, not only to attract foreign students, but also to keep the students from the country.

Approaching the Republic of Serbia to the European Union (EU) has enabled universities in the RS the access to a number of international programs and projects, amongst which the great number of received projects within the TEMPUS program have made the biggest impact towards the integration of the faculties within (public) universities. One of the many benefits of projects under this program, which involves the participation of several universities in the RS and/or from the Western Balkan region (WB) and HEIs from the EU, is the development of links between the participants in the projects. Parallel to the development of links between the institutions partners on projects, connections within the universities were strengthened, because several organizational units from the same university often participate in one project. Any new connection is contributing to the strengthening of inter and intra network of a university. One of the most important benefits from that is improved cooperation on joint activities and development of new interdisciplinary projects' proposals.

From the standpoint of the management of a university such networking is a positive effect, but it is certainly not enough to strengthen the cooperation within the university quickly enough. After the World War II the trend in the RS was increasing the

independence of faculties and institutes within the public universities, as well as duplication of functions and capacities, because all faculties became independent legal entities. To take the networking on the next level and to start advanced sharing of resources it is necessary to carry out some of the organizational changes. As an example of a university in the RS with a lot of options for intranetworking, in this paper the University of Belgrade (UB) is analyzed as the biggest university in the RS, which has 43 organizational units with the status of independent legal entity (31 faculties, 11 research institutes and university library). UB is founded in 1808 and currently counts more than 101,000 students. Networking of units within the university can be done through sharing of teaching resources, through joint administration and the sharing of facilities. This paper describes an analysis on one of the options for organizational networking for sharing teaching resources between network members. Analysis in this paper is focused on organizational problems. Although financial aspect is certainly one of the key factors for any organizational changes it has not been analyzed in this paper.

The rest of the paper is organized as follows. After Introduction, in Section 2, brief discussion about organizational analysis. Section 3 presents implementing network organization model. Section 4 describes problems with changing an organizational structure. Finally, Section 5 concludes this paper.

2 Organizational analysis

In the transition period, last two decades, faculties within the UB become competitors to each other due to the insufficient funds from the state. In order to attract more students, faculties at the UB have often developed study programs and courses that more or less coincide with the study programs implemented at other faculties within the UB. On the level of individual courses, it may be noted that among the most numerous are Mathematics, English Language, Statistics, Sociology, Psychology and Physics, which are offered by teaching staff from the faculty. These phenomena, supported by the desire for independence, led to a build-up of teaching staff from non-core science.

Organizing courses of Mathematics at some UB faculties, resulted in departments with 5 or more fully employed teaching staff (whether they are professors or teaching assistants). That is particularly the case for the faculties within the Group of Technology and Engineering Sciences.

Within the UB 31 faculties are organized in 4 groups: Social Sciences and Humanities, Medical Sciences, Sciences and Mathematics and Technology and Engineering Sciences. In the Table 1 there is a list of UB faculties with numbers of teaching staff, group where the faculty belongs, and the name of department responsible for teaching Mathematics. The UB - Faculty of Mathematics (UB-FM) has been deliberately omitted from the list. All data were downloaded from the UB's website and the websites of UB faculties.

Faculty	Group	Department	Teaching staff
UB Faculty of Electrical Engineering	Technology and Engineering Sciences	Department of applied Mathematics	14
UB Mechanical Faculty	Technology and Engineering Sciences	Department of Mathematics	13
UB Faculty of Civil Engineering	Technology and Engineering Sciences	Department of Mathematics, Physics and Geometry	12
UB Faculty of Agriculture	Technology and Engineering Sciences	Department of Mathematics and Physics	12
UB Faculty of Mining and Geology	Technology and Engineering Sciences	Department of applied Mathematics	11
UB Faculty of Transport and Traffic Engineering	Technology and Engineering Sciences	Department of applied Mathematics	8
UB Faculty of Organizational Sciences	Technology and Engineering Sciences	Department of Mathematics	6
UB Faculty of Technology and Metallurgy	Technology and Engineering Sciences	Department of Mathematics	5
UB Faculty of Economics	Social Sciences and Humanities	Department of Mathematics and Statistics	4
UB Faculty of Pharmacy	Medical Sciences	Department of Mathematics and Physics	4
UB Teacher Education Faculty	Social Sciences and Humanities	Department of Mathematics and methods of teaching Mathematics	4
UB Technical Faculty in Bor	Technology and Engineering Sciences	/	2
UB Faculty of Forestry	Technology and Engineering Sciences	/	2
UB Faculty of Philosophy	Social Sciences and Humanities	/	2
UB Faculty for Physical Chemistry	Sciences and Mathematics	/	0
UB Faculty of Physics	Sciences and Mathematics	/	0
UB Faculty of Chemistry	Sciences and Mathematics	/	0

Table 1: Overview of the UB faculties which have courses of Mathematics

It can be seen from the table, that the outside of the UB-FM, courses of Mathematics are organized

at 17 UB's faculties. Only at 3 faculties courses of Mathematics are run by professors from the UB-FM, while the 11 faculties have established independent departments which are responsible for Mathematics. That is especially the case with faculties from Technology and Engineering Sciences group where the number of hired teaching staff in the field of Mathematics is 81.

There is no common way or rule when it comes to organize courses of Mathematics and share resources. At the faculties from the Group of Sciences and Mathematics, teaching of Mathematics is exclusively organized by lecturers from the UB-FM. This is understandable if one considers that for 48 years (from 1947 until 1995) faculties within the group of Sciences and Mathematics were a one faculty named UB - Faculty of Natural Sciences, and that all of these faculties are located next to each other. Some of these faculties shares offices and classrooms. While the faculties separated the other as legal entities, the links between faculties and organization of courses of Mathematics has remained and continued to be successfully organized in these faculties like they are still one faculty. An interesting fact is that the 3 faculties from the Group of Technology and Engineering Sciences that are located in the same building (UB - Faculty of Architecture, UB - Faculty of Electrical Engineering and UB - Faculty of Civil Engineering) have separate departments of Mathematics as well as other services. In addition, 2 faculties from Table 1 which are in the 300 meters walking distance (UB - Faculty of Mechanical Engineering and UB - Faculty of Technology and Metallurgy) with previously mentioned faculties, also don't share any of the resources that they have.

There are two specific cases, the UB - Technical Faculty in Bor and UB - Teacher Education Faculty. Because of its physical location (249 km away of the UB-FM and other units within the UB) formation of local departments and engagement of their lecturers for teaching mathematics cannot be disputed in the case of the UB - Technical Faculty in Bor. UB - Teacher Education Faculty have many years relied on the UB-FM lecturers who collaborated with their own professors who are engaged in teaching methods of teaching Mathematics. From year 2013 they decided to hire a full-time professor of Mathematics to be able to form the curriculum for Mathematics course for teachers who teach in the first four grades of elementary school.

3 Implementing network organization model

The UB operates as an association of members, legal entities with a high degree of autonomy, often described as small kingdoms under one umbrella. Bearing in mind the degree of redundancy of resources and functions the UB has a good basis for networking and network organizational structure that will bring improved efficiency and prosperity to all its members. Network is a set of organizational units (companies) that have specialized functions that connects and coordinates the central organizational unit with the role of a broker. The network model allows members to focus on their primary activities and relieve of all the activities that could be performed by other members because of their competence [2].

The two most important preconditions for the formation of networks are trust and common goals [3]. In addition, the term of federalism is introduced in a networked organization. Federalism in a networked organization, among other things, means that all members of the network should retain its independence but also to develop interdependence between members. Interdependence is achieved partly through the reserve powers of the center, partly by locating services or facilities needed by all in the territory of one or two [3]. More organizational units that serves other members means more strength to the network. It is necessary to find the right balance between interdependency and autonomy because too much of interdependency leads to the inertia of the organization, while excessive autonomy leads to disorder [3]. In this case the concept of outsourcing services, giving the performance of its non-core activities to another member of the network, according to the sources that were used [5], it may lead to cost reduction, quality improvement, improvement of organizational focus, reducing investment costs and less internal administrative costs. In the case of the UB, faculties and research institutes would be able to retain their identity and independence, but they could also outsource certain parts of its non-core areas of expertise from other members. One model of outsourcing could be the creation of super departments and a number of smaller specialized departments. Super department would be responsible for the entire scientific field within the network, while specialized departments would be responsible for specific areas of applied Mathematics. It would be possible to do the same

for foreign languages, especially English, as well as for all other courses that are organized in several study programs on different faculties. It is important to emphasize that this does not mean that all of the teaching staff who are employed for teaching Mathematics outside the UB-FM will become jobless, and that their positions and responsibilities will be taken by teaching staff from the UB-FM. This process of organizational changes would be done in several stages, and one model could look like this:

- Establishing a direct link between the departments of Mathematics at the UB faculties with the UB-FM;
- Analysis of the current curriculums and the need for learning outcomes of Mathematics at different UB faculties;
- The creating of super department and specialized departments;
- Development of curriculums for the new courses in Mathematics;
- Analysis of the workload that is required to handle all faculties and
- Assignment of teaching staff departments according to their specialties.

After a while, human resources analysis should be performed to demonstrate whether and to what extent there is a surplus or a shortage of employees. One possible approach is described in the analysis of options for restructuring public companies [6]. If the results show that there is a surplus of employees, some of the possible next steps (postponement of promotion, freezing of recruitment for a certain period or downsizing) can lead to resistance and declining productivity of employees. Instead of firing the staff, the solution may be in increase of productivity by making smaller groups of students. Reducing the number of students in the group and the number of students for which one teacher is in charge leads to a significant increase in learning outcomes [7].

Central management at the UB should take a role of a broker who would carry out coordination of cooperation within the network, providing a functional frame for establishing and maintaining relationships through the provision of bureaucratic regulations that will motivate them for mutual cooperation instead of burdening the members.

If we return to our example of organizing courses of Mathematics, an additional argument for outsourcing may be that the UB placed among 150 universities in the world in the field of Mathematics,

two years in the row (2014-2015), on the widely popular Academic Ranking of World Universities (ARWU) also known as Shanghai ranking, which is a lot better position than the overall ranking position of the UB on the ARWU (between 200th and 300th position in 2016). Although the race for better ranking in world rankings should not be the goal of the universities from the RS [8], if we take this data as a relevant measure of success of a university, this fact positively distinguishes scientific work in the field of Mathematics at the UB. The formation of super departments and specialized departments would also greatly benefit the students. The quality of teaching could be more standardized through member faculties granting them better learning outcomes which should in addition be of great use for their future employers and economy in total. Furthermore, it is necessary to continuously adapt the education system needs of permanent diversification in the economy and society, and adequate solution to the problem what kind of qualifications should be given to people, how many experts and what kind of expertise they required a particular country. The emerging academic field focused on sustainability has been engaged in a rich and converging debate to define what key competencies are considered critical for graduating students to possess [9]. If the educational system is not aligned with the needs of the economy and the market, and if this is not expected in long period of time, it will not be able to create the knowledge necessary for development [10].

4 Problems with changing an organizational structure

An organizational structure allows information to flow to different parts of faculties and becomes the framework for entire university. When universities are trying to change an organizational structure, they are facing many difficulties and obstructions, because in majority of cases, especially in cases of universities with longer history, current organizational structure was not designed but rather developed ad hoc over time. It is wise to be proactive when it comes to changing the organizational structure, but even then, the process will encounter various problems.

Problems with changing an organizational structure include:

- Communication - Part of the purpose of a strong organizational structure is to facilitate smooth communication within departments and from one department to another. When organization (such as

university) is trying to change an organizational structure, it is working with a makeshift communication network until the planned network is put in place. This can cause information to be dropped or miscommunicated at every level of the university.

- Hierarchy - An organization runs smoothly when it has a hierarchy to follow. While it can be easy to understand the basic hierarchy of the organization from the rector down to the rest of the executive staff, the hierarchy among deans and other managerial part of the faculties are confused without an appropriate organizational structure. While university is changing an organizational framework, it will come across instances when various deans may take on authoritative roles they were not intended to have, which can cause confusion among the staff.

- Delegation – When university is trying to implement a new organizational structure, it can be difficult to properly delegate responsibility to departments or individual employees. It may be confusing for employees to understand their responsibilities when there was no official delegation in the past. Staff members have been doing what they needed to get the job done, and it will be difficult to move responsibilities around when implementing a new structure.

- Cost - Changing an organizational structure can be expensive. During the time it takes to get a new structure in place, productivity will be affected and organization's costs will rise in the transition period. Implementing new structure means getting everyone on to the same software, platforms for communication, bookkeeping, production and planning. Basically, to be more efficient later it is necessary to spend more than usually now so the change can take its place. Organizational structure is the method by which an organization communicates, distributes responsibility and adapts to change. Organizational structure is how a university utilizes its resources to achieve its goals. A University needs to keep its structure dynamic so that it can respond to the things that impact organizational structure. The University that can adapt is better able to survive [10]. At all time, we must keep in mind that universities are specific types of organizations. Their sole purpose is not generating profit (but it can be in some cases) it is education and research. Because of that corporate rules and market driven behaviour is not easily applicable. Organizational changes are rare, and benefits of changes that affects learning outcomes can usually be measurable only after few generations of students. That means at least five

years, so every change should be planned accordingly.

5 Making the network even stronger

The described example of organizing courses of Mathematics is just one of many that could be taken into consideration. Probably the next most suitable would be organizing the courses of foreign languages by forming a super Department at the UB - Faculty of Philology, where, for example, the first year of learning the language would be the same for all students, and subsequent years would be organized by specialized departments tailoring the curriculum for the needs of specific branches of science. This would be the benefit to the UB students who would have the opportunity to gain knowledge at a higher level than it is currently, and all study programs could benefit from it. Additionally, the UB - Faculty of Philology has been successfully using the Moodle platform for e-learning for more than 5,000 of their students. Extending to more students from other faculties is a challenge, but it is manageable. Next can be courses of Statistics, Sociology, Psychology, etc.

We are living in the era where the industrial manufacturing as basic organizational principle of society, is being replaced with the new technology, informational processors and industry of knowledge [11] In addition to the formation of super departments and sharing of teaching staff within the network, there are great opportunities for networking with the use of Information Communication Technology (ICT). The development of ICT [12] directly or indirectly affects: reducing the required number of employees, decentralization, development of horizontal coordination, improve inter organizational relationships and improving the network structure. Some authors propose networking 38 Australian universities in the networks of 5 to 7 universities, where the members within a network can share the administration, and all 38 universities would benefit from a single register of students [12].

6 Conclusion

Worldwide trend, which seems to come to the RS as well, is that countries are spending less and less funds to finance their public universities, forcing universities to find new sources of revenues and to reduce administrative costs. Pressures on public expenditure in higher education and research have led to the implementation of full costing

systems in universities, something that until recently was reserved only for enterprises. EUA (European University Association) in its report proposes determining the real full costs of all activities performed at universities, lecturing, research, enrolments, exams, etc. [13]. The introduction of the full costing systems in universities, by calculating the direct and indirect costs for services, enables universities to accurately perform financial planning but also easier to justify their requests for funds from the government as well as the level of tuition fees.

Universities and their faculties in the RS have already felt the effects of the decreased revenue from the state, but faculties often mishandle this situation when after any increase of costs they are trying to increase tuition fees, as well as various charges for administrative costs. Time has come for universities and faculties to seriously start thinking about the possibilities for restructuring and reorganization. Development of the universities may not be conditioned by an increase in the number of employees if there are no additional funds for it. The introduction of a network model of organization can result with more efficient and effective university and contribute to rising of the quality of teaching and level of learning outcomes. The University and its central units, should coordinate and foster cooperation between faculties and other member units, creating options to share resources as well as open the doors to cooperation with HEIs and companies from around the world.

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