# MONITORING OF FACULTIES AND DEPARTMENTS RESEARCH ACTIVITY AS A COMPONENT OF UNIVERSITY MANAGEMENT

**Stanislav Podolyanchuk**
Vinnytsia Mykhailo Kotsiubynsky State Pedagogical University, Ukraine
E-mail: stas177vn@ukr.net

## Abstract

*Research is an essential part of university activity. The evaluation of research activities is not only of scientific, but also of practical interest. Currently, however, the research evaluation is used primarily either for the analysis of the activities of a university as a whole or for tackling specific tasks, usually related to the financing of research projects. The use of monitoring systems for research activities as part of the internal university management has not been sufficiently studied. Therefore, the purpose of the research, which was conducted at Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University (Ukraine) over the course of 5 years, was to identify and critically evaluate the main practical applications of such monitoring in management activities. The monitoring system was created through the use of expert evaluation method. Information was collected with mandatory input control. The results of monitoring can be used for creating an information database, performing comparative analysis, making evaluation of research activities of a university as a whole and implementing the control function. Analysis of the research evaluation proved its positive impact on the advancement of science at the university. Based on the obtained results it is possible to solve organizational, financial and professional issues, make important management decisions. At the same time, it is necessary to consider the risks that may arise during the practical implementation. Emphasized is the universal character of proposed directions that can be used in the management of various universities.*

**Keywords**: *expert evaluation, monitoring system, research activity, research evaluation, university management*

## Introduction

Education has always played a crucial role in the advancement of humanity. Generating and spreading new knowledge are among key functions of university education. Having become research centres, universities are playing an increasingly important role in the global economy by accommodating economic growth and facilitating increased productivity (Kosor et al., 2019). Constructing a knowledge-based economy as well as a knowledge-based society at both national and international level calls for the application of new approaches meant to enhance the efficiency of university activities.

It is generally accepted that leading universities demonstrate excellence primarily in research activities. Besides, they can boast of highly qualified academic staff (Meek & Davies, 2009). The latter features seem to be interrelated: those having high research and publication outputs are considered to be more effective educators (Grunig, 1997). Since universities that strongly engage in research are regarded to be superior in important ways to those with lower research outputs, the increase in research efficiency is the matter of improving university image,

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which means better opportunities to attract and retain highly qualified academic staff, facilitate admission and increase the value of the institution's services (Grunig, 1997).

Naturally enough, undertaking actions to promote research and teaching quality is an important part of university management (Delgado-Márquez et al., 2012), which raises the issue of elaboration and implementation of efficient managerial strategies. No wonder, more and more scientists and practitioners of the educational industry are trying to understand the essence and peculiarities of management in the realm of higher education. Some evident findings of such research are the following: people holding executive positions in higher education pursue diverse goals (Lazzeretti & Tavoletti, 2006); efficient management of a group of people or an institution largely determines their performance efficiency; the higher education system has many significant features that largely reduce the efficiency of using traditional methods and forms of management for state institutions and various industries.

The first most prominent theoretical model that tried to lay a solid foundation for the higher education management is believed to be Clark's triangle of coordination – "Academe-State-Market". According to this model, it is the interaction of the above three components that ensures coordination between constituent parts within the higher education system. At the same time, each country can specify the basic model, shifting the focus to one of the vertices of the triangle (Clark, 1983). In attempt to simplify Clark's model, Van Vught (1989) reduced it to the models of: state control and state supervision.

Alternatively, Lazzeretti and Tavoletti (2006) single out four basic models of governance regarding the systems of higher education: the "collegium", the "bureaucratic-oligarchic", the "market", and the "new managerialism" models. The early 2000s saw a switch to various inclusive styles of leadership, such as distributed leadership (Joslyn, 2018), which is essentially different from positional authority (Bush, 2013). Rather widespread in research work governance is the organizational governance, which can be viewed as the organizational process and the mechanism of engagement of the concerned parties in the group action (Luo et al., 2019).

In general, one of the main features of a large part of the above theories is that most of them take into account the results of ranking, including the results of research activity monitoring. One of the components of monitoring as part of managerial activities is the evaluation process, which consists in regular collection of data on the resources, processes and outcomes of research activities with their further assessment and analysis. In this respect, the "new managerialism" governance model described by Lazzeretti and Tavoletti (2006) provided mechanisms due to which the national government controls independent universities.

One of the most common forms of the implementation of the above mechanisms and the presentation of relevant data are the rankings, which are seen as a means of improving the openness of higher education. Among other things, world rankings provide all interested parties with the information on how well they are doing in the competitive global knowledge stakes (Meek & Davies, 2009). Moreover, global rankings significantly enhance the competition among universities and entire countries (Marginson & van der Wende, 2009; Rauhvargers, 2011). According to Sadlak (2008), a special place of the university system should not be used as a "shield of exclusivity". The administrative importance of rankings is constantly increasing, too. These days they are subject to constant scrutiny of educational authorities. The respective data are used for the development of both national and international higher education policies.

Higher education ranking systems use various criteria for classifying university performance (Delgado-Márquez et al., 2012). The existing global university rankings include a number of indicators that directly or indirectly evaluate the research activities of universities. The proportion of such indicators often exceeds 50%. (Podolyanchuk, 2012). In fact, this is evidence of the dominant role of university science in determining the ranking position of universities. According to Keplinger and Koczanowicz-Dehnel (2008), the evaluation of research may: activate, modify, collectivize, improve, explain, aid, summarize, direct, legitimize

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etc. In order to translate the above possibilities into action one should apply relevant types of evaluation.

It should be noted that qualitative evaluation of higher education is gradually but surely disappearing. Currently, quantitative methods in the governance of higher education and research are becoming increasingly important. Research evaluation systems are quickly transforming research around the world (Marques et al., 2017). Initially, the research evaluation systems were the organized sets of procedures for assessing the merits of research, which were regularly used by various government agencies in public institutions (Whitley, 2007). However, their functions and applications have expanded significantly.

The process of developing monitoring systems for research activities is quite active today the world over. For example, the evaluation of university research activities in Great Britain has been recently extended to the institutional and national levels (Geuna & Martin, 2003). Previously the academic impact and research quality were measured by means of peer review (Grant et al., 2010). In the Netherlands, the smallest unit of assessment is represented by research programmes of subdepartments (Geuna & Martin, 2003). French researchers write activity reports every 2 years with a list of publications (Grant et al., 2010).

In Germany, there is no federal evaluation yet (Geuna & Martin, 2003). In Spain introduced is a mixed system of self-assessment and external assessment by means of interviewing (Grant et al., 2010). In the Czech Republic they developed the Evaluation Methodology, which takes into account diverse scientific results. The application of the above methodology aims at determining the extent of financing of research institutions (Good et al., 2015). In the Slovak Republic, university departments are evaluated by indicators common to institutions and by additional indicators (Geuna & Martin, 2003). In Poland research funding used to be determined taking into consideration quantitative and qualitative factors. However, in 1998 a new formula was introduced (Geuna & Martin, 2003).

One can hardly deny that the use of rankings in governance brings certain risks. Taking simplistic solutions (Hazelkorn, 2009) and emulating the achievement of several elite "world class" universities as a panacea for success (Hazelkorn, 2013) are among such risks. Moreover, the results of ranking depend heavily upon the choice of indicators and weights assigned to the indicators (Rauhvargers, 2011). As a result, the position of an institution can vary significantly depending on the weight of the specific criteria in various rankings (Hazelkorn, 2013). Despite the risks involved, rankings remain an important source of information about university performance efficiency. Moreover, their importance in university governance, in particular, and the higher education system as a whole is likely to increase in the near future. Thus, issues related to the use of the monitoring of research results are relevant, and the prospects for their application are seen as quite inviting.

*Research Problem*

Research activity in the university has many features, one of which is a fairly large number of research areas, a variety of forms of publication of scientific results, involvement of a large number of employees and even students in the research process. It is natural that evaluation of this process and obtained results is quite a difficult task both at the global and national levels, as well as at the industry and university levels.

In the modern interpretation research evaluation means the systematic determination of the merit, worth, and significance of a research activity (Huutoniemi & Rafols, 2016). As of today, it is a component of almost all global and national university rankings. New approaches related to the use of social media metrics (Wouters et al., 2019), webometrics, altmetrics (Fang & Costas, 2020; González-Valiente et al., 2016) and other indicators are being actively developed. However, according to Fang and Costas (2020), the results of Altmetric evaluation

in the real-time mode may depend on the choice of a source of data. Therefore, Wouters et al. (2019) acknowledged that current methods of research evaluation are focused on the scholarly dimensions.

Many systems for monitoring of research activities have been developed and are implemented at the national level. However, such systems are mainly related to the university as a whole, or are designed to solve specific tasks – selection of research projects, determining the amount of funding, etc. (Geuna & Martin, 2003; Good et al., 2015; Grant et al., 2010; Luo et al., 2019). There have been released research papers on the evaluation of the activities of certain university subdivisions, in particular, graduate courses (De Oliveira et al., 2019). At the same time, creation of monitoring systems for research activities of faculties and departments remains open. Therefore, the inadequate attention to research activities and research outcomes at the institutional level raises concerns (Porter & Toutkoushian, 2006). At this point, problems related to research evaluation of structural units attract scientists' interest sporadically and are not properly reflected in the scientific literature. In addition, questions of practical use of the obtained results remain insufficiently studied.

The application of evaluation results is usually limited to recognizing the feasibility of its use in management. Under such circumstances, a possible option is to offer specific areas and ways of practical application of monitoring results that would contribute to the improvement of the efficiency of research activities. In this case, the main restriction is the identification of and adjustment for risks in order to avoid making wrong management decisions. Therefore, it seems important and relevant to research all the problems associated with this process today.

## Research Focus

The research was focused on creation, analysis and practical use of the research activities monitoring results of the university's structural units.

## Research Aim

The purpose of the research was to offer and critically comprehend the main directions of using the results of the experience of implementing the research activity monitoring system in the management activities of the university.

## Research Methodology

### General Background

The research was based on a comprehensive approach to structure departments' research activities monitoring at pedagogical universities. It was consisted in simultaneous diagnostic, analysis and research work grading according to its major directions (quality of scientific and pedagogical staff, research and innovation activities, publishing activities, research work of students and young scientists, international research activities, research and organizational activities) as well as the categories of potential, result, and effectiveness (Podolyanchuk, 2015). The scientific potential was characterized by the scientific personnel and resources available at the university. Research performance was analysable and represented in comprehensive ways (Marginson, 2006). Efficiency analysis was valuable in informing policy makers (Kosor et al., 2019).

The main method used during the research was evaluation. According to Keplinger and Koczanowicz-Dehnel (2008), the essence of evaluation consists in the collection of information and assigning meaning in order to distinguish between beneficial and malign. According to Luo

et al. (2019), in the course of evaluating research activity it is necessary: to justify evaluation purposes; to systemize individual evaluation activities; to institutionalize evaluation procedures; to enhance the role of stakeholders in conducting evaluation procedures.

The research employed expert evaluation to develop the monitoring model. The evaluation itself was carried out using the ranking and scoring techniques. When ranking, an expert has to rank items in descending order and assign a number to each item within the ordered series (rank). As one of the varieties of scoring, the research employed the prioritization method of direct placement of weighting factors (the method point allocation). The essence of the method was to divide 100 points among the group of objects to reflect their relative importance (Bottomley et al., 2000; Doyle et al., 1997).

Since the monitoring system is based on a quantitative methodology, the rating method, mathematical and graphical methods became essential in the direct implementation of the model. At the final stage, methods of descriptive statistics, analysis, systematization, and generalization were used for further practical application of the obtained results.

### Participants

At the initial stage of the research, an expert group consisting of 21 experts was created. The number of experts was determined through the use of the sample survey theory based on the total number of the University's academic staff (Hrabovetskyi, 2010). The composition of the panel of experts was determined using the established criteria. The main requirements for experts included, but not limited to, the presence of significant scientific publications and experience in structures associated with the evaluation of research work (dedicated scientific councils, expert groups, editorial boards of scientific journals), etc. (Podolyanchuk, 2014). Among the experts: 12 men, 9 women; 14 holders of a D.Sc. degree, 7 holders of a Ph.D. degree in specific fields; 6 persons under the age of 50, 12 – from 50 to 60, 3 – from 60 to 65. In the process of practical implementation, the necessary information was provided by the heads of all educational and scientific units – departments and faculties. The faculties also included the educational and research institute. It should be noted that in Ukraine, the educational and research institute is a structural unit similar to the faculty by the nature of its activity, having a strengthened research component. The working group set up a database and made statistical calculations.

### Instrument and Procedures

Creation of the monitoring system began with identification of the main areas of research activity and the main categories. In order to determine weighting factors, we applied expert evaluation method in 2 stages. First experts determined weighting factors of research directions. With the view to reach better consistency of expert opinion, the survey was carried out in 4 steps (rounds). After the closing round, the concordance coefficient was 0.82. It should be noted that experts had a possibility to get to know general results of the previous evaluation. At the same time, the acquaintance with the previous results did not allow for any personification and panel discussions. At the second stage (that consisted of 3 rounds) experts determined weighting factors of indices of each research direction. After the closing round, the concordance coefficients were in the interval 0.50 to 0.73. Information was collected using specially designed forms with simultaneous input control of the completeness, accuracy and reliability of the prepared data. After the relevant calculations, rating scores of each structural unit were determined and ratings were formed in terms of scientific directions and categories. The research was conducted in Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University (Ukraine) for five years (2013–2017).

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*Data Analysis*

The database was generated and analysed in Excel on 18 independent sheets. The total number of departments (depending on the year) was 27-29, faculties – 8. The annual total number of input data reached approximately 2000 values, output data – 2500 values. Output data was displayed and analysed in the context of structural units (departments and faculties) for each scientific direction, each category, followed by formation of a general rating. The results were presented in both tabular and graphical form in two formats – score and percentage. Based on the monitoring results, analytical materials were prepared annually, and information publications were printed.

## Research Results

The monitoring results were a fairly large document with a large amount of statistical information. Since the data processing used normalization, it should be noted that the absolute value of rating scores is not very informative. More important is the comparative analysis and research of trends in final characteristics.

To analyse the results of monitoring of the research activities, first, the departments were grouped into quartiles $Q_1$, $Q_2$, $Q_3$, $Q_4$ (approximately 7 in each) based on the rating position, and then determine the average rating scores in each group. Analysing Figure 1, one can see a significant and stable gap between the departments results included in the first quartile ($Q_1$) and the results of other departments. All this allows to assert the existence of a certain scientific "core", i.e. departments that consistently have high scientific achievements. Analysing the frequency of occurrence of specific departments in the first quartile (Table 1), one can see that their total number is small (12). At the same time, three departments were in the leading group over all five years of the model implementation, one department – 4 years, two departments – 3 years. This is evidence of a fairly high stability of the scientific "core" and non-randomness of the results obtained.

**Figure 1**
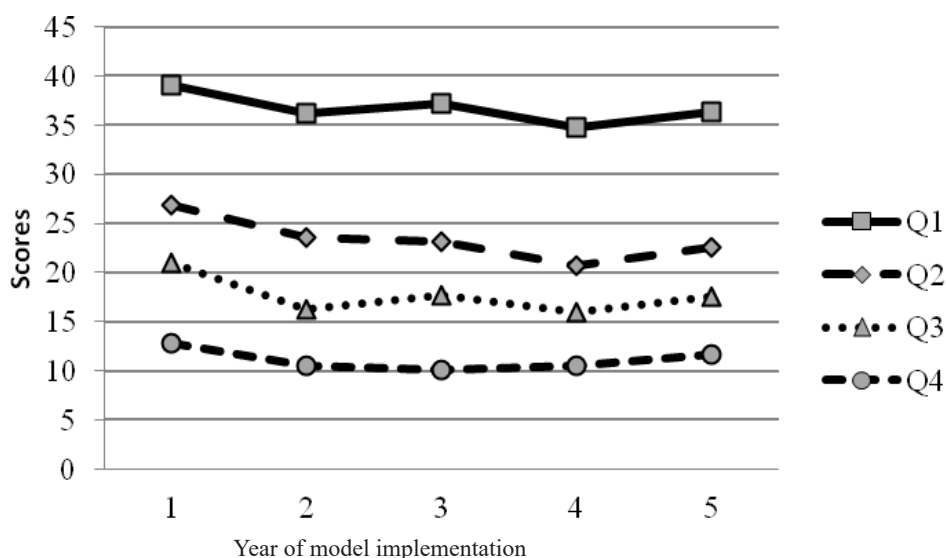*Average Rating Scores of Departments of Faculties Grouped in Quartiles ($Q_1$, $Q_2$, $Q_3$, $Q_4$).*

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**Table 1**

*Frequency of Occurrences of Departments in the First Quartile ($Q_1$).*

| Parameter | Value | | | | |
|---|---|---|---|---|---|
| Number of years | 5 | 4 | 3 | 2 | 1 |
| Number of departments | 3 | 1 | 2 | 4 | 2 |

Slightly different observations can be made in relation to the faculties. If they are divided into 2 groups according to the ranking results (4 faculties per group) and the proportion of each group is determined, it can be stated that over the last years of the model implementation there has been a clear trend towards convergence of results (Figure 2).

**Figure 2**

*Share of Indicators of Research Activity of Faculties Groups ($G_1$, $G_2$).*
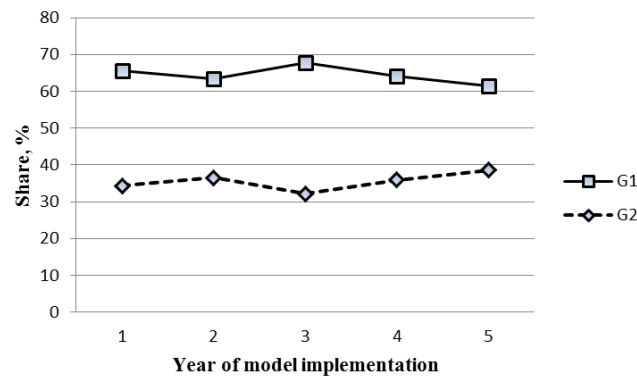


The dynamics of changes in the share of indicators of different categories in the overall rating of faculties is also indicative. As Figure 3 shows, there is a clear trend towards an increase in the share of result and effectiveness indicators, as opposed to a decrease in the share of potential indicators, which largely characterize previous achievements. Since the absolute indicators of research activity of the university as a whole have been constantly growing, this situation can be explained by an increase in the level of research activity of all structural units with an emphasis on its result and effectiveness.

**Figure 3**

*Share of Indicators that Characterize Categories (1– result and effectiveness, 2 – potential).*
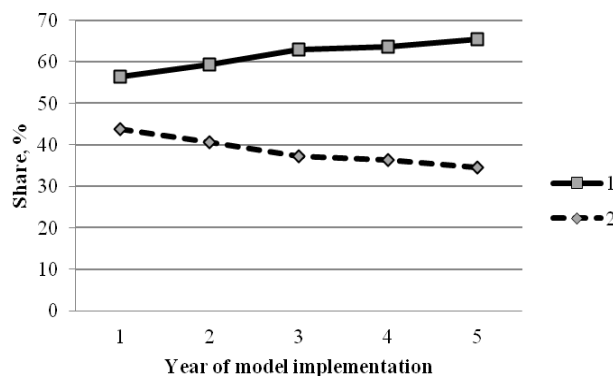
It is also interesting to compare the relative results by areas. As shown in Figure 4, there is a tendency to the increase in the proportion of international research activity indicators, which is especially important due to the great urgency of the issue of integration of Ukrainian universities into the European and global educational and research environment and publishing industry. At the same time, the increase in the proportion of publishing activity indicators was mainly due to an increase in the number of monographs and articles in leading academic journals. Thus, the final results confirmed the positive effect of the monitoring of research activities upon the development of research activities in the University.

**Figure 4**
*Share of Indicators that Characterize Directions of Research Activities (1 – publishing activities, 2 – international research activities).*
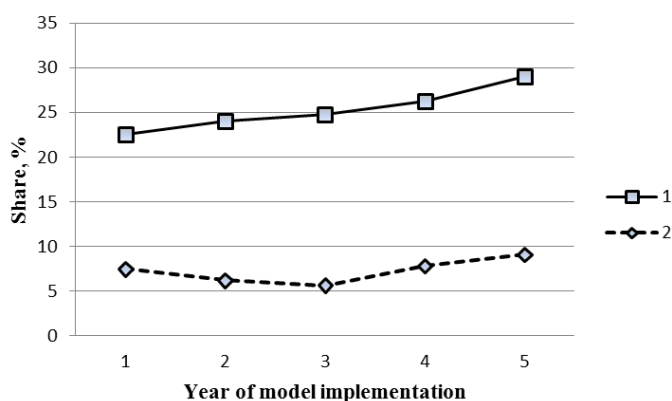


The final results and a careful analysis of the research activities of structural units allowed to outline several ways to use the results of implementation of the monitoring system in the management of the university. First of all, this system can be used as a powerful database containing information about achievements of faculties and departments. Usually, quantification of information significantly facilitates statistical processing of data and finding indicators necessary for reporting to the relevant ministry and (or) other executive authorities. An important direction of using the monitoring system is the ability to perform a comparative analysis of the results of research activities of individual structural units. Such data are usually the basis for determining or adjusting the development strategy of the university, highlighting the most promising areas of research, critical rethinking of relevance of the subject of research.

The research activity monitoring system can be used to implement one of the most important management functions – the control function. Its role, among other things, is to ensure the provision of feedback. In case of research activity monitoring, such feedback is mostly arranged in a non-contact way, which does not provide for the preparation of individual documents. This, in turn, saves time of structural unit managers and creates quite comfortable psychological conditions for management activities.

With certain reservations, research activity monitoring results can be taken into account for solving organizational issues. If individual faculties or departments have been showing poor results for a long time, there may be a question of their reorganization, reformatting or even liquidation. At the same time, decisions on administrative responsibility of the heads of such structural units are also possible. Certainly, monitoring results cannot be the sole basis for making personnel decisions, as they: firstly, have no legal basis; secondly, do not take into account the impact of external factors, which are often objective; thirdly, do not take into

account the original conditions under which the relevant managers started their management activity; and fourthly, do not evaluate the performance of similar structural units of other universities. The data obtained from monitoring can be useful not only at the university level. Heads of faculties and departments can use them with high efficiency. In such cases, it is logical to encourage, also financially, the best employees.

Publication of monitoring results provides evidence of transparency and openness in the activities of a universities and its readiness for informal reporting to all concerned parties. This openness usually strengthens the competitive environment at the university, which in most cases is considered as a positive aspect. At the same time, the technological implementation of this direction in modern conditions does not practically encounter any serious problems. An exception may be the publication of information about scientific projects that constitute a state, commercial or corporate secret or premature publication of the results of incomplete research works.

Typical for national evaluation systems determination of the amount of funding for research projects or programs depending on the results obtained at the university level is usually quite rare. However, the financial aspect may be present after summing up the results of research activities. It can be implemented in financing the research works from own sources, allocation of funds for the purchase of scientific equipment, determining the priority of financing scientific trips and internships, support for the structural unit in its participation in international projects or programs.

Extremely important from the point of view of using the results of research activity monitoring in the university management is the reliability and accuracy of input information sources. In this sense, the main trend should be the use of data that are objective (formal) in nature and have documentary evidence. In this case, an additional advantage is the availability of such data in the public domain. At the same time, information prepared directly by structural units should be minimized. The main reason for this approach is the probability of different interpretations of the content of individual research activity indicators, which can lead to incorrect presentation of data and distortion of the final results.

In general, the proposed areas of the monitoring of research activities results application cover a wide range of management methods. Therefore, they can be used for management activities in universities of various types, forms of ownership, level of research and educational activities, size, etc.

## Discussion

These days, evaluation plays a significant role in the operations of universities. According to Shadish (1998), evaluation must meet the needs of practical activities. Alkin and Christie (2004), outlining the three major components of evaluation (methods, valuing and use), highlight the importance of developing evaluation processes that are intended to assist in management decision-making. Huutoniemi and Rafols (2016) note that evaluations are used, among other things, to improve the performance of researchers and organizations.

The research evaluation is a component of many other systems that are currently used in universities, including knowledge management (Du & Yang, 2020), performance evaluation system (Cadez et al., 2017), etc. Knowledge management plays an important role in the innovative research and activities of universities (Du & Yang, 2020). The performance evaluation system increases the efficiency of research activities (Cadez et al., 2017). However, scientometric methods cannot fundamentally meet the requirements of evaluation in practice (De Oliveira et al., 2019. Therefore, a variety of internal monitoring systems have to be developed.

From this point of view, the most promising approach is to use the results of monitoring of research activities in the university management. For this purpose, it is advisable to use

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a wide range of management methods, which, based on how they work, can be divided into economic, organizational, administrative, and social psychological methods (Shehda, 2004). Taking this into account, the research identified the main areas of application of the monitoring of research activities results in university management. They relate to dealing with data analysis, organizational, personnel and economic issues. However, the implementation of managerial solutions which are based on, or at least take into account the monitoring of research activities results, may be associated with certain challenges.

Problems may arise in the psychological aspect, as a significant number of scientists and lecturers consider it impossible to make a quantitative comparison of scientific results different in nature and form of publication. Although it should be noted that such problems are usually temporary, which is partially confirmed by historical experience. For example, in Germany in the early 80s, most leaders in higher education actively resisted the ideas of competition, although the society recognized long ago the inequality of German universities quality (Federkeil, 2002).

Research activities at universities are often a team effort, so that it is sometimes difficult to separate the contribution made by a particular employee or even a structural unit (Podolyanchuk, 2015). Another problem is a certain difficulty in identifying the actual scientific component in the activities of scientists and lecturers. In actual practice they often have to complete the tasks, which are only indirectly related to the creation of new knowledge as one of the functions of science. Such activities (participation in the editorial board of professional journals, the organization of scientific conferences, etc.) markedly affect the evaluation results, although it significantly impedes the isolation of the actual scientific component.

The risk zone may also be the desire of individual heads of structural units to focus primarily on the indicators of research activity, which are included in the monitoring system, while neglecting other, perhaps no less important areas of research. In addition, the criteria for research activity evaluation may vary, at least if not the list, then the importance thereof in a given period of time. This means that the system must be dynamic and respond quickly to the needs of today.

It should be kept in mind that science as a whole is a synergistic system capable of self-organization, so it is necessary to clearly define the limits beyond which administrative factors begin to harm, rather than help the development of research (Kozlovskyi, 2012). That is why monitoring results should be used in management activities in a balanced and step-by-step manner. The main obstacle here is that generally accepted approaches to the essence and technology of creating systems for evaluating research activity have not yet been developed. The varieties of forms of research work in universities provide for the use of different approaches to its evaluation and significantly slow down the practical implementation. This problem is most significant in classical (multidisciplinary) universities, where specialists are trained in many, often very different, industries. This makes it very difficult to develop a universal model that would proportionally take into account the results of research activities that are typical for various research areas. This problem can be somewhat mitigated by the use of collective forms of creating a scientific product.

In general, the research outlines the practical applications of the results of the monitoring of research activities in university management. However, there might be other applications of such systems. Eventually, they are meant to upgrade the quality of higher education (Marques et al., 2017). As part of a comprehensive monitoring system for research activities, they can also be used at an individual level. As is known, the professional activities of a university teacher involve two components, lecturing and research. At the same time, it is mainly research outcomes that determine one's career advancement (Cadez et al., 2017). This, however, is obviously a topic for a separate research.

## Conclusions

Research activity is an important component of university functioning. Its evaluation is an integral part of various university rankings, and the evaluation results are taken into account by many managers and concerned parties for decision making. Systems for research activity monitoring of university departments are being actively developed, which are also designed to play an active role in the management of universities. At the same time, the directions of application of the obtained results in management activities can be very diverse. At the initial stage, the data obtained during monitoring may constitute a powerful information database, be used for comparative analysis of the research work of faculties and departments and evaluation of the university research activity as a whole. This information is a reliable basis for making important management decisions, including strategic decisions.

The results of monitoring can be used to implement the control function, and most importantly, without the need to prepare additional documents. With certain reservations, they can be taken into account for solving organizational, financial and professional issues. Publication of research results promotes transparency and openness of universities, which among other factors strengthens the internal competitive environment. In this case, sources of input information, which should provide the monitoring system with objective and reliable data, become important. The directions proposed in the research are universal in nature and can be used in the management activities of various universities.

Of course, the use of monitoring results in management activities has certain risks – imperfect technology, psychological rejection of individual approaches, difficulty in identifying the actual scientific component, possibility of ambiguous conclusions, etc. All this requires careful and gradual implementation of such systems. At the same time, despite certain reservations, the use of the research activity monitoring results of faculties and departments as part of university management has great prospects.

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**Stanislav Podolyanchuk**

PhD in Physical and Mathematical Sciences, Associate Professor, Dean of the Faculty of Mathematics, Physics, Computer Science and Technologies, Vinnytsia Mykhailo Kotsiubynsky State Pedagogical University, 21007, Vinnytsia, Ukraine.
E-mail: stas177vn@ukr.net
ORCID: https://orcid.org/0000-0001-9088-3342