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THEORIES OF MANAGEMENT OF THE RESEARCH ACTIVITY IN THE KNOWLEDGE-DRIVEN SOCIETY AND THEIR APPLICABILITY IN HIGHER EDUCATIONAL INSTITUTIONS: SYSTEMATIC REVIEW

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The purpose of the review was to identify the world-recognized management theories that are used to manage the research activity in higher educational institutions and assess the applicability of them in higher educational institutions of Ukraine. This study relied on the methods recommended for feasibility studies. This review utilised qualitative methods in the search and assessment of the relevant studies. Two instruments were used in the study. These were the Critical Appraisal Checklist and the Triangular Assessment Method. The theoretical management concepts such as Total Quality Management, Project Management, the Excellence Model designed by the European Foundation for Quality Management, Balanced Scorecard System, and Organisational Management have been adapted to the purpose of managing research at higher educational institutions. The findings implied that research management could be seen as a dimension of the quality management policy of the higher educational institutions. The study suggests that Organisational Management is quite a blur concept so far which causes misinterpretations and misleading in terms of both research activity organisation and promotion. It was found that the Total Quality Management and Project Management concepts could be used to manage the research activity at universities in Ukraine. The Balanced Scorecard System concept could also be applicable in Ukrainian higher educational institutions. However, the EFQM Excellence Model and Organisational Management could be partially applicable in Ukraine as they are more commerce-oriented, which seems to be a legislative loophole in Ukraine.

Key words: higher education; higher educational institutions; management theories; management of the research activity; knowledge-driven society.



Метою статті було визначення міжнародно-визнаних теорій менеджменту, що використовуються для управління науково-дослідною діяльністю в зарубіжних університетах, та оцінити дієвість цих теорій для закладів вищої освіти України. Для реалізації зазначеної мети обрано методи, що рекомендуються для аналітичних робіт: методи квалітативного оцінювання в процесі відбору та аналізу релевантних досліджень. За допомогою таких інструментів, як перелік критеріїв для критичного оцінювання наукових джерел та методика триаспектного оцінювання було проаналізовано сучасні найвідоміші концепції менеджменту в суспільстві знань. Теорії загального менеджменту якості, менеджменту проєктів, Модель Досконалості від Європейського фонду управління якістю, теорії збалансованої системи показників, організаційного менеджменту було адаптовано до цілей управління науковою роботою в зарубіжних закладах вищої освіти. Результати свідчать про те, що управління дослідженнями можна розглядати як вимір політики управління якістю у вищих навчальних закладах. Визначено, що організаційний менеджмент наразі залишається недостатньо точно охарактеризованим у наукових джерелах, що викликає дискусії стосовно неоднозначності його тлумачення та залишає простір для уточнення напрямів застосування цього концепту для організації та розвитку наукової роботи в університетах. Було також виявлено, що концепції загального управління якістю та управління проєктами можуть бути використані для управління науковою діяльністю в університетах України. Концепція збалансованої системи показників також має потенціал для того, щоб використовуватися в українських закладах вищої освіти. Однак з'ясовано, що такі концепції менеджменту як Модель Досконалості, запропонована Європейським фондом управління якістю, та організаційний менеджмент можуть бути лише частково застосовні в українських університетах, оскільки вони більш орієнтовані на комерційну діяльність, що наразі залишається все ще не до кінця вирішеним питанням на законодавчому рівні в Україні.

Ключові слова: вища освіта; заклади вищої освіти; теорії менеджменту; управління науковою діяльністю; суспільство знань.

Introduction. In the settings of the knowledge-driven economy, research activity is increasingly becoming a prerequisite of the regional, national and international recognition of the tertiary institution (Taylor, 2018; Tripp, Helwig and Yetter, 2017). The rationale for this trend relies on the fact that the higher educational institution research activities and services have vital impacts on the economy, society, and environment. The higher educational establishments are becoming commercial companies having similar business structures, similar business processes. They are also pursuing the same goals as any other business organisations are doing – creating added tangible or intangible value (Tomlinson, 2018). For this reason, higher educational institutions (HEIs) are adopting the key theories of management to manage their activities and to increase their competitiveness in the market.



Literature review. Given the above, the literature review found that the management of the research activity in HEIs is viewed as an integral part of quality management. The research management relies on several management theoretical concepts such as Total Quality Management (TQM), EFQM Excellence Model, Balanced Scorecard, Project Management, and Organisational Management. Some principles of every theory above are found in the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) (2015). Every theoretical concept is intended to establish cooperation among academics, researchers, and quality practitioners to take a competitive advantage in the sector (Alzeaiden, 2019). They are aimed at standardising the research activity outcome together with its planning and performing. The above theoretical management concepts are focused on the establishment of transparent and comprehensive interaction between the stakeholders such as education and research regulators and providers to ensure continuous improvement (Taylor, 2018; Wilson, 2018).

The review of the Total Quality Management concept corresponds the scope of the study because it is compatible with education practices in terms of goal settings and outcome measurements. The TQM sets the 'rules of the game' for every stakeholder in every domain and every process of management of educational process at higher educational institutions (Sohel-Uz-Zaman and Anjalin, 2016). It also provides the tools for educationalists, policy makers, scholars, and researchers to make their activities more efficient (Meirovich & Romar, 2006). EFQM Excellence Model relies on a customer-tailored approach to providing services and in educational settings it advocates stakeholders' needs analysis to adjust the curriculum and provide what the customers seek (Arjomandi & Grimshaw, 2009). The concept is quite applicable to the research activity considering the fact that the HEIs are doing their best to be social welfare-oriented. The Balanced Scorecard concept is used in educational institutions in a strategic planning and dominates over the performance assessment (Tohidi, Jafari, & Afshar, 2010). It fits the idea of a long-term planning of the institutional research activity.

The Project Management concept seems to be a more student-oriented management concept that is aimed at equipping students with the skills to deal with study and research tasks (challenges) efficiently (Trilling & Ginevri, 2015). The Organisational Management refers to the administration of the education stakeholders through supporting them situationally and in general (Connolly, James & Fertig, 2017). Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) implements the unification of quality assurance system which is a part of Bologna action lines such as 'qualifications frameworks, recognition and the promotion of the use of learning outcomes, all these contributing to a paradigm shift towards student-centred learning and teaching' (European Students' Union, 2017). It fits the study scope because it integrates the above concepts adding more emphasis to educational and research contexts.

The *purpose* of the review was to identify the world-recognized management theories that are used to manage the research activity in foreign higher educational institutions and assess the applicability of them in HEIs of Ukraine.



Methodology. This study relied on the methods recommended for feasibility studies (Frey, 2018). This review utilised qualitative methods in the search and assessment of the relevant studies. The study was designed as a flow of three stages. The first stage was intended to synthesise and select the relevant management theories. The originally designed Critical Appraisal Checklist (CAC) (adapted from A.5 Quality checklist for qualitative studies & A.8 Quality checklist for action research designs, see Appendix A) was used by the research team members in this stage. In the second stage, the Ukrainian higher institutional context applicability of every theory in terms of research management was assessed by the experts using the Triangular Assessment Method (TAM) (Pérez-Rodríguez & Rojo-Alboreca, 2017). The experts in Educational Management and Research performed the assessment. In the third stage, interpretation of the findings was performed and recommendations were produced. The summary and thematic analysis accompanied by the experts' assessment were used to analyse the yielded data. The review lasted from October 2019 to the end of May 2020. The study was intended to update the theory of the research management and to specify what applied value could that theory bring to the research activity management of the HEIs of Ukraine.

Description of the search strategy

The search strategy was conducted as recommended by Campbell et al. (2018). It was aimed at systematically searching for, appraising, and synthesising evidence related to the management theories that are applied in the research management of the higher educational institutions. To minimize the selection bias and related human errors, the search was performed independently by three people with a background in the field of educational management. The search strategy was based on the keywords and the review procedure was organised as recommended by Kugley *et. al.* (2017). The keywords search was intended to find the management concepts that were available in English, Ukrainian, and Russian languages. The search used the different combinations of the keywords (Boolean searching) within the research topic to manage to perform the Internet search extensively so that the tracking for the relevance estimation of the source would be more accurate. The time-efficiency was achieved by using truncation and wildcards in the search design. The keywords-based search design is presented In Table 1. It combined such concepts as management AND research AND university AND knowledge-driven society.

Table 1

The search strategy

Concept	Search keywords
Management	esp (manag* of the research).tw./OR (management theories AND research) OR (manag* of scientific activity) in university.tw./(upravlinnia naukovoui robotoiu v universyteti) [management of the research activity in university]
University research	esp develop* OR manag* research OR scien* activity AND modern university.tw.
Knowledge-driven society	esp knowledge society AND research AND manag* AND university.tw.



The search was repeatedly performed in the period from November 2019 to the end of May 2020. The inquiries were made using the above combinations in databases such as Crossref Metadata Search, Web of Science, and Google Scholar. The procedure of the review was standardised to comply with the PRISMA guidelines (Moher et al., 2015) that suggest organising the search into six stages such as identifying, short-listing, screening, checking appropriateness, synthesising and including (see Fig. 1). The 4-point Likert scale was used in the identification stage for the preliminary evaluation of the literature items. The values in the Likert scale meant as follows: 1 = poor relevance, 2 = medium relevance, 3 = good relevance and 4 = excellent relevance. The search was narrowed by application of previously developed the inclusion and exclusion criteria such as 1) the article should be published 30 years ago or more recently; 2) the article should reveal the concept(s) or best practice(s) of management of university research activity; 3) the implications drawn from the article should be relevant; 4) the article should be analytical; 5) it should be based on the theoretical framework on research management; 6) the findings should be supported by qualitative or quantitative data.

In the first three stages of the search and selection, each article was assessed critically and quantitatively using a Critical Appraisal Checklist (CAC) that was previously adapted and modified (see Appendix 1). The questions for the CAC were borrowed from Critical Appraisal Checklists (Greenhalgh *et. al.*, 2005) and adjusted to the research topic. The Checklist used a 4-point Likert rating scale with «Yes» = 4, «No» = 3, «Unclear» = 2, and «Not Applicable» (N/A) = 1. The final assessment was performed by three experts using the 5-point Likert approval scale with 1.00 - 1.99 = Strongly disapprove, 2.00 - 2.99 = Disapprove, 3.00 - 3.99 = Neutral, 4.00 - 4.50 = Approve, and 4.51 - 5.00 = Strongly approve. The articles that scored more than 3.00 were shortlisted for the final review and assessment. Any disagreement was overcome in the consensus meeting. It was recorded and transcribed verbatim. The Triangular Assessment Method (TAM) was used by three experts in the field of education and research management to assess the feasibility of the introduction of the research-purpose management best practices based on the management theories in HEIs of Ukraine. The panel of experts included 3 experts. One of those was with a Doctorate degree in Pedagogics, 1 expert was a dual degree in Educational Management (Masters' Degree) and Pedagogics (the holder of Ph.D.) and one expert was a holder of PhD Management degree. They assessed each source using values that could include decimals like 0.01, 0.02 up to 4.98, 4.99, and 5.00. The reason for using the scale with decimals was based on the belief of the research team members that decimals provide a higher level of accuracy making the assessments results more insightful and transparent. The articles that scored more than 3.00 were included in the final review. The consensus meeting was held to overcome any disagreements. The meeting was also a discussion platform for the experts to assess the effectiveness of the approaches included in the feasible literature list. The experts were supposed to vocalise the score based on the five-point scale and justify it.

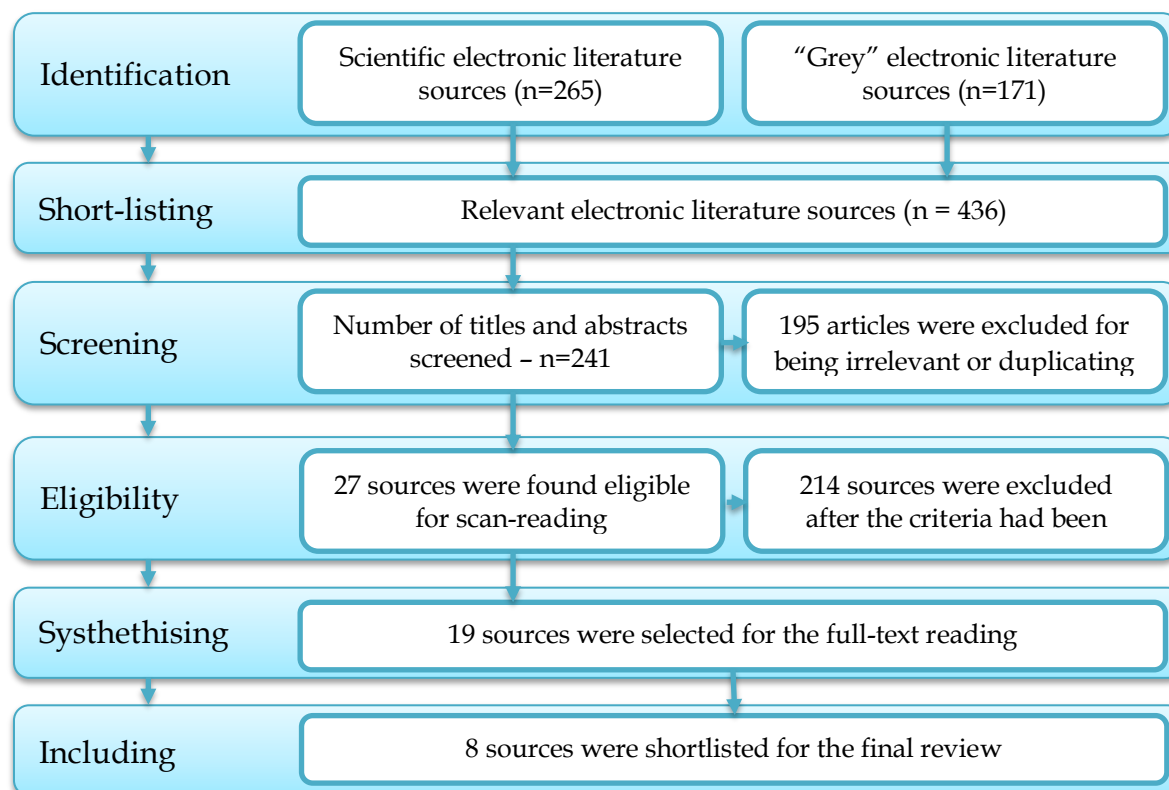


Figure 1. The keywords based search procedure

Instruments. Two instruments were used in the study. These were the Critical Appraisal Checklist (CAC) and the Triangular Assessment Method (TAM). The CAC was validated by the research team members. They computed the item-level content validity index (IL-CVI), Kappa coefficient, and scale-level content validity index (SL-CVI). The values for IL-CVI were higher than 0.85 and the coefficient was higher than 0.84. Both meant «good validity». The SL-CVI was 93% that meant high content validity. The validation of TAM was already fulfilled by Pérez-Rodríguez & Rojo-Alboreca (2017). It relies on the experts judgements expressed in values from 0 to 5 meaning the closer the value to 0, the more certain the expert is that their decision is accurate.

Results. The study found the 8 relevant sources discussing or revealing the use of the management theoretical concepts such as the Total Quality Management (TQM), Project Management (PM), the Framework Designed by the European Foundation for Quality Management (EFQM Excellence Model), Balanced Scorecard System (BSS) and Organisational management (OM) (see Table 2). The reviewer's assessment scores suggested that research management as a dimension of the quality management policy of the HEIs is given paramount importance by the experts. In the consensus meeting, the experts claimed that organisational management is quite an unclear concept so far which causes misinterpretations and misleadings in terms of both research activity organisation and promotion.



Table 2

Results of the systematic review of the sources shortlisted for the final analysis

No	Author, year	The concepts or best practice of university research activity management that it reveals	Implications	Provides analytics	Based on the theoretical framework on research management	Findings are supported by qualitative or quantitative data	Management theory it relies on	Reviewer's assessment score
1.	Dean & Bowen, 1994	Discuss how the research management could be improved using the total quality management theory principles.	Research management is an indispensable dimension of service quality.	No	Yes	No	Total quality management	3.6
2.	Huang & Hung, 2018	Study the social mechanisms of research educational management.	Provides proof that the Design-Based Research (DBR) is an effective methodology in organising education research.	Yes	Yes	Yes	Project management	3.8
3.	Johnson, 2013	Discusses the research strategy and planning development, the issues of fundraising and grant programmes, how to involve qualified people to ensure research leadership.	Suggests that research management in higher educational institutions relies on project management principles.	Yes	Yes	Yes	Project management	4.3
4.	Agarwa et al., 2019	Reveal the research management at university from the perspective of policy and strategy, and the trends driven by the internationalisation of higher education.	Conclude that research is of paramount importance at university and key criteria to assess the quality of education.	Yes	Yes	Yes	EFQM Excellence Model	4.6
5.	Ghvedashvili, Kvinikadze & Shabashvili, 2012	Reveal how reforms contributed to the research management and quality in higher educational institutions.	Due to the scientific centers, new research management, science popularisation, and internationalisation, the number of internationally competitive research projects increased dramatically.	Yes	Yes	Yes	Balanced Scorecard System	4.4
6.	Schützenmeister, 2010	Attempts to reveal different research management approaches have been analysed from both the research group level and the university department level.	States that research management at universities requires professional managers who are capable to make decisions on the feasibility of certain research projects and research directions.	Yes	Yes	No	Organisational management: coercive isomorphism, mimetic isomorphism, the concept of loose coupling	4.2



Continuation of table 2

7.	Wilson, 2018	Discusses the practice of adjusting the university research objectives and policy to the objectives of the government and nation-state.	The national objectives should be put above the university objectives.	Yes	Yes	Yes	Organisational management: the concept of loose coupling	3.9
8.	Hendriks & Sousa, 2013	Address the question of the research management from the perspective of knowledge management which is produced by the institution seen as a knowledge-intensive organisation.	Knowledge production management should be separated from the educational process and treated as an autonomous activity.	Yes	Yes	No	Organisational management	3.8

The results of the experts' assessment of the applicability of the management concepts such as the TQM, PM, EFQM Excellence Model, BSS, and OM in HEIs of Ukraine using the TAM are presented in Fig. 2.

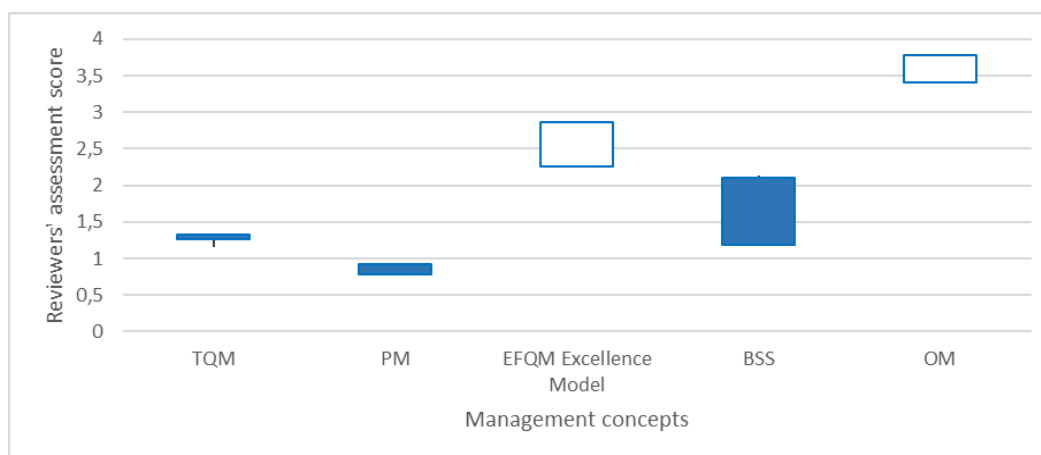


Figure 2. The results of the experts' assessment of the applicability of the specified management concepts in HEIs of Ukraine

As can be seen, the experts gave priority to the TQM and PM concepts considering them the most likely to be used to manage the research activity at universities in Ukraine. The BSS concept was judged to be applicable but the experts' opinions were quite dispersed. The EFQM Excellence Model and OM were tentatively considered applicable.

Commenting on the applicability of the above management theoretical concepts to manage the research activity in HEIs of Ukraine, the experts noted that research and science are still the secondary processes in HEIs, though these (research and science) are exhibited in the university missions that are expected to comply with Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG) (2015). Furthermore, the experts claimed that though legislation shaping to lose regulation of commerce-oriented activity of the HEIs is still ongoing,



the use of the EFQM Excellence Model and OM are gradually introduced by some universities in Ukraine as alternative or supplement to ESG.

Discussion. The study attempted to identify the world-recognized management theories that are used to manage the research activity in HEIs and assess the applicability of them in HEIs of Ukraine. Eight literature sources were reviewed. As far as we are aware, this has been the first systematic review revealing the management theoretical concepts from the view of their feasibility in managing the research activity in higher educational institutions of Ukraine.

It was found that the Total Quality Management, Project Management, the framework designed by the European Foundation for Quality Management, Balanced Scorecard System and Organisational management are used to manage the research activity to increase the institution's competitiveness in a knowledge-driven society. The findings suggested that research management is seen as a dimension of the quality management policy of the HEIs (Díez, Villa, López, & Iraurgi, 2020; Nasim, Sikander, & Tian, 2020). The study suggests that organisational management is quite a blur concept so far which causes misinterpretations and misleadings in terms of both research activity organisation and promotion.

It was found that the TQM and PM concepts could be used to manage the research activity at universities in Ukraine. The BSS concept could also be applicable in Ukrainian higher educational institutions. However, the EFQM Excellence Model and OM could be partially applicable in Ukraine as they are more commerce-oriented. The latter is consistent with findings of Escrig-Tena, Garcia-Juan & Segarra-Ciprés (2019) and Campatelli, Citti, & Meneghin (2011) who stated that the systems are aimed at developing staff but their efficiency is mostly measured by financial gains.

The above findings agree with the previous research and findings. The study goes in line with implications found in «Frederick Taylor and Scientific Management» (2017) stating that research and science should be developed through hiring the right people providing a high quality of work.

The study is consistent with Johnson (2013) stating that the researcher can be inefficient in a managerial role but can be trained in project management. The author's views are also consistent with the findings in this study, in particular, that the project management concept could be the most likely to be used to manage the research activity at universities in Ukraine. The reason for this is as follows: the PM concept concentrates on each project separately making planning and fulfilling research easier.

The study provides additional data to support the views of Dean & Bowen (1994) claiming that using the TQM concept to manage research and science activity at university raises the compatibility of the institution and contributes to its public image.

Conclusion. The theoretical management concepts mentioned above have been adapted to the purpose of managing research at higher educational institutions. The findings implied that research management could be seen as a dimension of the quality management policy of the HEIs. The experts specified that the organisational management concept when applied to the educational settings causes misunder-



standing in terms of organisation of research activity and its promotion. It was found that the TQM and PM concepts could be used to manage the research activity at universities in Ukraine. The BSS concept could also be applicable in Ukrainian higher educational institutions. However, the EFQM Excellence Model and OM could be partially applicable in Ukraine as they are more commerce-oriented. Further studies are needed to explore the management models that can be efficient in research management and their specific features.

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Appendix A

Critical Appraisal Checklist

Reviewer _____ **Date** _____

Author(s) _____

Year _____ **Source record number** _____

No		Yes	No	Unclear	N/A
1.	Did the source address the review research question?				
2.	What research management theory was the research question addressed through?				
3.	Did the study provide a feasible plan of the theory (concept) implementation that was congruous with the research management?				
4.	Was the effect size or the outcome of the research management theory explained clearly?				
5.	Was the study design that provided that effect size or the outcome duplicable or transferrable?				
6.	Did the study comply with recent theoretical insights in the field of research activity management in the higher educational institution?				

Exclude Include for scan-reading Include for final review

Reviewer's comment

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