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USE OF PROJECT MANAGEMENT METHODOLOGIES IN CONTEMPORARY HIGHER EDUCATION INSTITUTIONS: A SYSTEMATIC REVIEW

Abstract. *This systematic review explores the application and effectiveness of project management methodologies within the context of modern higher education institutions (HEIs).*

The study investigates a spectrum of methodologies, ranging from traditional to customized models, with a focus on identifying success factors and challenges. Employing a rigorous search and selection process, the research synthesizes key findings from existing literature, ensuring methodological robustness.

The results of this study offer insights into the prevalent project management practices adopted by HEIs and their consequential impact on universities. By exploring methodologies such as Agile, Hybrid approach, Lean, Lean Six Sigma, Scrum, and Scrumban, the study sheds light on the adaptability and suitability of these approaches in the unique landscape of HEIs.

This systematic review contributes to the academic discourse by providing a nuanced understanding of the integration of project management methodologies in higher education settings. The findings serve as a benchmark for current practices and offer practical guidance for educators and administrators seeking to enhance project management processes within their institutions.

Keywords: *Project Management methodologies, Agile, Hybrid approach, Lean, Lean Six Sigma, Scrum, Scrumban, Higher Education Management, HEIs.*

■ Introduction

In a fast-changing world filled with various tasks and projects, it is crucial to recognize the importance of efficient project management. Completing tasks and achieving goals depends on using project management methods effectively. While this approach is well established in fields like business, its use in higher education is still developing and has not been explored much.

The landscape of higher education has undergone a paradigm shift in recent years, driven by the introduction of processes termed “marketization” and “commercialization” [3, 5]. This transformative process seeks to infuse market elements into the education sector, with the overarching goal of bolstering financial sustainability, elevating educational quality, and enhancing the competitiveness of universities within a country. This transformation is not merely localised but reflects a global trend toward restructuring traditional educational institutions.

Despite the increasing recognition of project management as a vital organisational practice, research on its implementation in education sectors has been limited. The historical emphasis of Higher Education Institutions (HEIs) on research and teaching has traditionally kept them somewhat distant from the direct impact of project management methodologies [1].

The rise of the ‘Project Society’ [5] introduces a new paradigm, where organisations are actively involved in projects, challenging and transforming traditional structures. Higher

education institutions, traditionally steeped in academic pursuits, are no exception to this trend. Recognising the need to enhance competitiveness, many HEIs have begun to integrate project managers into various roles within their organisational frameworks [1].

Effectively aligning project management approaches with the unique characteristics of the education industry is paramount for successful 'Projectification' [5]. This process involves tailoring project management methodologies to suit the specific context, goals, and operational environment [19, 20].

As the education landscape embraces these changes, studies on the application of project management methodologies in HEIs have gained prominence. These studies offer a comprehensive overview of the evolving educational terrain, underscoring the growing importance of project management in higher education. Over the years, a trend has emerged, manifesting in the increased adoption of project management approaches across various facets of higher education, including the teaching-learning and curriculum/program development process [4, 13, 14, 16, 20, 21, 23, 25, 26, 28, 32, 33], and administrative processes [7, 8, 10, 11, 12, 15, 17, 18, 19, 22, 29, 31]. This trend reflects a collective recognition within academia of the inherent benefits that project management methodologies bring to diverse aspects of academic and administrative functions.

This study seeks to illuminate the application of project management principles in diverse educational settings, drawing insights from examples spanning different countries. Through a systematic review, the study aims at unravelling the utilisation and effectiveness of various project management methodologies within modern higher education institutions, providing valuable insights for educators, administrators, and researchers navigating the evolving landscape of project management in academia.

■ Research Methodology

In conducting this research study, a systematic approach was employed, commencing with the formulation of clear research questions:

■ Research Questions:

1. What project management methodologies are commonly employed in higher education?
2. How do project management methodologies impact different functions within higher education institutions?

To gather comprehensive insights, an exhaustive search for relevant studies was undertaken across various databases, journals, conference proceedings, and reputable sources. The selected platforms included Scopus, Research Gate, EBSCO, Emerald Insight, Web of Science, Science Direct, ProQuest, and Google Scholar.

In the pursuit of relevant literature, a strategic combination of keywords related to project management methodologies and higher education was employed. The keywords encompassed phrases such as "Project Management methodologies in Higher education," "Agile in Higher education," "Hybrid approach in Higher education," "Lean methodology in Higher education," "Lean Six Sigma methodology in Higher education," "Scrum," "Scrumban," and "Higher Education Management".

To ensure the precision and relevance of the collected data, specific inclusion and exclusion criteria were established. The inclusion criteria comprised studies within the publication date range of 2012-2023, focusing on key university functions (Teaching and Learning, Program Development, Administrative processes), and employing methodologies such as Agile, Lean, Scrum, and Hybrid.

After a thorough application of these criteria, a total of 25 studies met the inclusion requirements, three studies were excluded due to their general descriptions without specifying the functions of the university where project management methods were applied, and two additional studies were

added. Subsequently, the 24 selected studies were meticulously reviewed, and data extraction processes were carried out to derive meaningful insights into the utilisation and impact of project management methodologies in higher education institutions.

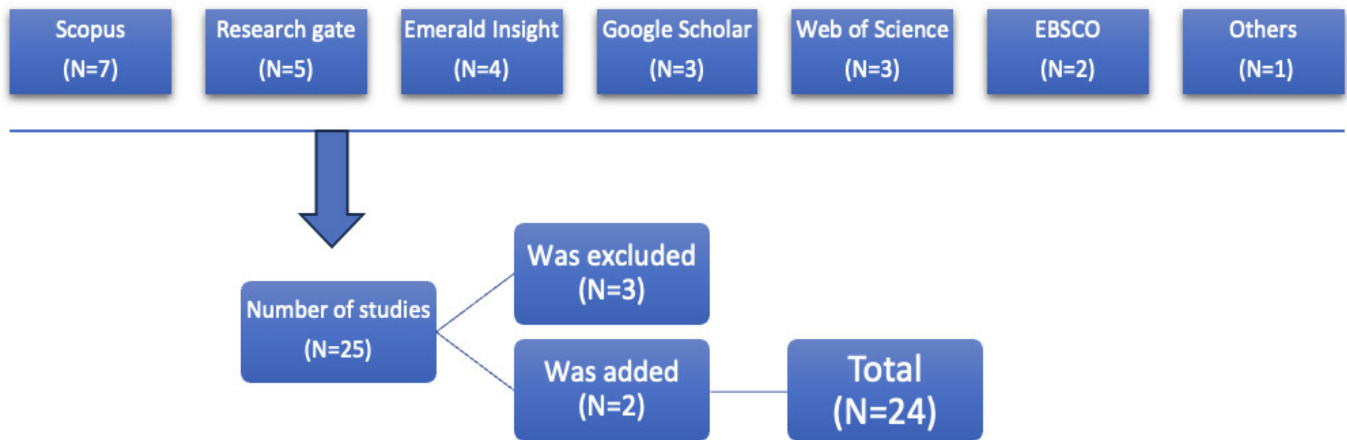


Figure 1. Identification and selection process of research papers

Source: Own illustration

To **extract the relevant data**/information from selected studies details on methodologies employed, key findings, challenges, and success factors were reviewed.

The main findings of each of the studies are described in Table 1 below.

Table 1. Research studies analysis of Project management approaches in HE

HE context	Author	Methodology employed	Findings of the study
Teaching and Learning	Kamat et al., (2012)	Lean	By adopting lean methodology, students were able to enhance collaboration and teamwork, which in turn facilitated the development of crucial interpersonal and communication skills.
	Kamat (2012)	Lean, Agile	Agile practices can be applied to curriculum design and delivery, allowing flexibility, responsiveness, and continuous improvement. Lean practices can be utilized to identify and eliminate inefficiencies in administrative processes, resource allocation, and student support services.
	Persson et al., (2012)	Scrum	The Scrum methodology was found to be suitable for both external interdisciplinary projects and smaller academic projects.
	Campbell et al., (2016)	Scrum	Scrum maximizes the team's ability to deliver quickly by embracing the fact that the problem being solved cannot be fully understood or described from the start, and instead focuses on responding to emerging requirements.
	Krehbiel et al., (2017)	Agile	The study found that adaptations of Agile to higher education produced positive outcomes, including increased student engagement, student responsibility for learning, enhanced collaboration, and higher-quality deliverables.
	Thomas et al., (2017)	Lean Six Sigma	The LSS was implemented in a case study of a new undergraduate Engineering program, resulting in improved efficacy of curriculum and program development.

HE context	Author	Methodology employed	Findings of the study
Teaching and Learning	Mikhieieva et al., (2017)	Scrumban	This paper shows that the approach effectively handles large HEI projects with minimal resources. It is suitable for events like DAAD or Erasmus+, and works well for cross-border projects, particularly in study program development.
	Masood et al., (2018)	Scrum, XP	The paper offers recommendations for educators and students to better coordinate and apply agile practices in university contexts, aiming to enhance the application.
	Zighan and EL-Qasem (2020)	Lean	The application of lean thinking in the business school helps eliminate non-value-added activities and reinforces value-added activities. Value stream mapping is found to be a useful tool for developing an employability-focused curriculum.
	Otero et al., (2020)	Scrum, XP	This paper provides recommendations on the usage of agile methodologies in educational environments, focusing on their potential to improve learning and adaptability to changing requirements.
	Pócsová et al., (2020)	Scrum	Implementing the SCRUM in the course increased the efficiency of the educational process and was useful for students in terms of learning outcomes.
	Reyes et al., (2021)	Scrum	By implementing Scrum in the classroom, students become self-managing teams responsible for creating valuable and useful increments of learning in each sprint. This active involvement and empowerment of students in their learning process leads to increased motivation and better academic results.
Administrative functions	Svensson et al., (2015)	Lean Six Sigma	The implementation of Lean Six Sigma methodology has led to the identification and elimination of process inefficiencies, reduction in errors and defects, streamlining of workflows, and optimization of resource utilization. These improvements have resulted in enhanced overall business process quality and effectiveness within the administrative functions of the university.
	Hofer and Naeve (2017)	Lean	This study demonstrates the viability of applying the lean strategy in higher education management. It establishes lean to create organizational frameworks and foster a changing culture, enabling quicker adaptation to the dynamically evolving educational landscape.
	Lu et al., (2017)	Lean Six Sigma	The LSS leadership model can help improve the quality of education, reduce non-value-added costs, and enhance operational efficiency in HEIs. It provides a fundamental base for HEIs to overcome challenges and sustain improvements.
	Sunder and Mahalingam (2018)	Lean Six Sigma	Lean Six Sigma (LSS) implementation in Higher Education Institutions (HEIs) can lead to improved service quality and efficiency.
	Ikbal et al., (2018)	Agile	By implementing Agile practices, universities can create a more dynamic, responsive, and student-focused educational experience, leading to improved learning outcomes and better preparation of students for the challenges of the modern workforce.
	Kucheryavenko et al., (2019)	Lean	Lean methodologies promote continuous improvement and encourage employees to actively participate in problem-solving and process optimization, resulting in better service quality.

HE context	Author	Methodology employed	Findings of the study
Administrative functions	Haerizadeh and Sunder (2019)	Lean Six Sigma	The implementation of LSS resulted in enhanced quality and efficiency in student services, leading to a better experience for the students.
	Li et al, (2019)	Lean Six Sigma	The study suggests that implementing LSS in the higher education industry can be driven by the mission to better serve customers, rather than solely focusing on financial gains.
	Ivetic et al., (2020)	Agile	Universities can benefit from implementing Agile practices either partially or through a full transformation, but the willingness to change is a crucial element.
	Hess and Benjamin (2015)	Lean Six Sigma	Lean Six Sigma can be applied in the university setting to improve processes in curriculum delivery, business and auxiliary services, admissions and enrolment management, and research.
	Mira and Kusakci (2022)	Lean	Lean improved efficiency and productivity in operational tasks performed by universities, such as admissions, research fund administration, and hiring, by eliminating non-value-added activities and streamlining processes.
	Klein et al, (2022)	Lean	The study suggests that implementing Lean practices enhances employee engagement and satisfaction, and increases the efficiency and productivity of operations within the HEI.

Source: Author generated from the literature provided in a table

To **extract the relevant data**/information from selected studies details on methodologies employed, key findings, challenges, and success factors were reviewed.

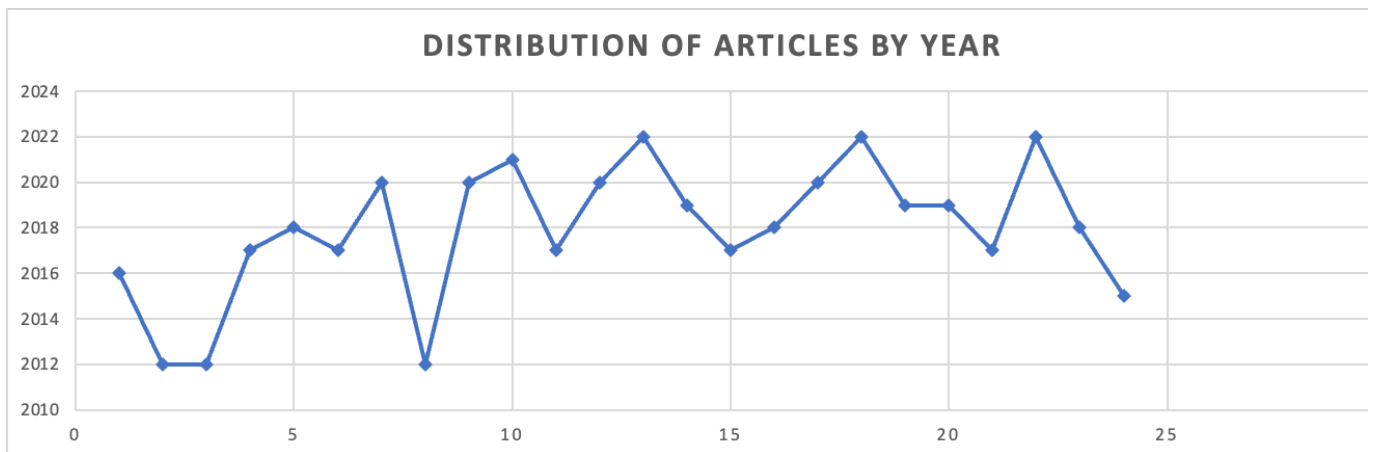


Figure 2. Distribution of articles by country

Source: Own illustration according to selected papers

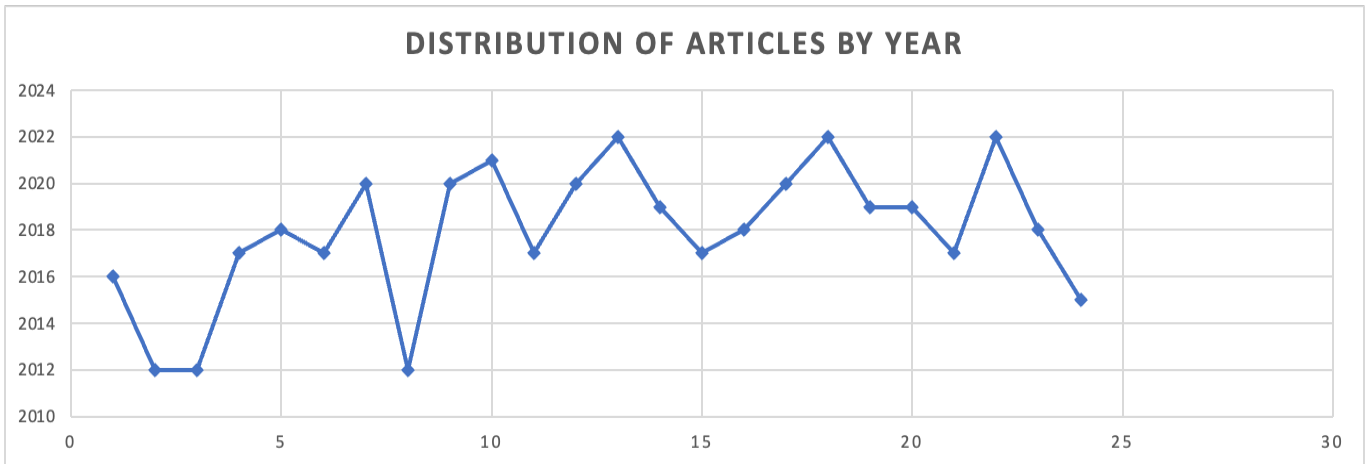


Figure 3. Distribution of articles by year
Source: Own illustration

■ **Discussions and Findings**

■ **Project Management methodology used for the improvement of HEIs**

Project management methodologies have emerged as transformative tools in higher education institutions (HEIs), influencing diverse aspects of collaboration, curriculum design, administrative processes, student engagement, and employee satisfaction.

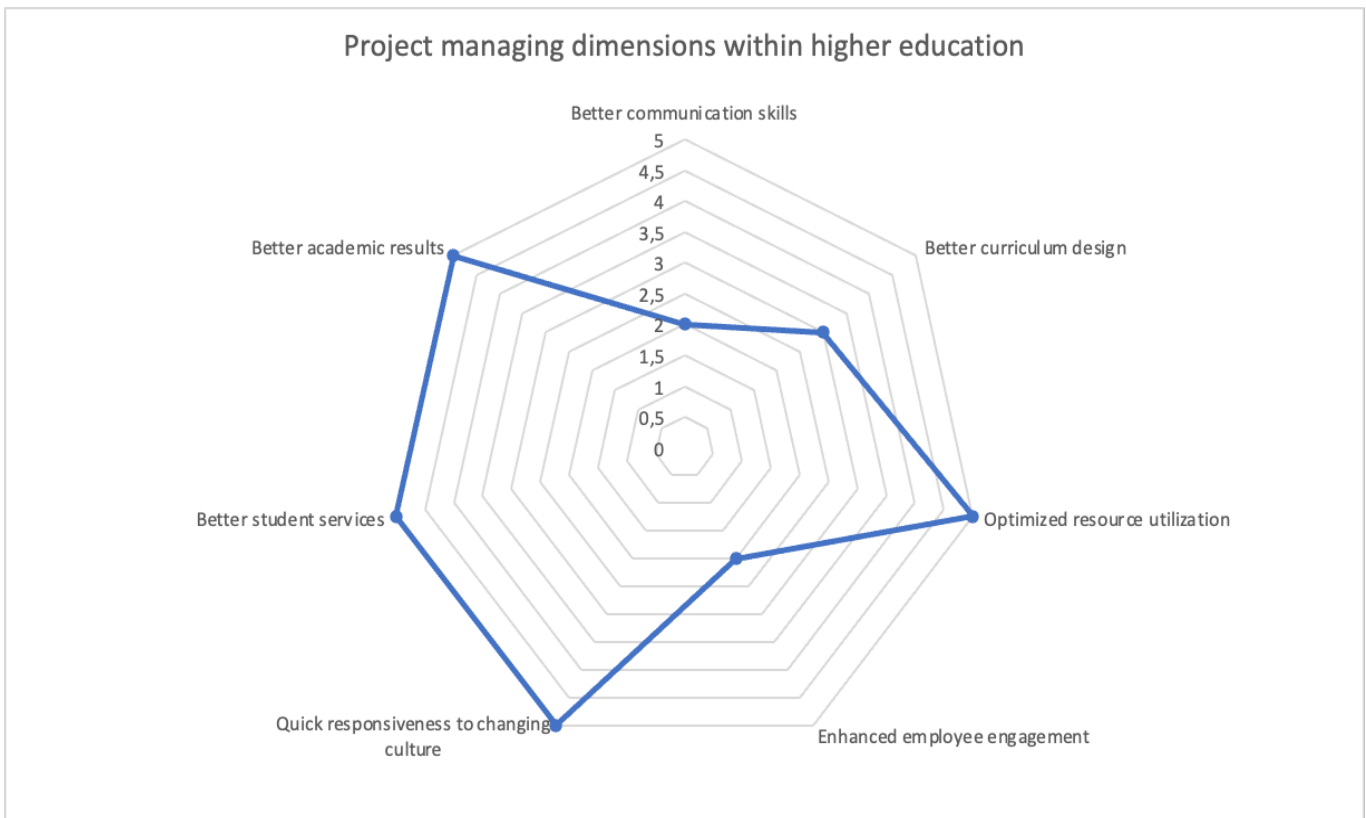


Figure 4. Benefits from Project Management Practices in HEIs
Source: Authors' illustration

The adoption of Lean methodology, as explored by Kamat et al., (2012), emerges as a pivotal factor in fostering collaboration and teamwork among students within Higher Education Institutions (HEIs). This correlation is indicative of the role Lean methodologies play in developing essential interpersonal and communication skills, contributing to the holistic development

of graduates. Beyond operational efficiency, Lean methodology proves to be a catalyst for comprehensive student development. So, Fisher et al., (2011) highlight that the context of using a Lean methodology in HEI led to the implementation of personalized advising services due to address individual student needs, academic goals, and career aspirations in Student Support Services. Moreover, according to Rafi et al., (2020), lean tools provide a positive impact on various aspects of work processes and organizational efficiency.

There is growing interest in applying agile and lean concepts in the classroom to improve educational experiences. For example, the work of Reyes et al., (2021) provides practical guidance on implementing Scrum principles in the classroom or lecture hall. It not only offers actionable insights for application but also introduces innovative concepts that may catalyse additional research and development in the field. Agile practices, as discussed by Kamat (2012), bring about a paradigm shift in curriculum design and delivery. The flexibility, responsiveness, and commitment to continuous improvement inherent in Agile methodologies contribute to the dynamic nature of Higher Education. This adaptability ensures that HEIs remain relevant, preparing students to navigate the challenges of their future careers. Agile methodologies foster resilience and agility in both educators and students, aligning with the evolving demands of educational landscapes.

Lean methodology, when applied to administrative processes and resource allocation, reveals its value in identifying and eliminating inefficiencies within HEIs (Kamat, 2012). Streamlining operations enables institutions to optimize resource utilization, resulting in cost savings and overall operational efficiency. This dual impact on financial considerations and resource allocation underscores the transformative potential of Lean methodology in the administrative functions of HEIs.

The adaptation of Agile to higher education, as evidenced by Krehbiel et al. (2017), extends beyond operational aspects to impact the overall educational experience. Agile methodologies contribute to increased student engagement, responsibility for learning, and collaboration. These positive outcomes elevate the quality of education, preparing students with knowledge, essential skills, and a mindset for success.

Scrum implementation in the classroom, as demonstrated by Pócsová et al. (2020) and Reyes et al. (2021), emphasises the transformative power of empowering students. Active involvement through Scrum methodologies leads to increased motivation, improved academic results, and an efficient educational process. This student-centric approach aligns with contemporary pedagogical principles, recognizing the importance of active engagement and empowerment.

Lean Six Sigma's success in identifying and eliminating process inefficiencies, illustrated by Svensson et al. (2015) and Hofer and Naeve (2017), establishes it as a cornerstone for optimizing resource utilization in HEIs. Beyond operational efficiency, Lean Six Sigma contributes to the enhancement of overall business process quality, creating an environment conducive to sustained improvements.

The study by Klein et al. (2022) underscores the positive correlation between Lean practices and enhanced employee engagement and satisfaction. This organizational impact emphasises the importance of engaged employees in the educational setting, contributing to a positive work environment and improved service quality.

While the summary covers the benefits of Lean, Agile, and Scrum in higher education, the geographical distribution of articles underscores the global applicability of these methodologies. Across diverse countries, the studies provide insights into how these project management approaches enhance educational quality, efficiency, and student outcomes. Special cases in certain countries may highlight unique challenges and solutions, showcasing the adaptability and effectiveness of Lean, Agile, and Scrum in diverse geographical contexts.

Over the years, the distribution of articles highlights the evolving interest in project management methodologies in higher education. By analysing the distribution of articles by year, it becomes

evident how these methodologies have gained traction and adapted to meet the evolving needs of educational institutions.

Overall, the integration of project management methodologies, including Lean, Agile, and Scrum, in higher education institutions proves transformative across various dimensions [4, 12]. These methodologies impact collaboration, curriculum design, administrative processes, student engagement, and employee satisfaction, enriching the educational environment and preparing students for success in a dynamic and competitive landscape [4, 12].

The studies consistently highlight the positive impact of Lean [21], Agile [10], and Scrum [25] methodologies on various aspects of higher education. Adopting Lean methodology fosters collaboration, teamwork, and the development of interpersonal and communication skills among students. Agile practices are applicable to curriculum design and delivery, providing flexibility, responsiveness, and continuous improvement. Lean practices identify and eliminate inefficiencies in administrative processes, resource allocation, and student support services.

By many researchers as Sobiecki and Kurzydłowska (2018), and Hidalgo (2019) a scrum methodology is found suitable for interdisciplinary projects and smaller academic endeavours, maximizing team efficiency by focusing on responding to emerging requirements.

Antony and Sunder (2020) discovered that the implementation of Agile methodologies in higher education leads to heightened levels of student engagement, responsibility, collaboration, and improved quality of deliverables. Additionally, Thomas et al. (2017) found that Lean Six Sigma is particularly effective in enhancing the efficiency of curriculum and program development, especially in larger projects with limited resources.

Notably, Lean thinking in business schools eliminates non-value-added activities and enhances employability-focused curriculum development. The implementation of Scrum in classrooms empowers students, leading to increased motivation and better academic results. Lean Six Sigma improves service quality, efficiency, and overall business process quality within administrative functions.

The articles stress the viability of Lean strategies in higher education management, creating organizational frameworks for a changing culture. Lean Six Sigma, as a leadership model, improves education quality, reduces costs, and enhances operational efficiency. Agile practices create a dynamic, responsive, and student-focused educational experience.

■ Conclusion and Further Research Directions

In the rapidly evolving landscape of higher education, the adoption of project management methodologies has proven instrumental in navigating the dynamic challenges faced by higher education institutions (HEIs). This analysis, rooted in a series of case studies, provides a comprehensive understanding of the transformative impact of Lean, Agile, and Scrum methodologies within the educational environment. As HEIs endeavour to expand beyond traditional teaching and research, the findings contribute valuable insights that equip institutions with the necessary tools to make informed decisions and thrive in a competitive environment.

While the discussed studies provide valuable insights, there are avenues for further research in the application of project management methodologies in higher education. Future research could delve into the long-term effects of these methodologies on student outcomes, exploring the impact on career success and professional development. Additionally, comparative studies analysing the effectiveness of different project management methodologies in diverse cultural and institutional contexts could contribute to a more comprehensive understanding.

The geographical distribution of research on project management methodologies in higher education is an area that warrants attention. Analysing articles by country and over the years could uncover trends, regional preferences, and areas where these methodologies are gaining more traction. Special cases and in-depth analyses of projects in specific regions or with unique

challenges could provide nuanced insights into the applicability and adaptation of project management methodologies.

Furthermore, investigating the scalability of these methodologies in various HEI settings, including smaller institutions or those with limited resources, would be beneficial. This could involve exploring strategies for tailoring these methodologies to different organizational sizes and structures.

In conclusion, the exploration of project management methodologies in higher education is a dynamic field with ongoing potential for research and development. Addressing these suggested research directions can contribute to a more comprehensive understanding of the benefits, challenges, and adaptability of Lean, Agile, and Scrum methodologies in diverse higher education contexts.

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ИСПОЛЬЗОВАНИЕ МЕТОДОЛОГИЙ УПРАВЛЕНИЯ ПРОЕКТАМИ В СОВРЕМЕННЫХ ВЫСШИХ УЧЕБНЫХ ЗАВЕДЕНИЯХ: СИСТЕМАТИЧЕСКИЙ ОБЗОР

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***Аннотация.** В данном систематическом обзоре рассматривается применение и эффективность методологий управления проектами в контексте современных высших учебных заведений (ВУЗов). В исследовании рассматривается спектр методологий, от традиционных до специализированных моделей, с акцентом на выявление факторов успеха и проблем. Используя строгий процесс поиска и отбора, исследование синтезирует ключевые выводы из существующей литературы, обеспечивая методологическую надежность.*

Результаты данного исследования позволяют понять распространенные практики управления проектами, принятые в вузах, и их последующее влияние на университеты. Изучая такие методологии, как Agile, гибридный подход, Lean, Lean Six Sigma, Scrum и Scrumban, исследование разъясняет адаптивность и пригодность этих подходов в уникальном ландшафте вузов.

Данный систематический обзор вносит вклад в академический дискурс, обеспечивая тонкое понимание интеграции методологий управления проектами в высшем образовании. Полученные результаты служат ориентиром для текущей практики и предлагают практические рекомендации для преподавателей и администраторов, стремящихся усовершенствовать процессы управления проектами в своих учебных заведениях.

***Ключевые слова:** Методологии управления проектами, Agile, гибридный подход, Lean, Lean Six Sigma, Scrum, Scrumban, управление высшим образованием, ВУЗы.*

ЗАМАНАУИ ЖОҒАРЫ ОҚУ ОРЫНДАРЫНДА ЖОБАЛАРДЫ БАСҚАРУ
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Аңдатпа. Бұл жүйелі шолуда қазіргі заманғы жоғары оқу орындары (ЖОО) контекстінде жобаларды басқару әдістемелерінің қолданылуы мен тиімділігі қарастырылады.

Зерттеу сәттілік факторлары мен проблемаларын анықтауға баса назар аудара отырып, дәстүрліден мамандандырылған модельдерге дейінгі әдістемелер спектрін қарастырады. Қатаң іздеу және іріктеу процесін қолдана отырып және зерттеу әдіснамалық сенімділікті қамтамасыз ете отырып, бар әдебиеттерден негізгі тұжырымдарды синтездейді.

Бұл зерттеудің нәтижелері университеттерде қабылданған жобаларды басқарудың кең таралған тәжірибелерін және олардың университеттерге әсерін түсінуге мүмкіндік береді. Agile, гибридті тәсіл, Lean, Lean Six Sigma, Scrum және Scrumban сияқты әдістемелерді зерттей отырып, зерттеу университеттердің бірегей ландшафтында осы тәсілдердің бейімделуі мен жарамдылығын түсіндіреді.

Бұл жүйелі шолу жоғары білім берудегі жобаларды басқару әдістемелерінің интеграциясы туралы нақты түсінік бере отырып, академиялық дискурсқа үлес қосады. Алынған нәтижелер ағымдағы тәжірибеге сілтеме ретінде қызмет етеді және өз мекемелеріндегі жобаларды басқару процестерін жетілдіруге ұмтылатын оқытушылар мен әкімшілерге практикалық ұсыныстар береді.

Түйінді сөздер: жобаларды басқару әдістемелері, Agile, гибридтік тәсіл, Lean, Lean Six Sigma, Scrum, Scrumban, жоғары білім беруді басқару, ЖОО.