International Journal of Engineering and Management Sciences (IJEMS) Vol. 9. (2024). No. 1.
DOI: 10.21791/IJEMS.2024.002

The Importance of Continuous Organizational Project Risk Management and the Value of Project Management Certificates in the Customers' Eyes

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Abstract. In an increasingly complex and volatile business environment, organizational project risk management plays a critical role in determining the chances of project success. Project management has become a common tool in the hands of large organizations for executing development and improving their production cycles in a more carefully planned way. However, the future is often hard to predict, and unexpected events may occur which could have been avoided with the use of the right tools and mindset. This comprehensive research study aims to showcase the importance of continuous risk management in organizations and highlight how risk management contributes to successful project outcomes. By synthesizing information from 59 high-quality publications from Scopus and Web of Science, the research describes various risk mitigation methodologies used across diverse fields, and explores potential obstacles faced by project managers when executing risk management strategies. The primary research of the study builds upon a survey conducted with 181 experienced project managers across various industries to gain deeper insights into their risk management approaches and the constraints they may encounter. Additionally, the study seeks to analyse the value of obtaining project management certificates in relationship with led projects' length and budget. Employing SPSS, the research presents descriptive statistics, regression, and correlation calculations to further analyse the data gathered. The aim of the research is to draw attention to the significance of continuous risk management, propose effective methodologies, identify and mitigate potential challenges, and shed light on the potential benefits of having certifications in the field of project management. This study aims to present valuable knowledge for both researchers and organizations striving to better understand the field of project risk management strategies through the systematic literature review and quantitative research results presented.

Keywords: Project Management, Continuous Risk Management, Organizational Risk

Introduction

The economic environment in which organizations operate became immensely turbulent and fast moving. The Covid-19 pandemic proved that the future is often greatly unpredictable. Organizations must face and mitigate risks successfully on both small and larger scales to be able to remain competitive and bring their projects to success within the planned scope. The number of publications in the field of risk management skyrocketed during the pandemic period highlighting the importance of continuous organizational project risk management and its role as a pivotal component in ensuring successful project outcomes [1], [2], [3]. The increasing complexity of projects and their interdependencies call for an integrated approach towards understanding, assessing, and managing risks. The right execution of

DOI: 10.21791/IJEMS.2024.002

risk management allows organizations not only to foresee potential threats but also to identify and exploit opportunities for value creation [4], [5], [6].

The relevance of this research is underscored by the evolving project management landscape, characterized by changing methodologies and the advent of technologies that continually redefine commonly used approaches to risk mitigation [7], [8], [9]. Consequently, gaining a thorough understanding of how to navigate these changes and manage risk effectively is of paramount importance for project managers and organizations as well.

The methodology employed in this research involves a systematic literature review, synthesizing 59 high-quality articles from Scopus and Web of Science in the field of continuous organizational risk management, based on the principles of the Prisma model [10], [11], [12], [13]. The primary research of the study was conducted through a survey of 181 experienced project managers across various industries. The results of the primary data collection and analysis aim to provide first-hand insights into the importance of continuous risk management, the methodologies utilized by the interviewed managers, and the difficulties managers face during risk mitigation. The study further aims to investigate the potential value of project management certifications, discussing how they might shape customer expectations and project outcomes [4], [14], [15], [16].

The overall aim of this study therefore is to emphasize and highlight the importance and positive aspects of continuous risk management. Second to present diverse methodologies used to successfully execute risk mitigation based on the synthetisation of quality articles on the field. Third to identify possible constraints that project managers face in reality during risk assessment.

Limitations of this research must be highlighted. The literature review is based on articles from the repository of Scopus and Web of Science, and may not conclude all the available knowledge on the subject. The primary research also relies on the responses of a select group of project managers, and therefore may not completely reflect the broader population of project managers across all industries. These limitations of the study have been taken into account, and conclusions are only drawn keeping in mind these constraints.

By synthetizing diverse perspectives and methodologies, this research aims to contribute to project risk management, and hopes to provide practical insights for both researchers and professionals in the field.

1. Literature review

The study builds upon the use of the PRISMA model, a commonly used tool for rigorous approach towards the synthesis of academic literature [10]. This research aimed to identify publications from the past between 2000 and 2023 with the keywords of: "Project risk management", "Organizational risk management", "Continuous risk management". The keywords were used as search terms in two reputable databases: Scopus and Web of Science, which are acknowledged for their high-quality articles. Initially, 344 articles were identified. Following the steps of the Prisma model, through the examination of the titles, keywords, and abstracts, publications irrelevant to this research were removed. Furthermore, duplicate studies were eliminated, leaving 59 sources to be synthesized in this review. The literature review section aims to provide a comprehensive understanding of the importance of continuous risk management and intends to synthetize the methodologies used in previous studies.

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Risk management is a strategic process that enables an organization to make decisions under uncertain conditions and, subsequently, to optimize its performance [17], [18]. Continuous project risk management, in particular, offers the means to identify, assess, and control risks on an ongoing basis, allowing for an adaptive response to changes and unforeseen circumstances [5], [19]. Risk management has gained high recognition in a multitude of industries in the past decades. Al-Qubaisi, for example, highlights the field of oil and gas industry, as this sector has been used to systematically investigate incidents and derive lessons for future operations [1]. Similar approaches have been seen in construction, information technology, manufacturing, logistics and software development while available research also extends to the area of risk management in space travelling [20], [21], [22], [23]. The future is often hard to predict and in cases of projects with strictly outlined time and cost constraints, planning for risks has become crucial [8], [24], [25]. Appropriate risk exploration and management can assist organizations in highlighting possible and already visible difficulties of the future thereby enabling risk mitigation and successfully overcoming these challenges [26]. However, changes in the project environment can also occur during the project execution phase. New difficulties may emerge while previously estimated risks may disappear. Organizations and the project team must repeatedly adapt to imminent/potential challenges. Risk events discovered in time provide greater opportunity for the project team to find solutions and to allocate costs accordingly. On the other hand however, reserving unnecessary resources to already non-existent risks might take away value from somewhere else in the organization. Therefore, continuous risk management consists in the constant search for balance between mitigating risks and allocating the right resources to the project enabling as smooth as possible project execution [20]

The methodologies used in the reviewed studies are used across a wide range of industries, and they highlight a great diversity in project risk management approaches. For example, Apostolopoulos et al. (2016) use a change risk assessment model to aid organizational decision-making while Taylan (2014) applied fuzzy set and systems to assess IT project risks in rapidly developing organizations. Agile methodologies and lean principles, which promote continuous improvement and risk management, were also frequently featured in the selected articles [11], [12], [27], [28].

Agile Frameworks and Processes. A significant number of articles underscored the importance of Agile frameworks in project risk management, promoting iterative development and adaptability [2], [28], [29]. These frameworks, such as Scrum, were observed as enhancing the agility and risk responsiveness of organizations. Agile approaches mostly found their biggest success in software development and IT projects, however due to their iterative, positive aspects they are becoming more and more popular on wide range of fields. Agile frameworks such as Scrum, as advocated by Adi Prakoso and Kuswardono Budiardjo (2021), encourage iterative development and continuous improvement. The available research emphasizes that incorporating Agile methodologies into project management allows for dynamic adjustments and proactive risk management throughout the project lifecycle. This framework, characterized by time-bound sprints, regular retrospectives and daily stand-up meetings, helps teams quickly identify and mitigate risks. Furthermore, Andreev and Malozemov (2020) takes a more systematic approach to the implementation of Agile methodologies in project risk management. They have proposed the development of an algorithm for selecting the optimal set of tools and techniques for Agile project management for engineering industries. Shameem, Nadeem, and Zamani (2023) expanding on agile approaches, have built their research upon traditional Agile methodologies

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by integrating agile methods with a genetic algorithm-based probabilistic model. The research presents a quantitative model that factors in project uncertainties and enhances risk management. It addresses the increased complexity and risks inherent in global software development projects, where distributed teams, cultural differences, and time zones introduce additional challenges [2], [29].

Decision-making Models. Researchers have utilized unique decision-making models to facilitate organizational decision-making under uncertain conditions. The Project Management Institute recommends the implementation and use of decision-making tools such as decision tree analysis or Monte Carlo analysis to facilitate decision-making based on determined probabilities of risks occurring [4]. Apostolopoulos et al.'s (2016) model is designed to facilitate organizational decision-making when companies are undergoing changes, which, without proper management, could introduce substantial risks. The model is designed to help organizations identify potential risks associated with change, analyse their potential impacts, develop mitigation strategies, and track the results of those strategies over time. Taylan (2014) brings a more technologically advanced perspective to decision-making in project risk management, using fuzzy set theory and systems thinking in appraising IT project risks. This approach represents a break from traditional risk management methods, which often fail to account for the inherent uncertainty and ambiguity in IT projects. Taylan's model leverages the capabilities of fuzzy set theory to model and quantify uncertainty, and systems thinking to understand the intricate relationships between different project risks. By considering both these aspects, the model provides a comprehensive and realistic assessment of IT project risks, enabling more informed and effective decision-making.

Lean Principles and Six Sigma. Lean principles and Six Sigma approaches were frequently noted for their contribution to continuous improvement, waste reduction, and risk management [11], [30], [31]. Lean principles facilitate process optimization, thereby reducing risks associated with inefficiencies and process variability. Publications on the field highlight that Japanese quality management mindsets and leaner approaches greatly correlate with the approach of continuous improvement, the removal of unnecessary processes, customer satisfaction and the successful management of risks. Galli (2018) discusses both the advantages and risks related to Lean Six Sigma deployment and sustainment, and how project management can help mitigate these risks. The author highlights the potential for continuous improvement inherent in Lean Six Sigma, emphasizing that a well-managed implementation of these methodologies can significantly reduce process variability and eliminate waste, both of which are key to reducing future project risks. Furthermore, Galli provides strategies on how project management can aid the effective deployment and sustainment of Lean Six Sigma, which ensures that the benefits are maintained over the long term. Similarly, Demirkesen & Bayhan (2020) presented a Lean Implementation Success Model specifically for the construction industry. The authors emphasized the role of lean principles in improving project performance and reducing risks. Their model provides a systematic approach to implementing lean principles in construction projects, which can help in identifying and managing potential risks early, reducing the likelihood of project delays, cost overruns, and quality issues. Su & Chou (2008) shared a systematic methodology for the creation of Six Sigma projects in a semiconductor foundry case study. The authors illustrated how Six Sigma methodologies can be effectively applied to minimize variability and improve process performance, ultimately reducing the associated project risks. The methodology presented by the authors includes the definition,

DOI: 10.21791/IJEMS.2024.002

measurement, analysis, improvement, and control (DMAIC) phases of Six Sigma, which provides a comprehensive approach to project risk management.

Use of Advanced Technologies. Studies on the field incorporated the use of advanced technologies to facilitate risk management. Franch et al. (2015) created the RISCOSS platform for managing risks in an open-source software adoption. Azhar et al. (2019) utilized the Hyperledger platform to construct an Enterprise Project Life Cycle [22], [32]. These advanced systems, however, are often developed to be situation or industry specific requiring set inputs to be reliable, making them hard to recommend and utilize on a more general level. The authors demonstrate through open source software how technology and digitalization can provide a secure, transparent, and efficient way to manage project information and processes across all stages of the project life cycle. These technologies offer enhanced capabilities in data analysis and process control, thereby providing project managers with better tools to identify, assess, and control project risks. These studies illustrate the ongoing shift in project management towards a more digital and data-driven approach, where advanced technologies play a significant role in risk management [32].

Risk Classification Models. Risk classification models were utilized in several studies to aid risk management. Risk classification is a crucial part of project risk management. It involves grouping potential project risks into categories based on specific criteria such as the source of the risk, the area of the project they affect, and their potential impact. This practice aids prioritizing risks and developing effective risk response strategies. The importance of risk classification is also promoted by both Eric Verzuh and the Project Management Institute. They suggest the use of simpler tools such as maintaining a risk catalogue or ranking risks just by their occurrence chance and potential impact. Even if advanced approaches are not available, risks must be identified, categorized and their potential impact must be defined [4], [14], [33].

Integrative and Cross-Functional Frameworks. Some studies adopted integrative and cross-functional frameworks for risk management, bridging the gap between different organizational functions and practices. Mossalam and Arafa's (2017) governance model integrates organizational project management with corporate practices. This approach encourages communication and collaboration among various departments or functions within an organization, leading to a better understanding of risks and more effective mitigation strategies. This model emphasizes the necessity for alignment between project management practices and overarching corporate strategies, especially in the domain of risk management. Cross-functional frameworks facilitate comprehensive risk management by promoting collaboration, alignment, and communication across different organizational functions and practices. This not only enhances the effectiveness of risk management activities but also supports the overall reaching of strategic objectives [34].

Project Quality Management Theory. Guo and Fan (2022) applied project quality management theory in their research, highlighting once again the important and ever-present connection between quality and risk management. Guo and Fan's model shows how the search for defects and continuous improvement opportunities can be utilized to manage risks in a specific sector. Their research asserts the implementation of rigorous quality management protocols and regulatory approaches to mitigate potential risks linked to safety in electric power construction projects. Project quality management, as implemented in the study, involves a series of processes, including quality planning, quality assurance,

DOI: 10.21791/IJEMS.2024.002

quality control and process standardization. These processes ensure that a project's output meets predefined standards and that processes are improved over time. The approach highlighted by the researchers helped reducing unexpected costs, enhancing safety, and ensuring the project's successful delivery [35].

As a summary of the synthetization of the reviewed publications, *Table 1* shows a brief systematic list of the analysed authors' studies and highlights the core approaches these papers presented.

Authors	Recommended Methodologies
Adi Prakoso B.; Kuswardono Budiardjo E. [28]	Agile Adoption Framework, Scrum Process
Al-Qubaisi S.S. [1]	Incidents investigation; learning approach; Continuous improvement strategy
Andreev V.V.; Malozemov S.N. [2]	Agile project management, improvement strategy algorithmic tools and techniques
Apostolopoulos C.; Halikias G.; Maroukian K.; Tsaramirsis G. [12]	Change Risk Assessment Model
Bierwolf R.; Frijns P.; Van Kemenade P. [36]	Stakeholder balancing method
Bolvin C.; Farret R.; Salvi O. [34]	Integrated Risk Management, regulated risk mitigation
Capaldo G.; Pierluigi R. [37]	ERP systems implementation strategies
Ceocea, RA; Rusu, C [38]	Implementation of change management approaches
Cevikbas M.; Okudan O.; Işık Z. [39]	Life cycle-based disruption claim management
Demirkesen, S; Bayhan, HG [30]	Lean approach
DePalmer D.; Schuldt S.; Delorit J. [40]	Prioritization using fuzzy model
Dobrovolskienė N.; Tamošiūnienė R. [41]	Sustainability measurement index
Escobar, M; Armando, G [20]	Continuous assessment and exploration of computer risks
Fotso, GB; Edoun, EI [8]	Implementation of ERP systems
Franch, X; Kenett, R; Mancinelli, F; et. Al. [22]	RISCOSS Platform
Galli B.J. [11]	Lean six sigma deployment and sustainment risks, statistical tools for project management
Guo H.; Fan S. [35]	Project quality management theory, Continuous improvement
Hosny, HE; Ibrahim, AH; Fraig, RF [21]	Continuous risk exploration and management framework
Khodeir, LM; Nabawy, EM [42]	HR framework
Manzoni A.; Prete A.; Searle G. [43]	Production optimization strategy
Martinsuo, M; Ahola, T [44]	Supplier integration, communication, transparency - complex delivery projects
Minten P.; Hayes R.; Boyes C. [45]	Lean manufacturing; Continuous improvement
Moballeghi E.; Pourrostam T.; Abbasianjahromi H.; Makvandi P. [46]	Information modelling system; Hybrid fuzzy multi-criteria decision-making tools
Mossalam A.; Arafa M. [47]	Governance model for integrating organizational pm
Mustapha M.; Adnan A. [48]	Enterprise risk management implementation
Napolitano, DMR; Sassi, RJ [49]	Fuzzy inference system model
Renault B.Y.; Agumba J.N.; Ansary N. [50]	Identification of core factors of influencing performance
Sawaryn S.; Dressler D.; Been K.; Bailey T. [51]	Common process application, regulations
Schimak G.; Duro R.; Kutschera P. [52]	Collaboration and decision-making tools
Schneider G.W.; DeHaven M.; Snell L.M. [53]	Continuous quality improvement project
Serpell, AF; Ferrada, X; Rubio, L [5]	Performance measurement and KPI setting
Shameem M.; Nadeem M.; Zamani A.T. [29]	Genetic algorithm based probabilistic model - agile
Shanmugapriya, S; Subramanian, K [54]	Structural equation model
Shinn, SA; Lunz, VA [55]	Sustained Change Framework
Su, CT; Chou, CJ [31]	Six Sigma projects
Taylan O. [27]	Fuzzy set and systems
Temple J.; Landaeta R.E. [56]	Knowledge Transfer
Teymouri, M; Ashoori, M [9]	Information technology improvement
Tripathi, KK; Hasan, A; Jha, KN [57]	Fuzzy preference relation technique
Vargas C.M.; Scott H. [58]	Continuous improvement strategy
Vena A.; Baldesi G. [59]	Knowledge management as mitigation of strategic risks
Qiang B; Zhang, YL [60]	Knowledge oriented process modelling
Zou P.X.W.; Wang S.; Fang D. [6]	Life-cycle risk management framework
Project Management Institute [4]	Risk mitigation matrix, risk catalogue, Monte-Carlo analysis, Decision tree

Table 1. List of analysed studies on the field of project risk management; own editing; sources: Scopus, Web of Science

Despite the evident benefits of implementing continuous project risk management, successful risk management is not without its challenges. Potential difficulties include lack of sufficient resources, lack of expertise, and resistance to change both from team members, stakeholders and customers of the project [9], [52]. Without proper management, the continuous appraisal of risks could potentially lead to decision paralysis or unnecessary caution [48], [61]. The methodologies applied in the examined studies are diverse and aim at providing innovative approaches, spanning across a range of industrial sectors. Understanding the need for project risk management and highlighting its potential impact to stakeholders often requires high level of expertise on the field. Even though managers often understand

DOI: 10.21791/IJEMS.2024.002

the need of mitigating risks, they face resource limitations and constraints which can significantly hinder project success. Project managers must try to highlight these risks to stakeholders and get their points across successfully. Project Management Professional (PMP) certification and similar credentials can play a key role in enhancing the effective application of risk management. Certified professionals possess a deep understanding of risk management processes and have proven their ability to apply this knowledge in real-world contexts [4]. Additionally, these credentials can enhance a professional's credibility and could potentially impact stakeholder trust and project outcomes [14].

The literature review highlighted the importance of continuous risk management and synthetized approaches to mitigating risks from a wide range of industries and researchers. Despite the challenges associated with implementation, the capability to continuously manage risks is critical for organizations in almost all industries.

2. Methodology

The aim of the primary data collection is to gather first-hand experiences and opinions from project managers on the topic of continuous risk management. The conducted survey incorporate questions on managerial attitude towards project risk management, difficulties and constraining factors managers are facing during project execution. The analysis aims to shed light on the potential correlations and values between project management certificates and trust from customers.

The data collection consists of a survey study [13], [16]. The data was collected over a two-month period from September to November 2021. The request to take part in the survey was shared with potential participants using a snowball methodology in online, controlled Facebook groups, specifically dedicated to experienced project managers to discuss their work related challenges and to ask for advice. A total of 181 managers responded to the survey during the data collection period. After the processing of the answers, 178 manager answered were determined to be fitting for further analysis. The SPSS software was utilized for data analysis. Descriptive statistics provides a summary of the overall tendency, dispersion, and distribution of the survey responses. Correlation and regression analyses were conducted to identify and measure the relationships and effects among variables, respectively.

The methodological limitations must be highlighted. The snowball sampling method, while effective in reaching a specific target group, might introduce a selection bias. The respondents were solely selected from specific project management community groups, potentially limiting the diversity of the sample and influencing the generalizability of the findings. Moreover, the representativeness of the sample cannot be fully established, as the exact composition of project managers worldwide at the time of conducting the survey was unknown. These methodological limitations are considered when interpreting the findings of the study [13].

3. Results

From the contributing managers 74% are male, 19% female and 7% preferred not give an answer. 33% of them live in a capital city, 36% in towns, 23% in another smaller type settlements. Due to the use of international Facebook groups, the geographical location of the answering managers are greatly diverse.

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Roughly, 32% of the answering project managers are located in North America. 23% answered the questionnaire from Asia, mostly India and China, 22% from various countries of Europe. 12% answered from the Middle east, dominantly from the United Arab Emirates. The remaining 11% answered from diverse origins, Africa, Latin America and other regions. 35% completed a MSc degree, 44% completed a BSc degree and 27% answered that they are performing project management with only middle school education. The average age of the managers responding to the survey is 40.42. Their average years of experience in project management is 7.7. The mode of years of experience is 7. The asked managers on average, lead 274 days long projects with an average budget of 9.7 million $. The median of the available project budget led by the asked managers is 4.8 million $. The answerers represent a wide range of fields, performing projects around the globe. The most commonly mentioned fields are showcased by Table 2.

Project field					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid					
	Construction	52	**29,2 %**	29,2 %	29,2
	Electrical engineering	9	**5,0 %**	5,0 %	34,2
	Engineering, manufacturing	45	**25,3 %**	25,3 %	62,5
	Informatics, software	69	**38,8 %**	38,8 %	98,3
	Other	3	**1,7 %**	1,7 %	100,0
	Total	178	100,0 %	100,0	

Table 2. Project field distribution; Own editing - SPSS database

The asked managers highly value the importance of project risk management and the availability of historical information from previous projects. Overall, 80.9% of the managers stated that during their careers their project was delayed at least once due to the lack of honest risk management and the appearance of an unforeseen event. A further 64% stated that their project even failed due to the same root cause.

Large project management institutes such as PMI, claims that achieving project management certificates are particularly important. Specific pm certificates are promised come with immediately higher responsibility and salary. Passing the certification exams requires high level of knowledge of the philosophy of project management and predetermined years of work experience. 43.8% of the answering project managers claimed to have a project management certificate. Also, a visible increase can be highlighted in the average duration of projects and budget which are led by certified managers. Managers with certificates also tend to put more emphasis on the importance of risk management. 92.7% of the asked managers claimed that project risk management is crucial throughout the whole project to ensure project success.

	Certification	
Average	Yes	No
Budget	11 549 767 $	8 001 978 $
Project length	312 days	238 days
Project management experience	5,15 / 6 Likert scale	4,22 / 6 Likert scale

Table 3. Average project attributes in connection with the ownership of PM Certification; Source: Own editing - SPSS database

The managers were asked what are the effects, the lack of risk mitigation during their projects might entail. 74.7% answered that an unsuspected event occurred, 61.2% replied that the overall quality of the project had to be lowered. 86.5% of the answers state that the project duration, 61.2% state that the project costs increased significantly. The asked managers are commonly fighting with risks by reserving

DOI: 10.21791/IJEMS.2024.002

backup resources, searching for alternative solutions, escalating the suspected risk to a higher organizational level, and in extreme cases by not proceeding with a given part of the project. The managers claimed that completely honest risk management and transparency regarding the possible pessimistic outcomes of a project would scare away 68% of the customers based on their experience.

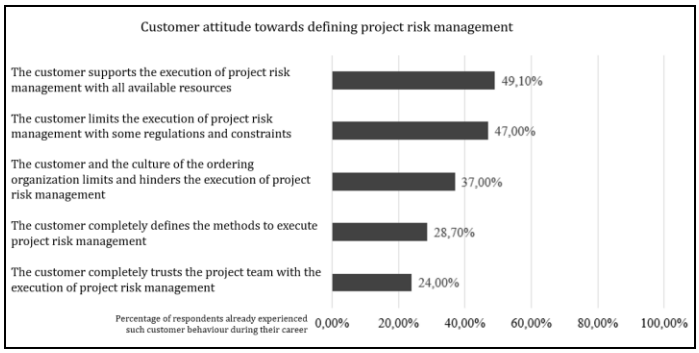

Figure 1. Customer attitude towards project risk management; Own editing

Limitations posed by customer organizations seem to be a crucial factor when identifying difficulties of implementing successful continuous project risk management. Figure 1 shows the attitude of customers towards risk management. The results show that in 49.1% of the projects the managers have worked in, the customer overall supported the execution of risk management and the discovery of risks with the available resources. However, 37% managers have also led projects in their career where they had to face a limiting organizational culture or regulations, in which case the success of risk management execution was hindered due to these processes. Figure 2 shows that the expectations of project managers towards maintaining risk management during the planning and execution phase of their projects stay high and significant, while the support from the customers seems to be mostly apparent only in the planning phase of the project. Based on the answers, customers do not value highly the importance of continued risk management during the execution phase of the projects.

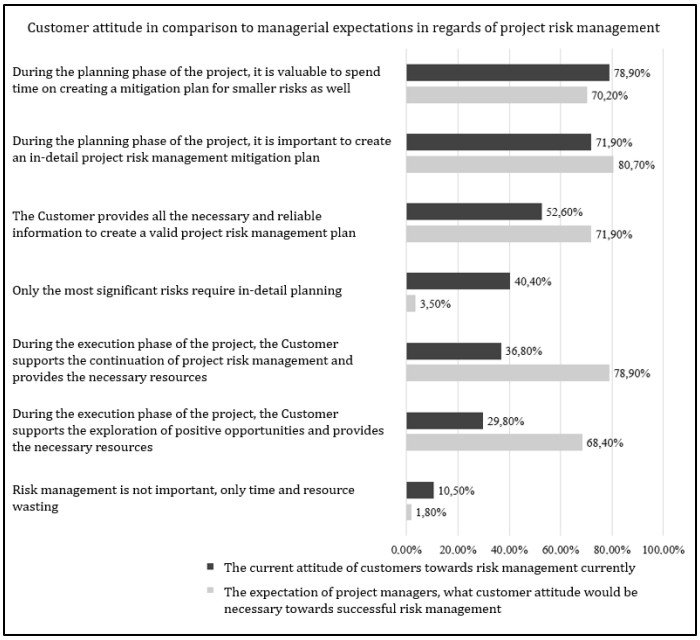

Figure 2. Customer attitude in comparison to managerial expectations in regards of project risk management; Own editing

DOI: 10.21791/IJEMS.2024.002

ANOVA analysis, correlation analysis and regression model analysis were performed in order to determine the possible connection of maintaining project management certification and the estimated potential trust towards project managers holding given certifications. Certified organizations advertise their certificates as greatly difficult to obtain. Achieved certificates should immediately provide a boost in the career of managers in terms of trust, responsibility and salary. Maintaining the certificates also requires a certain year of prior experience and paying a yearly fee to the certified organization.

- H0 = There is no connection between owning a pm certificate and the project budget / project length
- H1 = There is connection between the inspected attributes

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Project length - days	Between Groups	$2,87*10^5$	1	$2,87*10^5$	16,660	,000
	Within Groups	$3,04*10^6$	176	$1,73*10^4$		
	Total	$3,32*10^6$	177			
Average project budget $	Between Groups	$6,37*10^{14}$	1	$6,37*10^{14}$	6,118	,014
	Within Groups	$1,80*10^{16}$	173	$1,04*10^{14}$		
	Total	$1,87*10^{16}$	174			

Table 4. ANOVA Analysis: PM certification in relationship with Average project budget / length; Own editing

The significance level is smaller than $\alpha = 0.05$, therefore the null hypothesis can be rejected. There is a connection between certified managers and the length and budget of the projects they are managing. The second hypothesis searches for connection between years of experience in project management and the average project budget / length of the project the manager is entrusted with.

- H0 = No connection between the budget / project length and years of experience
- H1 = There is connection between the inspected attributes

Correlations				
		Years of experience	Average project budget $	Project length - days
Years of experience	Pearson Correlation	1	,354**	,373**
	Sig. (2-tailed)		,000	,000
	N	175	172	175
Average project budget $	Pearson Correlation	,354**	1	,461**
	Sig. (2-tailed)	,000		,000
	N	172	175	175
Project length - days	Pearson Correlation	,373**	,461**	1
	Sig. (2-tailed)	,000	,000	
	N	175	175	178
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 5. Correlation Analysis: Years of experience in connection with Average project budget / length; Own editing

On a $\alpha = 0.05$ significance level, the hypothesis is rejected for both project budget and project length. The years of experience has a $R = 0.354$ strength with the available project budget and an $R = 0.373$ strength with managed project length. Also, the available project budget correlates with the average project length on an $R = 0.461$ level, showcasing a medium strong relationship.

It has also been evaluated if managers with higher budget projects tend to lean towards higher percentage of risk reserves. The following correlation analyses the connection between project budget and the shared principle behind the optimal amount of risk reserve in percentage.

- H0 = No connection between budget and risk reserve
- H1 = There is connection between the inspected attributes

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With a significance of 0.081 on α = 0.05 level the hypothesis is accepted. Therefore, based on the reviewed sample there is no visible connection between the project budget and the need for a higher percentage of risk reserve.

Backward linear regression modelling was used by SPSS to find the most accurate model which determines the project budget in connection with other attributes. The model concludes an overall correlation strength of 0.6 between the entered attributes and the project budget. R2 = 0.372 highlights an overall 37.2% accuracy for the regression model.

Coefficients						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
7	(Constant)	$-1{,}03*10^7$	$6{,}32*10^6$		1,634	,104
	PM Certificate (Yes)	$3{,}31*10^6$	$1{,}81*10^6$	,157	1,829	,069
	Gender (Male)	$7{,}55*10^6$	$2{,}03*10^6$	,286	3,716	,000
	StudiesDATA (MSc)	$2{,}6*10^6$	$1{,}36*10^6$	,170	1,932	,055
	Experience in Project Risk management	$2{,}81*10^6$	$7{,}11*10^5$	,309	3,959	,000
	Age	$2{,}70*10^5$	$8{,}85*10^4$	,237	3,053	,003
	Project length - days	$2{,}74*10^4$	$5{,}30*10^3$	,356	5,177	,000
a. Dependent Variable: Average project budget $						

Table 7. Backward Linear Regression Model – Final model

The model displays that PM certificates, and having a master's degree highly increase the likelihood that the individual leads higher budget projects. Overall project management experience, age and the project length further increase the model's value. Project length and experience in project management attributes determine the final regression model with the biggest correlation with a standardized coefficient value of 0.356 and 0.309.

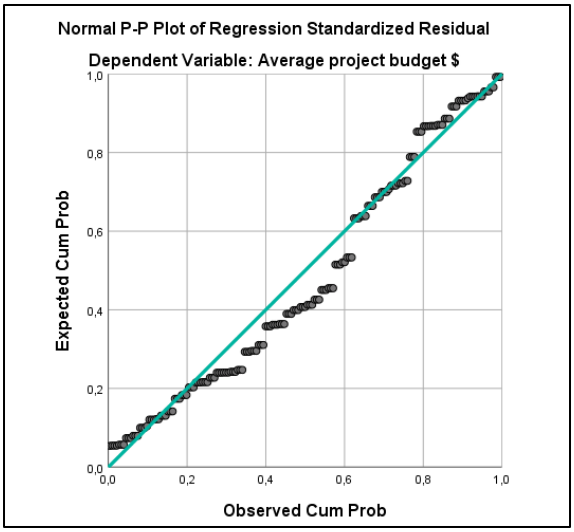

Figure 3. Backward Linear Regression Model; Own editing

The answers of the managers overall highlight that continuous risk management is critically important during the execution phase of their projects. Most of them already faced difficulties in their projects due to constraining factors set by the customers, the environment or by the availability of resources. The managers further highlighted that the project teams' expectations towards risk management often differs compared to the customers of the projects. The managers need to push and communicate the importance of continuous risk management as due to their studies and experiences they have the best understanding on its criticality.

DOI: 10.21791/IJEMS.2024.002

4. Discussion

The findings of this study aimed to offer insights into the important aspects of continuous risk management during project execution and the challenges faced by project managers in its implementation. The systematic literature review provided a comprehensive understanding of the various methodologies and approaches employed by project managers worldwide for continuous risk management. Furthermore, the empirical primary data collection aimed to gather first-hand information on the experiences of project managers regarding risk management, the perceived values of project management certifications, and the role of customer attitudes in the implementation of risk management strategies.

The literature review displays a common agreement on the criticality of continuous risk management in project execution across various sectors. These methods range from Agile project management methodologies and Scrum processes, to integrated risk management, lean approaches, and various statistical tools. Despite the diversity of the examined papers, all studies emphasized the importance of continuous risk assessment and mitigation throughout the project lifecycle. Implementing such strategies helps in the reduction of unexpected costs, enhancing safety, ensuring successful project delivery and, ultimately, managing potential risks that could be costly in terms of resources and time. Despite its visible criticality, the practical implementation of continuous risk management is often challenged by obstacles and limitations, as indicated by both the literature review and the managers asked during the primary data collection. Constraints such as lack of resources, lack of expertise, resistance to change, and inadequate customer support are prevalent, further confirming the assertions of Schimak, Duro, & Kutschera (2016) and Teymouri & Ashoori (2011). Consequently, project managers need to tackle these challenges by leveraging their expertise, adopting suitable risk management methodologies, and seeking stakeholder buy-in by transparently communicating their knowledge and the criticality of risk mitigation. Importantly, the data showed a significant difference between project teams and customers' attitudes towards continuous risk management.

The quantitative analysis indicated a positive relationship between the project budget, project length, and the manager's years of experience in project management, and project management certificates. This implies that experienced, certified project managers are often entrusted with larger and longer projects. Additionally, the data demonstrated the importance of project management certifications, which are held by 43.8% of the survey respondents. Certified managers not only had larger budgets and longer project durations but also placed a higher emphasis on the importance of risk management. This underscores the value of formal credentials, such as Project Management Professional (PMP) certification, in enhancing project outcomes and stakeholder trust.

5. Conclusion

Continuous risk management can help mitigate unforeseen costs, and ensure successful project delivery. Moreover, the research findings point out that project managers, despite understanding the value of risk mitigation, often face constraints like lack of resources, and inadequate support from customers.

DOI: 10.21791/IJEMS.2024.002

One of the main contributions of this research is the empirical evidence on the value of project management certifications. The data indicated that certified project managers tend to manage larger budget projects and place a higher emphasis on risk management. This underscores the importance of professional credentials in enhancing project outcomes and stakeholder trust. This is important as the findings shows that the customers of the projects are often sceptical or limit the resources available for risk mitigation. More trusted managers with globally esteemed certificates might be able to communicate better the need for continuous risk control and be able to negotiate better, more optimal terms for the project ensuring overall greater project success rates.

This study aims to provide valuable insights to project risk management and presents important implications for both project managers and academics. The research findings underline the importance of continuous risk management, the value of project management certifications, and the need to navigate various constraints effectively. As project environments continue to evolve, the insights offered by this research once again underline the importance of continuous risk management in projects.

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