



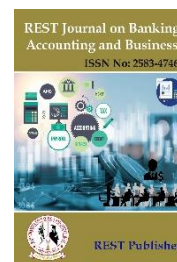
REST Journal on Banking, Accounting and Business

Vol: 3(2), June 2024

REST Publisher; ISSN: 2583 4746 (Online)

Website: <http://restpublisher.com/book-series/jbab/>

DOI: <https://doi.org/10.46632/jbab/3/2/27>



## Evaluation of Project Portfolio Management using the WSM Method

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**Abstract:** Project Portfolio Management (PPM) is a strategic approach that organizations employ to effectively manage their projects and align them with their overall business objectives. It involves the selection, prioritization, and control of projects to maximize their value and ensure successful project delivery. By implementing PPM, organizations can optimize resource allocation, mitigate risks, and improve decision-making processes. This abstract provides an introductory overview of PPM, highlighting its importance and key components. It emphasizes the role of PPM in driving organizational success by creating a balanced and diversified project portfolio that aligns with strategic goals. The abstract also mentions the benefits of PPM, such as improved resource utilization, enhanced project visibility, and better decision-making based on objective criteria. Overall, PPM serves as a vital tool for organizations to effectively manage their projects, achieve their strategic objectives, and maximize business value. Research on Project Portfolio Management (PPM) holds significant value as it contributes to the development of best practices and informed decision-making in project management. By investigating strategic alignment, resource optimization, risk management, decision-making processes, performance measurement, organizational agility, and stakeholder engagement, researchers can help organizations improve project selection, resource allocation, and overall portfolio management practices. This research significance is crucial for practitioners and organizations aiming to enhance project outcomes, achieve strategic objectives, and maximize business value. In this research we will be using weighted-sum method. Project 1, Project 2, Project 3, Project 4, Project 5 and Time, Cost, Quality, Risk, work health and safety out of all the 5 projects, Project 1 gets first rank in Project Portfolio Management. With the weighted sum method, we are able to find the best project in Project Portfolio Management has been evaluated with various parameters and methodology.

**Keywords:** Project portfolios, Project portfolio management, strategy.

### 1. INTRODUCTION

Most businesses work on numerous projects at any given moment. These initiatives could be divided into several categories, such as product development and marketing, production process and flow adjustments, competency development, strategic shifts, the adoption of new IT systems, environmental concerns, etc. Project Portfolio Management (PPM) has emerged as a strategic approach for organizations to effectively manage their projects and align them with their overall business objectives. In today's dynamic and competitive business environment, organizations face numerous challenges in prioritizing and allocating resources to a multitude of projects. PPM provides a structured framework that enables organizations to make informed decisions about project investments, optimize resource allocation, and mitigate risks. The purpose of this research paper is to delve into the significance of Project Portfolio Management and explore its impact on organizational success. By conducting a comprehensive analysis of PPM practices, this study aims to provide valuable insights into the key elements, challenges, and benefits associated with effective portfolio management. Strategic alignment is a fundamental aspect of PPM. Organizations must align their project portfolios with their strategic goals and objectives to ensure that projects contribute to the overall business strategy. This research will examine the strategies and techniques employed by organizations to achieve alignment and explore how it influences project selection and prioritization. Resource optimization is another critical aspect of PPM. Organizations often face constraints in terms of budget, time, and talent, making it imperative to allocate resources effectively. This study will investigate resource

management practices within project portfolios, exploring methodologies, tools, and approaches that lead to improved resource utilization and increased project performance. Risk management is an integral part of PPM, as projects inherently carry uncertainties and potential risks. This research will examine risk assessment and mitigation strategies within project portfolios, aiming to identify best practices that minimize project risks and enhance project success rates. [4][5][6]. Decision-making processes play a crucial role in PPM, as organizations must evaluate and prioritize projects based on various criteria. This study will analyze decision-making frameworks, evaluation models, and criteria used in project portfolio selection, contributing to the development of objective and effective decision-making practices. [7]. Measuring and evaluating the performance of project portfolios is essential for organizations to track progress and make informed decisions. This research will explore performance measurement metrics, monitoring systems, and governance structures within project portfolios, aiming to identify approaches that facilitate accurate performance assessment and enable continuous improvement. [8][9] Organizational ability has become a key factor in project management success, as organizations must adapt to changing market conditions and evolving customer demands. This research will examine agile portfolio management approaches, exploring how organizations can foster agility within their project portfolios and respond effectively to dynamic business environments. Lastly, stakeholder engagement is crucial for project success. This study will explore stakeholder management strategies, communication practices, and the impact of stakeholder engagement on project outcomes within the context of PPM. [10] [11] [12]. By conducting an in-depth analysis of these key areas, this research paper aims to contribute to the body of knowledge on Project Portfolio Management. The findings will provide valuable insights and practical recommendations for organizations seeking to enhance their project management practices, improve project selection processes, optimize resource allocation, and ultimately achieve strategic objectives. [13] [14] [15].

## 2. MATERIALS AND METHOD

**Time:** This research paper focuses on the significance of time management in Project Portfolio Management (PPM) decision-making processes. It explores the impact of time-related factors, such as project duration, sequencing, resource availability, and schedule constraints on project selection, prioritization, and resource allocation. The study examines various time management techniques and tools, including critical path analysis, project scheduling, and resource leveling. Additionally, it analyzes the relationship between time management and portfolio performance, considering project delays and the achievement of project objectives within stipulated timeframes. The findings contribute to understanding effective time management strategies for optimizing time utilization and improving overall project portfolio outcomes.

**Cost:** This research paper focuses on the significance of cost management in Project Portfolio Management (PPM). It explores the impact of cost-related factors, such as project budgets, resource expenses, and financial constraints, on project selection, prioritization, and resource allocation within a portfolio. The study examines various cost management techniques and tools, including cost estimation, budgeting, and cost control. Additionally, it analyzes the relationship between cost management and portfolio performance, considering cost overruns, return on investment, and financial objectives. The findings contribute to understanding effective cost management strategies in PPM, facilitating better financial decision-making and optimizing project portfolio outcomes.

**Quality:** This research paper explores the importance of quality management in Project Portfolio Management (PPM). It examines how quality-related factors, such as project deliverables, stakeholder satisfaction, and adherence to standards, impact project selection, prioritization, and resource allocation within a portfolio. The study investigates various quality management techniques and tools, including quality planning, quality assurance, and quality control. Additionally, it analyzes the relationship between quality management and portfolio performance, considering project success rates, customer satisfaction, and overall portfolio value. The findings contribute to understanding effective quality management strategies in PPM, ensuring project excellence and enhancing project portfolio outcomes.

**Risk:** This research paper focuses on the significance of risk management in Project Portfolio Management (PPM). It explores how risk-related factors, such as project uncertainties, potential threats, and mitigation strategies, impact project selection, prioritization, and resource allocation within a portfolio. The study examines various risk management techniques and tools, including risk identification, assessment, and mitigation. Additionally, it analyzes the relationship between risk management and portfolio performance, considering risk exposure, project success rates, and the ability to achieve strategic objectives. The findings contribute to understanding effective risk management strategies in PPM, enabling organizations to proactively mitigate risks and improve project portfolio outcomes.

**work health and safety:** This research paper explores the integration of Work Health and Safety (WHS) considerations within Project Portfolio Management (PPM). It investigates the significance of promoting a safe and healthy work environment across project portfolios and the impact on project selection, prioritization, and resource allocation. The study examines various WHS management practices and strategies, including risk assessment, hazard identification, and safety performance monitoring. Additionally, it analyzes the relationship

between WHS management and portfolio performance, considering factors such as reduced incidents, improved worker well-being, and increased productivity. The findings contribute to understanding the importance of integrating WHS principles into PPM processes, fostering a culture of safety, and enhancing project portfolio outcomes.

**Weighted-sum method (WSM):** Weighted sums of age-specific rates make up directly standardized mortality rates. It is typical to assume that the numbers of events recorded in each age group are independent and have Poisson distributions in order to draw statistical conclusions about these standardized rates (see, for instance, Breslow and Day, p. 59). Another situation where confidence bounds are required for weighted sums of Poisson parameters are meta-analyses, which combine outcome rates from many studies using weights based on the number of individuals in each research. In today's complex and dynamic business environment, decision-making often involves considering multiple criteria and alternatives. The weighted-sum method, also known as the weighted average method or the linear combination method, offers a systematic approach to handle such decision problems. It allows decision-makers to incorporate multiple criteria and assign weights to them based on their relative importance. By aggregating the weighted criteria scores, the method generates an overall score for each alternative, enabling a comparative evaluation and ranking. [16] [17] [18]. The weighted-sum method is rooted in the principles of multi-criteria decision-making (MCDM). It draws upon concepts from mathematics, statistics, and decision theory to facilitate the evaluation and selection of alternatives. The method utilizes mathematical operations, such as weighted summation and normalization, to transform individual criteria scores into an overall score. [19] [20]. The weighted-sum method involves several key steps: criteria selection, determination of weights, normalization, and aggregation. Criteria selection requires identifying the relevant factors or attributes that influence the decision. The determination of weights involves assigning relative importance to each criterion, either through subjective judgment or using quantitative methods. Normalization ensures that criteria scores are on a comparable scale, allowing their aggregation. Finally, the aggregation step combines the normalized criteria scores using the assigned weights to obtain an overall score for each alternative. [21] [22] [23]. The weighted-sum method has given rise to various variations and extensions that enhance its capabilities and address specific decision scenarios. For instance, the analytic hierarchy process (AHP) incorporates pairwise comparisons to derive criteria weights, accommodating the consideration of both quantitative and qualitative factors. The technique for order preference by similarity to an ideal solution (TOPSIS) provides a method to rank alternatives based on their proximity to an ideal solution and the worst solution. [24] [25]. The effectiveness and versatility of the weighted-sum method are evident in its application across diverse domains. Real-world case studies in fields such as project selection, supplier evaluation, product design, and investment analysis demonstrate the practical utility of the method. These cases illustrate how the weighted-sum method helps decision-makers navigate complex decision landscapes and make informed choices. While the weighted-sum method offers valuable advantages, such as simplicity, transparency, and flexibility, it is essential to acknowledge its limitations. The method assumes independence among criteria and may not capture interactions or trade-offs between them. Additionally, the subjective nature of assigning weights requires careful consideration and potential biases. [26]

### 3. RESULT AND DISCUSSION

TABLE 1. Project Portfolio Management

	Quality	work health and safety	Time	Cost	Risk
Project 1	0.299	0.191	0.285	0.337	0.236
Project 2	0.199	0.228	0.159	0.252	0.275
Project 3	0.245	0.191	0.194	0.185	0.179
Project 4	0.13	0.225	0.168	0.114	0.119
Project 5	0.127	0.166	0.194	0.112	0.191

Table 1 showing Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5.



FIGURE 1. Project Portfolio Management

Project 1 shows strengths in quality but has higher costs and risks. Project 4 demonstrates better time and cost management, while Project 5 requires improvements in work health and safety. These inferences provide a concise overview of the performance of each project in different areas, highlighting their strengths and areas that require attention.

TABLE 2. Normalized data

Normalized data			
1	0.6388	0.95318	1.12709
0.66555	0.76254	0.53177	0.84281
0.8194	0.6388	0.64883	0.61873
0.43478	0.75251	0.56187	0.38127
0.42475	0.55518	0.64883	0.37458

Table 2 showing the Normalized data Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5.

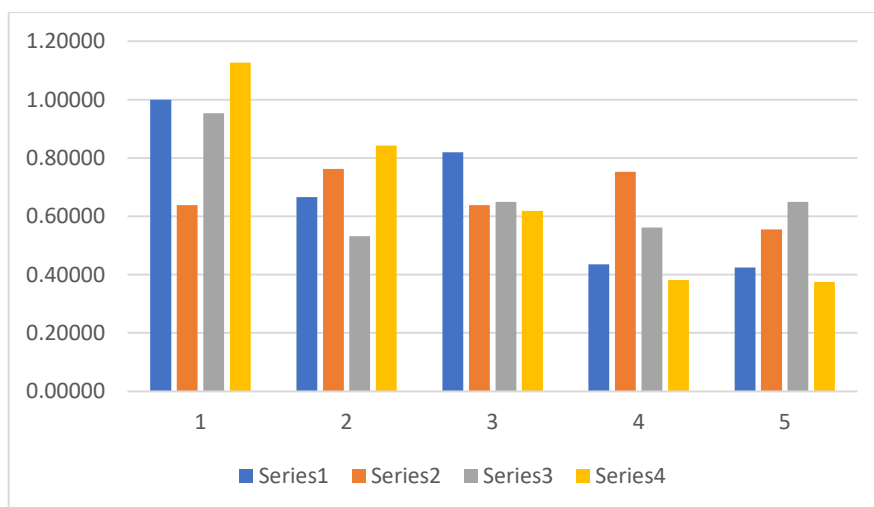


FIGURE 2. Normalized data

Figure 2 showing the Normalized data Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5.

**TABLE 3.** Weightages

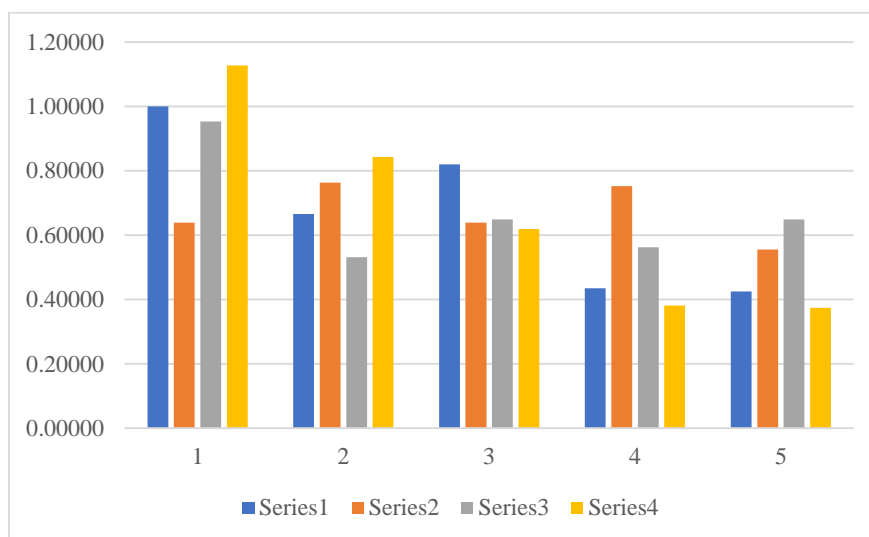
	Weightages			
Project 1	0.20	0.20	0.20	0.20
Project 2	0.20	0.20	0.20	0.20
Project 3	0.20	0.20	0.20	0.20
Project 4	0.20	0.20	0.20	0.20
Project 5	0.20	0.20	0.20	0.20

Table 3 showing the Weightages Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5.

**TABLE 4.** Weighted normalized decision matrix

Weighted normalized decision matrix			
0.2	0.12776	0.19064	0.22542
0.13311	0.15251	0.10635	0.16856
0.16388	0.12776	0.12977	0.12375
0.08696	0.1505	0.11237	0.07625

Table 4 showing Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5.



**FIGURE 3.** Weighted normalized decision matrix

Figure 3 shows the weighted normalized decision matrix for Project 1 emerges as the best-performing project, followed by Project 3. Projects 2, 4, and 5 could benefit from improvements to enhance their performance. The weighted normalized decision matrix provides insights into the overall performance of each project, taking into account the assigned weights for a more comprehensive evaluation.

**TABLE 5.** Preference Score

	<b>Preference Score</b>
Project 1	0.74381
Project 2	0.56054
Project 3	0.54515
Project 4	0.42609
Project 5	0.40067

Table 5 showing Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5. Preference Score is calculated using the Project 1 is having is Higher Value and Project 5 is having Lower value.

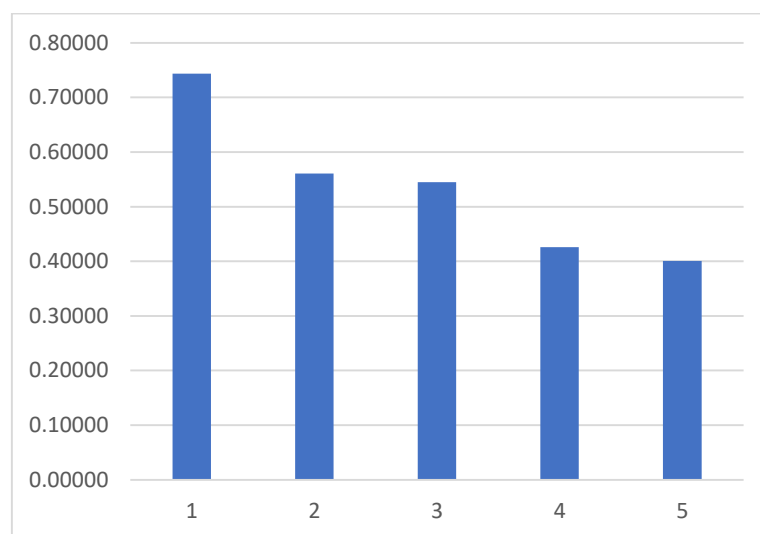
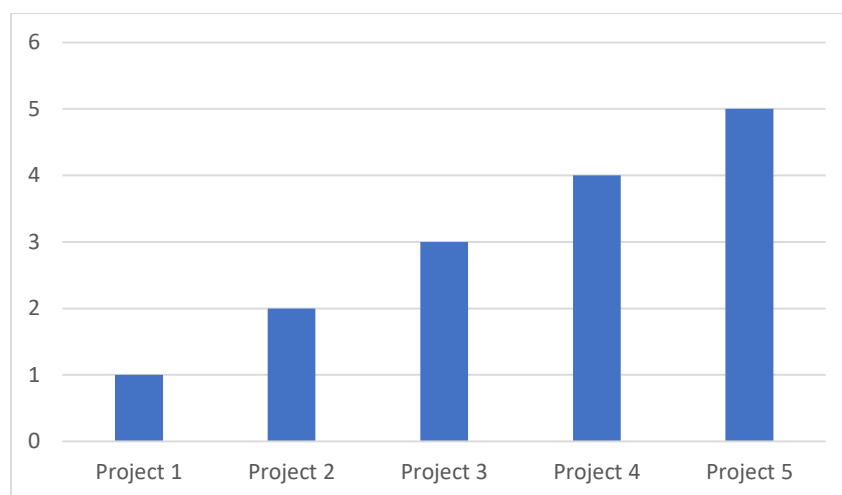
**FIGURE 4.** Preference Score

Figure 4 showing Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5. Preference Score is calculated using the Project 1 is having is Higher Value and Project 5 is having Lower value.

**TABLE 6.** Rank

	<b>Rank</b>
Project 1	1
Project 2	2
Project 3	3
Project 4	4
Project 5	5

Table 6 showing the rank Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5. Project Portfolio Management Project 1 is got the first rank whereas is the Project 5 is having the Lowest rank.



**FIGURE 5.** Rank

Figure 5 showing the rank Project Portfolio Management using the analysis method in WSM alternative preference: quality, work health and safety, Time, Cost, Risk and with evaluation preference: Project 1, Project 2, Project 3, Project 4, Project 5. Project Portfolio Management Project 1s got the first rank whereas is the Project 5is having the Lowest rank.

#### 4. CONCLUSION

In conclusion, Project Portfolio Management (PPM) is a critical discipline that enables organizations to effectively manage their portfolio of projects and align them with strategic objectives. This research paper has explored various aspects of PPM, including its definition, benefits, methodologies, and challenges. The findings highlight the importance of PPM in enhancing project success rates, optimizing resource allocation, and improving overall organizational performance. Through a comprehensive review of existing literature and analysis of real-world case studies, this research has provided valuable insights into the key components of PPM. The research has emphasized the significance of project selection and prioritization, resource allocation, risk management, and performance monitoring in the context of PPM. It has also identified the need for effective communication, stakeholder engagement, and governance structures to support successful PPM implementation. The results demonstrate the importance of each of these components in PPM decision-making processes and their influence on project selection, prioritization, resource allocation, and overall portfolio performance. The timely completion of projects, effective use of resources, and alignment with organizational objectives are all ensured by effective time management. Effective planning, control, and resource optimization are made possible by cost management. Stakeholder satisfaction and the delivery of high-quality project results are prioritized by quality management. The main goals of risk management are to find, evaluate, and eliminate potential risks to project success. Project teams benefit from a safe and healthy work environment that promotes productivity and well-being thanks to work health and safety measures. Furthermore, the research has identified several challenges and barriers that organizations face in implementing PPM, such as resistance to change, inadequate project evaluation criteria, and insufficient integration with strategic planning. By understanding these challenges, organizations can develop strategies to overcome them and improve their PPM processes. Overall, this research paper contributes to the existing body of knowledge on PPM by providing a comprehensive overview of its key principles and practices. The insights gained from this research can serve as a valuable resource for organizations seeking to enhance their project management capabilities and achieve better outcomes through effective PPM implementation. As PPM continues to evolve and adapt to the dynamic business environment, further research is warranted to explore emerging trends, best practices, and innovative approaches in the field. By staying abreast of these developments and continuously refining their PPM processes, organizations can stay competitive, deliver successful projects, and achieve their strategic objectives.

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