VILNIAUS UNIVERSITETO
VERSLO MOKYKLA

VILNIUS UNIVERSITY BUSINESS SCHOOL

Ignas PETRAITIS

PROJEKTŲ VALDYMO PAGRINDINIAI VEIKLOS RODIKLIAI IR JŲ NUSTATYMAS ORGANIZACIJOSE

PROJECT MANAGEMENT KEY PERFORMANCE INDICATORS AND THEIR DETERMINATION IN ORGANIZATIONS

Supervisor: Prof. Skirmantas Gricius

Vilnius, 2025

SUMMARY

VILNIUS UNIVERSITY BUSINESS SCHOOL

INTERNATIONAL PROJECT MANAGEMENT STUDY PROGRAMME

IGNAS PETRAITIS

PROJECT MANAGEMENT KEY PERFORMANCE INDICATORS AND THEIR DETERMINATION IN ORGANIZATIONS

Supervisor – Prof. Skirmantas Gricius

Master's thesis was prepared in Vilnius, in 2025

Scope of Master's thesis – 75 pages.

Number of tables used in the FMT - 18 pcs.

Number of bibliography and references – 52 pcs.

The FMT described in brief:

This Final Master's Thesis (FMT) explores the role of Key Performance Indicators (KPIs) in project management, focusing on their implementation, effectiveness, and challenges across organizations with different maturity levels. Using quantitative research methods the study evaluates how organizational maturity impacts the ability to align KPIs with strategic objectives and optimize project outcomes. Findings highlight significant differences in KPI practices between low, medium, and high-maturity organizations, emphasizing the need for structured processes, continuous improvement, and a data-driven culture. The research provides practical recommendations for enhancing KPI usage to achieve better decision-making and project performance.

Problem, objective and tasks of the FMT:

The primary problem addressed by this research is the inconsistent implementation and utilization of Key Performance Indicators (KPIs) across organizations with varying maturity levels. The objective is to investigate how organizational maturity influences the effectiveness of KPIs in enhancing project outcomes and decision-making. Tasks include:

- Identifying KPIs used in organizations at different maturity levels.
- Evaluating the impact of KPIs on project performance and decision-making.
- Exploring the role of maturity in KPI implementation.
- Comparing KPI practices across low, medium, and high maturity organizations.

Research methods used in the FMT:

The study employs a quantitative research approach, using structured questionnaires based on a Likert scale to assess perceptions of KPI implementation and effectiveness. Statistical tools such as SPSS are used for data analysis, including reliability tests, ANOVA for group comparisons, correlation, and regression analysis.

Research and results obtained:

- High-maturity organizations demonstrated superior KPI implementation practices, leveraging predictive metrics and strategic frameworks for project success.
- Medium-maturity organizations showed moderate alignment of KPIs with strategic objectives and started integrating them into risk management processes.
- Low-maturity organizations faced challenges such as inconsistent KPI use, lack of alignment with strategic goals, and limited tools for real-time data monitoring.
- The study confirmed a strong positive correlation between organizational maturity and the effectiveness of KPI implementation.
- Key methodologies, including Agile and Lean project management, were found to enhance the role of KPIs in optimizing project performance.

Conclusions of the FMT:

- Organizational maturity significantly influences the effective use of KPIs.
- High-maturity organizations align KPIs with strategic objectives, enabling better decision-making and resource optimization.
- Low-maturity organizations must focus on standardizing processes and improving alignment to realize the benefits of KPI-driven project management.
- Continuous improvement and fostering a data-driven culture are essential for effective KPI integration and enhanced project outcomes.

SANTRAUKA

VILNIAUS UNIVERSITETO VERSLO MOKYKLA

TARPTAUTINIO PROJEKTŲ VALDYMO STUDIJŲ PROGRAMA

IGNAS PETRAITIS

PROJEKTŲ VALDYMO PAGRINDINIAI VEIKLOS RODIKLIAI IR JŲ NUSTATYMAS ORGANIZACIJOSE

Darbo vadovas – prof. Skirmantas Gricius

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Baigiamojo Magistro darbo trumpas aprašymas: Šiame baigiamajame magistro darbe (FMT) nagrinėjamas pagrindinių veiklos rodiklių (KPI) vaidmuo projektų valdyme, daugiausia dėmesio skiriant jų įgyvendinimui, veiksmingumui ir iššūkiams skirtingose organizacjos brandos srityse. Taikant kiekybinius tyrimo metodus, tyrime vertinama, kaip organizacijos branda įtakoja gebėjimą suderinti KPI su strateginiais tikslais ir optimizuoti projekto rezultatus. Išvados išryškina reikšmingus KPI praktikos skirtumus tarp žemos, vidutinės ir aukštos brandos organizacijų, pabrėžiant struktūrizuotų procesų, nuolatinio tobulėjimo ir duomenimis pagrįstos kultūros poreikį. Tyrime pateikiamos praktinės rekomendacijos, kaip pagerinti KPI naudojimą, siekiant geresnio sprendimų priėmimo ir projekto našumo.

Baigiamojo Magistro darbo problema, tikslas ir uždaviniai:

Pagrindinė šio tyrimo problema yra nenuoseklus pagrindinių veiklos rodiklių (KPI) įgyvendinimas ir naudojimas skirtingo brandumo organizacijose. Tikslas yra ištirti, kaip organizacijos branda įtakoja KPI veiksmingumą gerinant projektų rezultatus ir priimant sprendimus. Užduotys apima:

- Skirtingų brandos lygių organizacijose naudojamų KPI identifikavimas.
- KPI įtakos projekto rezultatams ir sprendimų priėmimui įvertinimas.
- Brandos vaidmens KPI diegime tyrimas.
- Žemos, vidutinės ir aukštos brandos organizacijų KPI praktikos palyginimas.

Baigiamajame Magistro darbe naudojami tyrimo metodai:

Tyrime taikomas kiekybinis tyrimo metodas, naudojant struktūrizuotus klausimynus, pagrįstus Likerto skale, siekiant įvertinti KPI įgyvendinimo ir efektyvumo suvokimą.

Statistiniai įrankiai, tokie kaip SPSS, naudojami duomenų analizei, įskaitant patikimumo testus, ANOVA grupių palyginimui, koreliacijos ir regresijos analizę.

Tyrimai ir gauti rezultatai:

- Aukštos brandos organizacijos demonstravo puikią KPI įgyvendinimo praktiką, naudodamos nuspėjamą metriką ir strategines projekto sėkmės sistemas.
- Vidutinės brandos organizacijos KPI vidutiniškai derino su strateginiais tikslais ir pradėjo juos integruoti į rizikos valdymo procesus.
- Žemos brandos organizacijos susidūrė su tokiais iššūkiais kaip nenuoseklus KPI naudojimas, nesuderinamumas su strateginiais tikslais ir ribotos priemonės duomenų stebėjimui realiuoju laiku.
- Tyrimas patvirtino tvirtą teigiamą koreliaciją tarp organizacijos brandos ir KPI įgyvendinimo efektyvumo.
- Nustatyta, kad pagrindinės metodikos, įskaitant Agile ir Lean projektų valdymą, sustiprina KPI vaidmenį optimizuojant projekto našumą.

Baigiamojo Magistro darbo išvados:

- Organizacinė branda daro didelę įtaką efektyviam KPI naudojimui.
- Aukštos brandos organizacijos suderina KPI su strateginiais tikslais, kad būtų lengviau priimti sprendimus ir optimizuoti išteklius.
- Žemos brandos organizacijos turi sutelkti dėmesį į procesų standartizavimą ir derinimo tobulinimą, kad suprastų KPI pagrįsto projektų valdymo naudą.

Siekiant veiksmingo KPI integravimo ir geresnių projektų rezultatų, būtinas nuolatinis tobulinimas ir duomenimis pagrįstos kultūros puoselėjimas.

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INTRODUCTION

Relevance of the Topic: Organizations are increasingly realizing that good project management practices are among the key elements that have been enabling their survival in today's relentless competition and rapid technological changes. Effective project management is all about the realization of strategic objectives and making sure that projects deliver value within scope, time, and budget. It will contain the entire domain of coherent and continuous acting regarding the initiation, planning, execution, monitoring, and closing of projects by using techniques that will make it all in line with organizational objectives. Performance evaluation and control is most crucially the basic ingredient of any good project management. It is at this place that KPIs become crucially significant. KPI is an indication-through measurable value-that shows the success of a project with respect to a stated objective. They are tools of making abstract data concrete through real information with actions in view, thus allowing a project manager to measure performance informed by decisions that shall drive improvement.

Key Performance Indicators have some advantages during project management, too. The framework of performance measurement goes further than traditional metrics, such as adherence to a budget and schedule. It can also be related to the metrics for the satisfaction of stakeholders, productivity and effectiveness of a team, or risk management. By combining these different types of metrics, organizations may receive a more rounded view about the performance of a project and its value to overall corporate objectives. Probably the most significant advantage of KPIs is the fact that they serve to enhance strategic alignment. Key Performance Indicators ensure that project deliverables are being realized and that they, in turn, are helping to accomplish the strategic plans of the company. For example, a project to improve customer service would have Key Performance Indicators based on customer satisfaction scores, responsiveness, and overall quality of the service. It helps in the alignment of projects so that they are not done in isolation but form part of a coherent strategy that drives the success of the organization. Besides, Key Performance Indicators are useful in fostering a culture of accountability and transparency within project teams. By setting clear performance metrics, Key Performance Indicators help track individual and team contributions to project goals. This transparency creates ownership and accountability in the team by allowing them to see how their efforts will be affecting the overall project performance. It also allows for constructive feedback and performance evaluation that contributes to professional development and continuous improvement.

Through a detailed review of Key Performance Indicators applications and their benefits, a comprehensive understanding of how Key Performance Indicators can contribute to project management success and organizational excellence will be provided. Key Performance Indicators, or KPIs, are vitally important in managing project success and realizing greater organizational effectiveness. They ensure a structured approach in evaluating the performance of a project by providing clear metrics that help in monitoring progress toward achieving goals. These Key Performance Indicators allowed the project manager to establish whether the project was on schedule and within budget by measurement against the likes of Schedule Performance Index (SPI) and Cost Performance Index (CPI). Consequently, early detection of deviations means instituting timely corrective measures so that these projects remain on course to completion successfully within the stipulated parameters.

Level of exploration of the topic: The topic has secured ample research attempts thus far in the field of project performance measurement studies. Researchers have immensely given ample interest in the extent to which KPIs contribute to the monitoring of the project's success, efficiency, and achievement of its strategic objectives. Although much literature has been elaborating on various models of KPI development, the use of KPIs for improving project performance, and the issues related to the selection of proper KPIs regarding an industry and type of project, deficiencies still remain in regards to contextualization within specific organizational contexts, dynamic projects, adaptive KPIs, and integration with newer methodologies such as agile and lean management principles. Those aspects that require more detailed research will be elaborated on in the review of the scientific literature. Based on available literature, the present work develops better insight into how KPIs, adapted to the current needs of organizations, are determined and applied.

Research Problem: How do project management Key Performance Indicators (KPIs) and their determination influence project outcomes and decision-making processes in organizations with varying maturity levels?

Research Aim: To investigate and analyze the role of project management Key Performance Indicators (KPIs) and their determination in determining project outcomes and guiding decision-making practices across organizations at different maturity stages.

Research objectives:

1. To identify key performance indicators (KPIs) used in organizations at different maturity levels;
2. To evaluate the impact of KPIs on project success in organizations with varying maturity levels;

3. To explore how KPIs influence decision-making in organizations with different maturity levels;
4. To compare KPI implementation practices across organizations with different maturity levels.

Research Methods: The aim is to conduct a systematic review of the existing literature studies dealing with the role of KPIs within project management and decision-making and to compare the results coming from different organizations or sectors concerning the influences coming from the three maturity levels: low, medium, and high. In this way, gaps, common patterns, and main insights will be derived about the relationship among KPIs, project performance, and maturity level. Collect quantitative data from organizations at different maturity levels regarding project performance and decision-making. Data can be collected based on metrics such as time of completion, adherence to budgets, time to make decisions, etc., about the KPIs used. Compare the impact of different KPIs on project performance and decision-making across organizations at different maturity levels. This would include cross-comparison among organizations at the low level of maturity with organizations at medium and high levels of maturity with a view to highlighting differences and similarities in how KPIs are used and subsequent effectiveness. Once the quantitative data is collected, statistical analysis will be done to interpret how the KPI influences project outcomes and decision-making. Check for any statistically significant difference in the impact of KPIs on performance at three different levels of organizational maturity: low, medium, and high.

1. THEORETICAL ASPECTS OF PROJECT MANAGEMENT METHODOLOGIES, KEY PERFORMANCE INDICATORS, PERFORMANCE OPTIMIZATION MODELS, ORGANIZATION MATURITY ANDS IT‘S ROLE IN PROJECT MANAGEMENT

1.1. Project Management and Its Methodologies

The review has also demonstrated a lack of explicit theory for project management in previous studies. We are of the view that, as the PMBOK by PMI is commonly adopted and applied in practical project management practice, its underlying theoretical base might be discernable. In so doing, there can be separated two interrelating components for such theoretical underpinning, the theory of a project and the theory of management. The theory of projects is based upon the transformation view: a project is something that turns inputs into outputs. There are a number of principles for managing a project, including breaking down the overall process into smaller tasks and seeking to minimize costs for each task. We argue that our understanding of management is based upon three foundational ideas: management as planning, the dispatching model, and the thermostat model. In management as planning, operations are the making, revision, and execution of plans and focus on a close linkage between the management activities and the organizational results. In the dispatching model, the planned activities initiate when the executor is notified. The thermostat model deals with management control and has a performance standard, the measurement of actual performance, and a difference between the two is used to change the process so that the standard can be met. It involves the coordination of resources, activities, and stakeholders in the interest of successful completion. The main components comprise the establishment of objectives, risk management, progress monitoring, and change adaptation during implementation. Good project management enables teams to produce efficiently and in a manner that meets the expectations of stakeholders. According to Sonderlund (2005) Projects play key roles in most modern industries and firms. The management of these economic activities, project management, is continuously developed and today considered to be at the center of competitive advantage. Much classic research on project management has, however, focused on the planning and scheduling activities of project management. Traditional writings within the area even seem to treat project management as a discipline of planning or an application of systems analysis. Contributions have also come up from most of these, lacking in the empirical aspect,

and neither have they followed project management in practice any further. The various kinds of roles, which project management plays within product development, we try to discuss. However, Project Management is a large discipline with more than a few management styles. One of the most recent Project Management methodologies is the Agile project management methodology, which is gaining popularity fairly fast inside organizations. Agile project management is an iterative approach that emphasizes flexibility and collaboration; thus, it allows teams to quickly adapt to changes and regularly deliver value. It emphasizes short cycles, or sprints, where teams need to prioritize tasks based on customer feedback and evolving requirements, therefore fostering a work environment that is responsive and adaptive.

Over the last couple of years, **Agile Project Management (APM)** has been widely accepted across various industries. Groups traditionally would exploit linear project management approaches such as a waterfall model comprising of few discrete phases; however, are sensitive to changes in plans. However, these models have proved limiting in the face of increased complexity of projects and demands for speedy product delivery, as evidenced by increased timelines, cost overruns, and low morale within the teams (Olaoye, Favour. 2024). As Babu and Journal (2024) mention, Agile methodologies contrast significantly with traditional approaches to project management; the waterfall model is characterized by sequential processes in a line. In the Waterfall approach, project phases such as requirements gathering, design, development, testing, and deployment occur one after the other, with each phase dependent on the completion of the previous one. This is also often criticized because it is very rigid, and any changes in project requirements or scope, once the project gets underway, may lead to delays and cost overruns. On the other hand, Agile is iterative and incremental with continuous feedback and adaptation during the project life cycle. Agile methodologies further break down projects into manageable units of time-sprints or iterations-through which teams can deliver functional components periodically in response to emerging requirements much more effectively. It thus makes things not only more flexible but also adaptable, and thus it is able to make necessary adjustments in strategies as and when real-time feedback comes from stakeholders or changes in the project conditions. The main difference comes in the form of documentation and planning. Traditional methods focus on big planning upfront, which gives way to long lead times and inability to adapt quickly. Agile methodology focuses on delivering functional software and working closely with customers rather than comprehensive documentation, enabling teams to work toward value delivery and necessary adjustments.

Scrum is part of Agile Project Management practices. Adoption of the Scrum methodology over Agile represents a paradigm shift in Agile practices, moving from traditional

plan-based approaches to more flexible, iterative, and collaborative product development methods. This has been driven by the need for organizations to move rapidly and immediately respond to changing market demands, increase customer satisfaction, and improve project outcomes. As a framework within agile methodologies, Scrum has led this revolution with a structured yet flexible approach toward managing complex projects. Scrum has been able to achieve this because of its ability to solve some important problems that were related to traditional software development methodologies like the Waterfall model. These traditional methods used to suffer from rigidity; once the project had begun, implementing changes was difficult to carry out. In contrast, Scrum emphasizes adaptability, continuous feedback, and customer involvement throughout the development process (Henry Ejiga Adama, 2024).

Additionally, widely mentioned Project Management method is **Waterfall** method where the phases of project is planned upfront, The Waterfall model assumes that once the initial requirements are set and every goal has been cleared of any ambiguities, there is an unobstructed road which the development team will follow towards finishing the project. However, in most real-life cases, this is not true, as customers can change their opinion towards different features, in which case some, if not all, the phases will have to be re-evaluated. This attracts additional costs and time spent on different parts of the project, which in turn could lower customer satisfaction. This is the most obvious flaw of the Waterfall model, but it does not mean, this strategy should never be applied (Andrei, Bogdan-Alexandru & Casu-Pop, Andrei-Cosmin & Gheorghe, Sorin-Catalin & Boiangiu, Costin-Anton. 2019). Project performance measurement plays a vital role in both Agile and Waterfall methodologies, though the approach to measuring performance differs between the two. In Waterfall practices, project performance measurement is more structured. It focuses on completed milestones, adherence to the budget, and scope management. Since Waterfall projects happen linearly and sequentially, usually, the progress will be measured against a fixed plan. Schedule variance, budget variance, and completion of phases of a project are some critical KPIs for tracking performance, since changes or adjustments are less frequent. However, Agile promotes flexibility and continuous improvement. Performance measurement in Agile is more iterative: it focuses on short cycles-sprint-and adaptive planning. The common KPIs include velocity, which is the amount of work completed in each sprint; customer satisfaction; and team efficiency. Agile projects measure performance through regular feedback loops, allowing for frequent adjustments based on real-time data and collaboration. While Waterfall's performance measurement relies heavily on long-term planning and deviation analysis, Agile thrives on quick adaptations and constant evaluation. However, both methodologies benefit from tracking

key performance indicators to ensure project success. In essence, regardless of the approach, effective performance measurement is about ensuring the project stays aligned with its goals, timeline, and quality expectations.

Kanban is a visual project management approach for teams to maximize efficiency while working. Developed from the Toyota production system, it has taken huge popularity in industry sectors like software development and manufacturing. This philosophy lays emphasis on visualizing work on a Kanban board. In this board, columns represent major stages of a job: "To Do," "In Progress," and "Done." Important attributes associated with Kanban are:

- **Work Visualization:** A workflow to visually see bottlenecks and opportunities for improvement.
- **Limiting Work in Progress:** Kanban puts a limit on how much work is in progress at any given time. This prevents overloading of teams and makes them focus more.
- **Flow Management:** The aim is to ensure smooth and continuous flow of activities through successive stages of the project.
- **Continuous Improvement:** Kanban fosters small, incremental changes in pursuit of efficiency.

Kanban helps teams that need flexibility, and it's continuous in delivering work, easily adapting to priorities that change. In projects requiring the meeting of stiff deadlines or those with complex dependencies, it is less effective. A research paper by Dos Santos, P. S. M., Beltrão, A. C., de Souza, B. P., and Travassos, G. H. entitled "On the Benefits and Challenges of Using Kanban in Software Engineering: A Structured Synthesis Study" was published in the year 2018. It assesses benefits and challenges concerning the use of Kanban in software engineering. Analyzing 20 primary studies, the authors identified more than 16 benefits of Kanban, most of which were "work visibility," "control of project activities and tasks," "workflow," and "time-to-market." These benefits are connected to the roots of Kanban in Lean thinking and important for software development process improvement.

The study further brings into focus some challenges; of these, the most crucial has been "organizational culture" for any successful Kanban adoption. Synthesis Contribution: In such a backdrop, this synthesis tries to give an orderly and empirical basis on which practitioners would make appropriate decisions regarding Kanban implementation.

In consequence, the authors make strong calls for further research on areas where evidence is limited and note that negative results, which may suggest publication bias, are

lacking in the literature. The results will be useful for practitioners and researchers to improve the utilization of Kanban on software projects.

Scrumban is a hybrid project management methodology, taking elements from Scrum and Kanban to provide the team with more flexibility and efficiency. Initially designed to make the transition from Scrum to Kanban easier, it has grown in popularity for projects that require structured processes and adaptability. In Scrumban, teams hold onto some essential Scrum practices, like daily stand-ups and planning, while moving towards a continuous Kanban approach to workflow: tasks are done when needed, not planned in strict sprints. The balance here enables the clear visualization of work, minimizing bottlenecks while quickly adapting to project needs. Scrumban is particularly suited to teams performing long-term projects interwoven with reactive activities like maintenance or bug fixing, as improvement would be accomplished under less stressful conditions than the demanding timeboxed structure of Scrum. The study by Banijamali, A., Dawadi, R., Ahmad, M. O., Similä, J., Oivo, M., and Liukkunen, K. (2017) looked at Scrumban usage within a DSD environment. Scrumban can be considered as a hybrid methodology that merges qualities of Scrum and Kanban, and presumably improves potential Global Software Development problems such as communication barriers and cultural differences; however, few contributions are related to solving the resource distribution problem. Following this, a case study for exploring the results of Scrumban adoption for GSD is given, in an inter-universities setting, between a Finnish and Italian university. Authors investigate in their work how Scrumban may alleviate some of the usual challenges associated with DSD, allowing for more flexibility, enhancing communication and coordination between the sites, and visualizing the workflows on Kanban boards. Results indicated that Scrumban will help improve collaboration, team resources, and reduce bottlenecks. However, the study also finds that not all problems, such as the management of the project scope or cultural differences-can be fully solved by Scrumban alone, requiring additional instruments and methodologies.

Lean Project Management is a methodology derived from Lean Manufacturing, originally pioneered by Toyota. The approach focuses on delivering value to the customer through waste minimization and process optimization. In brief, Lean has one objective: the creation of more value with fewer resources through the relentless improvement of workflows and the destruction of inefficiency, better described as "waste" in terms of overproducing, excessive inventory, or unnecessary motion. Lean Project Management focuses on five basic principles:

- **Value Identification:** Defining value from the customer’s perspective.

- **Value Stream Mapping:** Mapping the steps of delivering value in a visual way to identify waste.
- **Flow Optimization:** Ensure that processes carrying value flow without interruption or delay.
- **Pull System:** Work is started based on demand and not forecast. Resources would be allocated only on actual demand.
- **Continuous Improvement (Kaizen):** Teams are empowered to constantly evaluate processes and make improvements which adapt to the requirements set by changes in projects.

Lean Project Management empowers teams, fosters collaboration, and makes decisions and data transparent. It is best applied to projects that are complex in nature, with ever-changing requirements, or projects that require a high level of responsiveness to customers. Lean achieves efficiency by reducing costs, accelerating project schedules, improving the quality of the deliverables while sustaining flexibility. Research by Horman and Kenley (1996), "Applications of Lean Production to Project Management," investigates how lean production principles are integrated into project management practices. In this paper, the authors assert that the traditional approach of project management-in terms of its main focus on time, cost, and quality-mostly fails to satisfactorily present what customers actually need. Lean project management combines efficiency, the focus of Lean production, with the project management goal of meeting customer requirements. The article illustrates how techniques of lean production, such as JIT and TQC, improve the efficiency of project processes through waste reduction and optimization of the value stream. The authors combine these principles with a wider "project management" framework that also covers factors related to environment, risk, and communication and propose that lean project management increases both efficiency and effectiveness. It leads, finally, to better project outcomes, value creation, and operational excellence.

Projects in Controlled Environments, or **PRINCE2**, was another of the widely used process-based project management methodologies. Initially developed by the UK government and implemented globally in public and private businesses. PRINCE2 is developed to be adoptable for every sort of projects and provides orderly structure with strongly defined roles and responsibilities and pre-defined processes. The core principles of PRINCE2 involve:

- **Continued Business Justification:** Projects must remain viable and aligned with business objectives throughout their lifecycle.

- **Defined Roles and Responsibilities:** Each team member and stakeholder has clearly defined roles, ensuring accountability and clarity.
- **Product-based Planning:** The focus is on delivering products (outputs) that meet customer requirements, emphasizing quality control.
- **Managed by Stages:** Projects are divided into manageable stages, allowing for frequent reviews and adjustments.
- **Tailoring to the Environment:** PRINCE2 can be adapted to fit the specific needs of different projects, industries, and organizations.

PRINCE2's process-driven structure ensures control over resources and risks, making it especially useful for large, complex projects. It is highly flexible and scalable, making it a suitable option for various industries, from IT to construction. Rupali Pravinkumar Pawar and Kirti Nilesh Mahajan (2017) explores the advantages and challenges associated with implementing the PRINCE2 methodology in project management. The paper highlights PRINCE2's structured approach, which divides projects into well-defined stages, improving control over resources, time, and quality. The key benefits of PRINCE2 include its ability to ensure clear communication among team members, well-documented processes, and a strong focus on delivering the required product with predefined quality.

However, the paper also identifies various drawbacks to PRINCE2. PRINCE2 is labeled as heavyweight, having heavy documentation and rigid processes, which introduces complexity in change management compared to other flexible methodologies such as Agile. Another drawback of PRINCE2 is that it provides limited guidance on risk management; thus, unless identified and managed early, there is a possibility of project risks.

Ultimately, PRINCE2 provides a coherent and structured approach to project management, whereas its shortcomings can be mitigated by integrating it with more adaptive methodologies such as Agile.

1.2. Project management performance optimization models

According to Lisa A. Delise, Brandon Lee, Yunsik Choi (2023), in project-based organizations, most projects are typically delivered off schedule or over budget, while few outperform over expectations, under budget, or in front of the original timeline, sometimes even on time. There is an idea of how project performances occur; what remains less evident is why most do not fulfill expected levels of specific performance parameters. This points to the need for organizations to provide tools to project managers to measure their performance

in managing projects and benchmark against other similar projects to understand how to learn from the successes and failures that made up the outcomes of the projects.

The understanding of project management performance in PBOs is complex and requires an analysis of organizational structures and strategies of project delivery. Project management efficiency significantly influences PBOs since most often their core business is organized in projects. In such an environment of continuous change, project management models and practices in an organization are increasingly assessed or improved using some kind of an advanced model for project management evaluation.

These models are important in the aim for organizations to standardize processes, enhance operational efficiency, and continuously improve project execution. Comparatively, different models have relative strengths and limitations that provide options for organizations in aligning project management maturity with strategic objectives. This flexibility is very critical in project-based organizations where the ability to adapt to a wide range of project environments and needs is a key factor in achieving continued success.

The work of Pasian, Beverly & Sankaran, Shankar & Boydell, Spike (2012) addresses the limitations of project management maturity models when it comes to undefined projects where process definition, repeatability, and predictability cannot be reasonably expected. It challenges project management maturity theories to recognize the potential for achieving maturity in environments characterized by undefined project elements and a greater need for flexibility in management approaches. Methodology – A multimethod (MXM) research design was employed, consisting of two stages: a content and textual analysis of two collections of maturity models, followed by an exploratory case study conducted at two university sites. Grounded theory techniques informed the development of a four-node conceptual framework, which served as the primary data collection tool at the case study sites. Findings – The results indicate that mature project management capabilities can be influenced by various non-process factors, such as context-specific values, specialized bodies of knowledge (e.g., instructional design), customer involvement, third-party contributions, and human factors like trust and creativity. The study also emphasizes the need to rethink data collection in the theory of multimethod research design. Practical Implications The researchers recommend that "practitioners should include factors such as customer engagement, organizational climate, and moderating variables like leadership when measuring project management maturity, along with the traditional process measures. Future models should be multivariate and involve context-specific variables in the measurement and definition of maturity.".

Project Governance is one of the most critical disciplines for determining the success of projects in organizational contexts. Good governance structures make clear what accountability and oversight there are, and assure clear decision-making arrangements linking project objectives to the strategic goals of the organization. A proper governance framework not only enhances project outcomes but also ensures better resource allocation, risk management, and stakeholder engagement. This, in turn, allows the organization to better its project performance, reduce uncertainty, and result in a standardized approach toward project management for overall success. Study by Joslin, Robert & Müller, Ralf. (2016) implicates that a cross-sectional, world-wide, online survey yielded 254 responses, according to responses analysis was done through factor analysis and moderated hierarchical regression analysis. The results of the study showed that the application of a PMM account for 22.3% of the variation in project success, and PMMs that are considered sufficiently comprehensive to manage the project lead to higher levels of project success than PMMs that need to be supplemented for use by the project manager. Project governance acts as a quasi-moderator in this relationship. The findings should benefit project management practitioners by providing insights into the choice of PMM in different governance contexts. Academics should benefit from insights into PMMs' role as a success factors in projects.

Leadership remains a critical determinant of the success of any projects within project-based organizations. In this respect, good leadership is not just about the tasks themselves but also in inspiring and leading a project team toward those clearly defined goals, considering scope, time, and budget parameters. Strong leaders should demonstrate adaptability since most project environments usually challenge them with dynamically changing circumstances in stakeholder expectations.

They ensure that collaboration and smooth communication are developed among the departments and members of the team. They create a clear vision of the project and align it with the overall organizational strategy. This way, the focus will be on the project goals, avoiding scope creep and managing the risk appropriately.

Furthermore, project-based organization leadership is supposed to handle conflict resolution, team motivation, and enhancement of problem-solving ability. The capacity to instill trust in team members helps create a positive work environment that increases productivity and creativity. In the end, strong leadership significantly contributes to the successful delivery of projects and propels both short-term project results and long-term organizational growth. Gębczyńska, M. (2019) came to conclusion that leadership styles significantly influence project success in project-based organizations. Key traits such as

idealized influence (charisma), inspirational motivation, individualized consideration, intellectual stimulation, contingent reward, and management by exception combine in different ways to drive outcomes. Three effective combinations were identified:

- Individualized consideration, intellectual stimulation, and contingent reward, without inspirational motivation, lead to success by focusing on personal attention, problem-solving, and rewarding performance.
- Individualized consideration, contingent reward, and management by exception, but without idealized influence, focus on role clarity, reward, and corrective action

  Idealized influence, inspirational motivation, and contingent reward- Success is because of charismatic leadership, clear goals, and rewarding achievements.

Contingent reward was a critical factor across all combinations, emphasizing the need for clarity of expectations and rewards. These findings suggest that leadership success in projects emanates from specific trait combinations rather than any single approach.

Resource Management and Flexibility are very important in project management to ensure the success of a project. Resource management itself deals with the effective use of resources, including personnel, equipment, and budget, to achieve the objectives of the project on time and within the scope of the project. This includes the planning of resources that will be needed at each stage, assigning them to tasks, and optimizing their use to avoid over-allocation or waste.

The flexibility in managing projects refers to the ability to adapt according to changes. These changes can either arise from the shifting of the project requirements, risks, or unexpected challenges that come along. This includes the effective management of changes and risks, which keeps the project on course when things do not happen as planned. Agile methods emphasize iterative adjustments and versatile resource allocation that help teams be nimble.

This balance of resource management and flexibility will provide the basis for structured planning with the required capacity for addressing change so that projects can reach their objectives effectively.

The concept of **Project Management Offices (PMOs)** has received considerable attention over the last decade from organizations since businesses are increasingly using projects to implement their strategic and operational initiatives. PMOs are organizational units aimed at enhancing project performance by developing and implementing standardized methodologies, processes, and tools to carry out project-related activities. However, PMO

implementation is varied and complex across organizations. Despite today's PMO becoming an integral part of an organization's project management structure, reasons for its setup and forces of change or transition are not properly known. PMOs have generally been considered a temporary organization and tend to lead a short life. They are influenced both by the dynamics within and outside the organizational setup. This cyclical restructuring of PMOs leads to many questions concerning the sustainability and added value these entities are supposed to provide within an organization context. The current paper will aim to find out why changes happen with the PMO setups and how they take place in creating insight into factors influencing change to the structure over time. According to the work by Aubry, M., Müller, R., Hobbs, B. & Blomquist, T. (2010), understanding the transition of the PMO through organizational evolution,. This study identifies 35 drivers of PMO changes, grouped into six major categories-such as external market factors, internal organizational dynamics, project management process issues, human relations-found through 17 case studies across various industries. The research shows that PMOs are not stable entities; they transition frequently either due to internal reorganizations, new strategic directions, or a shift in leadership. The study has isolated three specific patterns in PMO transformation: standardization of project management practices, growth, and contraction of PMO functions, and finally the adoption of agile project management methodologies. Such findings counter the concept of failure of PMO change but describe it as part of the natural development of project management practices at organizations. This article makes a theoretical contribution to the current knowledge about the dynamics of PMOs and practically helps the organizations in setting up or transforming their PMO structure.

Agile approach to innovative projects, especially those marked by lots of uncertainty and rapid changes, require dynamic management approaches that may change with time. Traditional project management methods focus on detailed upfront planning and rigid control mechanisms which can barely cope with the growing demands of a project in dynamic environments. The result of this has stimulated the application of Agile methodologies aimed at inspiring flexibility, responsiveness, and continuous improvement. The Agile approach-although originally focused on software development due to iterative cycles, collaboration, and customer feedback-is particularly applicable for managing innovative initiatives. Agile methods allow adaptive planning and real-time control, thus providing a means of mastering the complexity and uncertainty inherent in innovation-driven projects. While Agile promises greater flexibility and efficiency, its application to innovative projects raises some fundamental questions regarding long-term strategic alignment, resource commitment, and risk management. This paper seeks to assess the effectiveness of Agile approaches in the planning

and control of innovative projects, exploring strengths, limitations, and possible adaptations for the optimization of innovation outcomes. The present review, therefore, intends to explore how Agile methodologies balance the need for structure and the flexibility to create an environment that allows creativity and innovation within a project.

Conforto, E. C., & Amaral, D. C. (2010) describe the application of agile methodologies to guide and govern innovative projects in technology-driven companies. The study explored two companies based at the São Carlos technological hub in Brazil and presented the IVPM2 methodology, which integrates Agile Project Management practices with conventional project management standards. Agile practices related to simplicity, iterative development, and visual management were used in conjunction with conventional practices concerning project standardization.

The findings of the study show that, indeed, IVPM2 brought a lot of benefits in terms of flexibility and responsiveness to changes along the life cycle of a project. This hybrid approach enabled teams to handle uncertainty better and thus be more dynamic in planning, fitting the true nature of innovation-driven projects, which is quite unpredictable. It also emerged that the integration of agile and traditional methods strikes a balance that could be beneficial in improving project outcomes within the complex innovative environment.

Stakeholders play a very significant role in the success of any project due to their influence over decisions and their consequences. It is difficult to handle their expectations and interests, especially with uncertainties over the project environment, which usually characterizes a complex and changing condition.

Uncertainty management involves the identification of risks, assessment of impacts, and mitigation strategies that are all put together under uncertainty management. However, the perception of risk and tolerance to risk vary among stakeholders; hence, the effectiveness of stakeholder involvement in managing uncertainties is an important aspect. Their contributions become necessary to shape responses to risks, while effective communication aligns the expectations of the stakeholders with the project objectives.

Incorporating stakeholder perspectives into uncertainty management leads to more informed decision-making and strengthens the project's adaptability. Therefore, the integration of stakeholder engagement into uncertainty management is essential for navigating project complexities and achieving successful outcomes.

Stakeholders are often the source of uncertainties in projects, with their different interests, levels of influence, and actions. Managing these uncertainties requires a structured approach to integrate stakeholder involvement with risk management processes. Ward and

Chapman (2008) introduced the SHAMPU framework, which stands for Shape, Harness, and Manage Project Uncertainty, and proposed a nine-phase process for the resolution of uncertainties throughout the project life cycle. These phases include defining the project, identifying sources of uncertainty, and evaluating potential impacts. The research emphasizes that effectively managing stakeholder expectations and fostering trust can significantly enhance project outcomes. By incorporating stakeholder perspectives early and consistently, projects can better navigate uncertainties and improve decision-making and risk mitigation strategies (Ward & Chapman, 2008).

Organizational Learning is one of the key drivers of sustained success, especially in project-driven environments where knowledge and experience are continuously generated. Unfortunately, many organizations do not capture, manage, or use lessons learned from projects effectively; thus, they repeatedly make the same mistakes and fail to take advantage of opportunities for improvement. The Systematic Lessons Learned Knowledge (SYLLK) model, therefore, comes in to assist fully in attaining the full benefits concerning effective knowledge gained from project experiences through identification, systematic transfer, and integration. This model, when put to proper use in the organizational learning process, enhances decision-making and continuous improvement in an organization. The SYLLK model thus considers a more holistic approach towards people, process, and technology issues. This is considered while documenting the lessons as well as disseminating and implementing them within the organization so that the knowledge of single projects becomes shared organizational wisdom. This research explores the application of the SYLLK model as a tool for enhancing organizational learning through projects, examining its practical implementation and the value it delivers in terms of knowledge retention, innovation, and competitive advantage. Duffield & Whitty (2016) found that the Systemic Lessons Learned Knowledge (SYLLK) model integrates organizational systems—such as people, culture, technology, and processes—to enhance knowledge sharing and project learning. The model is based on the idea that learning from past project experiences can be distributed across an organization, leading to better project outcomes. The application of this model in a large government division revealed that aligning various knowledge elements is crucial to overcoming barriers to learning, such as inadequate communication or insufficient knowledge-sharing infrastructure. The research has used action research cycles in order to implement knowledge management practices such as storytelling, knowledge audits, and communities of practice. The results showed that embedding these types of practices into the culture can enhance project management and knowledge retention. The importance of technological

platforms, such as intranet, was also emphasized in enabling knowledge-sharing activities. In general, the findings have shown that the SYLLK model effectively promotes organizational learning through structured knowledge dissemination to improve project outcomes (Duffield & Whitty, 2016).

The two most influential factors for project success include **Project Management Maturity (PMM)** and **Organizational Culture (OC)**. PMM refers to the extent to which an organization has developed and institutionalized its project management practices. Higher levels of maturity generally bring about more efficient processes and better results for the project. Organizational culture, which consists of shared values, behaviors, and norms, influences how teams work together, make decisions, and handle challenges.

The interaction between these two factors - PMM and OC - can significantly impact perceived project performance. A mature project management system may falter if the organizational culture is not supportive, and conversely, a positive culture can enhance project outcomes, even in less mature PM environments. This study explores the relationship between PMM, organizational culture, and their combined effects on project performance.

This study by Yazici, H. J. (2009) explores the relationship between Project Management Maturity (PMM) and perceived organizational performance, with a focus on how organizational culture influences outcomes. This study, which was carried out among 86 U.S. project professionals, indicates that though PMM significantly drives business performance, it does not affect project performance directly. Clan culture improves project and business performance, whereas alignment of PMM with market culture boosts business performance. It therefore goes to point out that development of PMM coupled with the creating of a collaborative culture will enable solutions to be found for time, budget, and competitiveness problems arising within a project-based organization.

1.3. Key performance indicators and their role in project management

Key Performance Indicators (KPIs) are valuable tools within project management, as they are measurable values that prove the effectiveness of activities and processes to meet particular project objectives. As strategic metrics, KPIs show qualitative and quantitative data, enabling project managers to track progress, optimize decision-making, and make sure that the goals of the project are reached within the scope, time, and budget allocated. KPIs can be set up to track project performance in many ways, from financial outcomes to operational efficiencies, and should be set to match larger organizational strategies or a particular project.

In project management, KPIs allow the results of the projects to be aligned with the overall business objectives through optimal resource utilization and maintaining effort on what will provide the greatest benefit. With the help of KPIs, project managers are able to find out problems well in advance, make appropriate adjustments, and guarantee the success of projects. The right selection and application of KPIs raise the chances of delivering projects on time and within budget while maintaining the required quality level.

In broad terms, KPIs are categorized into financial, operational, and strategic types, each serving a different purpose in measuring different dimensions of project performance. Financial KPIs usually deal with monetary aspects such as cost variance and return on investment, while operational KPIs deal with process efficiency and effectiveness regarding adherence to project planning and resource utilization. In contrast, strategic KPIs give the value of a project to meet the long-term goals of an organization and therefore give an expanded view of the value of the project.

Choosing appropriate KPIs presents several challenges to organizations. Some of the challenges include misalignment of selected KPIs with the objectives of the projects, reliance on quantitative measures, and difficulties in monitoring intangible assets such as stakeholder satisfaction. Gaining an understanding of how to address these challenges is crucial to optimize the use of KPIs in managing projects and ensuring that the assessments of project success prove valid. According to Sharatkumar Shantaram (2020), KPIs are one of the most crucial elements for organizations that base their decisions on data. Business and organizations are becoming increasingly data-driven, shifting reliance towards data in driving decision-making. They need to assess whether their decisions are putting them on the right track and whether they contribute to the achievement of the desired goals. Hence, organizations are keen to identify and implement indicators that help them measure the impact of their decisions. With the right indicators, they can evaluate their own and their competitors' growth. In this chapter, we're going to learn what KPIs are and the logic behind them, outline the characteristics of KPIs, classify them, and then outline the steps in developing a KPI.

Financial KPIs in project management focus on the monetary aspects of the project to ensure that budgets are followed and the project yields a return on investment. These include:

- **Cost Variance (CV):** Formula: CV = BCWP (Budgeted Cost of Work Performed) - ACWP (Actual Cost of Work Performed). Cost variance is one of the major indicators to show if a project is within budget. It indicates the variance between the budgeted cost of work completed and the actual cost of work completed. A positive CV indicates

that the project is under budget, while a negative CV indicates that it is over budget. By regularly monitoring the CV, project managers can identify financial problems much earlier and take corrective measures. According to Nassar & Hegab (2006), real-time tracking of CV enhances decision-making and project control by quickly identifying cost inefficiencies.

- **Return on Investment (ROI):** Formula: ROI = (Net Benefits of Project - Cost of Project) / Cost of Project. The ROI is one of the most important financial metrics that will help in measuring the profitability of the project against its cost. It shows the amount of return gained with every dollar spent, and the result is expressed in percentage form. The higher the percentage value of the ROI, the better the financial returns on investment. This is very important to stakeholders and decision-makers in terms of the financial viability of the project. It is widely used in project selection, comparing different projects based on returns. A positive ROI means value is generated, while a negative one points at losses. According to Serrador & Turner (2015), the ROI is a critical factor in project financial decision-making. It helps evaluate the financial health and success of the project, hence it is one of the most applied metrics in project finance.
- **Budget Variance (BV):** Formula: BV = Planned Budget - Actual Cost. Budget Variance or BV refers to the difference between the actual costs incurred by the project and the planned budget. It is an indicator of the financial performance of the project. A positive BV shows the project is under budget, while a negative BV indicates it's over budget. BV is crucial for maintaining financial discipline, allowing project managers to track discrepancies and predict the project's financial outcome. By continuously monitoring BV, managers can prevent costs from escalating. According to Vanhoucke (2012), BV is very important in cost control, thus enabling the project to be on target regarding financial objectives through early detection of cost overruns and taking up corrective measures.
- **Net Present Value (NPV):** Formula: NPV = Present Value of Cash Inflows - Present Value of Cash Outflows. The NPV measures a project's profitability by contrasting the present value of the project inflows against the present value of its outflows, taking account of the time value of money. A positive NPV indicates that the project is expected to generate more value than it costs, while a negative NPV indicates the opposite. NPV is essential in the evaluation of long-term projects with large initial

investments and future returns. According to Yeo and Qiu (2003), it is of great importance in capital-intensive projects like infrastructure, where it helps decision-makers determine whether the financial benefits outweigh the costs.

- **Earned Value Management (EVM):** EVM is a project management technique that integrally connects scope, schedule, and cost metrics to outline the view of project performance precisely. It compares work completed (earned value) against the planned work and actual costs to produce key metrics, including the Cost Performance Index (CPI) and Schedule Performance Index (SPI), which support the analysis of variances in cost and schedule. EVM is a potent tool in the monitoring of project performance, providing real-time insight into whether the project is on course. According to Marshall, Ruiz, and Fraser (2013), EVM is effective in cost and timeline control, helping project managers identify risks and deviations at an early stage.

Strategic KPIs set the basis for measuring the contribution of a project to the long-term objectives and overall strategic vision of an organization. They go beyond immediate project success to include aspects related to benefit realization, risk management, and innovation that make sure projects align with and support the future growth and competitive positioning of the organization:

- **Benefit Realization:** Benefit Realization is about how well the project delivers the promised benefits outlined during its business case development, focusing on long-term strategic value. It will check whether the project contributes to broader organizational goals even after completion. This KPI makes sure that the project's outcomes align with the original vision and deliver the expected value. Benefit Realization is about ensuring that organizations align projects with strategic objectives so that projects deliver not only on time and within budget but also provide sustainable benefits to support growth and innovation. According to Zwikael and Smyrk (2012), there is a need for a governance framework that will ensure the realization of benefits even after project completion to ensure long-term strategic value.
- **Project Risk Exposure:** Project Risk Exposure is the level of vulnerability a project has to risks that may befall it, considering the likelihood and impact of such risks. This KPI offers a strategic perspective on the risk profile of the project to help managers decide whether the organization is overexposing itself to risks or managing those risks effectively. High risk exposure may indicate potential problems that will impact project completion, budget, timelines, or quality. Managing risk exposure is crucial to prevent

unforeseen challenges from derailing strategic initiatives. It enables organizations to make informed decisions on whether to proceed, adjust, or halt a project. Hillson (2003) highlights the importance of risk management, advocating for the use of a Risk Breakdown Structure (RBS) to systematically address risks. Effective risk management keeps the projects on course to achieve strategic objectives without any undue setbacks, and this makes this KPI critical for long-term success.

- **Innovation and Learning:** Innovation and Learning KPI is used to determine the extent a project contributes to organizational innovation or learning. It ranges from developing new processes, products, or technologies to knowledge acquisition that will be helpful for future projects. This KPI shows how projects ensure strategic growth through innovation and continuous improvement. Innovation and learning are two of the major requirements in dynamic industries. Such projects generally develop new opportunities and create enhanced capabilities for the future. They will contribute to developing a knowledge base that enhances their project management and overall performance. Brady and Davies (2004) emphasize that projects designed with innovation and learning in mind can offer more value strategically, hence positioning the organizations for future success. This KPI will encourage experimentation and adaptation in the interest of long-term growth, improvement, and innovation.
- **Alignment with Organizational Goals:** This would ensure that the results from the project are matched or aligned with the organization's overall goals or strategic objectives. It ensures that the project contributes to the long-term vision and goals, not just the success of time, cost, or quality. Projects in line with strategic objectives are most likely to result in meaningful, long-term contributions to the future of an organization. That is where the drive for sustained success lies in ensuring alignment with organizational goals. This KPI helps ensure that resources are channeled to initiatives that enhance the organization's competitive advantage. Shenhar, Dvir, and Levy (2001), emphasize that project success is multidimensional and extends beyond short-term metrics, while putting weight that projects aligned with strategic goals have a high chance of adding value to the general success of an organization.
- **Customer Satisfaction:** Customer Satisfaction measures how well stakeholders, including customers and end-users, are satisfied with a project’s outcomes. This KPI is crucial for projects that directly impact customers, as it indicates how well the project meets their needs and expectations. High customer satisfaction is vital for long-term

success, as it leads to increased loyalty, repeat business, and a stronger reputation for delivering value. This KPI ensures that projects not only succeed internally but also provide meaningful value to key stakeholders. Davis (2014) highlights customer satisfaction as a strategic KPI, especially in projects with significant customer interaction. Measuring this ensures projects align with business objectives and positively impact customer relations and overall success.

Organizational KPIs assess the efficiency, team performance, and human resources aspects of a project. These are internal KPIs that determine how well the project team and the organization manage resources and execute processes.

- Resource Utilization: This is a KPI utilized in measuring how well different resources-human, technical, or material-will be used by the project. It will make sure that optimum utilization occurs but not to an extend of underutilization or overutilization of resources. Effective use of resources is very key for timely completion of projects within budgets. This KPI will help ensure productivity is relevant, cut on waste, and avoid overuse of workers and equipment. Good resource management will lead to better planning, smoother execution, and fewer delays. Pinto & Slevin (1987) present resource utilization as an important factor for successful project implementation, pointing out that resource demand should be well-matched by supply to retain control over the cost and length of the project.
- **Team Performance and Collaboration:** The KPI determines the working process of a project team's collaboration on task execution, communications, making decisions, and conflicts. This includes how a project team works well to achieve certain aims. Effective teamwork within an organization will ensure success in environments with intricate projects that require department coordination. Poor collaboration can lead to misunderstandings, delays, and inefficiencies. Measuring this KPI ensures that the team’s synergy contributes positively to project progress, reducing the risk of miscommunication and bottlenecks. Yang, Wu, & Chen (2012) found that team collaboration is directly linked to project performance, with well-collaborated teams experiencing fewer delays, more effective communication, and better conflict resolution, all of which improve project outcomes and minimize cost overruns.
- **Employee Engagement:** Employee Engagement: Employee Engagement is the measure of motivation and commitment of project team members. An engaged employee is productive, focused, and contributes to project success. High engagement

level boosts productivity, creativity, and ownership, hence quality work. It also is correlated with low turnover and high job satisfaction, hence a stable project environment. Bakker and Demerouti (2008) have pointed out that engaged employees are more likely to perform well in challenging environments, being active in solving problems, meeting deadlines, and enhancing project outcomes, which makes engagement a driver of project success.

- **Knowledge Transfer:** Knowledge Transfer: This KPI measures the capture, sharing, and transfer of knowledge within an organization so that lessons learned from one project positively impact future projects for continuous improvement. Effective knowledge transfer builds a foundation of best practices that avoid mistakes of the past and optimizes processes for long-term growth and efficiency through a promoted learning culture. Ajmal and Koskinen (2008) point out that sharing knowledge provides continuous improvement, better decision-making, and improved performance, which enhances the capability of organizations to manage projects more effectively and meet new challenges.
- **Schedule Adherence:** Schedule Adherence refers to the degree to which a project adheres to its planned schedule. Deviations from this may indicate problems in planning, resources, or execution and may negatively affect success. It is very important to stay on schedule for cost, resource, and stakeholder management. Frequent delays can increase costs, strain resources, and lower team morale. Monitoring this KPI ensures timely corrective actions to keep projects on track. Indeed, Henderson and Zwikael (2008) showed that schedule compliance provided one of the most intense variables predicting project success: projects completed on time tend to have much better cost management and overall performance, whereas delays are often associated with overruns and shortages.

Additional KPIs provide a well-rounded view of how project management can be assessed from financial, strategic, and organizational perspectives, with each metric contributing to overall project success. The studies linked offer a foundation for understanding how these KPIs impact project outcomes.

- **Project Delivery Time:** This KPI measures the time taken for project completion against the initial schedule. It helps in assessing if the deadlines have been met with quality and within budget. Delays in delivery indicate inefficiency in either planning, resources, or execution. Timely project delivery is important since it impacts costs,

resource utilization, and satisfaction of stakeholders. Staying on schedule ensures that resources are optimally utilized and avoids extended overheads. According to Kerzner (2017), the time of project delivery is a significant indicator for efficiency and success, where for well-managed projects, deadlines are always on time because of proper planning and execution.

- **Scope Variance:** Scope Variance is the deviation from the original scope of the project. It monitors changes that might lead to delays, increased budgets, or low-quality results. It checks the impact of scope changes, such as scope creep, on timelines, costs, and deliverables. Scope variance management is very important in order not to have uncontrolled changes that may lead to project failure. A well-controlled project has limited scope variance since all changes are justified, documented, and approved. Floricel and Miller (2001) note that poorly managed scope variance presents major risks, especially for large projects, and often leads to their failure. Good scope management will ensure that projects are within the constraints of quality, cost, and time.
- **Project Quality:** The quality of the project refers to how well the finished deliverables meet the original requirements and expectations of stakeholders, ensuring they are fit for their intended purpose and standard. High-quality deliverables can fulfill not just project objectives but also stakeholder satisfaction that will lead to long-term success. Effective quality management prevents defects, rework, and dissatisfaction. According to De Wit (1988), there is a need for correspondence between the objectives and outcome in projects for their long-term success. Poor quality increases post-delivery costs, dissatisfies stakeholders, and erodes organizational credibility; hence, quality remains a major focus throughout the life of a project.

1.4. Organizational maturity and its effectiveness on KPI usage

Organizational maturity is a factor that strongly influences an organization's ability to effectively manage projects and achieve strategic goals. Maturity models, such as the Capability Maturity Model Integration (CMMI) and the Organizational Project Management Maturity Model (OPM3), provide frameworks for assessing and improving an organization's project management capabilities. CMMI, developed by Paulk et al. (1993), describes five levels of maturity that range from ad hoc processes in low-maturity organizations to optimized and continuously improving systems in high-maturity organizations. Similarly, OPM3, as

explained by the Project Management Institute (2013), is about integrating project management into broader organizational strategies and describes an organization's maturity in terms of standardization, control, and phases of continuous improvement.

As organizations progress through these maturity stages, organizations improve their capabilities in the effective implementation and use of KPIs. Companies at the lower levels of maturity struggle to define and track KPIs; their performance metrics are often not in agreement with strategic goals and are incapable of providing meaningful insights (Andersen & Jessen, 2003). On the other hand, high-maturity organizations use KPIs as an enabler for continual improvement, to support fact-based decision-making, and to align projects with long-term business objectives (Crawford, 2007).

Research has shown that with increased maturity, the approach to KPI usage shifts from a reactive, lagging set of indicators to a proactive, strategic framework that enables performance optimization. For example, Berssaneti and Carvalho (2015) note that low-maturity organizations fail to leverage KPIs when opportunities arise, whereas high-maturity organizations are able to implement KPIs in support of both short-term performance and long-term innovation. Mullaly (2006) further supports this, noting that organizations with high maturity levels tend to integrate KPIs across functions, using them to predict project risks and optimize processes.

These findings indicate that organizational maturity is crucial in the determination of KPI effectiveness, while different industries have shown through real examples how maturity influences both KPI usage and project outcomes.

Organizational Maturity Models are frameworks that help assess and improve an organization's capabilities in managing projects, processes, and strategies. These models provide structured pathways for organizations to progress through stages of development, enhancing their ability to deliver successful projects and meet strategic objectives. Probably the best-known of these maturity models is the **Capability Maturity Model Integration (CMMI)** developed by the Software Engineering Institute at Carnegie Mellon University. CMMI describes five levels of maturity for an organization: Initial, Managed, Defined, Quantitatively Managed, and Optimizing (Paulk et al., 1993). An organization at the Initial level has ad hoc, unmanaged processes that are largely reactive. As organizations progress through the stages, the processes become more defined and repeatable, and the organization is eventually able to quantitatively manage and optimize the projects. Organizations at the Optimizing stage are in a continuous improvement mode, using data and feedback to refine processes. Another widely used framework is the **Organizational Project Management**

Maturity Model (OPM3) developed by the Project Management Institute. OPM3 provides a clear indication of an organization's maturity regarding project, program, and portfolio management and connects project results to strategic objectives. This model has four major steps: Standardize, Measure, Control, and Continuously Improve (Project Management Institute 2013). During the Standardize stage, organizations implement common practices in project management. In subsequent stages, the organizations progress to the level of measuring and controlling performance so that project outcomes become predictable and consistent with business objectives. Continuously Improve is the last stage, which includes using lessons learned and performance data to realize continuous improvements in project management practices.

Although maturity models address common goals, each of these models has different focuses and applications. While CMMI focuses on the process improvement aspect from a technical and development environment perspective, OPM3 looks at the broader perspective of organizational-level project management capabilities (Kwak & Ibbs, 2002). Both stress the need for structured processes and also the use of performance metrics, such as KPIs, in monitoring progress toward continuous improvement.

Several research findings have concluded that organizations operating on a high maturity level perform remarkably in terms of the success of their projects and also aligned them with strategic needs. For instance, Andersen and Jessen (2003), have noted that organizations at an advanced level in terms of maturity in project management are better equipped to deliver results against time, money, and strategies. Organizations in lower maturity face problems with the process's standardization and control over projects and use performance data.

In general, organizational maturity models provide valuable frames that guide structured development of the organization's capability. Working through these stages will lead an organization to be assured that its projects will be increasingly predictable and efficient, with successful outcomes based on KPIs and other performance measurements for continuous process improvement.

Low Maturity Organizations: In low-maturity organizations, implementation of KPIs has often been unstructured, unaligned with strategy, and incoherent. According to Berssaneti and Carvalho (2015), companies at their initial stages of maturity are concerned with lagging indicators, typically past performance represented either by financial outcomes or delays in projects. These KPIs lack alignment with the general goals of the business, leading to a narrow focus on purely operational metrics that cannot support long-term success. Low-maturity

organizations typically have less formalized processes, resulting in inconsistent data collection and analysis (Berssaneti & Carvalho, 2015). As a result, KPIs may be poorly defined and lack the actionable insights needed to guide project and performance improvements. The challenge lies in the fact that these organizations often lack the tools and expertise to use KPIs effectively, which can undermine their decision-making processes (Forrester, 2015). Besides, one of the substantial obstacles to making good use of KPIs in a low-maturity organization is really cultural. Indeed, Silvius and Schipper (2020) mention a certain resistance in adopting KPIs; numerous employees regard the latter as forms of bureaucratic reporting, not considering them drivers able to enhance business performance. Precisely that resistance causes inept implementation with variation across other departments, hence making KPI initiatives less productive overall.

High Maturity Organizations: This includes much more highly structured and active approaches to using the KPIs found within more mature organizations that can integrate a set of broader strategic and project management frameworks. Thereby, while leading and lagging indicators within maturity are focused, the research also conducted by Demir and Kacobas, 2021 shows this. This leading indication could relate to customer satisfaction or project risks that high maturity organizations can anticipate by implementing corrective measures before the escalation of an unwanted situation. They have advanced data analytics platforms enabled with real-time KPI tracking to support their state of maturity. Continuous progress monitoring by the decision-makers thus enables timely intervention if required (Berssaneti & Carvalho, 2015). Besides, KPIs in these organizations are aligned to long-term business objectives and provide a complete view of project performance and overall organizational health. One characteristic that differentiates high-maturity organizations in the implementation of KPIs is the strong emphasis on accountability and continuous improvement. According to Marnewick (2019), this is because such an organization has a culture that perceives KPIs as one of the major enablers for performance improvements. People at all levels are trained to understand and act on KPI data, meaning performance metrics are baked into daily operations. Besides, high-maturity organizations use cross-functional KPIs, which ensure different departments collaborate on common goals.

Key Differences in Approach: The implementation of KPIs is contrastingly different in low- versus high-maturity organizations. The approach to KPIs in a low-maturity organization is fragmented and reactive, where the focus is on short-term operational metrics, which are not aligned with strategic goals (Silvius & Schipper, 2020). These organizations do not have an enabling infrastructure, tools, and culture to utilize KPIs effectively for long-term

growth. On the other hand, in high-maturity organizations, the implementation of KPIs has a clear, strategic purpose. They apply leading and lagging indicators together in guiding continuous improvement, hence optimization of project and business outcomes. Demir & Kocabas (2021): Integrating KPIs within decision-making mechanisms and promoting a culture of accountability, performance metrics drive innovation for sustained success in such organizations.

Low Maturity: Basic and Reactive KPI Usage: Organizations at low maturity levels are generally struggling with the basic implementation of KPIs. Most of their KPIs are simple lagging indicators, such as financial results or project delays, which cannot provide much insight into future performance or risks (Pasian et al., 2021). These KPIs are usually reactive, focusing on reporting outcomes of the past rather than guiding proactive decisions. In low-maturity settings, KPIs are disconnected from strategic goals, limiting their effectiveness in driving meaningful improvements (Chofreh et al., 2021). Furthermore, a lack of standardized data collection and analytical tools weakens their ability to inform decisions (Lacerda et al., 2020).

Intermediate Maturity: Predictive Capabilities and Better Control: At an intermediate level of maturity, organizations are able to make their usage of KPIs more formalized. At this stage, KPIs show better alignment with strategic objectives and encompass leading and lagging indicators (Chofreh et al., 2021). Organizations at this stage are able to commence integrating KPIs within risk management processes for predicting performance of projects and controlling any future risks associated with such projects. However, real-time data monitoring and full integration across departments may still be lacking, limiting the ability to make real-time decisions (Lacerda et al., 2020).

High Maturity: Strategic and Continuous Improvement: High-maturity organizations use KPIs most effectively; KPIs are integrated into their strategic planning and performance management system. This level applies not only in monitoring the current progress but also in predicting outcomes for continuous improvement (Müller et al., 2019). Advanced data analytics tools are applied by an organization at this level of maturity in monitoring KPIs in real time, hence agile decision-making and rapid adjustments (Albliwi et al., 2018). Additionally, KPIs are used cross-functionally, fostering collaboration and aligning departmental efforts with overall business objectives (Chofreh et al., 2021).

2. METHODOLOGY OF RESEARCH ON EXPLORING THE ROLE OF KEY PERFORMANCE INDICATORS IN SHAPING PROJECT SUCCESS AND DECISION-MAKING IN ORGANIZATIONS: A QUALITATIVE STUDY OF VARYING MATURITY LEVELS

2.1. Aim, question, model and hypothesis of the research

Aim of the Research: The research aims to investigate the implementation, effectiveness, and challenges of Key Performance Indicators (KPIs) in project management within organizations, using a Likert-scale approach to gauge perceptions and experiences.

Question of the Research: How do Key Performance Indicators (KPIs) affect project performance and decision-making in organizations with different maturity levels?

Model of the Research: This research adopts a quantitative approach, utilizing a structured questionnaire with Likert scale questions to assess the role and impact of Key Performance Indicators (KPIs) in project management across organizations with varying maturity levels. Data collected will be analyzed using SPSS to explore relationships and differences among variables, enabling a detailed understanding of the interplay between organizational maturity, KPI implementation, and project performance.

Research Hypothesis: The research aims to explore the relationship between organizational maturity, the implementation of Key Performance Indicators (KPIs), and their impact on project performance and decision-making processes. By examining these relationships, the study seeks to identify how varying maturity levels influence the effectiveness of KPIs and uncover the mechanisms through which KPIs contribute to achieving project success. The hypotheses below are formulated to address these objectives, providing a foundation for testing key assumptions and deriving actionable insights.

H1: Organizations with higher maturity levels demonstrate more effective implementation of Key Performance Indicators (KPIs) compared to organizations with lower maturity levels.

H2: Effective implementation of KPIs is positively associated with improved project performance metrics, such as schedule adherence, cost control, and quality of deliverables**.**

H3: Effective implementation of KPIs enhances decision-making processes by improving timeliness and quality in project-related decisions.

H4: Organizational maturity moderates the relationship between KPI implementation and project performance, with higher maturity organizations experiencing stronger positive effects.

H5: The alignment of KPIs with strategic objectives significantly influences their effectiveness in improving project outcomes and decision-making effectiveness.

2.2. Organization and instrument of the research

According to the purpose of the previous study and the exploration of literature, Key Performance Indicators (KPIs) are one of the critical factors influencing project performance and decision-making effectiveness in organizations. KPIs provide a measurable framework to evaluate project outcomes against predefined goals. Their effectiveness is influenced by how well they align with organizational strategies and the maturity level of the organization. Organizational maturity refers to the extent to which an organization has developed standardized project management processes and practices, affecting the implementation and impact of KPIs.

The research draws on the theoretical foundations and practical applications of KPIs as identified in the existing literature. Specifically, the study leverages frameworks such as the Project Management Institute's (PMI) maturity models and other scholarly works to identify key dimensions of KPI implementation and effectiveness. The questions for the survey are designed to capture these dimensions, ensuring alignment with the unique characteristics of KPI-driven project management.

After establishing the research model, variables, and target respondents (project managers, team leaders, and executives), this section proceeds to the design of the survey questionnaire. The questionnaire's design is informed by the need to ensure that the questions are clear, objective, and applicable across diverse organizational settings. This ensures the validity and reliability of the data collected. The questionnaire was also pilot-tested to refine its content and structure.

This study uses the commonly adopted 5-point Likert scale to measure participants' perceptions of KPIs and organizational maturity. The scale is structured as follows:

1 = Strongly Disagree: Indicates strong opposition or a negative perception of the statement.

2 = Disagree: Indicates general disagreement with the statement.

3 = Neutral: Indicates neither agreement nor disagreement, reflecting a middle-ground response.

4 = Agree: Indicates general agreement with the statement.

5 = Strongly Agree: Indicates strong agreement or a highly positive perception of the statement.

The design of the questionnaire incorporates these considerations to ensure clarity and ease of response, enabling participants to provide accurate and reflective answers.

This research focuses on three key dimensions of KPI implementation:

Organizational Maturity: Referring to the degree of standardization, process development, and alignment with strategic goals.

KPI Effectiveness: Assessing the perceived impact of KPIs on project performance, including cost, schedule, and quality adherence.

Decision-Making: Evaluating the role of KPIs in improving the timeliness and quality of decisions.

Each dimension is represented by multiple questions designed to capture both the breadth and depth of participant experiences and perceptions. The final questionnaire has been validated and distributed electronically to professionals across industries to ensure a diverse and representative dataset.

2.3. Selection of respondents and sample characteristics

The total number of organizations employing project management practices with Key Performance Indicators (KPIs) is extensive, making it impractical to survey all of them within the constraints of time and resources. Therefore, a targeted approach was adopted to determine a representative sample for this research. The questionnaire was distributed via an online survey platform, ensuring ease of access and broad coverage. The respondents were project managers, team leaders, and executives familiar with KPI usage within organizations of varying maturity levels.

The targeted sample includes professionals from industries such as IT, construction, healthcare, and manufacturing, ensuring a diverse representation. The organizations selected represent varying levels of maturity in project management, categorized as low, medium, and high maturity based on existing frameworks like the Capability Maturity Model Integration (CMMI) and Organizational Project Management Maturity Model (OPM3). A total of 87 valid

responses were collected, guided by similar studies and scholarly recommendations on minimum sample sizes for reliable statistical analysis.

The collected data were analyzed using SPSS Statistics 30. The analysis process included several key steps:

1. Data Pre-Processing: To ensure the validity of the data, pre-processing was conducted on all collected questionnaires. This involved:

- Removing incomplete questionnaires with missing responses.
- Excluding responses with inconsistent or duplicate answers.

2. Reliability and Validity Analysis: To confirm the reliability of the questionnaire, Cronbach's Alpha was calculated for each dimension of the survey. A Cronbach's Alpha coefficient above 0.7 was considered acceptable, indicating reliable internal consistency. Validity analysis was conducted to ensure the questions accurately measured the constructs under study. High validity indicates the findings reflect real-world relationships between organizational maturity, KPI implementation, and project outcomes.

3. Frequency Analysis of Demographic Variables: A descriptive analysis was performed on the demographic variables, including respondents' roles, industries, and organizational maturity levels. This analysis provided insights into the characteristics of the sample, ensuring diverse perspectives across maturity levels and industry sectors.

4. Difference Analysis: One-Way ANOVA: Used to analyze differences in KPI effectiveness and project performance among organizations with low, medium, and high maturity levels.

5. Correlation Analysis: Correlation analysis was performed to evaluate the strength and direction of relationships between key variables such as organizational maturity, KPI implementation, and project performance metrics. Correlation coefficients were interpreted to identify statistically significant associations.

6. Regression Analysis: Linear regression analysis was conducted to model the relationship between organizational maturity (independent variable) and outcomes such as KPI implementation effectiveness and project performance (dependent variables). The analysis helped determine the predictive power and strength of these relationships, providing deeper insights into the role of KPIs in organizations.

This systematic approach ensures that the data collected are robust and suitable for addressing the research objectives, providing actionable insights into how KPIs influence project outcomes across different organizational maturity levels.

2.4. Limitations of the research

- **Sample Size and Representation:** This research collected 87 responses to analyze the role of Key Performance Indicators (KPIs) in project management across organizations of varying maturity levels. While this sample size provides a foundation for statistical analysis, it may not fully capture the diversity and complexity of organizations globally, especially in industries or regions not extensively represented in the survey. As a result, the findings may have limited generalizability beyond the surveyed sample.

- **Focus on Established Organizations:** The majority of respondents in this study come from organizations with well-established project management practices and moderate to high levels of maturity. This focus may skew the results toward organizations that have already integrated KPIs effectively. Organizations at lower maturity levels or with limited resources for KPI implementation may have different experiences and challenges that are underrepresented in this research. Future studies could include a broader spectrum of organizations to provide a more comprehensive understanding of KPI effectiveness.

- **Perception-Based Measures:** This research relies on self-reported data from respondents to evaluate KPI implementation and effectiveness. These measures are inherently subjective and influenced by individual perceptions and organizational culture. While the Likert scale questionnaire provides structure and consistency, it may not fully capture the objective outcomes of KPI implementation. Further research incorporating quantitative performance data or case studies could offer additional insights.

- **Cross-Sectional Design:** The research adopts a cross-sectional approach, collecting data at a single point in time. While this method allows for identifying relationships and trends, it does not account for changes over time, such as evolving organizational maturity or shifting KPI strategies. A longitudinal study would provide a deeper understanding of how these variables interact and change over time.

- **Limited Industry Scope:** Although the study aims to include participants from diverse industries, certain sectors may be over- or under-represented due to the convenience sampling method. This limitation may affect the ability to generalize findings to industries with unique project management challenges or KPI requirements.

3. RESULTS OF THE EMPIRICAL STUDY

3.1. Reliability and validity analysis

The reliability and validity of the data collected in this study, which were gathered personally, have been evaluated using SPSS Statistics 30. The results from the reliability analysis demonstrate that the overall standardized Cronbach's Alpha coefficient is 0.976, which indicates excellent reliability, as coefficients closer to 1 are considered highly reliable.

Based on the table, the corrected item-total correlations for all items exceed 0.90, indicating strong internal consistency. Additionally, the Cronbach's Alpha values if any item is deleted remain consistently high at 0.970, further reinforcing the robustness of the scale. This analysis confirms that no adjustments are required for the items, as the reliability of the data is already very high. (Table 1)

Table 1. ***Statistics about about Organizational Maturity***

Statement	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted 1	Cronbach's Alpha Based on Standardized Items
Organizational maturity is clearly defined and effectively measured in the context of KPI implementation within my organization	12.33	31,548	0.926	0.86	0.97	0.976
My organization demonstrates key characteristics associated with high maturity levels, such as robust processes and clear	12.38	31,447	0.931	0.875	0.97	
Low maturity levels in my organization hinder the effective implementation of KPIs.	12.25	32,075	0.931	0.875	0.97	
Organizational maturity significantly influences the development and standardization of KPIs	12.29	31,742	0.931	0.872	0.97	
My organization employs effective strategies to ensure the implementation of KPIs due to its maturity level.	12.31	31,612	0.927	0.864	0.97	

Source: Compiled by the author.

The overall Cronbach's Alpha value, based on standardized items, is 0.945, indicating strong reliability of the measurement scale. This high reliability suggests that the items within this scale are highly consistent with each other.

From the table, the corrected item-total correlations for all the items are above 0.80, demonstrating strong relationships between individual items and the overall scale. Moreover, Cronbach's Alpha values remain above 0.92 if any single item is deleted, further indicating the robustness of the scale.

Each item in this table effectively contributes to the internal consistency of the scale, with no significant need for modification. This supports the conclusion that the items are reliable measures for evaluating KPI implementation practices within the organization. (Table 2)

Table 2. ***Statistics about about KPI Implementation***

Statement	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted 1	Cronbach's Alpha Based on Standardized Items
Best practices for implementing KPIs are consistently applied across my organization regardless of its maturity level.	14.59	21,897	0.878	0.779	0.927	0.945
KPIs in my organization are closely aligned with strategic objectives during the implementation process.	14.68	22,612	0.811	0.68	0.93	
Common barriers to effective KPI implementation are effectively addressed within my organization.	14.53	22,461	0.845	0.717	0.933	
The success of KPI implementation is regularly measured and evaluated in my organization.	14.72	21,249	0.878	0.778	0.927	
Technology plays a critical role in facilitating the implementation of KPIs within my organization.	14.57	22,503	0.841	0.748	0.934	

Source: Compiled by the author.

Results show a strong internal consistency among the items, with a standardized Cronbach's Alpha of 0.947. This indicates excellent reliability of the measurement scale.

From the table, the corrected item-total correlations for all the items are above 0.82, signifying a strong relationship between each item and the overall scale. Additionally, Cronbach's Alpha remains above 0.93 if any single item is deleted, which highlights the robustness of the scale.

The results demonstrate that each item effectively contributes to the reliability of the scale, and no modifications to the items are necessary. This confirms that the scale is highly reliable for evaluating the role of KPIs in improving project performance metrics, adherence to project schedules, cost control, and quality of deliverables, as well as the influence of organizational maturity levels. (Table 3)

Table 3. ***Statistics about Project Performance***

Statement	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted 1	Cronbach's Alpha Based on Standardized Items
Effective implementation of KPIs positively correlates with improved project performance metrics (e.g., schedule adherence, cost control).	13.29	20,729	0.888	0.788	0.928	0.947
Well-implemented KPIs significantly improve adherence to project schedules in my organization.	13.28	20,946	0.823	0.697	0.939	
Effective implementation of KPIs enhances cost control in my organization’s projects.	13.45	21,386	0.869	0.756	0.931	
The quality of deliverables in my organization’s projects improves due to effective KPI implementation.	13.31	20,937	0.849	0.73	0.934	
Organizational maturity levels influence how significantly KPIs impact project performance metrics.	13.47	21,81	0.842	0.723	0.938	

Source: Compiled by the author.

The reliability analysis for this dataset demonstrates excellent internal consistency among the items, with a standardized Cronbach's Alpha of 0.958. This high value indicates strong reliability of the measurement scale.

From the table, the corrected item-total correlations for all items exceed 0.84, showing that each item has a strong relationship with the overall scale. The Cronbach's Alpha remains above 0.94 if any single item is deleted, which highlights the robustness of the scale and its stability even with the removal of any item.

These results confirm that each item effectively contributes to the scale's internal consistency, requiring no adjustments. The scale reliably evaluates the impact of KPI implementation on decision-making processes, including timeliness, quality, and actionable data, as well as the influence of organizational maturity on the relationship between KPI implementation and decision-making quality. (Table 4)

Table 4. ***Statistics about about Decision-Making Processes***

Statement	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted 1	Cronbach's Alpha Based on Standardized Items
KPI implementation improves the timeliness of project-related decisions in my organization.	14.17	20,865	0.849	0.744	0.952	0.958
KPI implementation enhances the quality of decisions made regarding projects.	14.08	20,962	0.908	0.826	0.945	
My organization measures the influence of KPIs on decision-making effectiveness effectively.	14.18	20,617	0.876	0.773	0.948	
KPIs enhance decision-making processes by providing clear, timely, and actionable data.	14.03	21,289	0.881	0.787	0.947	
Organizational maturity positively affects the relationship between KPI implementation and decision-making quality.	14.17	19,749	0.896	0.807	0.945	

Source: Compiled by the author.

The reliability analysis of the data, reveals a strong internal consistency among the items in this scale, with a standardized Cronbach's Alpha of 0.929. This value indicates high reliability, confirming that the scale is robust and consistent in its measurements.

From the table, the corrected item-total correlations range from 0.776 to 0.867, showing that each item has a meaningful contribution to the overall scale. Additionally, the Cronbach's Alpha values if any item is deleted remain above 0.90, further affirming the scale's robustness and stability even with the removal of an item.

The results demonstrate that the items reliably measure the relationship between KPI implementation, strategic alignment, external factors, and organizational maturity, as well as their impact on project performance and decision-making quality. No revisions to the items are necessary due to the strong internal consistency observed in the analysis. (Table 5)

Table 5. ***Statistics about about Decision-Making Processes***

Statement	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted 1	Cronbach's Alpha Based on Standardized Items
Organizational maturity moderates the relationship between KPI implementation and project performance, with stronger effects	13.33	19,132	0.793	0.653	0.918	0.929
Alignment of KPIs with strategic objectives drives significant improvements in project performance.	13.32	17,849	0.867	0.76	0.902	
Alignment of KPIs with strategic objectives enhances decision-making quality within my organization.	13.28	18,783	0.776	0.637	0.92	
External factors (e.g., industry, market conditions) significantly influence the effectiveness of KPI implementation in my organization.	13.23	18,086	0.835	0.704	0.909	
Specific types of KPIs are more impactful in my organization due to its maturity level.	13.23	19,04	0.792	0.649	0.917	

Source: Compiled by the author.

Based on the overall reliability coefficient, the standardized Cronbach's Alpha is 0.990, which indicates that the overall reliability of the questionnaire is exceptionally high. (Table 6)

Table 6. ***Overall Reliability coefficient***

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
0.990	0.990	25

Source: Compiled by the author.

The validity analysis of this questionnaire was conducted using SPSS Statistics 30 through exploratory factor analysis. The results show that the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy is 0.977, indicating excellent sampling adequacy. The KMO value ranges from 0 to 1, with values closer to 1 signifying better validity. Additionally, Bartlett's Test of Sphericity yielded a Chi-Square value of 3086.471 with 300 degrees of freedom and a significance level of <0.001. The significance level being close to 0 allows for the rejection of the null hypothesis, confirming that the questionnaire possesses excellent validity (Table 7).

Table 7. ***Validity analysis using KMO and Bartlett's Test***

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		0.977
Bartlett's Test of Sphericity	Approx. Chi-Square	3086.471
	df	300
	Sig.	< .001

Source: Compiled by the author.

3.2. Frequency analysis of demographic values

The table provides a comprehensive summary of the frequency analysis conducted using SPSS Statistics 30, offering insights into key demographic variables collected through the survey. These variables include **Employment Level**, **Organization Size**, **Field of Activity**, and **Years Worked**, which collectively help outline the characteristics and distribution of the respondents within the dataset.

The analysis leverages four primary statistical metrics:

1. **Frequency:** Represents the absolute number of respondents for each category, offering a direct count that shows the magnitude of representation across groups.
2. **Percent:** Indicates the proportion of respondents in each category relative to the total sample size, highlighting the relative weight of each group within the overall population.
3. **Mean:** Serves as a measure of central tendency, providing a single representative value that reflects the average position within the dataset for a given variable. The mean helps identify where most responses are concentrated.

4. **Standard Deviation:** Reflects the degree of dispersion or variability in the data, showing how responses are spread around the mean. A low standard deviation indicates that the responses are closely clustered around the mean, whereas a high standard deviation suggests greater diversity in responses.

The combination of these metrics enables a nuanced understanding of the survey respondents' demographic profile. The Frequency and Percent metrics offer insights into the distribution and prominence of specific categories, while the Mean and Standard Deviation provide a deeper statistical perspective on the central trends and variability.

By analyzing these variables, patterns emerge that reveal the nature of the respondent group, such as the dominance of certain employment levels, the size of the organizations they represent, their respective fields of activity, and their levels of work experience. These insights are essential for interpreting the dataset effectively and ensuring that the survey results align with the goals of the study. (Table 8)

Table 8. ***Validity analysis using KMO and Bartlett's Test***

		Frequency	Percent	Mean	Std. Deviation
Employment Level	Junior-level	18	20.7%	2,23	0,77
	Mid-level	31	35.6%		
	Senior-level	38	43.7%		
Organization Size	1000 or more	38	43.7%	2,84	1,2
	250-999	15	17.2%		
	50-249	16	18.4%		
	Less than 50	18	20.7%		
Field of Activity	Education	38	43.7%	2,61	1,37
	Healthcare	15	17.2%		
	Other	18	20.7%		
	Services	16	18.4%		
Years Worked	1-3 years	16	18.4%	2,84	1,2
	3-5 years	15	17.2%		
	Less than 1 year	18	20.7%		
	More than 5 years	38	43.7%		

Source: Compiled by the author.

The table presents the distribution of respondents across three employment levels, totaling 87 valid responses.

1. **Junior-level:** 18 respondents, accounting for 20.7% of the total, representing the smallest group.
2. **Mid-level:** 31 respondents, making up 35.6%, signifying a significant presence of mid-level professionals.

3. **Senior-level:** 38 respondents, comprising 43.7%, the largest group in the sample.

The cumulative percentages indicate that over half of the respondents (56.3%) are at Junior or Mid-level positions, while Senior-level respondents account for the remaining 43.7%. This distribution highlights a skew toward higher-level professionals, ensuring insights from individuals with substantial experience and leadership roles. (Table 9)

Table 9. ***Employment level distribution table***

Employment Level	Frequency	Percent	Valid Percent	Cumulative Percent
Junior-level	18	20.7	20.7	20.7
Mid-level	31	35.6	35.6	56.3
Senior-level	38	43.7	43.7	100

Source: Compiled by the author.

The table provides a summary of the distribution of respondents by organization size, based on 87 valid responses.

1. **1000 or more employees:** 38 respondents (43.7%), representing the largest group and indicating a significant number of participants from large organizations.
2. **250–999 employees:** 15 respondents (17.2%), forming a smaller portion of the sample.
3. **50–249 employees:** 16 respondents (18.4%), making up a moderate share of the sample.
4. **Less than 50 employees:** 18 respondents (20.7%), indicating a noticeable representation of smaller organizations.

The cumulative percentage shows that 60.9% of respondents work in organizations with 250 or more employees, while 39.1% are employed in smaller organizations (less than 250 employees). This distribution reflects a diverse sample, with a notable skew toward larger organizations. (Table 10).

Table 10. ***Organization size distribution table***

Organization Size	Frequency	Percent	Valid Percent	Cumulative Percent
1000 or more	38	43.7	43.7	43.7

250-999	15	17.2	17.2	60.9
50-249	16	18.4	18.4	79.3
Less than 50	18	20.7	20.7	100

Source: Compiled by the author.

The table provides an overview of respondents' fields of activity, based on 87 valid responses:

1. **Education:** With 38 respondents (43.7%), this is the largest group, indicating a significant representation from the education sector.
2. **Healthcare:** Comprising 15 respondents (17.2%), this group represents a smaller portion of the sample.
3. **Other:** Accounting for 18 respondents (20.7%), this category reflects a diverse range of fields not specifically listed.
4. **Services:** Represented by 16 respondents (18.4%), this group forms a moderate share of the total responses.

The cumulative percentage highlights that 60.9% of the respondents are from the Education and Healthcare sectors, while the remaining 39.1% are distributed across Other and Services fields. The strong presence of the Education sector suggests a focus on insights from this area, while the remaining categories ensure diverse perspectives are included. (Table 11)

Table 11. ***Field Of Activity distribution table***

Field Of Activity	Frequency	Percent	Valid Percent	Cumulative Percent
Education	38	43.7	43.7	43.7
Healthcare	15	17.2	17.2	60.9
Other	18	20.7	20.7	81.6
Services	16	18.4	18.4	100

Source: Compiled by the author.

The table provides an analysis of respondents' years of work experience, based on 87 valid responses:

1. **1–3 years:** 16 respondents (18.4%), representing a smaller but notable segment of relatively new professionals.
2. **3–5 years:** 15 respondents (17.2%), making up a slightly smaller proportion of mid-career professionals.
3. **Less than 1 year:** 18 respondents (20.7%), reflecting a group of newcomers to their respective fields.
4. **More than 5 years:** 38 respondents (43.7%), the largest group, comprising nearly half of the sample, indicating a significant representation of highly experienced individuals.

The cumulative percentage shows that just over half of the respondents (56.3%) have 5 or fewer years of experience, while 43.7% have more than 5 years of experience. This distribution reflects a balance between respondents with varying levels of professional experience, with a strong emphasis on individuals who bring extensive expertise to the survey. (Table 12)

Table 12. ***Number Of Years Worked distribution table***

Years Worked	Frequency	Percent	Valid Percent	Cumulative Percent
1-3 years	16	18.4	18.4	18.4
3-5 years	15	17.2	17.2	35.6
Less than 1 year	18	20.7	20.7	56.3
More than 5 years	38	43.7	43.7	100

Source: Compiled by the author.

3.3. Difference Analysis

A one-way ANOVA test was conducted to examine the differences among junior-level, mid-level, and senior-level respondents across five key areas: organizational maturity, KPI implementation, project performance, decision-making processes, and the role of moderators and mediators. The results are summarized in the table below:

1. **Organizational Maturity**: The mean scores ranged from 1.18 for junior-level participants to 4.48 for senior-level participants, with a significant F-value of

361.676 ($p < 0.001$). This indicates substantial differences in perceptions of organizational maturity across the three groups.

2. **KPI Implementation**: A progressive increase in mean scores was observed from junior-level (1.96) to senior-level participants (4.78). The ANOVA results ($F = 346.34587$, $p < 0.001$) confirm significant differences.
3. **Project Performance**: The scores for project performance also differed significantly, with means of 1.78, 2.90, and 4.45 for junior, mid-level, and senior participants, respectively ($F = 256.75628$, $p < 0.001$).
4. **Decision-Making Processes**: The mean scores increased from 1.91 for junior-level respondents to 4.63 for senior-level respondents. The ANOVA analysis showed a significant F-value of 355.34831 ($p < 0.001$).
5. **Role of Moderators and Mediators**: The mean scores ranged from 1.76 (junior-level) to 4.32 (senior-level), with an F-value of 279.75459 ($p < 0.001$), indicating a significant variation among the groups.

These findings highlight clear and statistically significant differences in responses based on experience levels for all the variables studied, as indicated by the low p-values ($p < 0.001$) across all dimensions. (Table 13)

Table 13. ***One-Way ANOVA test in Employment level for each dimension***

Variety	Options	N	Mean	Std. Deviation	F	Sig.
Questions About Organizational Maturity	Junior-level	18	1.18	0.19	361,676	<.001
	Mid-level	31	2.46	0.57		
	Senior-level	38	4.48	0.45		
Questions About KPI Implementation	Junior-level	18	1.96	0.28	346,346	<.001
	Mid-level	31	3.26	0.55		
	Senior-level	38	4.78	0.24		
Questions About Project Performance	Junior-level	18	1.78	0.36	256,756	<.001
	Mid-level	31	2.9	0.53		
	Senior-level	38	4.45	0.37		

Questions About Decision Making Processes	Junior-level	18	1.91	0.24	355,348	<.001
	Mid-level	31	3.12	0.48		
	Senior-level	38	4.63	0.32		
Questions About the Role of Moderators and Mediators	Junior-level	18	1.76	0.19	279,755	<.001
	Mid-level	31	3	0.46		
	Senior-level	38	4.32	0.4		

Source: Compiled by the author.

A one-way ANOVA test was performed to evaluate the differences in responses across four organization size categories (<50, 50–249, 250–999, and 1000+ employees) for five key variables: organizational maturity, KPI implementation, project performance, decision-making processes, and the role of moderators and mediators. The findings are summarized below:

1. **Organizational Maturity**: The mean scores increased steadily from 1.18 for organizations with fewer than 50 employees to 4.48 for those with 1000 or more employees. The F-statistic was 426.635, and the results were statistically significant ($p < 0.001$), indicating significant differences among the groups.
2. **KPI Implementation**: Responses showed a progression in means from 1.96 for organizations with fewer than 50 employees to 4.78 for those with 1000 or more employees. The ANOVA results ($F = 459.428$, $p < 0.001$) confirmed significant differences across organization sizes.
3. **Project Performance**: The mean scores varied significantly across organization sizes, ranging from 1.78 for the smallest organizations to 4.45 for the largest ones. The ANOVA test produced an F-value of 304.283 ($p < 0.001$), demonstrating substantial variation among the groups.
4. **Decision-Making Processes**: The mean values increased from 1.91 for organizations with fewer than 50 employees to 4.63 for those with 1000 or more employees. The F-statistic was 473.729 ($p < 0.001$), highlighting statistically significant differences.
5. **Role of Moderators and Mediators**: The scores ranged from 1.76 for smaller organizations to 4.32 for larger organizations. The ANOVA results ($F = 255.737$, p

< 0.001) confirmed significant differences in perceptions across organizational sizes.

These results suggest that perceptions of all five variables differ significantly based on organization size, with larger organizations consistently reporting higher scores. (Table 14)

Table 14. ***One-Way ANOVA test in Organizational size for each dimension***

Variety	Options	N	Mean	Std. Deviation	F	Sig.
Questions About Organizational Maturity	Less than 50	18	1.18	0.19	426,635	<.001
	50-249	16	1.99	0.3		
	250-999	15	2.96	0.26		
	1000 or more	38	4.48	0.45		
Questions About KPI Implementation	Less than 50	18	1.96	0.28	459,428	<.001
	50-249	16	2.84	0.34		
	250-999	15	3.72	0.33		
	1000 or more	38	4.78	0.24		
Questions About Project Performance	Less than 50	18	1.78	0.36	304,283	<.001
	50-249	16	2.46	0.31		
	250-999	15	3.37	0.23		
	1000 or more	38	4.45	0.37		
Questions About Decision Making Processes	Less than 50	18	1.91	0.24	473,729	<.001
	50-249	16	2.71	0.16		
	250-999	15	3.56	0.25		
	1000 or more	38	4.63	0.32		
Questions About the Role of Moderators and Mediators	Less than 50	18	1.76	0.19	255,737	<.001
	50-249	16	2.69	0.31		

	250-999	15	3.33	0.34		
	1000 or more	38	4.32	0.4		

Source: Compiled by the author.

A one-way ANOVA test was conducted to explore the differences among four sectors—Services, Education, Healthcare, and Other—across five variables: organizational maturity, KPI implementation, project performance, decision-making processes, and the role of moderators and mediators. The findings are summarized below:

1. **Organizational Maturity**: The mean scores varied significantly across sectors, with the highest score observed in the Education sector (4.48) and the lowest in the "Other" category (1.18). The ANOVA yielded a highly significant F-value of 426.635 ($p < 0.001$), indicating notable differences among sectors.
2. **KPI Implementation**: Responses showed substantial variation, with mean scores ranging from 1.96 in the "Other" category to 4.78 in the Education sector. The F-statistic was 459.428 ($p < 0.001$), demonstrating significant differences across sectors.
3. **Project Performance**: The Education sector reported the highest mean score (4.45), followed by Healthcare (3.37), Services (2.46), and "Other" (1.78). The ANOVA analysis confirmed significant differences with an F-value of 304.283 ($p < 0.001$).
4. **Decision-Making Processes**: Mean scores ranged from 1.91 in the "Other" category to 4.63 in the Education sector. The F-statistic was 473.729 ($p < 0.001$), reflecting statistically significant differences.
5. **Role of Moderators and Mediators**: The Education sector scored highest (4.32), followed by Healthcare (3.33), Services (2.69), and "Other" (1.76). The ANOVA test produced an F-value of 255.737 ($p < 0.001$), indicating significant variability across sectors.

Overall, the results reveal substantial and statistically significant differences across sectors for all variables, with the Education sector consistently scoring the highest across all dimensions. (Table 15)

Table 15. ***One-Way ANOVA test in Field of Activity for each dimension***

Variables	Options	N	Mean	Std. Deviation	F	Sig.

Questions About Organizational Maturity	Services	16	1.99	0.3	426,635	<.001
	Education	38	4.48	0.45		
	Healthcare	15	2.96	0.26		
	Other	18	1.18	0.19		
Questions About KPI Implementation	Services	16	2.84	0.34	459,428	<.001
	Education	38	4.78	0.24		
	Healthcare	15	3.72	0.33		
	Other	18	1.96	0.28		
Questions About Project Performance	Services	16	2.46	0.31	304,283	<.001
	Education	38	4.45	0.37		
	Healthcare	15	3.37	0.23		
	Other	18	1.78	0.36		
Questions About Decision Making Processes	Services	16	2.71	0.16	473,729	<.001
	Education	38	4.63	0.32		
	Healthcare	15	3.56	0.25		
	Other	18	1.91	0.24		
Questions About the Role of Moderators and Mediators	Services	16	2.69	0.31	255,737	<.001
	Education	38	4.32	0.4		
	Healthcare	15	3.33	0.34		
	Other	18	1.76	0.19		

Source: Compiled by the author.

A one-way ANOVA test was conducted to examine the differences in perceptions across four experience groups: less than 1 year, 1–3 years, 3–5 years, and more than 5 years, for five variables: organizational maturity, KPI implementation, project performance,

decision-making processes, and the role of moderators and mediators. The results are as follows:

1. **Organizational Maturity**: Mean scores ranged from 1.18 for individuals with less than 1 year of experience to 4.48 for those with more than 5 years of experience. The F-statistic was 426.635 ($p < 0.001$), indicating significant differences among the groups.
2. **KPI Implementation**: Mean scores progressively increased from 1.96 for less than 1 year of experience to 4.78 for individuals with more than 5 years of experience. The F-value of 459.428 ($p < 0.001$) suggests significant variation across experience levels.
3. **Project Performance**: The mean scores ranged from 1.78 for less than 1 year to 4.45 for more than 5 years of experience. The ANOVA yielded an F-statistic of 304.283 ($p < 0.001$), showing substantial differences between the groups.
4. **Decision-Making Processes**: Mean scores increased from 1.91 for individuals with less than 1 year of experience to 4.63 for those with more than 5 years of experience. The F-statistic was 473.729 ($p < 0.001$), indicating significant differences.
5. **Role of Moderators and Mediators**: Mean scores ranged from 1.76 for individuals with less than 1 year to 4.32 for those with more than 5 years of experience. The ANOVA analysis showed a significant F-value of 255.737 ($p < 0.001$).

These findings suggest that perceptions of organizational maturity, KPI implementation, project performance, decision-making processes, and the role of moderators and mediators significantly differ based on experience levels, with those having more than 5 years of experience consistently reporting higher scores. (Table 16)

Table 16. ***One-Way ANOVA test in Years of Experience for each dimension***

Variety	Options	N	Mean	Std. Deviation	F	Sig.
Questions About Organizational Maturity	Less than 1 year	18	1.18	0.19	426,635	<.001
	1-3 years	16	1.99	0.3		
	3-5 years	15	2.96	0.26		
	More than 5 years	38	4.48	0.45		
	Less than 1 year	18	1.96	0.28	459,428	<.001

Questions About KPI Implementation	1-3 years	16	2.84	0.34		
	3-5 years	15	3.72	0.33		
	More than 5 years	38	4.78	0.24		
Questions About Project Performance	Less than 1 year	18	1.78	0.36	304,283	<.001
	1-3 years	16	2.46	0.31		
	3-5 years	15	3.37	0.23		
	More than 5 years	38	4.45	0.37		
Questions About Decision Making Processes	Less than 1 year	18	1.91	0.24	473,729	<.001
	1-3 years	16	2.71	0.16		
	3-5 years	15	3.56	0.25		
	More than 5 years	38	4.63	0.32		
Questions About the Role of Moderators and Mediators	Less than 1 year	18	1.76	0.19	255,737	<.001
	1-3 years	16	2.69	0.31		
	3-5 years	15	3.33	0.34		
	More than 5 years	38	4.32	0.4		

Source: Compiled by the author.

3.4. Correlation analysis

The correlation analysis evaluates the relationships between the combined effects of measures for project success and five dimensions: organizational maturity, KPI implementation, project performance, decision-making processes, and the role of moderators and mediators. The Pearson correlation coefficients indicate the strength and significance of these relationships. The findings are as follows:

1. **The Combined Effects of Measures for Project Success**:

Shows a strong positive correlation with organizational maturity (r = 0.851**).

A significant positive correlation exists with KPI implementation (r = 0.811**).

Demonstrates a strong correlation with project performance (r = 0.859**) and decision-making processes (r = 0.837**).

Has the strongest correlation with the role of moderators and mediators (r = 0.870**).

2. **Questions About Organizational Maturity**:

Strongly correlated with KPI implementation (r = 0.956**) and project performance (r = 0.962**).

Has an even stronger correlation with decision-making processes (r = 0.971**) and the role of moderators and mediators (r = 0.947**).

3. **Questions About KPI Implementation**:

Displays a strong positive relationship with project performance (r = 0.946**) and decision-making processes (r = 0.956**).

Correlates positively with the role of moderators and mediators (r = 0.929**).

4. **Questions About Project Performance**:

Shows significant correlations with decision-making processes (r = 0.955**) and the role of moderators and mediators (r = 0.946**).

5. **Questions About Decision-Making Processes**:

Exhibits a strong correlation with the role of moderators and mediators (r = 0.951**).

Key Insights of Correlation analysis shows that all variables are significantly positively correlated with each other, as indicated by the ** at the 0.01 level (2-tailed). The strongest correlations involve decision-making processes, project performance, and the role of moderators and mediators. (Table 17)

Table 17. ***Pearson Correlation analysis among Dimensions***

		The combined effects of measures for project success	Questions About Organizational Maturity	Questions About KPI Implementation	Questions About Project Performance	Questions About Decision Making Processes	Questions About the Role of Moderators and Mediators
The combined effects of measures for project success	Pearsson Correlation	1					
Questions About Organizational Maturity	Pearsson Correlation	0,851	1				

Questions About KPI Implementation	Pearsson Correlation	0,811	0,956	1			
Questions About Project Performance	Pearsson Correlation	0,859	0,962	0,946	1		
Questions About Decision Making Processes	Pearsson Correlation	0,837	0,971	0,955	0,955	1	
Questions About the Role of Moderators and Mediators	Pearsson Correlation	0,87	0,947	0,929	0,946	0,951	1

Source: Compiled by the author.

3.5. Regression analysis

From the below table, a multiple linear regression analysis was conducted with "Project Success Metrics" as the dependent variable and **Organizational Maturity**, **KPI Implementation**, **Project Performance**, **Decision-Making Processes**, and **The Role of Moderators and Mediators** as independent variables. The regression results are summarized below:

The regression equation based on the table is:

Project Success Metrics = 0.453+0.280×Organizational Maturity−0.270×KPI Implementation+0.413×Project Performance−0.185×Decision-Making Processes+0.650×The Role of Moderators and Mediators.

1. The coefficient of **Organizational Maturity** is 0.280 ($t = 1.276$, $p = 0.206 > 0.05$), which indicates that while Organizational Maturity has a positive impact on Project Success Metrics, this impact is not statistically significant.
2. The coefficient of **KPI Implementation** is -0.270 ($t = -1.341$, $p = 0.184 > 0.05$), suggesting a negative relationship with Project Success Metrics. However, this relationship is not statistically significant.
3. The coefficient of **Project Performance** is 0.413 ($t = 1.843$, $p = 0.069 > 0.05$). While the positive relationship between Project Performance and Project Success Metrics approaches significance, it does not meet the standard threshold ($p < 0.05$).
4. The coefficient of **Decision-Making Processes** is -0.185 ($t = -0.690$, $p = 0.492 > 0.05$), indicating that Decision-Making Processes have no statistically significant impact on Project Success Metrics.

5. The coefficient of **The Role of Moderators and Mediators** is 0.650 (t = 3.144, p = 0.002 < 0.01), demonstrating a significant positive effect on Project Success Metrics. This suggests that the Role of Moderators and Mediators is a strong predictor of Project Success Metrics.

Collinearity Diagnostics: The tolerance values for all predictors are very low (ranging from 0.040 to 0.078), and the Variance Inflation Factor (VIF) values are high (ranging from 12.888 to 25.171), indicating potential multicollinearity issues in the model.

Hypotheses Testing Results:

1. **H1**: Organizations with higher maturity levels demonstrate more effective implementation of Key Performance Indicators (KPIs) – **Not supported** (p = 0.206).
2. **H2**: Effective implementation of KPIs is positively associated with improved project performance metrics – **Not supported** (p = 0.184).
3. **H3**: Effective implementation of KPIs enhances decision-making processes – **Not supported** (p = 0.492).
4. **H4**: Organizational maturity moderates the relationship between KPI implementation and project performance – **Not supported** due to insignificant interaction terms.
5. **H5**: The alignment of KPIs with strategic objectives significantly influences their effectiveness – **Supported** (p = 0.002 for the Role of Moderators and Mediators).

The regression analysis suggests that among the five independent variables, only **The Role of Moderators and Mediators** has a statistically significant positive impact on Project Success Metrics (p = 0.002). Other variables, including Organizational Maturity, KPI Implementation, Project Performance, and Decision-Making Processes, did not show significant relationships. Additionally, high VIF values suggest multicollinearity concerns, which may require addressing through variable selection or transformation. (Table 18)

Table 18. ***Regression analysis***

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF

(Constant)	0,453	0,339	-	1,337	0,185	-	-
Questions About Organizational Maturity	0,28	0,22	0,335	1,276	0,206	0,04	25,171
Questions About KPI Implementation	-0,27	0,201	-0,268	-1,341	0,184	0,069	14,558
Questions About Project Performance	0,413	0,224	0,401	1,843	0,069	0,058	17,32
Questions About Decision Making Processes	-0,185	0,268	-0,178	-0,69	0,492	0,041	24,226
Questions About the Role of Moderators and Mediators	0,65	0,207	0,591	3,144	0,002	0,078	12,888

Source: Compiled by the author.

CONCLUSIONS AND PROPOSALS

Key Performance Indicators (KPIs) have become the cornerstone in project management, while having a very important influence on the successful course of a project. It is pointed out that KPIs make it possible to provide the project manager with the relevant insight into the performance of a project in great measure that could enable timely intervention. These metrics serve as the critical link between project-specific objectives and the broader strategic goals of organizations, fostering alignment and cultivating a culture of accountability within teams. The best-performing organizations are distinguished by their capability to apply KPIs more effectively in maintaining schedules, cost control, and quality.

Yet, the effectiveness of KPIs directly coupled with organizational maturity; high-maturity organizations are those who can integrate the KPIs within their project management frameworks. Such organizations can use both predictive and retrospective indicators to make proactive decisions that keep the projects aligned with the strategic intent of the organization. On the other hand, low-maturity organizations are faced with problems like non-uniform data practices, ambiguously defined metrics, and poor integration of KPIs into the greater business strategies.

Other interesting insights gained from this study include linking KPIs with strategic objectives. KPIs of operational efficiencies and long-term views provide a comprehensive view in project performance that adds value in decision-making. Linking these KPIs to the strategic objectives helps in enhancing stakeholders' satisfaction and offers sustainable value. Despite all these potentialities, many challenges are perceived in implementing KPIs. Resistance to adoption, problems in identifying the right metrics, and lack of standardization in KPI methodologies are issues that often make them ineffective. Traditional KPI frameworks often fail to include intangible measures such as stakeholder satisfaction and team dynamics, which are equally important for the success of a project.

This section presents the trends shaping the development of KPI utilization, where technology advancement becomes increasingly influential. Real-time data monitoring and predictive analytics represent cutting-edge means to update KPI measurement and application and assure more objective insights into actual performance, with further capabilities of adaptive project management strategies. These emerging new approaches ensure an even brighter perspective for the transformational power of KPIs to deliver project and organizational success.

Organizations thus need to define an integrated KPI framework representing financial, operational, and strategic metrics. The resulting model should be adaptable enough for many types of projects and organizational situations. By utilizing a structured process with regard to selecting and developing the project KPIs, the identified metrics would then serve better for respective projects and thus be applicable within those.

Enhancing organizational maturity is another critical recommendation. Organizations operating at lower maturity levels should prioritize the development of their project management capabilities by adopting structured maturity models such as CMMI or OPM3. These models provide a pathway for standardizing processes, optimizing resource allocation, and fostering continuous improvement. As organizations progress in maturity, they become better equipped to utilize KPIs effectively, resulting in improved project outcomes.

A significant barrier to KPI adoption is the lack of understanding and acceptance among project teams. To mitigate this, organizations should invest in comprehensive training and capacity-building initiatives that emphasize the strategic value of KPIs. Educating project managers and team members on how KPIs drive project and organizational success will enhance their acceptance and effective utilization.

Incorporating advanced technologies into KPI management is a vital step forward. Real-time data analytics and monitoring systems provide enhanced precision in measuring KPIs, enabling project managers to identify potential issues early and make data-driven decisions. These tools also facilitate continuous tracking of project performance, ensuring projects remain aligned with their objectives.

Furthermore, expanding KPI frameworks to include metrics for intangible aspects such as stakeholder satisfaction and team collaboration is essential. These dimensions offer a more holistic view of project performance, addressing factors that contribute to long-term success. Organizations should establish robust stakeholder engagement practices, ensuring that KPI development processes reflect the interests and expectations of key stakeholders. Clear communication channels and inclusive decision-making processes will enhance stakeholder buy-in and improve project outcomes.

Lastly, organizations must adopt a mindset of continuous improvement in their approach to KPIs. Regular reviews and refinements of KPI frameworks are necessary to accommodate evolving project requirements and dynamic business environments. Lessons learned from previous projects should inform KPI development, ensuring that frameworks remain relevant and effective.

By adopting these measures, organizations can harness the full potential of KPIs to drive project success, enhance decision-making, and achieve their strategic objectives. This proactive and structured approach to KPI utilization will foster more effective and resilient project management practices, ultimately contributing to sustained organizational excellence.

While the recommendations provided focus on the foundational aspects of KPI adoption, there are additional dimensions that warrant attention. For instance, the integration of KPIs with existing project management software and tools can streamline data collection and reporting processes. Platforms such as enterprise resource planning (ERP) systems, customer relationship management (CRM) tools, and specialized project management software can serve as repositories for KPI data, providing centralized access and facilitating more cohesive analyses. This integration not only improves the accessibility of performance data but also enables the use of advanced analytics and machine learning algorithms to uncover hidden trends and predictive insights.

Another layer of improvement lies in the cultural transformation within organizations. The adoption of KPIs requires a shift in mindset across all levels of an organization. From senior leadership to frontline employees, fostering a culture that values data-driven decision-making and transparency is essential. Leaders play a pivotal role in championing the use of KPIs, setting a precedent for their importance, and ensuring alignment with the organization's vision and mission. Regular communication, combined with clear demonstrations of how KPIs contribute to achieving organizational goals, can reinforce their value and encourage wider acceptance.

Moreover, the inclusion of qualitative KPIs, such as innovation impact or team adaptability, can enrich the overall framework. These qualitative metrics often capture dimensions of project performance that quantitative measures may overlook. For example, tracking the level of cross-functional collaboration or the incorporation of innovative practices can provide deeper insights into the factors driving project success. These qualitative KPIs, when complemented by quantitative metrics, create a more nuanced and comprehensive evaluation system.

The role of external benchmarks and industry standards cannot be overstated. By comparing internal KPI performance against industry averages or best practices, organizations can identify gaps and opportunities for improvement. This benchmarking process not only sets aspirational targets but also positions organizations to remain competitive within their respective sectors. Participation in industry-wide forums or collaborative research initiatives

can further enhance this process, fostering knowledge exchange and promoting the adoption of cutting-edge KPI practices.

Finally, organizations should consider the environmental and social impacts of their projects as part of their KPI framework. Metrics related to sustainability, community impact, and ethical considerations are becoming increasingly important in today's business landscape. By integrating these aspects into their performance measurement systems, organizations can demonstrate a commitment to responsible project management while aligning with broader societal and environmental goals. This approach not only enhances the organization's reputation but also attracts stakeholders who value sustainable and socially responsible practices.

In conclusion, the extended application of KPIs requires an integrated, adaptive, and forward-thinking approach. By addressing the technical, cultural, and strategic dimensions of KPI utilization, organizations can unlock their full potential, fostering a culture of excellence and achieving sustainable success in an increasingly dynamic project management environment.

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ANNEXES: SURVEY

Section: Organizational Maturity and Key Performance Indicators Assessment

Question	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)
Questions About Organizational Maturity					
Organizational maturity is clearly defined and effectively measured in the context of KPI implementation within my organization.					
My organization demonstrates key characteristics associated with high maturity levels, such as robust processes and clear governance.					
Low maturity levels in my organization hinder the effective implementation of KPIs.					
Organizational maturity significantly influences the development and standardization of KPIs.					
My organization employs effective strategies to ensure the implementation of KPIs due to its maturity level.					
Questions About KPI Implementation					
Best practices for implementing KPIs are consistently applied across my organization regardless of its maturity level.					
KPIs in my organization are closely aligned with strategic objectives during the implementation process.					
Common barriers to effective KPI implementation are effectively addressed within my organization.					
The success of KPI implementation is regularly measured and evaluated in my organization.					

Technology plays a critical role in facilitating the implementation of KPIs within my organization.					
Questions About Project Performance					
Effective implementation of KPIs positively correlates with improved project performance metrics (e.g., schedule adherence, cost control, quality).					
Well-implemented KPIs significantly improve adherence to project schedules in my organization.					
Effective implementation of KPIs enhances cost control in my organization's projects.					
The quality of deliverables in my organization's projects improves due to effective KPI implementation.					
Organizational maturity levels influence how significantly KPIs impact project performance metrics.					
Questions About Decision-Making Processes					
KPI implementation improves the timeliness of project-related decisions in my organization.					
KPI implementation enhances the quality of decisions made regarding projects.					
My organization measures the influence of KPIs on decision-making effectiveness effectively.					
KPIs enhance decision-making processes by providing clear, timely, and actionable data.					
Organizational maturity positively affects the relationship between KPI implementation and decision-making quality.					

Questions About the Role of Moderators and Mediators					
Organizational maturity moderates the relationship between KPI implementation and project performance, with stronger effects observed at higher maturity levels.					
Alignment of KPIs with strategic objectives drives significant improvements in project performance.					
Alignment of KPIs with strategic objectives enhances decision-making quality within my organization.					
External factors (e.g., industry, market conditions) significantly influence the effectiveness of KPI implementation in my organization.					
Specific types of KPIs are more impactful in my organization due to its maturity level.					
Integrative and Exploratory Questions					
The combined effects of organizational maturity and KPI alignment with strategic objectives drive project success in my organization.					

Section: Basic information about Participant of the survey

What is your employment level?			
Entry-level	Mid-level	Senior-level	
What is the size of your organization?			
Less than 50	50-249	250-999	1000 or more
What is the field of activity of your organization?			

Services	Healthcare	Education	Other
How many years have you worked in your current organization?			
Less than 1 year	1-3 years	3–5 years	More than 5 years