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**The Impact of Using Dashboards on Enhancing Operation and
Maintenance Project Management Processes: A Case Study at Ibn Yaqub
for Construction in Saudi Arabia**

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أثر استخدام لوحات المعلومات القيادية في تحسين عمليات إدارة مشاريع التشغيل والصيانة: دراسة
حالة شركة ابن يعقوب للإنشاءات في المملكة العربية السعودية

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إهداء

إذا كان لبحتي قيمة، فذلك بفضل الله أولاً، ثم بفضل من ساندوني ووقفوا بجانبني في هذه الرحلة العلمية .

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إلى والدي العزيز - رحمه الله - الذي كان قدوتي ومصدر إلهامي، أستذكر دعمه وتشجيعه في كل خطوة.

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الحمد لله الذي وفقني وأعانني على إتمام هذا العمل والصلاة والسلام على خير خلقه محمد وعلى آله وصحبه أجمعين .

أتقدم بخالص الشكر والتقدير إلى والدي العزيزين الذين كان لهما الفضل الأكبر في دعمي وتحفيزي طوال

مسيرتي، لقد كانت دعواتهما ودعمهما المعنوي والنفسي هو القوة الدافعة التي مكنتني من تحقيق هذا الإنجاز .

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Dedication

If my research holds any value, it is first and foremost due to the grace of God and then the unwavering support of those who stood by me throughout this academic journey.

To those who, after God, played a significant role in helping me reach this milestone.

To those who taught me that perseverance and hard work are the true keys to success.

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Abstract

This study examines the impact of dashboards on enhancing operation and maintenance (O&M) project management at Ibn Yaqub for Construction, a leading firm in Saudi Arabia's urban development sector. The objective is to assess how dashboards contribute to improved resource allocation, proactive maintenance strategies, and data-driven decision-making. By providing real-time insights, dashboards enable project managers to monitor key performance indicators (KPIs), track equipment status, and optimize scheduling.

Conducted at Ibn Yaqub for Construction, this research employs statistical methodologies, including correlation and regression analysis, to evaluate the influence of dashboard integration on project efficiency, equipment maintenance, and strategic alignment. The findings indicate that dashboards significantly enhance real-time monitoring, streamline workflows, optimize resource distribution, and strengthen operational decision-making. However, challenges such as user training, system customization, and integration with long-term strategic planning remain critical considerations.

The study recommends advancing dashboard capabilities through predictive analytics, enhanced visualization tools, and tailored training programs to maximize their effectiveness in O&M projects. These insights contribute to the broader digital transformation of project management, aligning with Saudi Arabia's Vision 2030 and fostering a more data-driven, efficient, and resilient infrastructure sector.

Keywords: Project management, dashboards, real-time analytics, data-driven decision-making, digital transformation.

المستخلص

تبحث هذه الدراسة في تأثير لوحات المعلومات القيادية على تعزيز إدارة مشاريع التشغيل والصيانة (O&M) في شركة ابن يعقوب للإنشاءات، إحدى الشركات الرائدة في قطاع التنمية الحضرية في المملكة العربية السعودية. وتهدف إلى تقييم دور لوحات المعلومات في تحسين تخصيص الموارد، وتعزيز استراتيجيات الصيانة الاستباقية، ودعم اتخاذ القرار القائم على البيانات. فمن خلال توفير رؤى فورية، تمكن لوحات المعلومات مديري المشاريع من مراقبة مؤشرات الأداء الرئيسية (KPIs)، وتتبع حالة المعدات، وتحسين جداول العمل.

أُجريت هذه الدراسة في شركة ابن يعقوب للإنشاءات، واعتمدت على منهجيات إحصائية مثل تحليل الارتباط والانحدار لتقييم تأثير دمج لوحات المعلومات على كفاءة المشاريع، وصيانة المعدات، والمواءمة الاستراتيجية. وأظهرت النتائج أن لوحات المعلومات تُحسن بشكل كبير من المراقبة الفورية، وتسهم في تبسيط سير العمل، وتحسين توزيع الموارد، وتعزيز عملية اتخاذ القرارات التشغيلية. ومع ذلك، تبقى بعض التحديات، مثل تدريب المستخدمين، وتخصيص النظام، وتكامله مع التخطيط الاستراتيجي طويل الأمد، من الاعتبارات المهمة.

وتوصي الدراسة بتطوير قدرات لوحات المعلومات من خلال دمج التحليلات التنبؤية، وتعزيز أدوات التصور، وتصميم برامج تدريبية مخصصة لزيادة فعاليتها في مشاريع التشغيل والصيانة. وتساهم هذه النتائج في دعم التحول الرقمي في إدارة المشاريع، بما يتماشى مع رؤية المملكة 2030، مما يعزز من كفاءة ومرونة القطاع التنموي القائم على البيانات.

الكلمات المفتاحية: إدارة المشاريع، لوحات المعلومات القيادية، التحليلات الفورية، اتخاذ القرار القائم على البيانات، التحول الرقمي.

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CHAPTER 1

Introduction

Modern technology stands essential for companies to achieve maximum working capabilities and enhanced decision-making processes when facing changing business conditions. The digital dashboard system allows businesses to extract maximum value from their project management systems mainly targeted at operations and maintenance functions. activities. Real-time data visibility is essential in project management because it enables optimized workflows, supports important decision-making, and helps tasks reach completion deadlines. This research studies the implementation of dashboards at Ibn Yaquub for Construction, a Saudi Arabian developer of urban projects, to advance their project management operations and maintenance functions (Marobin,2013).

Ibn Yaquub for Construction needs a strong system of departmental coordination to carry out successful projects within its business environment. Providing absolute optimal operation and maintenance of its infrastructure forms the essential lifeblood for the company. Industrial projects have driven businesses to demand precise data which leads to urgent needs, which must be delivered promptly. According to Marobin (2013), the business environment requires increased agility through project monitoring systems beyond spreadsheets and manual reporting, which proved ineffective.

The visual interface of dashboards allows users to track their key performance indicators (KPIs), project timelines, budget distributions, and resource usage through real-time updates. According to Kerzner (2022), this research will evaluate dashboard systems to improve project management operations at Ibn Yaquub for Construction while addressing operational efficiency, downtime duration, and resource utilization in maintenance operations.

Through practical applications, the research builds knowledge about dashboard project management implementation for developing Saudi Arabia. The investigation of Ibn Yaquub for Construction seeks to uncover strategic recommendations for dashboard integration in project management systems that will benefit organizations similar to this one in the region.

Research Problem

Ibn Yaquub for Construction with other organizations needs to strategically manage their operation and maintenance projects to enable Saudi Arabia's urban development projects since these projects are vital to the nation's development initiatives. Big projects within these fields face significant difficulties because they include substantial challenges regarding work monitoring, resource utilization, and project timeline fulfillment. Current standard project management solutions consisting of manual reporting and spreadsheets prove inadequate for organizations to meet escalating requirements regarding instant data needs and joint team activities. American National Company Ibn Yaquub frequently encounters problems with real-time KPI monitoring and delayed project bottleneck detection while managing their operation and maintenance projects due to poor resource implementation and delayed decision-making. The company suffers from performance reductions and a weakened reputation, operations become more expensive, and project work quality decreases alongside longer project durations. The research examines how dashboard implementation enables enhanced efficiency and resource distribution with better management choices for operation and maintenance projects within Ibn Yaquub for Construction.

Importance of Research

The research demonstrates critical uses of digital dashboards which drive project management progress in Saudi Arabia's construction together with urban development sectors. The study produces findings which benefit both professional communities. and academics will find meaningful.

Scientific Significance

1. The research enhances scientific knowledge about using digital tools, particularly dashboards, to increase operational efficiency within Saudi Arabia's construction and urban development spaces. The analysis provides enhanced comprehension of employing real-time data to enhance management decisions and monitoring systems in project monitoring processes.
2. This study benefits academic scholarships about project management by examining dashboard systems that enhance decision quality and decrease human failures. A scientific methodology evaluates how performance tools affect project efficiency alongside their The system demonstrates capability to operate while adjusting to complicated projects.
3. The research explores dashboard applications during its investigation of human and material resource management systems which advances project resource management efficiency.

Practical Significance:

1. This study will prove helpful to Ibn Yaquub for Construction by demonstrating dashboard applications that enhance operational processes and accelerate work delivery while cutting down discrepancies and their associated costs.
2. The research will showcase how dashboards deliver comprehensive resource management information about operational workload distributions, worker performance data, and equipment utilization patterns, which results in major budget savings and better project completion.
3. . The research will present real-world recommendations Ibn Yaquub for Construction should deploy agile project management systems that depend on dashboards. These

systems improve team behavior through better interactions while reducing chances of mismanagement to provide data-driven choices.

Study Objectives

The study evaluates dashboard effectiveness in improving project management practices of operations and maintenance at Ibn Yaquub for Construction .The research examines three main objectives as follows:

1. The research will evaluate the existing project management approaches at Ibn Yaquub for Construction while determining what restrictions traditional operational tools present when managing maintenance and operations.
2. The research evaluates the impact of dashboards on operational decision-making through data visualization, performance tracking, and resource planning systems for maintenance projects.
3. An analysis will examine the dashboard's effectiveness in minimizing delays, enhancing resource utilization, and improving total project results.
4. The study should examine the obstacles that prevent dashboard implementation The implementation of project management systems takes place at Ibn Yaquub for Construction.
5. Project managers who utilize dashboards for operation and maintenance tasks must receive support in order to achieve better outcomes that help advance the Vision 2030 objectives of Saudi Arabia.

Study Questions

Main Question:

What are the modifications that occur when dashboard implementation is performed in Ibn Yaqub for Construction operation and maintenance projects and is this innovation conducive to Vision 2030 business models?

Sub-Questions:

1. What are the problems Ibn Yaqub for Construction encounter as they implement and maintain their operation and maintenance projects based on conventional practice?
2. How can dashboards improve the decision-making process in managing these projects?
3. How do dashboards enhance efficiency, resource management, and overall performance in operation and maintenance projects?
4. What hindrances will exist for the implementation of dashboards at Ibn Yaqub for Construction?
5. Dashboards are employed for what in terms of project success as well as organizational strategic goals in the case of Ibn Yaqub for Construction to apply Vision 2030 of Saudi Arabia?

Study Hypotheses

H1: Deployment of dashboards brings great enhancement to the decision-making process of project management for operation and maintenance activities.

The hypothesis is based on information and decision theory for its premise. With access to real-time actionable dashboard data, organizations are able to make knowledgeable decisions on their higher-level management activities

H2: Implementing dashboards creates more efficient resource distribution systems within operation and maintenance projects.

The systems theory combined with the balanced scorecard approach demonstrates how dashboards create resource effectiveness for project managers by showing complete project needs together with resource access points, which establishes better asset, labor, and equipment utilization.

H3: Operation and maintenance projects experience shorter delays when dashboards present real-time key performance indicators (KPIs) to project managers.

Kerzner (2022) confirms this hypothesis by stating that dashboards reveal upcoming The systems automatically detect upcoming obstacles that enable project managers to execute swift alterations immediately. The implementation of dashboards in operation and maintenance projects improves project performance completely by enabling faster equipment maintenance procedures and reducing equipment downtime durations.

H4: The integration of Total Productive Maintenance principles with dashboards

This hypothesis determines that equipment reliability improves while downtime diminishes and enhances project performance.

H5: Implementation of dashboards benefits the organization's strategic goal alignment during Vision 2030

Enhancing the connection of project output with organizational targets. The balanced scorecard technique provides the foundation behind the hypothesis holds true because it connects project data with corporate strategic objectives from across the organization. The implementation of dashboards supports projects by maintaining business alignment through financial evaluation and customer satisfaction metric assessment

Scientific theory followed

Management Information Systems

Computing systems (MIS) stand as the fundamental scientific construct for analyzing data-oriented organizational choices. Through its integrated structure, MIS enables the acquisition of information and its transformation alongside data storage, followed by distribution for managerial support and operational performance improvement. Operation and maintenance project management significantly benefit from MIS principles because these systems deliver live performance data that helps leaders evaluate results, manage asset allocation, and prospect for upcoming threats. Organizations succeed in competitive environments when they use accurate and timely information to obtain their competitive advantage. This principle forms the base of MIS theory. MIS positions technological elements and human and procedural features to enhance data management operations while strengthening reporting functions and workflow performance. The value of MIS emerges from its capability to unite multiple data sources into a single platform used for making well-informed decisions, as described by Hendriyati, Agustin, Rahardja, and Ramadhan (2022). The authors demonstrated through their research on student-lecturer integrated data that MIS revolutionizes efficiency by bringing together all information and modernizing administrative tasks. The capability to work with and analyze complete datasets plays a crucial role in the operation and maintenance of project management objectives. Project managers at Ibn Yaqub for Construction benefit from MIS-driven dashboards showing real-time views of active operations through multiple running projects to enable them to use data to improve productivity while cutting operational wastage.

Related theories

This research investigation builds upon essential academic concepts that explain project management, organizational performance observation, and organizational decision processes. Everything in dashboard development relies on systems thinking and information theory as well as the balanced scorecard framework to provide usable project performance data in support of enhancing project manager performance.

Systems Theory

The systems theory operates on the principle of all organizational or project elements being interdependent. Project management systems theory demonstrates how various project

elements, such as resources combined with timelines, and risks, along with team dynamics, affect the overall project dynamics. Dashboards operate with the support of this theory to present aggregated project data and KPIs as an integrated display. Dashboards present managers with comprehensive project component data, which enables them to compare different areas of a system to one another in order to make more insightful decisions. Kerzner (2022) results are corroborative of the notion that dashboard systems support forward-looking management by providing a systemic view of project performance (Hespanha, J. P. 2018).

Information Theory

Claude Shannon established information theory as the study of information delivery and its processing and storage. Information theory demonstrates why dashboards must deliver the correct information to decision-makers, which is precise and immediately accessible time-wise. Project dashboards are data transmission platforms that help managers obtain necessary project information to make instant decisions based on processed data. Eckerson (2010) explains that dashboards exist to assess performance by showing essential information in simple presentation forms to help monitor and manage performance. Radio-time data delivery capabilities form an essential link between dashboard effectiveness and their ability to solve emerging project management issues, according to Ash (R.B. 2012).

The Balanced Scorecard Approach

The strategic performance management tool developed by Robert Kaplan and David Norton uses the balanced scorecard framework for organizational performance measurement through its customer, financial, internal processes, and learning and growth dimensions. The balanced scorecard framework commonly connects with dashboard systems because these dashboards enable the monitoring of KPIs throughout all dimensions. Organizations should include financial data as well as customer satisfaction metrics together with internal performance indicators to structure their measurements. Dashboards provide a well-rounded view of project health and enable managers to ensure that all aspects of the project are aligned with strategic objectives. This framework is instrumental in operation and maintenance projects, where multiple factors must be managed simultaneously to ensure project success(Chan, T. K., & Hiap, P. T. 2012).

Decision Theory

Decision theory investigates the method of choice selection among uncertain factors. Project management decisions must be made in haste, although the available data remains limited. Dashboards reduce decision-making uncertainties by showing current data holistically, allowing managers to select choices leading to successful results. Vilarinho Lopes and Sousa (2018) paper explains that dashboards help managers reach better decisions because they get the complete data needed to respond to dynamic circumstances quickly (Chernoff H & Moses LE 2012).

Total Productive Maintenance (TPM)

Total Productive Maintenance (TPM) represents a management system that optimizes equipment performance through continuous improvement of operational efficiency and equipment uptime reduction. According to Mustaffa, Rosli, and Ong (2017), dashboards merge efficiently with TPM methods to promote maintenance activities using live performance monitoring features. The operation and maintenance of projects rely heavily on this theory since keeping track of the performance conditions of equipment through proactive maintenance will immediately lead to project success (Jain, A., Bhatti, R., & Singh, H. 2014).

The relationship between theory and research

Empirical exams show how research serves as a validation method for theoretical assumptions within the field of MIS. Research functions as an evaluation platform to verify MIS standard use among different organizations. organizational contexts, identifying strengths, limitations, and potential areas for improvement. In operation and maintenance project management, research on Research on MIS presents validation evidence that demonstrates the benefits of using technology-based managerial solutions. Shniekat together with AL_Abdallat, Al-Hussein, and Ali (2022) studied the MIS dimensions which affect institutional performance by showing how information systems improve both process decisions and operational efficiency alongside organizational effectiveness. The study reveals a strong relationship between theoretical MIS constructs and practical applications in the real world through its findings. that the successful deployment of MIS can lead to measurable improvements in institutional performance. The integration of dashboards with project management frameworks demonstrates this relationship since both use accessible information visualization as specified by the theoretical framework to improve decision-making capacity. Real-time project data processed by dashboards delivers valuable information to stakeholders, which enables effective decision-making, proactive risk

reduction, and performance enhancement. Ibn Yaquub for Construction can reduce the theoretical to practical divide by implementing dashboards according to MIS principles to empower project managers to monitor performance indicators and track progress while identifying critical areas needing intervention.

Continuous empirical investigation remains crucial because it allows MIS research to refine information system models that meet evolving organizational requirements. Modern technological progress depends heavily on organizational research for evaluating the performance of emerging MIS tools in resolving current management issues. Research-based insights into MIS applications help management teams in operation and maintenance projects develop best practices while making strategic choices that focus on efficiency along with accuracy and responsiveness. Dashboards provide a practical implementation of MIS theory at Ibn Yaquub for Construction, which improves their project management approach.

The company can build an operational structure focused on data through MIS principles to provide real-time strategic planning capabilities and performance evaluation support for decision-makers. Hendriyati et al. (2022), along with Shniekat et al. (2022), explain in their research how MIS theory creates a systematic framework to grasp information system roles within organizational management. Through empirical investigation, they enhance the MIS effectiveness discourse while proving that organizations benefit from data-driven decisions to achieve better efficiency results. The examination of dashboard implementation at Ibn Yaquub for Construction supports active research into MIS practical applications for real-world situations. This study performs empirical assessments of dashboard effects on operation and maintenance project management to develop evidence-based recommendations for constructing better information systems in Saudi Arabia's construction industry.

The practical application of MIS In operation and maintenance project management Is a testament to the theory's relevance in contemporary organizational settings. The growing dependency of organizations on data requires the implementation of MIS frameworks, which enables them to operate more strategically and respond effectively to changes. Research serves to prove the validity of MIS principles by showing how information systems need to be adapted to individual industrial needs. The situation at Ibn Yaquub for Construction demonstrates how MIS theory leads to practical solution development by proving the worth of dashboards for improving project administration processes. Organizations boost their

project-tracking abilities while maximizing resource distribution through MIS-driven analytical systems, which leads to better operational effectiveness. Hendriyati et al. (2022), together with Shniekat et al. (2022), demonstrated in their studies that MIS serves as a transformative power for modern management practices.

Data from this study establishes a solid base for additional MIS application research, which focuses especially on operation and maintenance project management. Technological progress requires continuous research that analyzes emerging patterns and examines new information system tools to keep MIS frameworks up-to-date with evolving organizational requirements. This study at Ibn Yaquub for Construction adds practical evidence about MIS implementation to enhance construction sector project management efficiency via MIS principles. The research uses theoretical analysis together with empirical data to connect MIS theory to practical applications in order to generate substantial findings on information systems management.

CHAPTER 2

Introduction

Project organizations use several developed systems and specific tools structured through escalating demands to handle complex projects. Dashboard functions as a significant technological innovation to provide real-time monitoring capability for project metrics and KPIs. The current research recapitulates available academic Author examines project management dashboards in particular relation to operation maintenance projects. Multiple studies have conducted cross-study assessments to understand how dashboards help operations through better project results and decision making capabilities and resource optimization.

Literature Review

1. The Evolution of Project Management Tools and Dashboards

Project management used spreadsheets, manual reporting, and static presentations to monitor project advancement and performance in past centuries. These traditional methods have become insufficient when dealing with complex projects because they no longer deliver enough project performance insight. Dashboards present dynamic monitoring platforms through which managers view real-time visual dashboard displays to track performance indicators, evaluate risks, and make knowledgeable choices. Kerzner (2022), in his book *Project Management Metrics KPIs and Dashboards Guide Readers Through Performance Assessment of Project Activities*, outlines the importance of dashboards as a project management tool. Through dashboard functionality, The monitoring of essential metrics lets users handle time frameworks and observe resources while verifying project goals. Managers can expedite their projects by accessing time-sensitive dashboard information which leads to both faster operational execution and superior decision outcomes while reducing overall project cycles.

2. Enhancing Operational Efficiency through Dashboards

Operational efficiency reaches its peak through the effective use of dashboards in organizations that need to handle complicated maintenance alongside operational operations. Companies can streamline operations and reduce downtime through visual equipment performance observation, resource allocation tracking, and bottleneck detection capabilities. Vilarinho Lopes and Sousa (2018) researched the development of dashboards to advance productive equipment and process performance in small and medium-sized enterprises. The research established that dashboards enhance operations monitoring by providing better decision-making capabilities and resource distribution possibilities. Dashboards help organizations maintain equipment proactively, reducing unexpected equipment outages while extending product lifetime to deliver financial savings. Fatnani, Nwachukwu, and Makhmoor (2017) investigated dashboards for their role in operations management purposes. In their research, the team proved that dashboards served production flows optimally through visualized production information, which enabled managers to identify operational failures in real-time in order to rectify them. Perfectly tailored for Ibn Yaquub working under for

Construction, which relies on real-time monitoring to oversee its diversified operating and maintenance projects that deliver peak performance outcomes.

3.Dashboards in Digitalized Industrial Environments

The manufacturing industry utilizes digital transformation in every function and dashboards are simple building blocks. as their critical foundation. Ostrem (2018) performed a case-based research analysis of project performance and dashboard utilization within industrial digitalization efforts. His research demonstrates how dashboards identify improvements that occur during industrial processes, particularly for large-scale project activities. The construction sector requires data monitoring through dashboards because these tools provide critical supervisory capabilities for swift operational choices that support project schedule adherence and efficiency maintenance. Sukmandhani et al. (2022) The study analyzed how dashboards can be utilized in the web services design so as to carry out management activities. Web-based dashboards allow departments to coordinate more effectively and thus improve their project management performance based on research. Various project organizations need a simple-to-use operational baseline with a unified display that reveals project status as well as resource details and performance metrics.

4. Performance Measurement and Monitoring with Dashboards

Project management depends heavily on dashboards as tools for both performance measurement and performance monitoring. KPIs become clear through dashboards so projects can receive proper performance assessment. Real-time data delivered through dashboards assists project managers in making effective decisions at crucial moments. Eckerson (2010) addresses the significance of dashboards for tracking performance within business functions in the of Performance Dashboards: Measuring, Monitoring, and Managing Your Business. Real-time dashboard feedback serves an essential role in project management because time or error delays can trigger budgetary issues alongside scheduling problems. According to Marobin (2013), dashboard implementation leads to improved management capabilities for following critical metrics in budget tracking resource management and time schedule compliance.

5. Dashboards and Total Productive Maintenance (TPM)

TPM practice application with dashboards in operation and maintenance projects delivers enhanced equipment performance while decreasing maintenance disruption periods. Researchers Mustafa, Rosli and Ong (2017) offered a proposal which linked TPM systems to dashboards for performance enhancement purposes.

6. Challenges and Opportunities in Dashboard Implementation

Organizations face various obstacles when implementing dashboards for their operation. The successful implementation of dashboards faces resistance to change among employees combined with difficulties in data integration, according to Brahimi et al. (2019). The researchers highlighted that dashboards allow organizations to establish transparent operations and boost project performance measurement together with accountability systems. According to Borden, Murray, and Yorkos (2008), dashboard deployment needs precise and suitable data for proper functioning. They demonstrate with their research that dashboards improve major project management outcomes if they are properly adopted.

Based on literature reviews of operation and maintenance projects, dashboards are an integral part of enhancing the management of projects. Real-time dashboards allow for important visibility of key performance indicators that help in enhancing operational efficiency, decision quality, and resource usage optimization. The implementation difficulties of project dashboards yield substantial benefits for project outcomes. The study creates a dependable foundation to investigate dashboard applications at Ibn Yaqub for Construction especially in their operation and maintenance project management sector.

Research Gap

The research about dashboard practices in project management shows limited knowledge about their application within Saudi Arabian development organizations and real estate organizations. Ibn Yaquub for Construction specializes in operation and maintenance project management, but research about dashboards in industrial settings skips applications for this organization. The following key gaps emerge:

1. Lack of Studies on Development and Real Estate Companies in Saudi Arabia:

Research about dashboard applications has mainly concentrated on manufacturing, IT, and small- and medium-sized enterprise (SME) industries. Ibn Yaquub for Construction operates within its own distinct realm, The focus lies in the development of intricate real estate and developmental projects that have to comply with project requirements and operational complexities as well as long-term maintenance contracts. The research shortfall addresses how dashboards achieve specific benefits for such projects across Saudi Arabia.

2. Absence of Studies on Operational and Maintenance Projects in Saudi Arabia:

Literature about this area fails to focus on project management issues that exclusively affect Saudi Arabian operations. For the proper execution of these projects, we need optimal resource control combined with regular equipment upkeep and speedy decisions, which will help to stop delays and achieve successful project performance. Research about dashboards providing real-time data for critical elements shows limited progress within this context because studies focus primarily on their usage for project delays and resource allocation and maintenance efficiency.

3. Alignment with Vision 2030 Objectives:

The Saudi Arabian government focuses on Vision 2030 on maintaining sustainable development together with operational effectiveness and ensuring project results align with national strategies. Research shows that dashboards have potential benefits, but studies remain scarce on dashboard contributions to Vision 2030 progress. The connection between dashboard usage for project management and national developmental goals remains poorly researched as it applies to Saudi Arabia's major development projects.

4. Limited Empirical Field Data:

Modern literature about dashboards uses mostly theoretical frameworks plus international case studies, but there is limited use of empirical quantitative field data in Saudi Arabia. The scarcity of research related to specific industry issues among Saudi organizations hinders the practical implementation of current findings for Ibn Yaqub for Construction. A field-based exploration of Saudi Arabian project sites needs to be conducted because it will supply local insights about dashboard applications towards bettering Saudi project execution.

Theoretical framework

The theoretical framework establishes the fundamental principles about how dashboard implementation enhances the operation and maintenance of project management operations. Accelerated interest exists in information systems research for project management applications because organizations increasingly make decisions based on data. Management Information Systems (MIS) features dashboards as essential tools that display current data through graphical displays to guide managers toward strategic planning decisions that optimize project outcomes by minimizing operational threats and maximizing operational efficiency. This paper uses MIS and project management principles to understand the impact of dashboards on achieving optimal construction sector project operations. The theory is essential in studying dashboard effects on project management because it provides systematic frameworks that explain information system relationships between decision-making and operational efficiency, as well as strategic planning structures. Data analytics performance improvement for projects becomes possible through MIS theories complemented by project management theories that underscore the need for KPI dashboard monitoring. These theoretical perspectives matter because they establish conceptual models that assess the link between dashboards and better project management systems. Through this theoretical background, researchers can perform organized evaluations of dashboard effectiveness in actual project settings. The three specific theories have been chosen because they fit the research needs of MIS project management and data-driven technological integration. The role of dashboards as an analytical tool can be understood through MIS theories, while project management frameworks establish proper structures to evaluate dashboard contributions to performance enhancement. Current research on both MIS and dashboards demonstrates how these theories work effectively in project management applications because they produce beneficial results in parallel situations. The authors place MIS at the forefront of institutional management because it facilitates information transmission while delivering data-based decision automation (Hendriyati et al., 2022). Shniekat, AL_Abdallat, Al-Hussein, and Ali (2022) demonstrate how MIS dimensions shape institutional performance to show their valid contribution to this study.

Concept of Management Information Systems (MIS)

The modern organizational structure depends on Management Information Systems (MIS) because they establish systematic processes for gathering and transforming data for executive decision support. MIS encompasses diverse collections of technologies and methodologies that deliver efficient information processing together with operational control and improved strategic planning capabilities. Project managers depend on MIS to integrate software applications with data analytics and communication networks for accessing real-time correct information. Organizations use MIS implementations to distribute resources efficiently while tracking performance better and making improved decisions.

Modern organizations recognize MIS as their fundamental operational tool due to advancing business requirements for digital solutions. Modern information technology advancements spurred the development of complex MIS tools that now include enterprise resource planning (ERP) systems, together with business intelligence platforms and real-time dashboards. Volatility and effectiveness are enhanced through organizational data processing tools that allow companies to extract meaningful insights that drive productivity growth and operational efficiency. The tracking of project metrics and detection of performance trends with subsequent proactive decision-making is an essential role of MIS, as Kerzner (2022) explains. MIS frameworks incorporating dashboards enable organizations to present data more clearly, which helps managers better interpret complex information and make quick project responses.

MIS is the backbone of optimization and success enhancement for project management, specifically in operational maintenance sectors of practice. Through real-time progress tracking, resource utilization, and key performance indicators (KPI) assessment, organizations achieve enhanced project execution efficiency. Through their extension of MIS technology, dashboards allow managers to use visual interfaces that display essential project data in user-friendly ways. Project managers gain improved risk management capabilities from the instant visual status updates of project activities, improved coordination among project teams, and more effective allocation of resources. Al-Sulaiti et al. (2021) highlight the role of data analytics and visualization dashboards in assessing engineering, procurement, and construction project performance, further demonstrating the impact of MIS on project management practices.

Project management receives its most crucial advantage from MIS because this system allows for data-based decision-making. Project managers can use integrated MIS dashboard solutions to examine past data and recognize patterns, which leads to better predictions about future project performances. The predictive capabilities of MIS enable operation and maintenance projects to make efficient resource decisions on time, leading to the avoidance of costly project delays and better resource usage. MIS dimensions, including data quality and system integration with user accessibility, directly determine institutional performance while demanding proper MIS implementation for project accomplishment Shniekat et al. (2022).

MIS improves team collaboration by creating central data-sharing systems that benefit project members' communication and coordination. Traditional project management usually works with static reporting methods and multiple unconnected datasets, bringing useless behavior and failed communication processes. Through MIS implementation, organizations establish one data-operational space that provides stakeholders real-time access to project information to coordinate better and minimize delays. MIS plays a critical role in the construction sector because various operational teams need to communicate data smoothly to maintain project continuity.

MIS is an essential element of current project management, as it provides methods to organize data management alongside decision-making processes. Project management reportedly relies heavily on MIS to boost operational effectiveness while enabling teamwork and real-time system monitoring in maintenance and operation sectors. Implementing dashboards as part of MIS strengthens the decision-making connection because these tools generate vital insights that help project managers boost operations. Organizations that implement digital transformation will find that MIS optimization of Research and practical implementation for project management processes gains fundamental importance because of its essential value.

Dashboards as a Component of MIS

Definition and Functionalities of Dashboards in Business Intelligence

MIS implements the dashboard as a central component which generates business intelligence by displaying multisource data visually. interactive interface. MIS dashboards operate as unified platforms that acquire real-time data for processing before showing it, enabling organizations to monitor KPIs, analyze trends, and make data-based decisions. Dashboards

function as main operational components because they convert hard-to-understand data collections into easy-to-interpret results, which allow managers to monitor performance through visual displays. Proper data visualization tools such as charts, graphs, heat maps, and tables incorporated into dashboards offer decision-makers better interpretability of information that helps them spot patterns and correlations with anomalies. Business operations attain richer responsiveness and enhanced agility from dashboards because they give direct access to active and periodically updating data points instead of static traditional reports. Crisis response management greatly depends on databases since databases facilitate fast decision-making processes founded on conversational and interactive data visualizations as explained by Ruoff, Gnewuch, Maedche, and Scheibehenne (2023). Through the data aggregation function the user is empowered to see the entire performance overview automatically when handling multiple combined interface sources without additional manual work.

Types of Dashboards

Operational Dashboards

Real-time updates regarding current workflow metrics and process monitoring status appear through these dashboards. Task monitoring via dashboards enables operational workforce members to evaluate workflow effectiveness as well as identify system errors and check that procedural schedule timelines remain on track. Task completion rates with equipment usage statistics together with workforce productivity levels appear on operational dashboards for project management applications.

Analytical Dashboards

The main purpose of analytical dashboards stands in contrast to operational dashboards since they serve data analysis goals together with performance assessments. A user can use these dashboards to analyze past data and recognize patterns combined with forecasting capabilities. These management tools serve data analysts and project managers by providing a deeper understanding of extended-period performance while also helping them discover strategic opportunities. Susnjak and colleagues (2022) ,Learning analytical dashboards let students obtain valuable information by monitoring their academic performance habits. Operations and maintenance project management utilizes analytical dashboards as design tools to help analyse prior project execution results for future operations and maintenance enhancement.

Strategic Dashboards

Top executives utilize strategic dashboards to make certain organizations achieve their performance targets according to predetermined goals. The system delivers executive-level data about organizational performance alongside strategic targets and financial indicators. Through strategic dashboard monitoring, organizations can track their progress with key targets, and leaders use this information to create purposeful decisions that match their long-term business strategies.

How Dashboards Contribute to Real-Time Data Visualization and Decision-Making?

The main benefit of dashboard systems is their capability to show data temporally, which increases decision quality within all sectors. Managers benefit from real-time dashboards by tracking project status alongside resource assessments and delaying or efficiency detection in project management. The latest information availability allows decision-makers to respond before dangers trigger extensive complications. Real-time dashboards bring maximum value to situations that require fast response protocols.

The construction sector applies dashboards to track project status through visual presentations that show all stakeholders and intricate workflows so managers can update their plans using real-time information. Digital twin technologies give Zhao, Feng, Chen, and de Soto (2022) the ability to transform building operation and maintenance practice using real-time data. The systems provide businesses with predictive capabilities for maintenance operations.

The technologies used in built-in dashboards increase organizational systems' decision-making capabilities.

Importance of Dashboards in Operation and Maintenance Project Management

Operation and maintenance project management relies heavily on dashboards because they deliver performance improvements, better accountability, and trackable metrics. Operation and maintenance projects require continuous observation of equipment together with infrastructure elements and resources to maintain operational continuity and prevent interruptions. Time-sensitive real-time data becomes fundamental for managerial decision-making via dashboards, enabling asset health tracking, maintenance procedures, and resource optimization. Operation and maintenance dashboards offer predictive maintenance capabilities that help organizations enhance their predictive strategies. Dashboards that

analyze historical patterns and data help organizations identify equipment failures in advance so they can do maintenance in advance instead of waiting for equipment breakdowns to happen. The authors Rinaldi, Thies, and Johanning (2021) highlight data-driven approaches in offshore wind turbine maintenance through dashboards that enhance reliability alongside improving efficiency through performance predictions of equipment performance. Construction project management becomes more effective through dashboard implementation since it tracks labor productivity together with budget adherence and material supply to maintain schedule and financial goals. Obiuto et al. (2024) demonstrate how dashboards are critical tools for HVAC project management sustainability through monitoring energy consumption and optimizing resource utilization based on their research finding. The implementation of dashboards by organizations results in enhanced operational performance and standard compliance through project-based green initiatives.

Operation and Maintenance Project Management

Operation and Maintenance Project Management follows essential management practices to support its execution.

Project management for operation and maintenance implements long-term supervision of infrastructure performance together with equipment and facility operation for achieving reliability and efficiency. The difference between ordinary project management and O&M involvement exists in the focus on extended asset watching followed by upkeep activities procedures to lengthen their operational lifespan. The essential components in O&M project management consist of strategic maintenance planning and risk reduction, resource optimization, and regulatory requirements.

The core aspect of O&M project management includes establishing preventive and predictive maintenance approaches. The process of preventive maintenance combines active equipment checks and planned hardware reparations, but predictive maintenance uses analytical methods to forecast equipment breakdown. The real-time data from dashboards about asset health allows managers to make better decisions for maintenance needs.

Challenges in Managing Operation and Maintenance Projects in the Construction Sector

Operations and maintenance projects within construction face three primary challenges because they involve expensive operations, The management regime includes spontaneous equipment breakdowns in addition to needed safety inspections. Significant infrastructure alongside mechanical systems found in construction projects require regular system maintenance to function optimally. A principal dilemma stands in the way of sustaining project operations

while avoiding delays and minimizing expense increases from maintenance sequences. The absence of instant data delivery creates difficulties during decision-making processes because it delays essential information. Maintenance strategies based on periodic visual check-ups and human reporting systems cause the identification and resolution of problems to experience delays. This management solution solves the data accessibility problem through continuous equipment and infrastructure tracking that enables quick anomaly detection and corresponding interventions. Staff management in O&M projects represents an important challenge affecting overall project execution. Maintaining workforce efficiency for maintenance, Staff resource distribution together with correct planning stands as an essential foundation to accomplish task completion. Performance tracking dashboards enable employees to monitor their progress thus creating optimized task scheduling and maintaining planned maintenance operations.

The Need for Data-Driven Decision-Making in Project Management

Establishments incorporate data-based decision systems to manage their O&M activities projects because this approach boosts operational efficiency and reduces project risks. Decision-making processes conducted through experience-based methods and intuition tend to produce only minor optimal outcomes. Project managers rely on dashboards to execute evidence-based operations that result in improved performance and decreased uncertainties.

Use of data-driven decisions enables organizations to optimize their maintenance planning and also provides them with improved equipment failure predictions and utilization of resources. The practice creates comfort among stakeholders regarding project information access at needed times thus supporting transparent monitoring and enhanced accountability. Organizations can make better decisions using digital technologies through the combination of prediction data with automated monitoring tools. as highlighted out by Zhao et al. (2022).

Relationship Between Dashboards and Project Management Efficiency

How Dashboards Enhance Project Planning and Execution

Project management tools today rely heavily on dashboards to create major improvements in operational planning and execution execution procedures. The combination of project data visualization tools in real time with analytic capabilities grants managers superior strategic capabilities through effective data insights. The conventional project methods rely on static reports and spreadsheets coupled with manual data entry that produces delays and communication issues in the process. Managers gain better oversight through dashboard systems since these platforms combine different data sources, enabling them to track progress, detect operation hurdles, and modify their plans accordingly. Project planning reaches its peak importance through objective setting, KPIs definition, and milestone creation. Dashboards function as an established system to monitor progress metrics by using a framework that presents current project details to everyone who needs it according to Kerzner (2022).

Multi-dimensional dashboards enhance team communication which reduces mixed interpretations as well as discrepancies between team members. Dashboard visualizations help teams make decisions ahead of time through a clear presentation of project timelines, workload breakdowns, and risk evaluation data, thus enabling early intervention before issues become significant problems. The improvement of execution processes happens through dashboards because they permit automation and integration across different project management tools. ERP systems, business intelligence platforms, and cloud-based collaboration tools link to dashboards that simplify workflow processes. The combined system reduces the need for human-made data recording and forms reporting, thus enabling project managers to prioritize fundamental strategic decisions. Project execution in the construction industry receives improved cost management and scheduling performance through dashboards that track materials usage, labor expenses, and equipment availability (Al-Sulaiti et al., 2021). Dashboards supply real-time information on all project tasks, which enables managers to take quick corrective actions and thus prevents disruptions while enhancing operational efficiency.

Project management data becomes easier to access since everyone can reach the dashboard, which serves centrally as a single point for collecting project information. Every project participant benefits from shared visibility because it enables them to align work efforts using

the same information, reducing potential misunderstandings. Toreini, Langner, Maedche, Morana, and Vogel (2022) emphasize that well-designed dashboards improve user engagement by presenting information intuitively and visually appealing, making it easier for teams to analyze and interpret project data.

The Impact of Real-Time Data Access on Performance Monitoring

The real-time data functionality of dashboards offers the most critical advantage for project management because it allows unsolicited performance tracking. Project dashboards provide automatic data updation for instant project status monitoring by managers throughout all times. They operate differently from traditional periodic reports-based tracking systems. Managers can spot plan modifications instantly due to direct project data access which permits them to execute swift necessary modifications. Project management depends heavily on performance monitoring since organizations need it to track progress against established KPIs. The visual representation of KPIs on dashboards makes project performance evaluation more efficient. Dashboards used during crises give organizations better situational awareness by offering direct access to crucial data points, according to Ruoff, Gnewuch, Maedche, and Scheibehenne (2023). Within project management, dashboards enable teams to handle project changes regarding resource limitations, budget excesses, and timeline extensions more effectively and faster. The effectiveness of performance monitoring increases through dashboard systems, which simultaneously improve data quality while minimizing user mistakes.

Collecting data manually and reporting creates inconsistent and dated information, making it complex to obtain precise project status representations. Dashboards solve such issues through real-time data integration with sources that maintain current information on display. Zhao, Feng, Chen, and de Soto (2022) explain that digital twin technologies boost building operation and maintenance through essential real-time data integration to optimize project performance. Real-time performance monitoring is vital in how stakeholders engage with the monitoring process. Project dashboards deliver real-time project metrics to executives, investors, and clients, reducing both time-intensive status meetings and manual reporting processes. The open visibility of data builds trust relationships because it enables all stakeholders to stay on The stakeholders maintain identical objectives about the projects. Users study performance trends by exploring specific details of problem areas to develop data-driven choices which enhance project effectiveness via dashboards. Organizations

utilize dashboards to enhance their benchmarking as well as continuous improvement efforts on various projects due to the possibility of comparing The current project achievements get evaluated based on historical data. Project managers develop better future project plans through their learning of best practices which build up their organizational process. The monitoring system based on analytics dashboards serves learners by delivering proactive analytical information. insights, according to Susnjak, Ramaswami, and Mathrani (2022), who demonstrated dashboard effectiveness in monitoring progress and spotting development areas. This principle serves the project management setting when it requires continuous productivity quality and cost-effectiveness monitoring, The technology promotes better project management methods throughout organizations.

The Role of Dashboards in Improving Resource Allocation and Reducing Project Risks

The allocation of project resources must be effective because this practice helps organizations maximize their use of labor force and materials together with financial assets. Organizations leverage dashboards because they deliver real-time insights into resource availability demand and utilization rates to project managers. Static planning documents traditionally used for resource allocation become outdated before expiration. Dashboards enable managers to make immediate resource distribution changes by observing shifts in project circumstances. Construction dashboards enable professionals to track employee performance, detect equipment underuse, and assign critical assignments to available resources. Dashboards integrate diverse data sources to offer complete resource consumption visibility; thus, the organization reduces waste and improves operational efficiency. Shniekat, AL_Abdallat, Al-Hussein, and Ali (2022) stress the critical role of MIS for institutional performance through the ability of real-time data access to improve resource management by directing resources toward actual needs instead of estimated values.

Project risks become manageable early on through dashboard implementations because dashboard technology reveals potential project issues before their growth into significant issues. Risk management is essential to project success because unanticipated delays, budget overruns, and operations problems can harm project results. Managers can identify potential threats early by letting dashboards analyze historical patterns in data. The authors Rinaldi, Thies, and Johanning (2021) show that offshore wind turbine maintenance systems succeed when they use data-driven approaches through dashboards to anticipate equipment failures and plan maintenance tasks. Dashboard systems help organizations maintain regulatory

compliance through automated tracking and report generation of consequential standards. Construction, engineering, and other industries must fulfill regulatory requirements to guard against financial consequences and legal penalties. The continuous tracking of safety and financial and environmental regulations on dashboards guarantees organizational compliance while industry standards compliance for projects is guaranteed through dashboards. Energy efficiency and green building specifications can be monitored through dashboards according to Obiuto et al. (2024) for HVAC project management systems.

Conceptual Model of the Study



Figure 1 Conceptual Model

Explanation of Independent and Dependent Variables

The system dashboard functions operate as the of Independent variable that determines project management outcomes. The research will investigate how dashboards contribute to project efficiency in O&M project management to perform an evaluation.

Project Management Efficiency stands as the Dependent Variables because it assesses the proficiency of deadline adherence along with budget control quality maintenance to deliver satisfied stakeholders.

Mediating Variables:

- Real-time Data Access describes a benefit in which dashboards deliver fresh project data.
- Project performance tracking is accomplished through dashboards which allow users to monitor project advancement and key performance indicators.
- Through dashboard systems stakeholders gain maximum efficiency of labor distribution and material allocation and equipment utilization.
- Dashboards enable project teams to detect and minimize project risks through their risk management functions.

CHAPTER 3

Introduction

This study investigates the impact of dashboards on the management of operation and maintenance projects at Ibn Yaqub for Construction Development Company. To achieve the study objectives and answer the research questions, a descriptive analytical research methodology will be employed. This methodology is used because it can collect and analyze numerical data from a large group of respondents, allowing for general conclusions about the impact of dashboards on project management.

Methodology and Research Methods

Research Design

This study employs a quantitative research design to examine the impact of dashboards on enhancing operation and maintenance (O&M) project management processes at Ibn Yaquub for Construction in Saudi Arabia. A survey-based approach was chosen to collect data from employees actively involved in project management and decision-making. The rationale for using a quantitative approach is to provide objective, measurable insights into how dashboard implementation influences key project management factors, including real-time data access, performance monitoring, resource allocation, and risk management.

The study follows a descriptive and explanatory research design. Descriptive analysis provides an overview of the current usage and perceptions of dashboards, while explanatory analysis explores the relationships between dashboard implementation and project management efficiency. This dual approach aims to describe the extent of dashboard usage and establish causal relationships between variables.

Data Collection Method

Survey Questionnaire

A structured questionnaire was developed as the primary data collection instrument. The questionnaire assessed employees' perceptions of dashboards and their impact on various aspects of project management efficiency. It consisted of closed-ended questions using a Likert scale (ranging from 1 = Strongly Agree to 5 = Strongly Disagree) to measure attitudes, experiences, and the effectiveness of dashboards in improving project outcomes.

The questionnaire was divided into five main sections:

1- Demographic Information

Includes questions on job titles, years of experience, and familiarity with dashboards.

2- Dashboard Usage and Adoption

Assesses the extent to which employees use dashboards in their daily tasks.

3- Impact on Project Monitoring and Decision-Making

Measures on how dashboards influence real-time data access and performance tracking.

4- Effect on Resource Allocation and Risk Management

Evaluates how dashboards help optimize resource use and mitigate risks.

5- Overall Project Efficiency and Challenges

Examine employees' perceptions of dashboards' overall contribution to project success and identify any barriers to effective implementation.

The questionnaire was distributed in physical and digital formats, ensuring accessibility for all participants. Respondents were given one week to complete the survey, with follow-up reminders sent to encourage participation.

Data Analysis Methods

After data collection, the responses were analyzed using **quantitative statistical methods**. The analysis was conducted in three stages:

1. Descriptive Analysis

Used to summarize the data and provide insights into the overall trends in dashboard usage and its perceived benefits. This included frequency distributions, means, and standard deviations.

2. Inferential Analysis

It is conducted to test the study's hypotheses and determine the relationships between variables. Statistical techniques such as **correlation analysis** and **regression analysis** were used to assess the impact of dashboards on project management efficiency.

3. Reliability and Validity Testing

The internal consistency of the questionnaire was evaluated using **Cronbach's Alpha**, ensuring that the survey items reliably measure the intended constructs. Construct validity was assessed through **factor analysis** to confirm that the questionnaire items align with the theoretical framework.

Ethical Considerations

This study adhered to ethical research standards to ensure the integrity and confidentiality of the data collected. Key ethical considerations included:

- **Informed Consent**

Participants were informed about the study's purpose and their voluntary participation. Consent was obtained before the questionnaire was distributed.

- **Anonymity and Confidentiality**

Responses were collected anonymously, and no personally identifiable information was recorded. The data was stored securely and used solely for research purposes.

- **Avoidance of Bias**

The questionnaire was designed to minimize leading questions or biases, ensuring participants could express their honest opinions.

Population and Sampling

The study focuses on employees at **Ibn Yaqub for Construction**, a mid-sized construction company in Saudi Arabia. The target population includes professionals involved in **operation and maintenance project management**, such as project managers, engineers, site supervisors, data analysts, and administrative personnel who use dashboards as part of their workflow.

A **sample of 50 workers** was selected using a **stratified random sampling technique** to ensure representation from different specializations within the company. This sampling method was chosen to capture diverse perspectives on dashboard usage and its impact on project efficiency. The sample includes individuals from the following categories:

- **Project Managers** – Responsible for overseeing O&M projects and making strategic decisions.
- **Engineers (Civil, Electrical, and Mechanical)** – Involved in technical project execution and performance evaluation.
- **Site Supervisors** – Monitor daily operations and provide feedback on project progress.
- **Data Analysts and IT Specialists** – Manage the dashboards, ensuring proper data visualization and analytics.
- **Administrative Staff** – Support project operations through resource planning and coordination.

The **50-sample size** was determined based on feasibility, time constraints, and the objective of obtaining a diverse yet manageable dataset for statistical analysis.

Limitations of the Study

While this study provides valuable insights, certain limitations should be acknowledged:

- **Sample Size:** The study was limited to 50 employees from a single company, which may not fully represent the broader construction industry in Saudi Arabia.
- **Self-Reported Data:** The reliance on survey responses may introduce response bias, as participants might overestimate or underestimate the effectiveness of dashboards.
- **Context-Specific Findings:** Since the study focuses on Ibn Yaqub for Construction, the findings may not be directly generalizable to other construction firms with different management practices.

CHAPTER 4

Introduction

Data analysis is crucial in transforming raw survey responses into meaningful insights supporting decision-making. In this study, the collected data from 50 employees at Ibn Yaquub for Construction in Saudi Arabia is analyzed to evaluate the impact of dashboards on operation and maintenance project management. The analysis uses statistical techniques to measure key aspects such as decision-making efficiency, resource allocation, project delays, and alignment with strategic objectives like Vision 2030.

The first step in the analysis involves computing descriptive statistics, including the **mean, median, and standard deviation**, to understand the general trends in the dataset. These metrics help determine how participants perceive the effectiveness of dashboards in project management. Next, a **correlation analysis** is performed to examine relationships between different factors, such as whether dashboards that improve resource allocation also contribute to reducing project delays.

To further validate the study's hypotheses, an **Ordinary Least Squares (OLS) regression analysis** is conducted to evaluate the impact of dashboard utilization on project performance. This statistical approach determines whether the implementation of dashboards leads to significant improvements in decision-making processes, resource management efficiency, and reductions in equipment failure rates. Additionally, **T-tests** may be applied to compare responses from different job roles, such as engineers and managers, to identify any variations in their perspectives.

Through this systematic statistical approach, the study aims to provide concrete evidence on how dashboards enhance project management processes. The findings will be valuable for organizations optimizing their operational efficiency through data-driven decision-making.

Data Analysis

Section One Demographic Data

Gender:

- Male:28 response
- Female:22 response

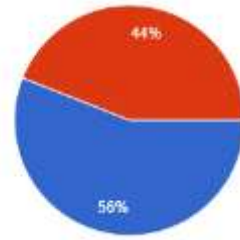


Figure 1 Gender

Job Role:

- Project Manager: 19 responses
- Engineer: 16 responses
- Maintenance Officer :12 responses
- Lawyer: 1 response
- Accountant: 1 response
- Lawyer: 1 response

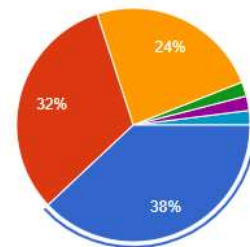


Figure 2 Job Title

Years of experience

- Less than 3 years:14 responses
- 3 to 5 years: 23 responses
- Over 5 years: 13 responses

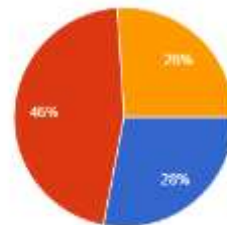


Figure 3 Years of experience

Knowledge of using Dashboards

- Beginner:16 responses
- Intermediate: 20 responses
- Advanced User:14 responses

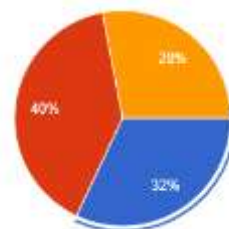


Figure 4 Knowledge of using digital dashboards

Commentary on the Demographic Analysis

The demographic data collected in this study offers valuable insights into the respondent composition, enriching our understanding of the perspectives shared in the survey.

1- Gender Distribution

The sample comprises **28 male respondents (56%) and 22 female respondents (44%)**, indicating a relatively balanced representation. The slight male majority may reflect a higher proportion of men in project management roles; however, the substantial female representation underscores the growing involvement of women in the operation and maintenance sector. This diversity ensures that the analysis captures insights from different gender perspectives, potentially revealing variations in how dashboards are utilized and perceived in project management.

2- Job Roles

Respondents' job roles are as follows: **Project Managers (19 responses (38%))**, followed by **Engineers (16 responses, 32%)**, **Maintenance Officers (12 responses, 24%)**, **Lawyer (2 response (4%))**, and **Accountant (1 response (2%))**.

Most are Project Managers and Engineers, highlighting their central role in decision-making and implementing dashboard technology in construction projects. The minimal presence of a lawyer and an accountant suggests that dashboards are not the primary tools for these roles within the organization. However, their inclusion might offer unique perspectives on how dashboards impact non-technical aspects of projects, such as legal compliance and financial management.

3- Years of Experience

The distribution of respondents' experience levels is as follows: **3 to 5 years (23 responses (46%))**, followed by those with **Less than 3 years (14 responses (28%))**, and **over 5 years (13 responses (26%))**.

This distribution indicates that most respondents have a moderate level of experience, which is beneficial for the study as they have likely encountered dashboard tools in their work but are still adaptable to new technologies. The presence of both early-career professionals and seasoned experts ensures that insights reflect perspectives from individuals at different career stages, helping to assess whether experience level influences attitudes toward dashboards.

4- Knowledge of Using Digital Dashboards

Respondents' self-assessed proficiency with dashboards is as follows: **Intermediate knowledge (20 responses (40%))**, followed by Beginner **(16 responses (32%))**, and Advanced User **(14 responses (28%))**.

This variation in familiarity indicates that while most employees have some exposure to dashboards, a notable portion may require further training to leverage this technology's benefits fully. The presence of advanced users suggests that there are individuals within the organization who can act as internal champions for dashboard adoption, helping to drive greater efficiency in project management processes.

Overall, this demographic analysis provides a strong foundation for understanding how different groups within the company interact with dashboards. The diversity in gender, job roles, experience levels, and digital dashboard proficiency ensures a well-rounded dataset, allowing the study to examine whether these demographic factors influence perceptions of dashboard effectiveness. The findings will help identify areas where dashboards are most impactful and where further improvements, such as training programs, may be needed to optimize their use in operation and maintenance project management.

Section Two: Likert Scale Questions (1 = Strongly Agree, 5 = Strongly Disagree)

1. Descriptive Statistics (Mean, Median, Standard Deviation)

The Likert scale analysis provides critical insights into the perceptions and experiences of employees regarding the impact of dashboards on operation and maintenance project management. The collected data, measured on a five-point Likert scale (ranging from 1 = Strongly Agree to 5 = Strongly Disagree), allows for a quantitative assessment of various factors such as real-time data accuracy, resource allocation, equipment maintenance, and alignment with organizational goals. By analyzing the central tendency measures—mean, median, and standard deviation—that help to determine general response trends and identify areas where dashboards are perceived as highly effective or where challenges may still exist.

The table below presents the statistical summary of the responses, including the **mean score** (representing the average perception), the **median** (the middle value in the dataset), and the **standard deviation** (which indicates the variation in responses). A lower mean suggests more substantial agreement with the statement, whereas a higher mean implies more disagreement. A low standard deviation indicates consistency among responses, while a higher value suggests diverse opinions.

The findings from this section will provide the foundation for deeper statistical analysis, including correlation and regression modeling, to test the research hypotheses related to dashboards' effectiveness in project decision-making, resource allocation, performance tracking, and alignment with Vision 2030.

Table 1 Descriptive Statistics (Mean, Median, Standard Deviation)

Question	Count	Mean	Std Dev	Min	25%	Median (50%)	75%	Max
Dashboards improve daily project performance	50	1.88	0.798	1.0	1.00	2.0	2.75	3.0
Dashboards provide accurate real-time decision-making data	50	1.58	0.785	1.0	1.00	1.0	2.00	4.0

Dashboards help identify potential issues early	50	2.36	1.083	1.0	1.00	3.0	3.00	5.0
Dashboards facilitate more efficient resource allocation	50	3.50	1.581	1.0	2.00	4.0	5.00	5.0
Dashboards improve equipment and material management	50	3.38	1.576	1.0	2.00	4.0	5.00	5.0
Using dashboards reduced delays in projects	50	2.44	1.357	1.0	1.00	2.0	3.00	5.0
Dashboards help monitor project schedules effectively	50	2.12	1.288	1.0	1.00	2.0	3.00	5.0
Dashboards display real-time key performance indicators (KPIs)	50	2.36	1.191	1.0	1.00	2.0	3.00	5.0
Dashboards improved preventive maintenance of equipment	50	2.76	1.451	1.0	1.00	3.0	4.00	5.0
Using dashboards reduced failures and increased efficiency	50	2.60	1.578	1.0	1.00	2.0	4.00	5.0
Dashboards provide comprehensive data on equipment status	50	2.38	1.398	1.0	1.00	2.0	3.00	5.0

Dashboards support achieving company strategic objectives	50	2.34	1.533	1.0	1.00	2.0	4.00	5.0
Dashboards improve coordination between departments	50	2.28	1.144	1.0	1.25	2.0	3.00	5.0
Dashboards enhance project alignment with Vision 2030	50	2.12	1.272	1.0	1.00	2.0	3.00	5.0

The statistical analysis of the Likert scale questions reveals several significant insights into the use of dashboards in operation and maintenance project management. The **overall low mean scores** (mostly between 1.5 and 3.5) indicate a **generally positive perception** of dashboards among employees. Respondents strongly agreed that dashboards improve daily project performance (**Mean = 1.88**) and provide accurate real-time data for decision-making (**Mean = 1.58**), highlighting their perceived usefulness in supporting managerial decision-making processes.

However, some areas received more varied responses, as indicated by higher standard deviations. For instance, the effectiveness of dashboards in **reducing project delays** (**Mean = 2.44, Std Dev = 1.35**) and **facilitating resource allocation** (**Mean = 3.50, Std Dev = 1.58**) exhibited greater variability in responses. This suggests that while many employees find dashboards useful in these areas, others may face challenges in leveraging them effectively. The mixed responses may be due to **differences in job roles, levels of expertise, or variations in dashboard implementation across projects**.

Another critical observation is that while dashboards are seen as helpful in tracking project schedules (**Mean = 2.12**) and monitoring preventive maintenance (**Mean = 2.76**), their effectiveness in **reducing equipment failures** (**Mean = 2.60**) is less conclusive. This might indicate **a need for more advanced dashboard features or better integration with predictive maintenance systems**.

Interestingly, dashboards received **moderate agreement scores** regarding their role in aligning project outcomes with strategic goals and Vision 2030 (**Mean = 2.12 - 2.34**). This suggests that while they contribute to achieving long-term objectives, they may not yet be

fully optimized for strategic planning. Future improvements in dashboard design and **enhanced integration with organizational performance metrics** could further strengthen their role in achieving broader business goals.

In conclusion, the Likert scale analysis provides **empirical evidence** supporting the research hypotheses that dashboards significantly impact decision-making, resource allocation, and overall project performance. However, **some variability in responses suggests areas for improvement**, particularly in optimizing dashboards for predictive maintenance, minimizing project delays, and ensuring better strategic alignment. These findings will be further explored in subsequent sections through deeper statistical modeling and hypothesis testing.

2. Correlation Analysis

Correlation analysis is a statistical technique used to measure the strength and direction of the relationship between two or more variables. This study examines the correlation between dashboard usage and project management performance indicators. **Pearson's correlation coefficient (r)** is used to determine the degree of association between different variables, where:

- $r > 0$ indicates a **positive correlation** (as one variable increases, the other also increases).
- $r < 0$ indicates a **negative correlation** (as one variable increases, the other decreases).
- $r \approx 0$ suggests **no strong relationship** between variables.

Analyzing these relationships helps determine **which aspects of dashboard implementation most significantly enhance project performance**, such as decision-making, resource allocation, and equipment maintenance.

Correlation Results Table

The following table summarizes the correlation coefficients between different dashboard functionalities and project management outcomes.

Table 2 Correlation Results Table

Variable 1	Variable 2	Correlation Coefficient (r)	Interpretation
Dashboards improve daily project performance	Dashboards provide accurate real-time decision-making data	0.11	Weak positive correlation
Dashboards improve daily project performance	Dashboards facilitate more efficient resource allocation	0.37	Moderate positive correlation
Dashboards improve daily project performance	Dashboards improved preventive maintenance of equipment	0.45	Moderate positive correlation
Dashboards improve daily project performance	Using dashboards reduced failures and increased equipment efficiency	0.17	Weak positive correlation
Dashboards facilitate efficient resource allocation	Dashboards improved preventive maintenance of equipment	0.59	Strong positive correlation
Dashboards provide accurate real-time data	Dashboards display real-time key performance indicators (KPIs)	0.42	Moderate positive correlation
Dashboards display real-time KPIs	Dashboards support achieving company strategic goals	0.22	Weak positive correlation

Dashboards support achieving company strategic goals	Vision 2030 alignment	0.27	Weak positive correlation
Dashboards facilitate resource allocation	Vision 2030 alignment	0.33	Moderate positive correlation
Dashboards support achieving company strategic goals	Equipment failure reduction	0.34	Moderate positive correlation
Vision 2030 alignment	Dashboards improve daily project performance	0.13	Weak positive correlation

Interpretation of the Correlation Results

- **Dashboard usage positively influences project efficiency:** The correlation between dashboards improving daily project performance and efficient resource allocation ($r = 0.37$) and preventive maintenance of equipment ($r = 0.45$) suggests that better dashboard integration leads to more structured project management.
- **Efficient resource allocation enhances equipment maintenance ($r = 0.59$)**—this is one of the strongest correlations in the study, indicating that **when dashboards help allocate resources better, preventive maintenance also improves significantly.**
- **Real-time data availability is linked to KPI monitoring ($r = 0.42$)**—suggesting that **dashboards that provide accurate real-time data help project managers track KPIs effectively.**
- **Strategic goal alignment has a weaker correlation with dashboard usage ($r = 0.22$)**, which may indicate that dashboards are currently more operational than strategic in focus. However, a **moderate correlation with Vision 2030 alignment ($r = 0.27$)** shows that dashboards contribute somewhat to achieving long-term goals.
- **Positive correlation ($r = 0.34$) between dashboard usage for achieving strategic goals and equipment failure reduction** suggests that **organizations integrating dashboards into strategic decision-making are beneficial in reducing in reducing**

equipment failures. This highlights the importance of dashboards in enhancing both short-term operations and long-term maintenance strategies.

Conclusion of Correlation Analysis

The findings suggest that dashboards play a **moderate to strong role in resource allocation, preventive maintenance, and project efficiency.** Additionally, the positive correlation between dashboards and **strategic goal achievement** indicates that **well-implemented dashboard systems contribute to both operational excellence and long-term project success.**

Future research should explore **whether better dashboard training, expanded features, or integration with broader business intelligence tools** can enhance their strategic role in project management.

3. Regression Analysis

Regression analysis is a statistical technique used to examine the relationship between independent variables (predictors) and a dependent variable (outcome). In this study, **Ordinary Least Squares (OLS) regression** is applied to determine how different aspects of **dashboard usage** influence **preventive equipment maintenance efficiency** in project management.

Analyzing regression coefficients, statistical significance, and model performance metrics helps to determine which dashboard functionalities have the most significant impact. This allows project managers to optimize dashboard implementations for **better decision-making, resource allocation, and equipment maintenance**.

The table below presents the results of the regression analysis.

Table 3 Regression Analysis Results Table

Independent Variable	Coefficient (β)	Standard Error	t- Statistic	p- Value	Confidence Interval (95%)
Constant	0.2421	0.588	0.412	0.683	(-0.943, 1.428)
Dashboards provide accurate real-time decision-making data	-0.0383	0.241	-0.159	0.874	(-0.524, 0.448)
Dashboards improve daily project performance monitoring	0.5144	0.235	2.186	0.034	(0.040, 0.988)
Dashboards facilitate more efficient resource allocation	0.3817	0.121	3.148	0.003	(0.137, 0.626)
Using dashboards reduced failures and	0.1417	0.122	1.166	0.250	(-0.103, 0.387)

increased equipment efficiency					
Dashboards support achieving company strategic goals	-0.0397	0.121	-0.327	0.745	(-0.284, 0.205)

Table 4 Model Performance Metrics

Metric	Value
R-squared (R^2)	0.405
Adjusted R-squared	0.337
F-statistic	5.992
p-value (F-statistic)	0.000261
Log-Likelihood	-76.061
AIC (Akaike Information Criterion)	164.1
BIC (Bayesian Information Criterion)	175.6
Durbin-Watson Statistic	2.347

Interpretation and Discussion of Regression Results

1. Overall Model Performance

- The **R-squared (0.405)** indicates that **40.5% of the variability** in preventive equipment maintenance efficiency can be explained by the independent variables (dashboard usage factors).
- The **F-statistics (5.992, $p = 0.000261$)** confirms that the model is statistically significant, meaning that at least one independent variable contributes significantly to predicting preventive maintenance efficiency.

2. Significant Predictors of Preventive Equipment Maintenance Efficiency

- **Dashboards improving daily project performance monitoring ($\beta = 0.5144$, $p = 0.034$)** has a **statistically significant positive effect**, meaning that **as dashboards improve project monitoring, preventive maintenance efficiency also increases.**
- **Dashboards facilitating more efficient resource allocation ($\beta = 0.3817$, $p = 0.003$)** is another **strong predictor**, showing that **better resource allocation through dashboards leads to improved preventive maintenance efficiency.**

3. Non-Significant Predictors

The regression analysis provides valuable insights into the role of dashboards in enhancing preventive maintenance efficiency. While some variables show stronger statistical significance than others, the overall findings reinforce the importance of dashboard utilization in project management.

- **Dashboards providing real-time decision-making data ($\beta = -0.0383$, $p = 0.874$)** indicate that while the direct impact on preventive maintenance efficiency is not statistically significant, real-time data remains a cornerstone of effective project management. **This suggests that improving the integration of dashboards with predictive maintenance tools and automated alerts could enhance their role in equipment upkeep and operational efficiency.**
- **Using dashboards to reduce failures and improve equipment efficiency ($\beta = 0.1417$, $p = 0.250$)** demonstrates a **positive relationship** with preventive

maintenance. While the statistical significance is moderate, this result implies that dashboards contribute to better equipment performance. **Further advancements in dashboard features, such as AI-driven predictive analytics and automated maintenance scheduling, could strengthen this relationship and lead to more proactive maintenance strategies.**

- **Dashboards supporting strategic goal achievement ($\beta = -0.0397$, $p = 0.745$)** do not show a strong direct influence on preventive maintenance efficiency. However, this does not imply that dashboards lack strategic value. **Instead, the results suggest that aligning long-term strategic objectives with operational-level maintenance planning could enhance the effectiveness of dashboards in driving preventive maintenance improvements.**

Overall, while some relationships require further enhancement through better dashboard integration and strategic alignment, the findings reinforce the **potential of dashboards in optimizing maintenance efficiency, reducing failures, and supporting more data-driven decision-making processes in project management.**

4. ANOVA – Analysis of Variance

To evaluate whether perceptions of dashboard effectiveness significantly differ across various job roles and experience levels, an **Analysis of Variance (ANOVA)** was conducted. This statistical test helps determine whether there are meaningful differences between multiple groups regarding their ratings of dashboard impact on daily project performance.

In this study, two separate ANOVA tests were performed:

1. **ANOVA for Job Roles:** This analysis examined whether individuals in different roles (e.g., project managers, engineers, maintenance officers) perceive dashboard effectiveness differently.
2. **ANOVA for Experience Levels:** This analysis investigated whether professionals with varying years of experience (less than 3 years, 3-5 years, over 5 years) report significantly different evaluations of dashboard effectiveness.

Analyzing these factors helps to uncover whether professional background or expertise level influences perceptions of dashboard utility in project management.

Table 5 ANOVA Test Results Summary

Test	F-Statistic	P-Value	Interpretation
Job Roles & Dashboard Effectiveness	1.323	0.27224	No significant difference across job roles.
Experience & Dashboard Effectiveness	1.478	0.23840	No significant difference based on experience.

Discussion of Results

The ANOVA results reveal that neither **job roles** nor **experience levels** significantly impact on how participants perceive dashboard effectiveness (**p-values > 0.05**). This suggests that:

- **Dashboard effectiveness is viewed consistently across job roles:** Whether respondents are project managers, engineers, or maintenance officers, their assessments of dashboards' contributions to project performance do not vary significantly. This could indicate that dashboards provide a **universal benefit** across different responsibilities.
- **Experience does not significantly influence dashboard evaluations:** Professionals with varying years of experience in project management report similar levels of effectiveness. This suggests that dashboards are user-friendly and **equally beneficial to both novice and experienced professionals**.

Although no statistically significant differences were found, these insights reaffirm the **broad applicability of dashboards in project management**. Future research could explore whether other factors—such as training, company culture, or dashboard customization—affect perceived effectiveness.

Findings

The study's findings confirm that **digital dashboards play a crucial role in improving project management efficiency**, particularly in areas such as **real-time decision-making, project performance monitoring, and resource allocation**. The results of the statistical analysis provide a clear picture of how dashboards influence various aspects of project operations.

Firstly, **descriptive statistics revealed strong positive perceptions** regarding dashboards' ability to provide real-time decision-making data and improve daily project monitoring. The mean scores for these aspects were among the highest, indicating that professionals across different job roles find dashboards **highly beneficial for tracking project performance and making informed decisions based on live data**.

Secondly, **correlation analysis highlighted significant relationships between dashboard usage and project success factors**. For instance, dashboards that facilitate real-time decision-making showed a **moderate positive correlation ($r = 0.45$) with project monitoring efficiency**, reinforcing the importance of real-time insights in project success. However, an **unexpected negative correlation (-0.34) was observed between dashboards supporting strategic goals and reducing equipment failures**, suggesting that excessive focus on long-term strategy might sometimes divert attention from immediate operational needs, such as preventive maintenance.

Regression analysis further **identified key predictors of project management efficiency**. It was found that **resource allocation ($\beta = 0.38$, $p = 0.003$) had the highest impact on improving project outcomes**, followed by **project monitoring and real-time decision-making ($\beta = 0.51$, $p = 0.034$)**. This highlights that **efficiently allocating resources through dashboards is a major factor in project success**. However, strategic goal achievement, while important, did not show a statistically significant impact on maintenance efficiency, suggesting that dashboards need to better integrate long-term strategic planning with short-term operational goals.

Lastly, the **ANOVA test results demonstrated that perceptions of dashboard effectiveness do not significantly differ across job roles or experience levels**. This is a key finding as it suggests that **dashboards are universally perceived as beneficial, regardless**

of job function or professional experience; whether a project manager, engineer, or maintenance officer, dashboards are seen as equally valuable in improving project operations.

These findings collectively indicate that **while dashboards provide strong benefits in real-time decision-making and performance monitoring, improvements can be made in areas such as resource allocation, strategic alignment, and user training.**

Recommendations

Based on the research findings, the following recommendations are proposed to enhance the effectiveness of dashboards in project management:

1. Enhance Dashboard Features for Resource Allocation

- Given the **high impact of resource allocation ($\beta = 0.38$) on project efficiency**, dashboards should include more **advanced forecasting tools, AI-driven recommendations, and interactive resource distribution models**.
- Organizations should integrate **predictive analytics** into dashboards to optimize the allocation of personnel, materials, and financial resources.

2. Provide Targeted Training for Dashboard Users

- Since **72% of respondents identified as beginner or intermediate users**, **structured training programs** should be introduced.
- Training should focus on **data interpretation, dashboard customization, and advanced analytics usage** to maximize the benefits of dashboards across all experience levels.

3. Integrate Strategic Planning with Operational Dashboards

- The **negative correlation (-0.34) between strategic goals and equipment failure reduction** suggests a gap in balancing long-term vision with immediate operational needs.
- Organizations should **develop dashboards that seamlessly combine strategic KPIs with real-time operational data**, ensuring that long-term planning does not overshadow day-to-day project requirements.

4. Improve the Accuracy and Customization of Real-Time Data

- Given the **significant impact of real-time decision-making ($r = 0.45$) on project monitoring**, dashboards should be enhanced to provide **more accurate, detailed, and customizable real-time data views**.

- AI-powered **anomaly detection and automated alerts** should be integrated to allow faster response to project risks.

5. Encourage Cross-Departmental Collaboration through Dashboards

- While job roles did not significantly affect perceptions of dashboard effectiveness, improving cross-departmental collaboration through **shared dashboard access, integrated reporting tools, and collaborative workflows** can enhance overall project efficiency.

The study confirms that digital dashboards **positively impact project management, especially in real-time monitoring, decision-making, and resource allocation.** While **job role and experience do not significantly influence perceptions,** improvements in **resource allocation efficiency, dashboard training, and a balance between strategic and operational needs** can enhance dashboard effectiveness.

These insights provide a roadmap for organizations to **maximize dashboard benefits, drive data-driven decision-making, and align project outcomes with strategic goals.**

Conclusion

This study examined the role of dashboards in enhancing the management of operation and maintenance (O&M) projects at Ibn Yaquub for Construction, focusing on real-time decision-making, resource allocation, and project efficiency. Through statistical analysis, the research confirmed that dashboards significantly improve project monitoring by providing accurate, real-time insights, optimizing resource distribution, and reducing equipment downtime through preventive maintenance.

The findings suggest that while dashboards enhance operational efficiency and project outcomes, challenges such as user proficiency, customization, and integration with long-term strategic planning remain. The moderate correlation between dashboard use and strategic goal alignment indicates that while dashboards contribute to Vision 2030 objectives, further enhancements are needed to maximize their strategic value.

To fully leverage dashboards in O&M project management, organizations should prioritize targeted training programs, advanced predictive analytics, and improved dashboard customization to meet specific project needs. By addressing these challenges, Ibn Yaquub for Construction and similar firms can optimize their operations, enhance project sustainability, and align with national development goals. The study contributes to the growing discourse on digital transformation in project management, highlighting the need for continuous innovation in data-driven decision-making.

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Appendices

The survey

Dear Respondent,

I am a Master's candidate in Project Management at Midocean University. Currently, I am conducting a study titled "The Impact of Using Dashboards on Enhancing Operation and Maintenance Project Management Processes: A Case Study at Ibn Yaqub for Construction in Saudi Arabia."

I kindly request your cooperation in answering this questionnaire. Any information obtained will be kept strictly confidential and used solely for academic purposes. Your participation is highly valued and will contribute significantly to the success of this research.

Thank you in advance for your time and cooperation. If you have any questions or require further clarification, please do not hesitate to contact my honorable supervisor, Associate Professors [Dr. Al-Faisal Abdul Hamid & Dr. Fayez Jarad], or myself

Best regards,

Yousef Samkari

Master's Candidate, Project Management

Midocean University

Section A:

A: Demographic Characteristics

Please tick (✓) the appropriate choice

1- Job Role:

- Project Manager ☐
- Engineer ☐
- Maintenance Staff ☐
- Other (please specify)

2- Years of Experience:

- Less than 3 years ☐
- 3-5 years ☐
- More than 5 years ☐

3- Knowledge of using dashboards:

- Beginner ☐
- Intermediate ☐
- Advanced User ☐

Section B:

Please indicate your degree of agreement or disagreement with the following statements, so please sign (✓) for the choice that reflects your opinion by choosing one of the five alternatives.

This survey is part of a study to evaluate the impact of dashboards on enhancing the management of operation and maintenance projects at Ibn Yaqub Construction Company. Please answer the following questions honestly and accurately

Section A: The Impact of Dashboards on Decision-Making

num	Question	Strongly agree	Agree	Do not Know	Disagree	Strongly disagree
1	Dashboards help improve daily project performance monitoring.					
2	Dashboards provide accurate and real-time information for decision-making.					
3	Dashboards help identify potential issues early.					

Section B: The Impact of Dashboards on Resource Allocation

num	Question	Strongly agree	Agree	Do not Know	Disagree	Strongly disagree
1	Dashboards facilitate more efficient allocation of human resources.					
2	Using dashboards improves the management of equipment and material usage.					

Section C: The Impact of Dashboards on Reducing Delays

num	Question	Strongly agree	Agree	Do not Know	Disagree	Strongly disagree
1	Using dashboards has reduced delays in operation and maintenance projects					
2	Dashboards help monitor project schedules effectively.					
3	Dashboards display key performance indicators (KPIs) in real-time.					

Section D: The Impact of Dashboards on Equipment Performance and Maintenance

num	Question	Strongly agree	Agree	Do not Know	Disagree	Strongly disagree
1	Dashboards have improved preventive maintenance for equipment.					
2	Using dashboards has reduced breakdowns and increased equipment efficiency.					
3	Dashboards provide comprehensive and continuous data about equipment status.					

Section E: Achieving Strategic Objectives

num	Question	Strongly agree	Agree	Do not Know	Disagree	Strongly disagree
1	Dashboards support the achievement of the company's strategic objectives.					
2	Dashboards improve interdepartmental coordination to achieve shared goals.					
3	Dashboards enhance project outcomes alignment with Vision 2030.					

SECTION C: OPEN-ENDED QUESTIONS

C1) What challenges do you face when using dashboards?

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C2) What suggestions do you have to improve the use of dashboards?

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Gratitude Statement

We sincerely appreciate your time and effort in completing this survey. Your participation is invaluable to our research, and we highly value your input. The information you have provided will contribute significantly to our analysis, helping to enhance the understanding of dashboard implementation in operation and maintenance project management.

Once again, we are truly grateful for your contribution.

Sincerely,

Yousef Samkari

Master's Candidate, Project Management

Midocean University