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| RESEARCH ARTICLE

The Role of Enterprise Portfolio Management in Digital Transformation Strategies

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| ABSTRACT
Today's world undergoes rapid technological changes, and organizations must address these changes. However, given the potential to play a critical role in transformation initiatives, it often takes scarce resources and partial efforts without a reliable way to measure the success of transformation initiatives. Enterprise Portfolio Management (EPM) addresses such issues by making digital transformation projects work with business objectives, utilizing resources best, managing risks, and allowing real-time performance evaluation. The parameters in this paper provide a clear discussion of how EPM plays an important role in enforcing digital transformation strategy to elongate strategic alignment, optimize resources, manage risks, measure performance, and support agile decision-making. This looks at how EPM ensures that the initiatives concentrate on the company's vision, efficiently use the resources, mitigate technological and implementation risks, and track progress according to clear metrics. In addition, the paper discusses the resistance to change and data access problems organizations encounter when adopting EPM. The use case offered in this section outlines the best practices for digital transformation through EPM, which include clearly defining an objective, which tools can be used in a scalable manner, fostering cooperation between all involved parties, handling the change appropriately, and continuously evaluating performance. EPM provides organizations with the idea that digital transformation is not just successful. However, this sustains the delivery of sustainable value; thus, they can remain afloat in the administrative bop digital space. The findings of this study quite argue that EPM is a bedrock that enables superior competitive advantage in the digital era.

| KEYWORDS

Enterprise Portfolio Management (EPM), Digital Transformation, Resource Optimization, Agile Decision-Making, Risk Management

| ARTICLE INFORMATION

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1. Introduction

Digital transformation is essential in today's business landscape, and organizations are compelled to stay competitive, relevant, and efficient. Digital transformation involves deploying the latest digital technologies in all business dimensions, making businesses truly different in how they do business, adding value to customers, and responding to market needs. Typically, this transformation is adopting technologies like cloud computing, artificial intelligence (AI), machine learning, big data analytics, and the Internet of Things (IoT), which help streamline operations, improve customer experience, and generate new revenue. Digital transformation holds tremendous importance as it can disrupt the erstwhile traditional business models and make the business environment more nimble and data-driven. Digital transformation is gaining pace, and if one organization fails to take this as an opportunity to adopt digital technologies, it will indeed become obsolete and wash away the competitive edge it once had over other organizations. Such companies can significantly reduce their efficiency, innovation, and responsiveness time to markets. This is not simply an improvement of technology but a cultural shift by which organizations must reconsider strategy, processes, and value proposition. The path of digital transformation is not an easy one, however. However, most organizations find it hard to deal with resource constraints, uncoordinated efforts across various business functions, opposition to change, and lack of an efficient

way of measuring the success of digital projects. In addition, as enterprises introduce new technologies like data analytics or robotic process automation, they encounter cybersecurity, data privacy, and compliance issues. This is a crossroads for most companies on their digital transformation journey. They do not know what to do about their technology investments and are not making major returns or yielding.

With EPM, an organization can address important issues concerning Digital Transformation. An organization's portfolio of projects, programs, and initiatives is managed and governed by EPM to ensure that projects are effectively aligned with the organization's strategic goals, allowing it to optimize its supply of resources and appropriately manage risks. EPM gives a well-scoped approach to making decisions regarding the allocation of resources for projects, proper prioritization of projects, and proper tracking of project performance, all of which have a vital role in the digital transformation process. EPM helps companies pass digital transformation and guarantees strategic alignment of the efforts with the company's overall goals by offering a digital duality of initiatives and projects. Concurrently, it also provides a way to monitor and measure the digital project by employing key performance indicators (KPIs) and many other metrics. EPM also enables organizations to calculate risks associated with the failure of digital transformation, cyber security breaches, and shifting the market to controlled levels through prudent planning and monitoring.

EPM is also useful for implanting agility in a very quick transforming dynamic condition of digital land, including the capacity to make quick determinations and the capacity to realign its portfolios following dynamic advertise conditions, changing innovations, and changing client demands. EPM is a common trend among organizations as they embrace digital transformation. However, it is a crucial tool that sits between the investment that an organization makes in the digital and the organization's strategy to allow the organization to be sure that the technology investments of an organization are coordinated in that strategic trajectory, pleasant in usefulness, and bring genuine favor.

This article seeks to understand how Enterprise Portfolio Management helps organizations to become successful digital transformation strategies. The rest of this paper explores how EPM substantially helps strategic alignment, resource optimization, risk management, performance evaluation, and agile decision-making in digital transformation. Organizations will encounter typical problems when implementing EPM and offer the best practices using the framework to step up to digital success. This article explores these aspects to assist with integrating EPM into the organization's digital transformation strategy. This study aims to present concrete advice to businesses in terms of how they can respond to the challenges of digital transformation and turn the technologies they invest into value and grow sustainably. The article will look at the theoretical insights and then provide real-world examples and case studies of how EPM can help enhance digital transformation.

2. Literature Review

2.1 Studies on Digital Transformation

The trademark of the modern business strategy is the absence of transformative change. Instead, it gives organizations an edge in terms of emerging technologies. Kane et al. (2019) research has argued that digital transformation is a method that allows businesses to improve operational efficiency and innovate and also make more customers. However, such changes are often needed to stay in the game of an ever more automated market. For example, their study shows that organizations have increased their adaptive and scalable efforts when advanced technologies are installed in their business model. These play a major role in their long-term success. Vial (2019) also describes using digital transformation to facilitate business agility. His research reminds us that digital technologies help organizations react faster to changing markets in industries with rapid innovation and disruption.

Figure 1: Digital Transformation and Enterprise Portfolio Management

Digital transformation also transforms traditional business models and organizational structures. The organization should alter its strategic capabilities to increase the benefits of digital transformation, which has been investigated by Bharadwaj et al. (2013). It also involves moving from hierarchical structures to more cooperative, agile, and speed in their decision-making and innovation. Furthermore, clients increasingly expect their business partners to adopt and assimilate cutting-edge technologies like cloud computing, big data analytics, and artificial intelligence, enabling the business to personalize customer experiences and

increase operational efficiencies. In terms of organization, we have to change our processes and set new skills to support digital initiatives in response to these technological advancements. Westerman et al. (2014) find that organizations that overlook technological changes will eventually reach a strategic dead end.

Along with changing business processes, digital transformation impacts industry competitiveness. Competition is raging in corporate life, and this is taking place in a world where organizations are footing the bill for new technologies and digital capabilities. Digital transformation has become a critical requirement for organizational success, as this drive for innovation has become a strong change enabler. In their study, Fitzgerald et al. (2014) argue that companies leveraging digital transformation can disrupt industries, create new markets, and deliver differentiated value propositions, creating sustainable competitive advantage.

2.2 Portfolio Management and its Strategic Role

It has been well-documented that portfolio management is important to the strategic side of things in both the traditional and digital worlds. The Project Management Institute (PMI, 2021) says that portfolio management ensures, among other things, that the organization's projects and initiatives are aligned with its strategic objectives, facilitating better decision-making and better allocation of resources and management of risks. However, in a digital environment that's constantly changing, portfolio management helps organizations concentrate on the highest priority of initiatives that can add tremendous value to business. Portfolio management also protects against risks by offering a reason to distribute resources to projects in a way that balances short-term and long-term needs.

Digital goals can be achieved efficiently when portfolio management and digital transformation are closely related. According to Aubry et al. (2017), portfolio management contributes to digital transformation by allowing a choice among and managing digital projects. This framework ensures that corporate-level initiative is the focus of organizations at the trouble or project level and, in the process, prevents systems from being fragmented, and fewer financial resources are invested in activities that do not support corporate-level initiatives. Continuously monitoring and making real-time decisions are equally important in effective portfolio management in digital transformation, as the camera continues to say. It enables organizations to assess digital initiatives' performance, measure the risk of these initiatives, make timely adjustments in case of change in business priorities, and monitor various projects.

Figure 2: An Overview of Strategic Portfolio Management

EPM tools and frameworks change to fit these demands as companies migrate towards electronic transformation. Real-time data analytics, cloud-based solutions, and AI have become part of EPM tools, which can analyze and monitor their performance, manage risks, and ensure that their strategies are aligned. According to Crawford (2018), the advancement of EPM tools is closely related to research on the EPM tools, which makes decision-making more accurate, provides timely insights into project performance, and subsequently adjusts to these changes and opportunities. Additionally, contemporary EPM frameworks adopt agile methodologies that enable smarter and reconfigurable times, ensuring that contents are managed in a volatile digital environment.

2.3 The Gap in Existing Research

Research on digital transformation and portfolio management is abundant, though integrating enterprise portfolio management (EPM) with digital transformation is not included in the literature. Though it has great potential to enable success in digital initiatives, the role of EPM in digital transformation has not been examined well. More often than not, many studies remain focused on the traditional role of EPM in resource allocation, risk management, and performance evaluation (PMI, 2021) and neglect the specifics to make it support the bewildering complexities of digital transformation.

Some studies suggest more research on how EPM can facilitate organizations in handling the complexity of digital transformation (Aubry et al., 2017; Crawford, 2018). However, this domain lags in the limited exploration of EPM's role and the potential role to address the specific issues organizations face in digital transformation, such as managing divergent digital projects, taking decisions on high strategic initiatives, and aligning with constantly moving business goals. According to Westerman

et al. (2014), in their review of digital transformation literature, while portfolio management is an important part of digital strategies, there is little work on practical frameworks and case studies about leveraging EPM effectively into this. The number of stakeholders and projects and the rate at which technologies evolve within digital transformation initiatives often make it difficult to understand how EPM tools and techniques can be adapted to meet the needs. With this in mind, this paper closes that gap by offering a detailed analysis of how EPM can enable digital transformation strategies through strategic alignment, resource optimization, and agile decision-making.

3. Theoretical Framework

3.1 Strategic Management Principles

Strategic management sets the base for the linkage of organizational initiatives with long-term goals. Strategic management applies to decision-making inside Enterprise Portfolio Management (EPM), where decision-making is concerned with managing the projects and programs with the overall goal of an organization. This discipline has several core concepts, including formulating, implementing, and evaluating strategies to accomplish competitive market advantage and organizational effectiveness. Strategic management is about hedging our resources against risks and optimizing the value-making from all the projects an organization is involved in (Grant, 2016). In the case of EPM, this means bringing all portfolio projects together as a unified portfolio that aligns with the business's strategic agenda. Prioritization of initiatives is deemed one of the key elements of strategic management in EPM. EPM gives the frameworks and tools to assess and choose projects that align well with corporate objectives. For example, portfolio governance structures help ensure the most value is delivered (per the strategic objectives); hence, the implementation is limited to those initiatives (Meskendahl, 2010). It is a preventive measure that ensures that the strategic direction of any organization is not undermined by projects that are fragmented or aligned poorly with each other.

In the resource-based view of EPM, resource allocation is another fundamental issue for strategic management. Strategic management seeks to optimally allocate resources across different initiatives to provide the highest priority, most critical, and high-impact projects. As part of strategic management, resource allocation (the act of allocating) of EPM contributes to overall organizational performance by ensuring it helps to improve business decisions on investments in human, technological, and infrastructure capital. In addition, systems theory in portfolio management comes into play as it offers a means to view the interdependencies and interconnection of organizational projects. The Strategic Management Process in EPM takes its ground in Systems Theory. It implies that an organization is composed of different systems that function through interrelated structures and that all projects should have relationships to organizational goals (Meier, 2018). Knowing these interdependencies enables organizations to recognize the conflicts or synergies between projects, which helps them make more efficient decisions and allocate the required resources. By utilizing systems theory, effective risk management and performance evaluation become possible as managers can anticipate the effects of changes in a single portfolio project on other projects.

3.2 Evolution of EPM in the Digital Era

The advent of such technological advances as real-time data analytics and agile methodologies has influenced the evolution of Enterprise Portfolio Management (EPM) in the digital era. Surprisingly, EPM has always been considered related to the structured management of projects following fixed processes and predictive methodologies. However, EPM has gradually become more and more flexible and data-driven because organizations have more and more to operate in dynamic environments marked by rapid technological changes.

EPM has become a major beneficiary in the digital transformation race because real-time data analytics has become critical (Bansal, 2022). Organizations have been able to make more informed decisions. As a result, projects have been monitored continuously rather than at set milestones, thanks to their access to massive amounts of data. With real-time analytics, EPM can quickly adapt to market conditions, technological innovations, and customer requirements. The capability of making proactive adjustments, minimizing the risks that digital transformation efforts bring with it, and keeping the portfolio aligned with the changing strategic objectives of the organization. Also, integrating advanced data analytics tools with EPM platforms makes continuous project performance evaluation possible, leading to more accurate forecasting and better decision-making capabilities.

Figure 3: Enterprise Performance Management (EPM)

In addition, agile has also played a big role in the design and implementation of EPM frameworks. Project management using the traditional waterfall approach could not compensate for the need for flexible projects in digital environments, as projects must constantly change. Conversely, agile methodologies demand flexibility, teamwork, and iterative development. Thus, they appear to find support in most digital transformation cases (Schwaber & Sutherland, 2017). The EPM framework has adopted agile principles to manage projects in shorter cycles, react to change more quickly and adapt to stakeholders ' feedback at every project stage. Organizations were able to invest in managing portfolios that have both traditional and digital initiatives simultaneously due to the shift to agility.

In the digital era, not only cross-functional collaboration has also become a cornerstone of EPM. Different departments, such as IT, marketing, finance, and operations, are involved in commenting on the complexity of digital transformation projects. Digital projects can only be implemented successfully when functions can collaborate. This collaboration has necessitated adapting EPM tools to promote collaboration across departmental boundaries using communication, sharing of resources, and decision-making. For this reason, organizations were able to tear silos down and bind teams around a cohesive project to achieve more successful outcomes while dealing with such complexities and intricacies of digital transformation.

Cross-functional collaboration increases EPM's agility, incorporating a diversified perspective in the decision-making process. Involving key stakeholders from different disciplines, as digital transformation usually necessitates many iterations and flexible adjustments, optimizes speedy adaptation to new challenges and opportunities. Agile and cross-functional integration within EPM frameworks enables the organization to stay responsive to internal and external changes, thereby increasing its resilience to the effects of digital disruption (Figueiredo et al., 2022). That is why EPM has changed dramatically in the digital era, thanks to technological advancements like real-time data analytics and agile methodologies. Such changes to EPMs have increased their flexibility, responsiveness, and collaborative aspects, making them indispensable tools for organizations undergoing a digital transformation phase. Now that EPM frameworks are embracing these innovations, they can support modern portfolios' dynamic and complex nature so that digital transformation efforts will follow organizational goals and market realities.

4. The Role of EPM in Digital Transformation

Enterprise Portfolio Management (EPM) is an important function for implementing digital transformation within an organization. While companies adopt new technologies and practices, projects must be aligned, resources must be optimized, risks must be managed, performance must be measured, and agile decision-making must be enabled. Doing so ensures that EPM enables businesses to execute digital initiatives as efficiently as the requirements while also enhancing their strategic capabilities in the long term.

Figure 4: Benefits of Enterprise Performance Management (EPM) System

4.1 Strategic Alignment

Digital initiatives must have strategic alignment, and digital initiatives should be aligned with the organization's mission, vision, and long-term objectives. The structured framework of EPM reduces the risk of disparate efforts and money falling down a technology black hole by ensuring that digital transformation project efforts are tied straight to business priorities. When projects are well aligned with strategic goals, organizations have guidance on where the digital transformation is heading, bringing a well-aligned and cohesive direction for projects.

EPM performs strategic alignment as it gives visibility over the entire portfolio of projects. It facilitates senior management's focus on initiatives that will create the maximum strategic value, such as projects that increase customer engagement, operational efficiency, or new business models. EPM serves as a tool to map digital initiatives against the overall organizational strategy to ensure resources get allocated to the most impactful areas and make digital efforts in sync with corporate objectives (Cokins, 2017).

Some case studies demonstrated the value of digital transformation with strategic alignment. For example, a global telecommunications firm used EPM to align digital projects with its central corporate purpose of customer experience. By prioritizing digital initiatives using EPM tailored to customer needs and long-term strategic goals, the company moved forward with efforts to streamline and minimize redundancies and speed up delivery of the most valuable projects. By leveraging EPM, a multinational manufacturing company synchronized its digital transformation with its view of achieving leadership in Industry 4.0. The company was able to align digital initiatives to manufacturing process optimization and reduce costs, improve product quality, and increase overall efficiency.

4.2 Resource Optimization

Digital transformation often entails high investments in technology and infrastructure and may create tension among the systems and new business models pursued. With limited resources, it is important to focus on specific initiatives that will bring the most return on investment (ROI) and the biggest chances to grow an organization. As a holistic view of the organization's digital initiatives, EPM is a key enabler to optimize resources since leaders can better decide where to allocate resources to achieve the best results.

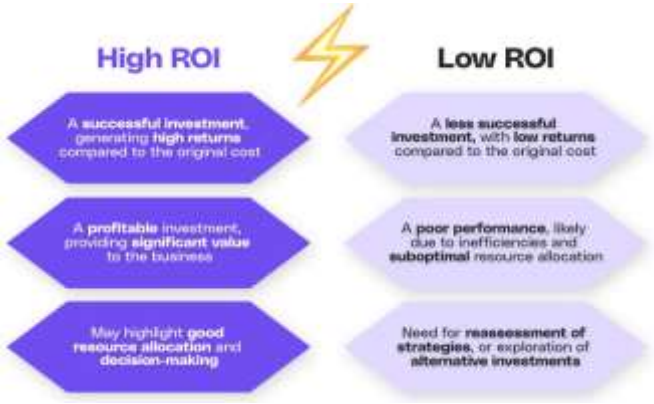

Figure 5: An Overview of Return on Investment (ROI)

EPM enables digital initiatives to determine the value and impact of initiatives to optimize resources. The EPM approach allows one to have a holistic view of all running projects and discover redundancies, underperforming initiatives, and resource gaps. Through efforts in streamlining and reallocating resources in correlation with strategic priorities, the organization can maximize the derivation of value from its investment in the organization.

For example, EPM assisted an international retail chain to get the most from digital transformation by aligning all the tech investments with the company's strategic goals. The company chose to reduce the investment in the little impactful projects because digital initiatives are prioritized to achieve customer-centric objectives like introducing e-commerce platforms and improving the supply chain efficiency. A case of such an application is a healthcare provider that adopted EPM to maximize their digital transformation projects, including setting up telemedicine platforms and launching electronic health record systems. The strategic priorities of these initiatives suggested that limited resources could effectively be deployed to deliver high-impact projects on time and within budget.

4.3 Risk Management

Any digital transformation initiative has inbuilt technological risks, such as cybersecurity threats, data breaches, compliance challenges, and implementation obstacles. EPM can help determine, judge, and reduce these risks as an organized framework. Including risk management in the portfolio management process can help organizations practice proactive risk response to the issues that might occur in the execution of digital transformation projects. Risk management through EPM ensures that organizations get an overall view of all digital initiatives and, more vividly, organize the risks based on every project (Hiyari,

2020). Decision makers are data-driven as they decide which of these initiatives they should pursue based on their risk profiles. Moreover, EPM tools allow risk mitigation strategies to be incorporated into project plans, covering the whole project lifecycle.

For instance, an EPM project facilitated a financial services company's management of business risks associated with digital transformation adoption, such as mobile banking applications and moving customer data to the cloud. By integrating risk assessments for cybersecurity and compliance checks into the EPM process, a company could assess vulnerabilities early and establish mitigating actions to safeguard organizational and customer assets (Bailey, 2021). It also used EPM to manage the risk of digital transformation because of the activity of a government agency dedicated to managing public infrastructure projects. The agency adopted a risk-based approach to portfolio management where each digital project would have potential risks such as data privacy concerns, regulatory compliance, and implementation delays. Through this approach, the agency was able to reduce the risk amounts such that they did not become critical problem areas of its digital initiatives.

4.4 Performance Measurement

Digital transformation initiatives need to be assessed based on their success. Accordingly, effective performance measurement for return on investment (ROI) and proving to stakeholders that the effort was successful is needed (Gill, 2018). Therefore, EPM contributes largely to building out performance metrics and key performance indicators (KPIs) that measure the success of digital projects. EPM allows organizations to evaluate digital initiatives' impact in settings and make necessary tweaks by having clear expectations and benchmarks. Generally speaking, EPM frameworks involve performance measurement tools that qualify several metrics: project completion timelines, observing adherence to budget, customer satisfaction, and efficiency in operations (Kerzner, 2022). These are used to measure the results of the organization's digital efforts and to see how these efforts determine whether they are helping them reach their goals in the manner in which they do.

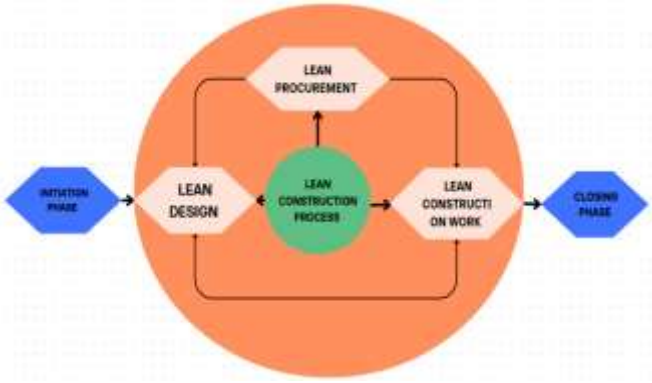

Figure 6: Key Performance Indicators (KPI) to Measure Effectiveness

An e-commerce company uses EPM to calculate the success of its digital efforts, such as erecting new online storefronts or implementing AI into its customer service platform. KPIs for each initiative were set as desirable performance standards, and the company could track progress, thereby changing strategies when some projects failed to do so as expected. For instance, a different company was a technology company that employed EPM to gauge digital transformation project performance, such as cloud-based enterprise resource planning (ERP) systems. The firm measured KPIs such as cost savings, user adoption rate, productivity improvements, and the ability to optimize its portfolio over time as a result of its digital projects.

4.5 Agile Decision-Making

Today's rapidly changing market conditions and the technology round make organizations capable of making faster and more informed decisions. EPM's ability to deliver real-time data on project performance and provide organizations with the ability to respond to new information appropriately and quickly makes it an efficient tool. This is essential to make agile directions to moving digital initiatives with business goals and market needs. Real-time monitoring of digital transformation projects using tools such as EPM gives up-to-date information regarding the progress of the projects, resource utilization, and risk factors. Decision makers are given data visibility to make data-driven decisions as they happen. In addition, by incorporating agile principles in the EPM processes, organizations can change quickly in the event of necessity and change faster than the process is typically controlled.

The use of EPM in a real case, where a worldwide manufacturing company used it to transform the digital transformation from traditional product giving and receiving to the Internet of Things (IoT) on production lines optimizing their line. Real-time data analytics enabled the company to make quick decisions, which meant it had to change its production schedules and resource allocation and handle unforeseen challenges on time. Similarly, an EPM adoption in place to spur digital transformation initiatives, for instance, integrating blockchain technology into secured transactions, also led to more agile decision-making (Fenwick & Vermeulen, 2019). With its hands-on latest data on project execution performance, the organization was able to immediately respond to market changes and develop its strategies to remain competitive in a highly dynamic industry.

5. Challenges in Implementing EPM for Digital Transformation

EPM is crucial to aligning digital transformation initiatives with the organization's objectives. However, organizations will have many problems implementing the EPM framework in the digital transformation environment. Such challenges include overcoming resistance to change, data integration challenges, the balancing between short-term and long-term deliverables, and skill gaps.

5.1 Resistance to Change

Organizational inertia and stakeholder resistance are the main barriers to implementing EPM in digital transformation. It is difficult to change management, especially in large organizations in which permanent employees are accustomed to working in ways they have been. EMPM is resisted because of a shift in mental outlook. EPM often needs to recalibrate existing practices, systems, and structures to support digital initiatives (Kotter, 2012). Employees (in particular, those in senior management) might resist the pain of disruption from existing practices when they think there is a risk to their benefits from EPM or do not understand why there is a reason to do so.

Figure 7: EPM Software Adoption Challenges

Organizations such as large multinational corporations are real-world examples of resistance to efforts to introduce digital portfolio management tools. For instance, several financial services companies find it difficult to implement new EPM systems when the executives and staff are wary of tools they deem complex and unconducive to existing operations (Bansal, 2020). A good value proposition and clear change plans, with good communication, will help counteract this resistance. To help transform, leadership needs to champion transformation by actively engaging stakeholders and addressing those concerns firsthand so that anyone in the organization can see the value of EPM in increasing productivity and also, in the end, providing the organization with big-time success.

5.2 Data Access and Integration

Data access and integration is the second major difficulty that needs to be overcome to implement EPM for digital transformation. To execute digital transformation initiatives, real-time data must flow through an organization seamlessly to make decisions, but there are issues that many organizations have with their data. The EPM tools are data-dependent for both portfolio evaluation and decision support and when the data infrastructure is not robust, they may be invalid. However, many companies work along siloed systems that cannot aggregate and integrate data from different departments, slowing things down and destabilizing the performance metrics.

A case study on a global healthcare provider provides some insights into the issues we face even as we integrate EPM systems with existing Electronic Health Record (EHR) systems. Although many critical investments were made in EPM tools, data from EHR systems did not align with Portfolio Management metrics regarding resource allocation. As a result, the resource was not being efficiently utilized (Jones, 2018). Organizations can address this challenge by investing in an entire data management system that can integrate multiple data sources to provide accurate, up-to-date data to EPM tools. Additionally, EPM tools must be selected to accommodate existing platforms, further disrupting less and helping with data flow.

Figure 8: Electronic Health Record (EHR) Implementation

5.3 Balancing Short-Term and Long-Term Objectives

In digital transformation, one often running challenge is achieving short-term wins while tending towards long-term strategic objectives. Digital transformation often means driving fast technological changes and exploring short-term solutions, such as increased customer experience or operational effectiveness (Wang et al., 2020). However, if one focuses too heavily on short-term gains, one cannot focus on the organization's main, broader, long-term goals. Since they are developed to fit portfolios to organizational strategy, the portfolio may lose coherence with the whole vision when this priority changes to the immediate results.

For example, in a case study of the retail chains' digital transformation, executing quick results to customer satisfaction metrics shifted away from strategic digital capabilities. As a result, these misallocated resources did not evolve into a better strategy for the future, hindering long-term innovation. This requires organizations to focus on initiatives in their portfolio that bring practical value to the present and help with long-term strategic goals. EPM tools can Enable visibility across the whole portfolio by not allowing short-term investments to compromise with long-term investments in innovation and sustainability.

5.4 Skill Gaps

For EPM to be successfully implemented for digital transformation, it relies on existing staff who can smoothly navigate between strategic management and technological complexities. Much work has been done to document the shortcomings of professionals equipped to support EPM system integration with digital transformation objectives (Bharadwaj et al., 2013). The inability to find these requisite ranges of domain experts hinders organizations that want to deploy EPM successfully and significantly due to the number of interrelated project management experts, IT systems, and business practices.

A simple example would be that many small to medium-sized enterprises (SMEs) struggle with EPM adoption as the necessary personnel to both take on and implement improved data analytics, agile methodologies, and cross-functional collaboration are often not in place or lacking. Such gaps hinder the capability to adopt EPM tools, which rely on specialized knowledge for configuration and maintenance (Bansal, 2022). The solution to this challenge is to invest in training programs to build such skills in our workforce. This way, besides helping them, they can partner with external experts if they need temporary help while forming in-house experts. In addition, organizations must foster a culture of continuous learning and development to keep up with the evolution of the skills needed for digital transformation efforts.

Figure 9: Small and Medium Enterprises (SME)

EPM for digital transformation is not an easy task. There has been resistance to change, data access, integration problems, and balancing short to long-term objectives, all of which are barriers to success. Despite these challenges, organizations can overcome them with the right strategies—specifically, by practices and systems such as clear change management systems, robust data management systems, focus on long-term strategic goals, and skills development. For organizations, addressing these issues head-on ensures frameworks to facilitate and expedite the EPM frameworks to support and accelerate their digital transformation efforts.

6. Methodology

6.1 Research Design

Based on these competing arguments, the study adopts a mixed method approach, including qualitative and quantitative research methods, to explore the role of Enterprise Portfolio Management (EPM) in the online digital transformation strategy. The qualitative component involved examining a set of case studies from organizations that have been able to implement the EPM frameworks within their process of digital transformation. The case studies present issues of practical EPM and the impact of the former on organizational performance, resource optimization, risk management, and agile decision-making. The quantitative component consists of surveys conducted with industry professionals to understand the effectiveness of EPM tools and strategies across various sectors (Sison, 2022).

The research design's goal embraces theory combined with practice through the synthesis of academic literature and empirical findings. Applying this mixed methods approach provides a thorough understanding of how EPM plays a role in digital transformation, combining the richness of qualitative case studies with the generalizability of quantitative data.

6.2 Data Collection

The data is collected through both primary and secondary sources. Primary data is gathered by structured interviews and surveys with the key stakeholders in an organization undergoing digital transformation. These stakeholders include project managers, chief information officers (CIOs), senior decision-makers on the EPM team, and digital transformation initiatives (Nyati, 2018). The structure of the interviews gives the experts opportunities to probe the challenges, strategies, and outcomes of implementing EPM in live situations. Apart from interviews, the researcher distributes surveys to a wider sample of professionals to gather quantitative data on the overall efficiency of the EPM in achieving successful digital transformation.

Figure 10: CIO - Chief Information Officer Role

Academic articles, industry reports, and other publications are used to source secondary data. The information in these sources concerns background, theoretical framework, general digital transformation, and portfolio management trends and challenges. Academic sources include peer-reviewed journal articles, books, and conference papers, but they give special attention to industry reports from top consulting firms and research organizations. Combining primary and secondary data will provide a good context for working on the research topic.

6.3 Data Analysis

This data analysis takes a structured approach to find out the most important trends and patterns of adoption of EPM in digital transformation programs. Thematic analysis is used when qualitative data is used to code and sort interview responses. This process is then described by identifying repeated themes and patterns of how EPM supports strategic alignment, resource optimization, risk management, and performance measurement in digital transformation efforts. After this, they analyze the qualitative data further through the case studies by comparing and creating an understanding of the contextual factors involved in the success or failure of EPM frameworks.

The data reveals relationships between the use of the EPM and the digital transformation outcomes through statistical methods like descriptive statistics and regression analysis. Descriptive statistics can offer a brief analysis of the survey results, with frequencies, averages, and percentages, and regression analysis can help determine the strength and significance of a relationship between EPM adoption and performance indicators like return on investment (ROI), operational efficiency, and risk mitigation. A mixed methods approach permits the study of findings from more than one source, thus increasing the validity and reliability of the findings.

6.4 Limitations

Limitations of the study, such as the rigorous research design, still exist despite the study, which could limit the generalizability of the findings. However, the sample size is one key limitation, especially for the qualitative part. Interviews and case studies are confined to a few organizations that have undertaken EPM as a part of their digital transformation. These cases offer interesting insights but may not be the experience of all organizations. Additionally, the survey sample may suffer from response bias since only those who wish to take the survey may have had different experiences or views from those who do not.

The study is also limited to these industries, and another limitation relates to the fact that the case method necessarily chooses to generalize. It is not clear how far these findings can be directly applied to organizations belonging to other sectors with their own digital transformation strategies and EPM tools (Izzo et al., 2022). Additional companies may also have restricted access to some proprietary data, which can hinder the ability to make conclusive observations regarding the effect that EPM has had on widespread digital transformation.

The study also depends on current academic research and industry reports, and changes in future digital transformation strategies and portfolio management practices are possible. As we continue to advance in technology, tools, frameworks, and methodologies could emerge between now and when the study is complete, rendering the conclusions irrelevant. While these will limit the study, the mixed methods approach can still provide a full view of EPM within the digital transformation, giving valuable insight to academics and practitioners.

7. Best Practices for Leveraging EPM in Digital Transformation

For digital transformation, Enterprise Portfolio Management (EPM) is the top-of-mind tool for managing the rich and often disconnected set of initiatives that accompany the conversion. By leveraging best practices in EPM, organizations can be assured that digital transformation strategies follow organizational goals and deliver the required outcomes.

Figure 11: Enterprise Project Management Best Practises

7.1 Define Clear Objectives

One of the key fundamental best practices for ensuring the success of EPM-enabled digital transformation is clear, well-marked objectives. A strategic direction and a roadmap, these objectives define the objectives on the ground for all organizations taking their first steps on the digital transformation journey. Stohl et al. (2020) found that organizations with clear goals for digital transformation align their technological initiatives more closely to the long-term business goals of the organizations. Goals are well defined, allowing decisions on what digital projects to spend effort on and resources towards, and these efforts continue to concentrate on high-impact initiatives.

Clear objectives also help improve communication within departments and between stakeholders. Research further suggests that clear goal-setting for digital transformation initiatives facilitates the alignment between business and technology leaders by bridging the gap (Callander, 2020). This alignment means that all the parties are moving towards the same strategic vision, thereby increasing collaboration and reducing the probability of realizing the intended outcomes.

Additionally, the objective definition should include the participation of key stakeholders from various parts of an organization. Setting objectives at a lower level when employees from all levels have input makes it more likely that the objectives will become owned and acted upon, processes that are key to the successful adoption of digital transformation strategies.

Moreover, organizations should put in place a system to check the progress towards these objectives in order to quickly make necessary adjustments to the strategy when the need arises.

7.2 Adopt Scalable Tools

Scalable tools are another crucial best practice in using EPM in digital transformation—tools that grow to the organization's needs. Digital transformation is usually a dynamic update in technology and enterprise processes, and the tools used to manage enterprise portfolios should be flexible enough to support these changes (Sassanelli & Terzi, 2022). Cloud-based EPM tools are particularly well positioned in this concern based on scalability, accessibility, and integration capabilities integral to successfully implementing large-scale, complex transformation projects.

From larger organizations, we have scalable portfolio management tools in real-time, from which stakeholders can acquire up-to-date information about project status, resource assignment, and risk in any project. These are tools by which an organization can quickly adjust its priorities based on when they are appropriate and respond as fast as time allows to changes in the digital landscape. Additionally, carriers can add artificial intelligence (AI) and automation in EPM tools that predict risks and opportunities more accurately. This allows the process to make agile decisions to handle complexity at the heart of all digital transformation. The ability to scale EPM tools allows organizations to maintain operational efficiency and accommodate disruptions associated with expanding the portfolio or introducing new digital initiatives. These tools can be ensured to be supported by EPM, which means they will have the basis for continuous, sophisticated transformations.

7.3 Foster Collaboration

Any digital transformation initiative is based on collaboration between the business and IT teams. In that case, this will help these teams work to bring in technological solutions that will merge with business objectives or digital projects and help deliver value. This is because it creates an environment for assertion between business and IT stakeholders to harness the digital transformation output it is offering. This alignment guides both groups on the overall objectives at the higher organizational level so that the decision tends to be better and more informed, which leads to better project results.

Collaboration is possible when business and IT teams share ownership of the digital transformation goals and continuous communication (Camarinha-Matos et al., 2019). Even using easy-to-use EPM tools can facilitate collaboration amongst the stakeholders, where the stakeholders can access real-time data and see how they are doing, discuss the challenges, and move forward together. Additionally, all perspectives go into the decision-making process as cross-functional teams are formed between business leaders and technical experts. A big international organization is an example of successful collaboration and developed a way to join related cloud-based EPM tools to enable the company to share people inside and out globally. As a result, this outcome enabled the company to run its digital projects better and align its strategic vision with technological initiatives.

Figure 12: Enterprise Performance Management (EPM

7.4 Focus on Change Management

More often, digital transformation requires major cultural and organizational shifts, and change management has become one critical part of leveraging EPM. Organizations must find solutions to resist change and ensure that employees are ready for the new ways of working. The challenges faced when changing technologies come with important strategies for change management that Westerman et al. (2014) indicate are useful in helping ensure that employees and even your customers completely understand and embrace new technologies.

Significant in driving change is the leadership. Transformation is strategic and requires leaders to communicate the digital strategic vision and enable the transition away from old tools and workflows for employees. Having transparent communications about EPM's benefits and how EPM puts the transformation process in motion can go a long way in allaying concerns and building trust in the new systems. Organizations should also invest in training and support to build up employees' skills to utilize the new

EPM tools. Another way to minimize disruption and decrease resistance to change is to implement a gradual approach, introducing new systems and processes in small incremental bits. Westerman et al. (2014) note that the more an organization travels through the digital transformation journey, the more important it is to continue engaging employees to get feedback and adjust the change management strategy as required.

7.5 Continuously Evaluate and Adapt

Continuous re-evaluation and adaptation are key to building the long-term success of digital transformation efforts. Digital transformation is a dynamic process, and organizations need to be agile to respond to the latest trends, new technologies, and dynamic market changes. Using EPM systems, organizations can also continuously evaluate digital initiatives due to the real-time data they receive on their progress; consequently, they can identify any issues or bottlenecks early on during the process (Stohl et al., 2020).

Digital initiatives should be clearly outlined and assessed to meet the intended goals so that organizations can set clear performance metrics. The challenge we overcame with this data-driven approach is to allow businesses to begin exploring where to allocate resources and which projects to prioritize. Organizations should constantly incorporate employee, customer, or other stakeholders' feedback to refine their digital transformation strategy further to suit business and market dynamics. The EPM system must handle new challenges and thus be flexible. When integrated with EPM, Agile methodologies enable organizations to pivot and enhance their digital initiatives throughout the ERM stage (de Castro, 2022). It enables organizations to remain tactful and flexible as they cover the intricacies of digital transformation.

Figure 13: The Importance Of Continuous Evaluation And Adaptation

8. Future Directions in Enterprise Portfolio Management for Digital Transformation

8.1 Potential Developments in EPM Tools and Methodologies

The digital transformation strategies will mostly depend on developing advanced Enterprise Portfolio Management (EPM) tools and approaches as organizations respond to the fast-changing digital environment. This integration of technologies like artificial intelligence (AI), machine learning (ML), and real-time analytics will allow for fast decision-making, optimization of resource allocation, and risk management in EPM in the future.

By enabling automated decision-making and better portfolio management, AI and ML algorithms will play a major role on AI and ML algorithms on developing EPM tools. It enables these technologies to be used with large amounts of data, find patterns, predict results, and suggest some actions. For example, machine learning models can predict who is likely to succeed in digital transformation projects and enable a portfolio manager to focus on those initiatives that are expected to be higher impact projects (Halper, 2019). Moreover, AI gives decision-makers more free time to strategize instead of keeping their heads down when dealing with the administrative overhead of tracking project progress or performance metrics.

Data analytics will also help integrate EPM systems and make them more adaptable and responsive to changes within the system. Managers can monitor portfolio performance in real-time and, thus, their portfolio progress on a continual basis, as well as make data-driven changes to strategies based on evolving conditions (Nyati, 2018). This will be an important capability for organizations that must retain flexibility in dynamic markets. This will entail being able to adjust resource allocations and timelines depending on market conditions, technological advancements, and unexpected disruptions to keep digital transformation efforts on track to their strategic goals.

The more notable and happening trend at present is the development or transition of EPM methodologies from traditional silos to more collaborative and cross-functional paradigms. EPM tools will help better integrate future business leaders, IT staff, and project managers. Through this, the portfolio management process will not be isolated to any department but will instead align with all the needs of subprocessors and company stakeholders (Keskinen, 2022). Additionally, cloud-based EPM platforms will foster real-time collaboration between team employees from different locations so that those employees may easily contribute to the planning and decision-making of projects without physical presence. Integration across departments and with external partners will be necessary for digital transformation in order to innovate.

8.2 Opportunities for Organizations to Leverage EPM for Competitiveness

To serve in a competitive environment where fast-transforming digital technology affects organizations, EPM is mandatory for businesses to align their digital transformation initiatives with strategic business goals. Digital disruption has many opportunities for companies to thrive, and EPM focuses on the best optimal resource allocation, risk mitigation, and performance measurement. EPM is one of the key opportunities in terms of optimization between the short-term operational goals and the long-term strategic objectives. Most digital transformation cases require large investments in new technologies and processes that can hurt immediate business performance sacrifice in exchange for long-term goals. Organizations can continuously monitor their portfolio of projects by adjusting priorities of already existing projects and diverting projects to immediate executions as well as future ambition (Kumar, 2019). Organizations wishing to continue operating without a break while driving innovation and long-term growth will have to run that balancing act.

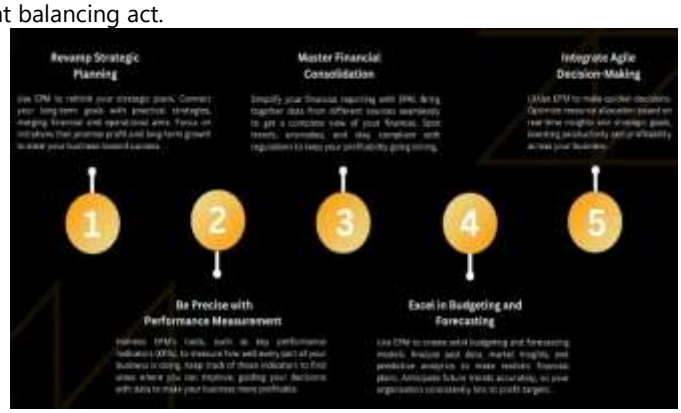

Figure 14: Ways to Maximize Profits with EPM

The other gap to fill is an increasing focus on sustainable innovation. EPM is closely associated with an organization's digital transformation and can be used by an organization to scope the long series of transformation efforts. Companies can position themselves as digital innovators and corporate leaders by selecting initiatives focused on technological advancements and corporate responsibility in the form of ESG. EPM can be utilized not only for the financial optimization of a business or project but also to align the business or project with broader social goals.

In addition, EPM can be leveraged to anticipate the risks related to digital transformation, including cybersecurity threats, regulatory compliance problems, and project execution failures. Integration of risk management in the EPM system allows for proactively identifying and managing possible threats. A simple example is using real-time risk analysis to make portfolio management platforms identify projects that may result in security and compliance risks so that the organization can take corrective measures before the malady can come about. EPM can also facilitate digital risk management by providing a panoramic perspective of organizational risks, which helps to make better decisions within the complex and volatile digital environment.

Digital transformation will play a central role in shaping the future of EPM due to the prevalence of data-driven decision-making. EPM systems can analyze data accumulated via digital tools, which organizations have amassed in large quantities (Bansal, 2015). In the example, predictive analytics could be used to predict what will happen in the future and uncover how to transform them digitally. In addition, the business intelligence aspect of EPM tools can assist organizations in identifying wastages and suggesting improvements to performance. Given the growing reliance of businesses on data for planning strategy, integration of advanced analytics in EPM will be vital to compete.

Enterprise Portfolio Management offers future opportunities for Organizations to strengthen their competitiveness in an increasingly digital world. EPM tools and methodologies will evolve to support more agile and collaborative processes based on data and keep those digital initiatives in line with broader business objectives Peura, 2021). Suppose they concentrate on integrating AI, real-time data analytics, and cross-functional collaboration. In that case, organizations will be in a better position to succeed in new challenges and avail themselves of new opportunities for digital transformation. For that reason, EPM will continue to play a crucial role as a strategic alignment, resource management, risk management, and performance monitoring enabler so that digital transformation initiatives make a meaningful contribution towards long-term organizational success.

9. Conclusion

In the fast-changing business scenario, digital transformation has become a strategic priority for organizations to maintain a competitive advantage. Organizational models, processes, and customer interaction are redefined because technology is integrated into every aspect of business operations. There are massive opportunities to grow and become more efficient in transformation projects, but complex challenges are also in great numbers. As a result, Enterprise Portfolio Management (EPM) comes into play. EPM is an important enabler of digital transformation success because it provides a structured approach to managing multiple projects towards bigger strategic goals, optimizes resource resources, and reduces risk.

The contribution of OPM's digital transformation is quite large. It first ensures alignment with projects and programs associated with the organization's vision and long-term goals. This also prevents the organization from having fragmented initiatives that may have served another purpose but may not contribute to meeting organizational goals. This also helps prioritize projects in terms of high impact since, in the case of funds, it can allocate resources to it in the most optimum configuration – financial, human, or technological. In modern digital transformation, resource optimization is increasingly critical because organizations tend to be under constraints (or run with constraints) in both skilled staff and technological infrastructure. EPM allows a company to ensure that all the initiatives, which are the strongest of the most relevant, will be able to muster the momentum for a higher return on investment.

From this perspective, EPM obtains another special benefit in risk management. This upgrading has potential, but many risks exist: cyber is one, compliance is another, and implementation failure is another. For example, a real-time risk assessment framework is an avenue through which EPM projects should proactively identify and remove risks before they happen. This becomes necessary in the ever-changing, volatile, and unpredictable digital world. Risk management is integrated into the EPM process, ensuring the continuation of operations. This offers the possibility to achieve an environment of change where the organization can turn around quickly to react and respond to disruptions.

The other pillar on which the value of EPM in digital transformation is built is performance measurement. It is especially important not to leave such organizations without measuring the newly developed technologies and processes. This is possible in EPM tools that set clear KPIs and metrics for tracking the progress and success of transformation efforts. The data-driven approach ensures that organizations can always review and improve their strategies based on this data to keep themselves aligned toward the goal of their transformation.

Several things lie ahead for the future of EPM within digital transformation. With the increase in Artificial Intelligence (AI) and Machine Learning (ML) when transforming across EPM tools, these tools will be able to do more of the decision-making, better allocate resources, and make predictions, all with the intent of letting organizations make more informed 'real-time' decisions. In addition, real-time data analytics will enable the monitoring of performance and quick adaptation to market changes. EPM systems will get smarter and make sense to users more often, collaboratively, and integrated over time, allowing organizations to manage their portfolios more effectively and efficiently.

However, EPM in digital transformation has challenges in being implemented successfully. However, resistance to change, lack of access to real-time data, and scarcity of qualified professionals can slow down the use of the EPM frameworks. To overcome these, these people who easily become fragmented must be brought together in a culture of collaboration, there must be investment in scalable EPM tools, and the change management strategies must be robust. Additionally, organizations must continuously evaluate portfolio performance to stay on track with their goals and be prepared to modify and respond continuously. Due to its importance, EPM is an integral part of strategic digital transformation. Such an EPM framework can provide a complete framework for aligning resources, managing risks, measuring performance, and supporting agile decision-making so that digital initiatives support long-term GOA. With businesses competing increasingly within a complex digital landscape, EPM must be used to its full extent to help keep a competitive edge and drive sustainable growth in the future.

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