PROJECT MANAGEMENT SUITABLE FOR THE DIGITAL WORLD

by

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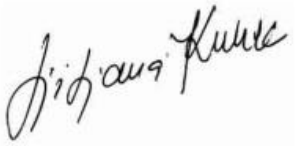

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Dedication

I dedicate this thesis to global project managers who work hard to overcome the challenges of a constantly changing digital world. This work is for those who are adapting to new ways of managing projects and striving to achieve success despite the obstacles. I also hope that this research adds helpful insights to the field and supports those leading digital transformation efforts.

Acknowledgements

I would like to express my deepest gratitude to all those who supported me throughout this research journey. First and foremost, I thank my mentor, Dr. Isaac Ahinsah-Wobil for his invaluable guidance, insightful feedback, and constant encouragement. His expertise and commitment were instrumental in the completion of this thesis.

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ABSTRACT

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This study attempts to make sincere efforts to analyze the challenges and barriers that global project managers are facing in a rapidly changing business environment. This proposal attempts to decode the unique challenges to global project management and the magnitude of their effect on project team performance in the global business environment. The present study aims to contribute some impactful findings in the existing literature and try to extract practical implications with a focus on the potential opportunities and barriers and their remedies for multinational organizations. With the need to adapt to the rapidly changing environment and the digital shift, it is necessary to spend efforts to research how the new technologies require traditional project managers to adapt to support the digital transformation.

The primary objective of this research is to investigate how digitalization has impacted the demands placed on project management. By doing so, it aims to shed light on the disparities between the skill sets of traditional project managers and the proficiencies necessary for successfully navigating digital transformation. With this in mind, the study endeavours to pinpoint the most suitable project management methodologies and tools that project managers can utilize to capitalize on the advantages of digital transformation.

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INTRODUCTION

1.1 Introduction

The fourth industrial revolution or what is referred to as Industry 4.0, the deeper penetration of the internet and enhanced connectivity have driven the broad-based adoption of digital technologies across almost all industrial domains. The trend intensified when COVID-19 emerged and governments imposed restrictions on the movement of men and materials. Digital transformation has become inevitable for organizations to meet emerging customer demands and ensure their sustenance. Global digital transformation spending is estimated to experience a CAGR (Compound Annual Growth Rate) of 16.3% and reach $3.4 trillion in 2026 (International Data Corporation, 2022). Given the magnitude of digital transformation that is happening at the global level, it has become imperative for businesses to channel their time, money, and resources into building and operationalizing the digital transformation strategy.

The positive impact of digital transformation is well-documented in several studies. Digital transformation is expected to catalyze and pioneer organizational innovation (Yoo, 2013) while integrating business processes (Fitzgerald, et al., 2014), and exploring business opportunities beyond their horizon (Matt, et.al., 2015). The unprecedented adoption of digital technologies is disrupting all walks of business value chains from suppliers and distributors to the front desk and shop floor. Innovative business models are evolving to cater to the growing needs of the market (Sinha, et.al, PWC insights, 2019). As digital transformation integrates Industry 4.0 and digital technologies into all business and value streams, it demands a holistic transformation ranging from the systems, operations, and processes to the workflow and culture of a business.

Project management is a crucial determinant of the success of a business. In the intensely competitive landscape, firms work out strategies to enhance the efficiency of project management to deliver intended business results. As companies see more payoffs

from investments made into building project management teams, tools, resources, and expertise, in terms of enhanced efficiencies, greater value, customer satisfaction, and reduced costs, firms are on a spree to leverage project management operations to stay ahead of their counterparts in the industry (The Value of Project Management, 2010).

Marle and Vidal (2016) present the limitations of traditional project management techniques, tools, strategies, and operations in planning, scheduling, and delivery of complex projects. Traditional project management and waterfall approaches lack the ability to scale and broaden their scope to meet the growing needs of the rapidly evolving digital landscape. Identifying and bridging the gap that exists between the needs of digital transformation and the abilities of the project management techniques and teams is a must to ensure the success of a business (Thiry M., 2013).

Project managers play a key role in enabling digital transformation as they own the responsibility of shaping the transformative vision charted out by their management and leadership. The role of a project manager has become more crucial than ever. Project managers are expected to be pivotal in change management and drive the collaborative efforts needed to achieve the intended outcomes of digital transformation. Given the magnitude of this transformation, project managers endure several challenges and hardships in embracing change and leveraging digital transformation to the fullest.

1.2 Research Problem

The literature review shows that a lot of studies conducted in this vertical have focused on estimating the importance of digital transformation for businesses. However, when it comes to the evolving role of project management in digital transformation and the challenges faced by project managers in driving this transformation, there are very limited studies. They do not reveal the cruciality of the project manager role and the challenges they endure in acing the digital transformation.

The project seeks to address the problems faced by project managers in software development in adapting to the ongoing digital transformation which has brought about

several changes in project management. The study aims to identify the skills and competencies possessed by project managers, compare them against those required to meet the evolving demands of digital transformation, and ultimately present the gaps and challenges in the process.

The skills and competencies possessed by traditional project managers in managing timelines, stakeholders, budgets, risks, etc. are inadequate to meet the demands and requirements of digital transformation. Digitalization requires diverse teams to work in synergies. Successful organizations are those that can create highly skilled teams with people from diverse backgrounds and experiences. Analytical, problem-solving, critical thinking, communication skills, and decision-making abilities are becoming more important. Several new roles including analysts, programmers, designers, etc. are emerging. Roles have become more fluid, and organizations are embracing the idea that different business units must come together to deliver compelling value to the customer. Given this, traditional project managers have to amp up their skills, competencies, and mindset to create a diverse yet inclusive workforce and align the right person to perform the right job.

Beyond diversity in teams, several novel project management methodologies and techniques like Scrum, Agile, etc. have evolved. Though such methodologies are more flexible and do not require exhaustive planning upfront, they pave the way for more frequent customer interactions and reviews. The ownership is also distributed where every person in the team is responsible and accountable for the outcomes. This is unlike traditional project management where the Project Manager shouldered complete ownership of the project from design and execution to delivery.

Furthermore, Project Managers must empower themselves to become familiar with these evolving project management methodologies. They need to upskill and reskill themselves to adapt to the changing environment. Though the Scrum and Agile methodologies were initially developed for Information Technology (IT) related projects, they are now being scaled across different industries. However, irrespective of the industry they are employed in, project managers and product managers must learn the

requirements of the new methodologies and adapt themselves. As different industries have different requirements, in the process of learning and adapting to digital transformation, they must also emphasize building the skills needed to address their industry-specific demands.

The year 2020 introduced remote work which was not so common. Only 6% of the employed workforce worked from home and more than three-quarters of them had never worked from home (Coate, 2021). When COVID-19 emerged, organizations offered remote and work-from-home options to keep the ship running amidst lockdowns and restrictions. Digitalization became mainstream and Project Managers had to shoulder the extra responsibility of driving this change. Anticipating that the digital movement was short-term, organizations and employees waited for the normal to bounce back and to get back their operations to physical offices post-COVID. Against what was expected, they never returned to what their pre-COVID normal was, but a new normal emerged and the remote work stayed on for longer.

Teams became increasingly diverse not just in terms of skills, but in terms of geography and culture. Managing such diverse teams requires understanding the cultural variations and fostering deeper engagements beyond geographical boundaries to ensure that they align themselves with the missionary commitments of the organization and the deliverables of the project. The Project Manager acts as a facilitator to understand their unique attributes and sensitivities and endeavours to bring about successful coordination which in turn plays a crucial role in the success of ongoing and future projects (Naheed & AlMulla, 2021).

Beyond adapting to technical, methodological, and structural changes, Project Managers act as the change agents and are the crucial drivers of change and evolution. Beyond skills and competencies, they must train themselves to become adaptable to the demands of the ever-changing, complex project environment. This requires an agile mindset which cultivates the thought process and open mind to learn, collaborate, and achieve the desired results.

Digital transformation not only impacts the project management of IT teams but also every other team in the organization like HR, sales, marketing, customer relationship, risk management, operations, etc (Simion et al. 2018). This increases the complexity of the process. In that case, project managers of not just IT teams, but every team in the organization are expected to scale their skills, competencies, and mindset to integrate themselves with the changing business structure and help the organization achieve its goals.

One of the major barriers to bringing about digital transformation and reaping the fullest benefits is the absence of a well-thought-out strategy. Before the emergence of the pandemic, though digitalization was gaining prominence, the pace was relatively slower. When the pandemic ravaged unprecedented disruptions, and people had to find safe accommodations inside the fortified walls of their houses, new requirements emerged. The ongoing digital transformation picked up the pace and as they were expected to spontaneously accommodate to the changing demands, there wasn't enough time for firms to strategize this transformation. (Kutnjak, Ana., 2021)

Digital adoption took a quantum leap at both industrial levels and organizational levels. Experimentation with digital technologies gained momentum and investments made helped organizations navigate successfully through the crisis and the disruption that followed. Many business models have become obsolete (Amankwah-Amoah, Khan, & Wood, 2020).

Broadly, COVID-19 and the disruptions that emerged following the pandemic impacted businesses in two different arenas- one was external and more about how firms interact with customers, suppliers, and other stakeholders, and two was internal and it influenced the employee-employer relationships. (Sostero et al., 2020). This testifies to the disruptions and changes that project management teams endured and more particularly, the challenges and struggles of the project managers. As they play a key role in facilitating interactions and driving the expectations between the management and the project teams of organizations, they had to scale themselves at an accelerated pace to meet the demands that emerged out of the digital disruption.

As explained earlier, digitalization brings about a change in the business models, value chains, operational strategies, delivery channels, and almost every process in an organization. How companies approach digitalization and what defines their success in the digital era has remained a key subject of research in the post-pandemic era. (Stonehouse & Konina, 2020).

It is evident that the accelerated pace of digitalization during and post the pandemic disrupted the operations of an organization and the functionality of almost all its business units. Three years since the pandemic, and the disruption is not over yet. What was thought of as a short-term disruption has stayed on to produce long-run impacts and new normalcy. Though investments and rapid experiments helped organizations navigate through the crisis, deeper strategies and planning are required to sustain in the long run. The same applies to project teams and project managers. It is important that they develop a mindset to accept changes and amp up their abilities and skills to fully leverage the abilities of the digital transformation on the one hand and ensure their commitment to delivering excellence and compelling value proposition on the other hand. This requires a deeper understanding of the skills and requirements of the traditional project management methodologies, changes that the digitalization has brought in, and the skills and competencies required to embrace the change and unlock the benefits of digital transformation to the maximum possible extent.

1.3 Purpose of Research

The main purpose of this study is to explore the changing requirements of project management in the context of digitalization. This helps understand the gap between the skills possessed by traditional project managers and the competencies required to navigate digital transformation. In this context, the research aims to identify the tools and project management methodologies appropriate for project managers to unlock the benefits of digital transformation in project management. In addition, it will also examine the need for training and project management in various industries.

Specific objectives

The objectives of the research include the following.

- To understand the key aspects of traditional project management methodologies.
- To identify the skills and competencies of traditional project managers.
- To explore the strategic and operational changes that digital transformation has brought about to different business units in an organization.
- To explore the project methodologies and tools that have evolved as a part of the digital transformation endeavour.
- To examine the gap that exists between the requirements of traditional project management and digital transformation.
- To understand the challenges that project managers endure in embracing digital transformation.
- To explore the opportunities that project managers can leverage from digital transformation.
- To examine the need for training and skilling programs to help project managers reap the complete benefits of digitalization.

1.4 Significance of the Study

The degree of digital transformation has been a crucial determinant of organizations' success during the pandemic. Organizations that have embraced digital transformation have mitigated their losses better than other firms that have constrained digital adoption (Abidi, N., El Herradi, M., Sakha, S., 2022).

Digital transformation has remained a continuous process in the last 20-30 years. Previously, it was more about digitizing the analogue processes and systems within an organization. But, today adapting to digital transformation is not just about learning to use a cluster of technologies or becoming well-versed in them; It calls for a holistic

transformation in terms of building the mindset, analyzing user behaviour, developing customer-centric solutions, redesigning the sales channels, becoming more adaptive to changing market trends and conditions, capturing analytics and deriving actionable insights from the same, and much more.

Beyond that, the employees of an organization and the project leaders should upscale themselves and upgrade their skills to the changing requirements of technological and digital transformation. This is crucial for both the project managers individually and the organization to realize the true purpose of the transformation (Sousa & Rocha, 2019).

COVID-19 accelerated the pace of digital adoption to new heights and the adoption of technology and leveraging digital transformation is no longer a nice-to-have but has become a must-have for any organization (Guinan et al., 2019). Companies had to force themselves to embrace digital adoption and they did not have sufficient time to define and systemize the digital processes, methodologies, and transformation. They adopted changes 20 to 25 times faster than expected (LaBerge L. et.al, 2020). This meant that project managers had to scale their skills and competencies at an accelerated pace to match the requirements and demands of the business landscape.

It is important to assess the gap that persists between the skills needed for project management in conventional terms and on the grounds of evolving digital transformation trends from the perspectives of both the project manager and the businesses. To project managers, it would help them understand the expectations better and motivate them to explore opportunities for upskilling, growth, and sustainability. To businesses, it would help provide training and invest in the right set of methodologies, tools, and resources needed to embrace digital transformation and make the most out of them. Efficient and skilled project managers would mean better leadership, strong collaboration, and enhanced efficiency of processes.

1.5 Research Design

There are three types of research design - descriptive, explanatory, and experimental designs. The descriptive nature of research design is an observational research technique and aims to describe the nature and characteristics of the research variable. It focuses on answering research-related questions. Experimental research design applies a scientific approach to problem-solving and research and aims at sourcing the necessary data to help the researcher make better decisions.

The explanatory method aims to take a deeper dive into the primary data and explain the results of the secondary analysis corresponding to the objective, theme, and problem of the research. I used an experimental design to curate the data from project managers, businesses, and other stakeholders to strengthen the purpose of the research. Along with the experimental design, I also used an explanatory method to do a secondary analysis of the data and find answers to the research question.

For data collection, I have employed primary and secondary analysis. I have collected data from project managers, product leaders, employees, and other stakeholders through interviews, surveys, observations, etc. for the primary analysis. For the qualitative interview, I have sampled project managers from a broad spectrum of industries including IT, services, and manufacturing sectors. The questions are designed in such a way that the answers offer valuable information for the study. For secondary data, I have referred to journals, books, magazines, business reports, government statistics, and so on (Bergbom & Lepp, 2022).

The qualitative analysis is based on the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) framework which streamlines the process of reporting systematic reviews and meta-analyses. It is an evidence-based framework and uses minimum data to perform systematic meta-analysis reporting and reviewing. The framework promotes transparency in research and enhances the quality of review, research, and reporting.

To perform the secondary analysis, I employed the thematic data analysis method. It is a widely used method to analyze qualitative data and determine common patterns, topics, ideas, etc. (Braun & Clarke, 2019).

I have employed the six-step process including familiarization, codification, generation of themes, review of themes, naming and defining of themes, and finally putting them together to perform the thematic data analysis (Kiger & Varpio, 2020). These six steps help derive patterns, concepts, and insights from thematic analysis. Thematic data analysis is a very accessible framework and offers much-needed flexibility for qualitative data analysis.

1.6 Research Purpose and Questions

The overall aim of the study is to explore the challenges faced by project managers in adapting to digital transformation and identify the skills and competencies needed for a seamless transition. Following are the primary research questions considered for the study.

What are the challenges experienced by the project managers in adapting to digital transformation?

What are the skills, competencies, and tools needed for project managers to navigate the transformation?

How can organizations support project managers in enhancing their skills and abilities to be able to achieve a successful transition?

1.7 Thesis Structure

The study is organized into five chapters, and the content of each chapter is outlined below.

Chapter one is the introduction to the research while presenting the scope and background of the research. The chapter also defines the problem, presents the approach, and details the significance of the study.

Chapter two is the literature review where I have explored and presented the findings and theoretical underpinnings of previous studies on the scope of digital transformation, processes, means, and methods for project management. It also presents the gap in the existing literature and connects the gap with the objectives of the research.

Chapter three details the methodological approach that I use to analyze the qualitative data from the literature review, interview, observations, journals, and so on. It also outlines the thematic data analysis method used to derive patterns in topics and observations, and the six-step process followed to undertake the thematic data analysis.

Chapter four offers an outline of the results and leads to a discussion of how project managers could strengthen their skills and competencies. It also describes the significance of the study and the results in the evolving digitalization trend.

Chapter five presents the conclusions and recommendations based on the findings and results of the thematic analysis and other methodologies used in the study. It also presents the limitations of the research while also examining the possibilities and scope for future studies.

CHAPTER II:

REVIEW OF LITERATURE

2.1 Theoretical Framework

In this section, I present the existing literature pertaining to my research objective of understanding the impact of digitalization on businesses, and the broad-based impact it has on project management methodologies, frameworks, and processes. More specifically, the literature focuses on understanding the objectives, methodologies, and strategies of traditional project management and the gap that persists between traditional project management and digitalization requirements. The section also evaluates the skills and competencies possessed by traditional project managers and sheds light on the importance of skilling, upskilling, and reskilling themselves to meet digitalization objectives.

Undoubtedly, digital transformation has brought about a positive impact on all walks of business (Averina, T et.al., 2020).. The automation that followed the digital revolution has enhanced the efficiency of business operations leading to improvements in business productivity and outcomes. It has helped reduce resource consumption, save time, and enhance the overall quality of their value offerings. Digitalization helps reduce manual errors and presents new ideas and opportunities for value customization, delivery, and revenue sources (Tudose MB, Georgescu A, Avasilcăi S., 2023).

Overall, digital transformation has enhanced the odds of success for businesses and has helped mitigate operational, technical, market, and financial risks. The globe has shrunk, and businesses have ventured beyond the fortified geographical boundaries. It has reconfigured the entire business landscape and has streamlined the workflows more efficiently to reduce operational costs and transactional delays (Miroudot & Cadestin, 2017).

Beyond restructuring the internal operations of a business, digital transformation has made a significant impact on the value proposition and offerings of a business, its business model, and customer expectations and experience (Averina, T et.al., 2020).

A lot of times, organizations tend to ignore and oversee digital transformation as a not-so-important strategy for their business or industry. Whereas in reality, it is far different from other trends and it has become a must-have for businesses to ensure that they survive and thrive (Mishrif, A., and Khan, A., 2023). It must be noted that digital transformation is not about changing a particular process flow or automating a process using modern technologies. Instead, it has impacted all walks of businesses and people's lives that customers themselves are demanding higher degrees of customization and personalization when it comes to the pace, cost, features, and functionalities (Verhoef, P, et.al., 2023). This means that businesses have no other option, but to solve the challenges and embrace the opportunities that come from digital transformation to serve customers better and drive employee satisfaction by promoting deeper collaboration and seamless communication through digital channels (Averina T, et.al, 2020).

Several studies show that digital transformation is long-sustaining and that it has become imperative for businesses to push themselves beyond and adapt to the evolving nature of the highly competitive and rapidly changing business landscape (Qiu, R., 2022; Deloitte insights, 2023; Mishrif, A., and Khan, A., 2023).

Project management has remained a key part of business success and digitalization has brought about a profound impact on the objectives and methodologies of project management. Traditional project management methods are linear and each step in the project management has to follow a sequence. There was less room for flexibility, changes, and feedback. Because they are rigid the project sequence, workflow, and outcomes are fixed at the beginning of a project, and it became difficult to manage large

projects following the traditional project management methodologies. On the other hand, agile and other modern project management methodologies are iterative and incremental offering more space for collaborative endeavors, feedback, and iterations (Ciric, D et.al, 2019).

Beyond that, digitalization has created more space for remote collaboration, virtualization, and coordination with interdisciplinary teams from across the world (Battisti E, 2022). So, project management has endured significant challenges that are totally new, and the communication and interpersonal skills of project managers have gained more relevance in this digital era than in the previous decades.

When digitalization seeped in through the business process, the role of project management and project manager became more crucial in leading the transformation. Understanding the expectations of the businesses in the digital landscape and mapping them to the current skills of the traditional project managers helps identify the gaps that persist between the skills they possess and what is expected out of them.

The literature review aims to understand the scope of digitalization and its impact on various business processes focusing on the project management vertical. The study also aims to evaluate the skill and competency requirements of modern project management methodologies.

The chapter is organized into several sections and the details are given below.

Section 2.2 reviews studies that analyze the scope of digitalization and leads a discussion on how businesses could enhance the productivity of their business practices and improve the efficiency of business outcomes by leveraging digitalization principles and processes to the fullest possible extent.

Section 2.3 reviews the common challenges and hardships that businesses endure when it comes to adopting digital technologies and leading digital transformation. I have

also reviewed the challenges in the evolving landscape and curated strategies that businesses have adopted to navigate the changes that have popped up due to digitalization.

Section 2.4 shows the impact of digitalization on the project management arena. While the previous sections covered the impact, challenges, and scope of digitalization at the broader business levels, this section narrows down the scope to understand the impact of evolving technologies and trends on project management activities. It also leads a discussion on the role of project management in delivering business outcomes so as to emphasize the cruciality of project management and project managers in the digital landscape.

In Section 2.5, I have curated the traditional project management methodologies and their nuances in terms of their features and functioning. This helps gain an understanding of the conventional flow of processes and activities in project management and calls out details about how they remain obsolete in the digital era.

In Section 2.6, I have curated the modern project management methodologies that have evolved to cope with the expectations and requirements of digital transformation. Highlighting the inabilities and incompetencies of the traditional project management methodologies, this section leads a discussion on the importance of organizations shifting to use modern project management technologies and adapting to the requirements of the digital revolution, so they get to stand ahead of other businesses in the industry.

In Section 2.7, I have curated the findings from my extensive literature review about the skills needed for project managers to navigate the challenges in the project management landscape. The section highlights how project managers can make use of digital technologies to automate the repetitive tasks they are performing every day and

save time and cost that they can indeed invest in performing other crucial tasks of the project management.

Section 2.8 summarizes the key findings from the literature review and leads a discussion on the gaps that exist in the current studies.

2.2 Scope of Digitalization

Though the terms 'digitization' and 'digital transformation' are often used interchangeably, they carry different meanings and purposes. Digitization refers to the process of converting information from analogue to digital form using Information and Communication Technologies (ICT) while digital transformation on the other hand, refers to the changes that digital technologies can bring about to business processes, products, and organizational structure (Savic, D., 2019).

Digitalization has become a major trend disrupting the strategies and operations of a business in the short and long term (Tihinen, M and Kaariainen, J., 2016; Parviainen et.al., 2017). Digitalization refers to a broad fundamental change than digitizing the processes and products. It refers to "the changes associated with the application of digital technology in all aspects of human society." (Stolterman,E. and Fors, A.C., 2004). Digitalization focuses on integrating the key aspects of various industrial and internet-based technologies into the work ecosystem and the business environment (Gray and Rumpe, 2015).

The impact of digitalization extends beyond the technological enhancements to disrupt the business models, operations, processes, and experiences relating to the internal team, vendor management (Martinez 2019), innovative value offerings, and customer satisfaction (Henriette, Feki, and Boughzala 2016). Orlikowski and Iacono (2000) show that the impact of digital transformation is not confined to internal

operations and team management but also extends to produce a pronounced impact on the external environment like customer experience and vendor management.

The emergence of COVID-19 has produced far more disruption than any other incident after the second world war and has accelerated the adoption of digital technologies. (Zaheer, K.et.al, 2021; Amankwah-Amoah., et.al., 2020; Priyono, A., Moin, A., and Putri,V., 2020). Businesses have accelerated the digitization of their internal operations and supply chain functioning by three to four years. A deeper dive shows that the businesses have increased the share of digital products and services in their business portfolio, and this has accelerated by more than 7 years (LaBerge, Laura, et al., 2020).

The COVID-19 pandemic accelerated the paradigm shift in the business world as they led the digital transformation from the forefront. Some businesses are reluctant to invest and are staying put with the traditional means while others are taking proactive steps and decisive action to leverage the benefits of transformation and evolve stronger than before. Businesses that make the most out of this digital transformation and those that take necessary steps to navigate the downturn and challenges are in an advantageous position when compared to their peers who are reluctant to adapt to the business requirements and evolving trends.

Digital transformation usually impacts the business model and its operation in the very beginning. This produces a spiral that propagates to other business operations leading to a stronger impact on the way a business collaborates with its stakeholders (Agarwal and Helfat, 2009). Digital transformation and the strategic shift are not one-time changes but are continuous and ongoing (Soukas and Chia, 2002). Digital transformation has the power to impact the internal functioning of the organization as well as the business models and external channels of the business (Fitzergerald et al.,

2013). Digital transformation should be envisioned as a major change and impactful process rather than the typical narrative of looking at it from a one-time change perspective (Schuhmann et al, 2015).

As more and more countries around the globe open up their economies and integrate themselves into the global economic landscape, they become vulnerable to competition. Digital Transformation helps businesses enhance the efficiency of their operations, streamline their workflow, and save transactional costs. All these help them gain an edge and stay apart from other businesses in the competitive landscape (White, M., 2012). Digitalization has also brought about productivity enhancements, cost reductions, and innovations driving the need for digital transformation on a broader scale (Hess,T et,al., 2016).

As per PWC's Future of Customer Experience Survey 2017/2018, 73% rate customer satisfaction, and experience playing a key role in impacting their purchasing decisions. The customers of today demand increased speed, convenience, knowledge, and personalization. Digital transformation helps organizations meet these customer demands and develop a deeper understanding of customer behavior and intentions. Beyond that, achieving digital transformation requires a customer-centric strategy (Puthiyamadam, 2017).

The fourth industrial revolution, or the evolution of Industry 4.0 technologies and its impact on project management methodologies has received interest among researchers. There is a keen focus on change management, technology, skills and capabilities, and governance. Pruseth and Garimella (2017) show that digital transformation is expected to result in impactful changes by several means and notable among them include customer centricity, remote teams, creativity, and innovation.

Digital transformation is often associated with the functioning and responsibilities of the IT and systems department in an organization. But, in reality, digital transformation impacts multiple areas covering marketing, IT, product development, strategy, leadership, and HR. So, the transformation isn't as straightforward, simple process as it may seem at first, immediate instance (Hackman. et al, 2016).

Liu et al (2011) show that digital technologies have had a pronounced impact on organizational transformation in the last decades. Businesses that have integrated digital technologies into their business operations have achieved several enhancements and have evolved to set new standards in their industrial operations.

PWC (2030) shows that automation, robotics, and Artificial Intelligence are advancing at an enormous pace, and they will change the way businesses operate and function. It also shows that around 37% of employees are sceptical about how their jobs will be in the future when automation gains full-speed adoption and AI becomes mainstream.

Alshaikhi, A. and Khayyat, M. (2021) show that project management teams must leverage AI to enhance the quality of outcomes and decision-making. Using auto-scheduling functionalities of AI and other digital technologies, project managers can enhance project planning outcomes. Digital technologies also help exercise better control over the workflow structure and pattern of planning, execution, and delivery of a project.

Mohamed Hashim et al. (2022) present the scope and importance of digitalization despite the challenges and change management issues that project managers and businesses endure. The study concludes that though change is not always simple, as far as the success of the company, team members, and company projects is concerned, self-imposed digital disruption is worth it in the long term. It must be remembered that

companies that have implemented digital transformation in their operations have recorded extraordinary improvements in their performance and revenues.

Win & Kham (2018) reveal that many business processes and tasks that do not need design and analytical skills, like back-office jobs, will be automated progressively by using digital and industry 4.0 technologies. Florence Daddey (n.a.) shows that though digital transformation involves challenges, there are also several opportunities. So, businesses must evaluate project management in the digital era from a broader perspective and invest in mitigating the challenges.

Artificial Intelligence and other disruptive technologies have the power to enhance the pace of business operations and project management activities (A. Foster, 1998).

According to Moore Ben (2021), AI and other disruptive technologies has the power to eliminate 80% of the mundane, daily work such as data curation, collection, tracking, and analysis. Anand Swaminathan (2017) describes the key differences between technological transformation and digital transformation and calls out why project management plays a more crucial role in digital transformation than technological transformation. When companies introduced Enterprise Resource Planning (ERP) in the 1980s and ’90s, it was a major technological transformation as it called for a major change and shift in the technological structure and functioning of organizations (Shadrack Katuu, 2020). However, ERP and other major technological transformation initiatives did not influence the way the businesses worked or how they served their customers. Say, when it brought about a change in the financial systems flow, it had no influence on the customer expectations or value proposition the company delivered to the customer. However digital change is much more than the technological shift as it

introduces new technology and software competencies to offer new experiences, products, and services to customers.

Several studies reveal the broad-based impact of digital transformation and the potential of digital technologies (Averina, T, et.al, 2021; Tudose MB, et.al, 2023; Qiu R. 2022). From the literature review, it is convenient to conclude that often businesses misconceive digital transformation as a one-off process. As digital is often associated with Information Technology, businesses perceive digital transformation as the sole responsibility of the IT department and systems professionals. Businesses also ignored digital transformation from the purview that it evolved as a contingent technology to handle the restrictive measures and the new normal that emerged during the COVID-19 pandemic. They were anticipating a revival to the old normal in the post-COVID world (McKinsey & Company, 2020).

In reality, digital transformation has become a must-have and it has emerged as a continuous, ongoing process. Digital transformation is no longer related to just IT and systems departments but has extended beyond to disrupt all walks of a business from vendor management, marketing, sales, HR, and project management to business models and customer experience(Verhoef, P, et.al., 2023).. The post-COVID world did not go back to the pre-COVID world but resulted in an altogether new world that evolved to be a continuation of the changes that happened during the COVID period. So, businesses that waited for the pandemic to get over and for the world to revive back to the old normal, have already lost a competitive edge (Gulliksen, et.al, 2022).

2.3 Challenges of Digitalization

Digital transformation is commonly referred to as a period of VUCA (Volatile, Uncertain, Complex, and Ambiguous) as it is associated with constant changes and

uncertainties. This shows the challenges that the businesses and other associated stakeholders endure in their roles as digital transformation impacts all walks of business.

Michelotti, P. (2018) shows that digitalization has brought about far more impacts than changes in the technical operations of a business. Successful implementation of digitalization requires changes in culture, project management, business strategy, business models, delivery channels, etc.

Issa et.al (2018) show that companies experience challenges in implementing digital transformation and industry 4.0 technologies because they look at digital technologies and the transformation process as a one-time, ready-made solution rather than as a concept, ongoing process. The complexity involved in the implementation of digital technologies hinders the pace of adoption.

Harisson et.al (2016) show that businesses endure struggles in implementing digital transformation as they fail to identify and close the gap between business requirements and technological abilities. According to Wang et.al (2016) organizations, particularly those in manufacturing endure challenges in linking businesses with technology at strategic levels. Rogers (2016) shows that only 20% of organizations succeed in implementing Industry 4.0 and this is primarily because they view digital technologies and Industry 4.0 solutions as IT-related projects. Whereas in reality, digital transformation is a holistic process requiring resources of sorts. When organizations perceive digital transformation as an IT project, they fail to foresee the magnitude of the challenge and so do not allocate sufficient resources needed to leverage the fullest benefits of digital transformation.

When businesses endeavor to harness the benefits of digital transformation, there will be changes and shifts in the culture of the organization. Though there will be resistance to such changes and transformations, overcoming them yields a powerful

impact (Tsoukas and Chia, 2002). The Project Manager of the Future: Developing digital-age Project Management Skills to Thrive in Disruptive Times (2018), a PMI study shows how project managers should leverage the opportunities from technological disruption. The study shows that continuous disruption is the new normal. As Laggard organizations are slow in adapting to the disruption, they risk the chance of being left behind and others that are adept at adapting to the change gain a competitive advantage.

According to Aubry and Lavoie-Tremblay (2018), in the dynamic and transient environment of the projects, basic processes like the project organization, team members and resources planning, team structure, and team management must be emphasized more during the early stages of the projects. The advent of digitization and the digital transformation that followed has disrupted all these steps. Though several project management tools like ClickUp or TeamGantt have evolved to meet the project management needs and demands in the digital era, a lot of gaps and challenges persist when it comes to the role of project managers in the constantly evolving digital landscape.

Ryba (2017) shows that the new tools and modern project management methodologies require a significant investment in technology, strong management decisions, and revamping the project management culture in the organization. This has gone far ahead from being a 'nice-to-have' technology and advancement to becoming a 'must-have' for businesses to navigate the challenges and rise ahead of competitors.

In the digital era, project management faces three critical issues, which include the following- the need to analyze the vast amounts of data to be able to make sound decisions, scheduling and planning using Artificial Intelligence and other digital tools, and comprehending the complexities involved in digital technologies.

As organizations were not prepared to embrace digital technologies and the transformation, they endured several challenges. The narrow view that digital transformation is the key responsibility of the IT and systems departments resulted in far more challenges as organizations failed to allocate sufficient resources needed to bring about digital transformation. Beyond that, the sudden acceleration in the adoption of digital technologies to handle the uncertainties of COVID-19 challenged several organizations. They struggled to cope with the sudden changes and sustain their competitiveness.

It must be noted that digital technologies are disruptive by very nature and the rapid rate of evolution is such that something new today becomes old and outdated the very next day. This challenges the operational structures of traditional organizations and they remain reluctant to invest in bringing about the digital transformation. The digital transformation and its challenges can be brought under three categories. 1. Digital assets that include digitalizing the infra, buildings, fleet, equipment, supply chains, etc. 2. Digital usage that impacts the way the businesses deal with internal and external stakeholders. 3. Finding a digitally empowered workforce remains a challenging affair (Gandhi et al., 2016). In traditional business models, the digital workforce remained a sole requirement of the IT department. Whereas, in the evolving world, finding a digitally equipped workforce remains a crucial challenge for businesses.

As business leaders start restructuring their external strategies, operations, and internal activities to amp up their capabilities to the requirements of the evolving trends, they endure challenges in managing and optimizing the costs and profits (Blanchet et al., 2014). The evolution of digital technologies has narrowed boundaries and businesses endure competition from a larger scale than it was before. With digital technologies, customers now have far more access to products and services that meet their

requirements. Previously, the business competition was location-based and restricted to a country or region. But today, they endure challenges and risk the chance of disruption from other businesses across the world (Vidas-Bubanja & Bubanja, 2017). Moreover, the competition has now become intense because new businesses evolve and because they are new, they remain open to adopting the new technologies and catering to the market requirements. They are faster than the existing organizations with rigid standards and operating procedures, more so, with less room and space for creativity and innovation.

Lekic et al. (2014), show that businesses need employees and teams with a combination of technical skills, technological know-how, soft skills, interpersonal skills, and social abilities. As teams have become more remote and hybrid work has become the norm of today, building a quality workforce, managing their cross-cultural diversities, and catering to their needs remains a challenge. Finding employees and building business teams with collaborative skills and cross-functional competencies remains a key challenge for businesses. Also, organizations lack the expertise and skills needed to oversee and drive this transformation from a strategic viewpoint.

Customers today expect more personalization and customization when it comes to a product or service. The period of mass production and standard operating procedures is gone, and such rigid operational and product abilities have become obsolete (Vidas-Bubanja & Bubanja, 2017). Another reason why businesses find it difficult to adopt digital transformation is the lack of time. As explained earlier, digital transformation happened at an accelerated pace than most businesses anticipated, unlike technological transformations which usually happen at a gradual speed. So, businesses found it challenging to adapt to the sudden changes and expectations in the business environment.

Maksimenko, I. (2021) defines digital transformation as a combination of digital technologies and organizational transformation. Organizations should leverage the

advantages of connectivity and other digital technologies to bring about a transformation in their business processes, activities, and value offerings. Businesses have been adept at adapting digital technologies to their business processes since the internet emerged and took the technological world by storm. Organizations have also transformed their business processes over a period of time. But when it comes to doing both, the organizational transformation and adapting the digital technologies at the same time, they need far more resources and endure greater costs and time requirements. So, they find it difficult to manage these requirements.

Employee resistance is another key aspect of instituting and operationalizing digital transformation initiatives. Employees, who have been with the organization for quite some time get so comfortable with the status quo that they find it difficult to accommodate changes that happen in the business environment. This is complicated by the fact that digital transformation drives a major structural change within and outside the organization. Employees find it far more difficult to adapt to the changing business requirements (Scholkmann, A.B., 2021).

The major challenges organizations endure when it comes to adapting and handling digital transformation requirements can be summarized as the following.

- Lack of resources needed to drive the digital transformation,
- Lack of understanding when it comes to digital transformation and misconceptions around it,
- Thinking that digital transformation is a one-time process,
- Affordability constraints,
- Lack of time,
- Lack of flexibility in the business structure to accommodate the changes,
- Employee resistance,

- Lack of skilled workforce and expertise to drive the digital transformation initiatives,
- Disruption by new players and startups

Though there are challenges in institutionalizing and operationalizing digital transformation, businesses should understand that the changes that accompany digital transformation are here to stay for longer and so they must adapt to the changing environment to ensure that they thrive and make a profitable business. Businesses should deeply evaluate the costs against the benefits and understand that spending on digital transformation initiatives are not expenses but, rather investments that would yield far more benefits than cost.

2.4 Impact of Digitalization on Project Management

The Project Management Institute which is a pioneer in project management research defines project management as the tools, approaches, tools, approaches, techniques, skills, and knowledge to meet the project expectations and requirements. Automated Project Management (APM) is defined as a set of tools, methodologies, and approaches used to automate the tasks, activities, and operations of the project management arena.

Tim Bryce (2013) shows that project management is a crucial aspect of corporate culture and plays an integral role in enhancing the organization's overall performance. This helps businesses gain an edge in the competitive business landscape. Treb Gatte (2016) shows that project managers' responsibilities, work, and functioning have not changed much in the last 30 years, even when different project management methodologies have evolved. Artto et al. (1998) show that project management deals with planning and managing different activities associated with a project. It is about planning,

managing, executing, and monitoring different activities in a project so the risks involved in the projects are mitigated and they can be completed. This enhances the productivity of teams and eventually, the efficiency of businesses.

As explained in the previous section, the scope of digitalization and digital technologies have extended far beyond the IT and systems department to disrupt all aspects and operations of business functioning. Given that project management remains a crucial aspect of business operations, digitalization has produced a strong impact on the project management arena. Uncertainty remains an unavoidable aspect of digital transformation. The traditional project management arena has remained structured, and rigid, and followed a standard operating procedure to bring about planning, collaboration, and successful delivery of project outcomes. However, the evolution of digital technologies, Industry 4.0 technologies, and changing customer expectations require far more flexibility in project operations. I have surveyed a broad set of available literature sources to understand the impact of digitalization on the scope and scale of project management, and the findings are given below in the following section.

Michelotti, B. (2020) shows that it is vital for organizations to align their strategy, technology, and leadership to be able to leverage evolving trends like digitalization and globalization and benefit from them. Kinelski (2020) shows that project team or project management has become mainstream, and a primary term often used in corporate communications. Digitalization and innovation happening in the digital landscape have the power to boost the outcomes of a company's project management.

Simion et al. (2018) show that project management in this digital age is majorly influenced by the Industry 4.0 revolution. The influence of Industry 4.0 is so huge that project management teams must redefine their components, workflow, and the

methodologies they adapt to a greater extent. Along the lines of Industry 4.0, project management 4.0 may gain prominence and become mainstream.

Win & Kham (2018) reveal that Industry 4.0 is predominantly a mode of dynamic configuration of production methods. Given that, an integrated approach to project management helps gain a competitive advantage in the industry. As the scope of Industry 4.0 technologies is wide and constantly evolving, the project teams tend to focus on achieving the specific objectives relating to the diverse elements and components of Industry 4.0. Auth et al. (2019) make an important point that a digital change is not just cloudification or digitalizing the existing systems and procedures. This needs a complete restructuring of the company's services and products around the existing digital capacities. In that case, the project managers play a crucial change in bringing about digital change.

The deeper penetration of digital technologies has not only impacted business strategy and operations but also the nature of operations in the workplace environment. It calls for the integration of mobile, big data, cloud computing, and search-based applications to develop an efficient workplace and organizational culture in the digital era (White M., 2012). In this era of digitalization, the primary intent of project management is to save time and costs while also increasing transparency. So, the key stakeholders involved in the process of project management are also expected to amp up their skills to be able to realize positive outcomes (Ryba, 2017).

Parviainen et al. (2017) show that the impact of digitalization extends beyond the internal structure of an organization to the level of process management, organization management, business domains, and society and community levels. Whyte, Stasis, and Lindkvist (2016) show that digital transformation brings about a notable impact on project management outcomes.

Mohan (2019) shows the impact of AI and IoT (Internet of Things) in project planning, management, controlling, benchmarking the best practices, setting expectations, increased efficiency, etc. Dharmalingam (2018) shows that the Internet of Things (IOT) reduces the complexities involved in project management. It helps exercise control over various phases of the project and promotes speedy analysis and reporting, data generation, deep analytics, legal and ethical compliance, etc. Digitalization is changing the way businesses operate and function to eventually impact all walks of business including project management.

Marnewick et al (2022) show that digital technologies have a moderate impact on project management. The study also reveals that in a majority of business cases, digital technologies are used as tools for efficient project management. The study also highlights the lack of academic research conducted to estimate the impact of digital transformation and digital technologies on project management processes and shows how the concept of digitalization in the project management arena remains behind the scope of a distinct thought. The study calls for the community of researchers to work on the collective vision of understanding the real-time, broad-based impact of digital technologies on the project management landscape.

Research studies to evaluate the impact of digital technologies on the project management landscape are very important as they help identify the actual skills requirements of the project management landscape in the digital era. This helps businesses understand the gap that exists when we evaluate the skills possessed by project managers and those that are needed to navigate digital transformation successfully. This way, businesses can organize training and make informed decisions to help project managers and other stakeholders involved in the project management process navigate the digital transformation without hassles and struggles.

With digitalization and shrinking global boundaries, project teams are diversified and spread across the world. As digital platforms became mainstream, teams started working remotely and through hybrid means. In this scenario, ensuring a good flow of communication and collaboration is a challenge for project management teams. When project managers and teams upskill themselves to solve the challenges presented by digital transformation and by leveraging automation abilities and optimization mechanisms, they can save time and human resource costs. They can also achieve more flexibility in managing projects. (Naheed, F., & AlMulla, L., 2021).

One of the key impacts of digitalization is the increase in speed with which projects are expected to be delivered. As agile delivery is becoming the norm, businesses must amp up the speed of their processes to be able to meet expectations and ensure sustainability in the disruptive business environment (Deloitte, 2020). According to Bullock (2022), digital transformation enables project managers to enhance collaboration, streamline communication, and channel their focus on strategy and outcomes. This is unlike the traditional roles of project managers where the focus is on project status and the process rather than outcomes. Digital transformation also helps the members of the project team to save more time and expend it on more creative pursuits and core tasks that are critical for the completion of their project as well as for their own career advancements. This goes a long way in creating happier workspaces and more productive and fulfilled employees.

Ryba (2017) shows that the modern project management methodologies that have evolved in the digital era help businesses save costs, and time, and improve the efficiency of business processes. According to Wim & Kham (2018), though several project management methodologies have evolved, the means of collaborating, coordinating, and passing on information to the team and management have not changed much. Artificial

Intelligence and Cloud computing have the power to automate collaborative activities and channel the dissemination of information to the team to enhance overall business efficiency.

Issa et.al (2018) suggest steps and roadmaps for the implementation of Industry 4 technologies. It starts with preparing the task force for change followed by an assessment of the requirements and the potential of digital technologies. This should be followed by defining the focus, generating use cases, assessing the impact of implementing the digital technologies on the identified use cases, and then finally selecting the use cases.

Win & Kham (2018) show that Artificial Intelligence and other evolving technologies have the power to change the flow of project management tasks. Such technologies reduce the complexities involved in the project and ease the lives of project managers. The abilities of digital transformation and disruptive technologies empower project managers to deliver projects at an accelerated pace than otherwise. Such technologies promote deeper collaboration, and accurate reporting, and enhance the project flow.

According to Win & Kham (2018), as digital transformation leads to delocalization, decentralized decision-making becomes the norm leading to quick decisions. As it promotes deeper collaboration, digital technologies remove bottlenecks and obstacles when it comes to interdepartmental communication and collaboration. Several communication channels have evolved in this regard to replace the traditional means of using fax, voice messages, and interoffice memos. Project managers of today have a wide range of communication tools at their disposal. This includes video conferencing, voice messaging, voice calls, emails, group meetings, in-person meetings, and so on. These social collaboration tools and innovative applications make

communication faster and integrated to eventually increase the odds of success of project deliveries, and enhance the quality of project outcomes, and efficiency of businesses.

The above studies show that the project management arena has been disrupted by digital transformation. Digital transformation has impacted the way project managers collaborate with internal teams. From using traditional tools like memos and faxes, they have moved ahead to using project management software tools to ensure seamless communication and collaboration. Beyond, the emergence of digital collaboration tools and systems has introduced remote working and so projects now have cross-cultural teams.

Apart from revolutionizing internal collaboration and communication, digital transformation also has impacted other tasks in project management that include defining the project vision, planning the processes, and monitoring the performance. With Industry 4.0 technologies and digital transformation initiatives, the repetitive processes in day-to-day project management can be automated and so stakeholders and project teams can save the time and effort they were investing in performing these mundane tasks into doing more critical tasks and handling core business operations. This has the power to enhance the productivity of project teams as well as the efficiency of business functioning, to eventually drive more profits and returns.

Data and analytics form a crucial element of decision-making in the digital world. Automating the process of collecting data, analyzing them, and using AI to make data-driven decisions helps businesses reduce the inaccuracies that result from manual data collection and decision-making and the inefficiencies that follow. Though there are several studies that have researched the general scope of digitalization and the challenges involved, not a lot of them are available when it comes to full-fledged research about analyzing the impact of digitalization on project management outcomes. As project management forms a crucial aspect of business operations, an in-depth study to analyze the impact of the ongoing, digital transformation is the need of the hour to understand the

real-time issues and help project managers navigate the challenges on one hand, and support businesses in offering training and skilling programs to project managers and teams. This would help project team's amp up to the burgeoning needs of the project management and leverage the abilities of disruptive technologies to drive greater efficiency in business operations.

2.5 Traditional project management methodologies

In the previous section, I presented a detailed assessment of the impact of digital transformation on project management. The findings from the literature show that digital technologies have produced a significant impact on the project management arena. I also covered the importance of leveraging the benefits of such technologies to automate mundane, repetitive tasks and investing the time and effort of project teams into performing more crucial tasks. In this section, I summarize the findings from my review of the literature available on traditional project management methodologies, processes, and operational flows.

The waterfall method is the most common traditional project management methodology and takes a linear approach when it comes to the software development industry. The methodology is easy to understand and use. As it is based on a linear approach, the waterfall methodology becomes complex and does not yield powerful outcomes when there are changes made to the scope and objectives of the project. Such changes result in delays and impact the quality of the project deliverables (Boehm, 1988). Waterfall and V-Model remain the most commonly used traditional project management methodologies (Leau et al., 2012).

The waterfall project management method remained one of the most commonly used project management methodologies until digitalization gained mainstream. It

follows a linear, sequential approach to the project management process, so they cannot move to the next phase of the process until the previous process is fully completed. This is appropriate for projects that are easy to define from the beginning to the end and for those that do not require any flexibility (PMI, 2017).

Most traditional project management methodologies follow a linear and incremental approach to navigating the project management life cycle (Wysocki, 2014). In these methodologies, the process flow is sequential and requires that one process be completed before beginning the next process in the sequence (Singhto & Denwattana, 2016). So, these processes leave no room for learning, feedback, and iterations. This is one of the significant disadvantages of the traditional project management methodologies. This inflexibility to adapting feedback and improvements is often quoted as the reason for its incompatibility and unsuitability to the requirements of the digital landscape and modern project management methodologies (Wysocki, 2014).

Fleming & Koppelman (2010) show that the Critical Path Method (CPM) is another traditional project management method and helps plan and schedule a project. It identifies the longest critical project path and helps build plans around navigating the same. The CPM method can be effective in understanding the critical, short path to achieving the project goals, yet loses its advantage because of its limitations in identifying the resource constraints and insufficient room for planning to meet the uncertainties and contingencies.

Eliyahu M. Goldratt introduced the Critical Chain Project Management (CCPM) methodology in 1997 (Lepadatu, 2010) and this emphasizes the need for allocation of resources including human resources, equipment, cost, etc. need for seamless execution of project tasks and completing them (Leach 1999, 2000). So, this serves as an extension of the CPM (Critical Path Method) by addressing the key challenges and constraints

within. It requires the time duration for each of the tasks in the project from the start until the end of the project and so solves the challenges associated with project planning (Updegrove 2014). This also accounts for delays and buffers. So, in the CCPM method, the project managers determine the critical path by accounting for resources, planning, and buffers for all the activities involved. The critical project resources are optimized to enable the critical path. (Leach 2000).

PRINCE2 (Projects IN Controlled Environments) is one of the common management approaches and offers a structural approach to planning, executing, tracking, and exercising control over a project. Yet the documentation is cumbersome, and this adds to the complexity of the process (Galliers & Leidner, 2014). PRINCE2 remains a standard used often in the United Kingdom and presents guidance to approach several activities and processes performed within the project management arena. It is a process-based approach.

All the traditional project management approaches, primarily, the waterfall methodology follow a standard approach and have a similar life cycle with five important phases, covering initiating, planning, executing, controlling, and closing. It must be noted that the activities flow in the traditional project management was predictable and so all the resources needed were also predictable. This remained the case irrespective of the nature of the industry, domain of operation, size, scale, and scope of a business.

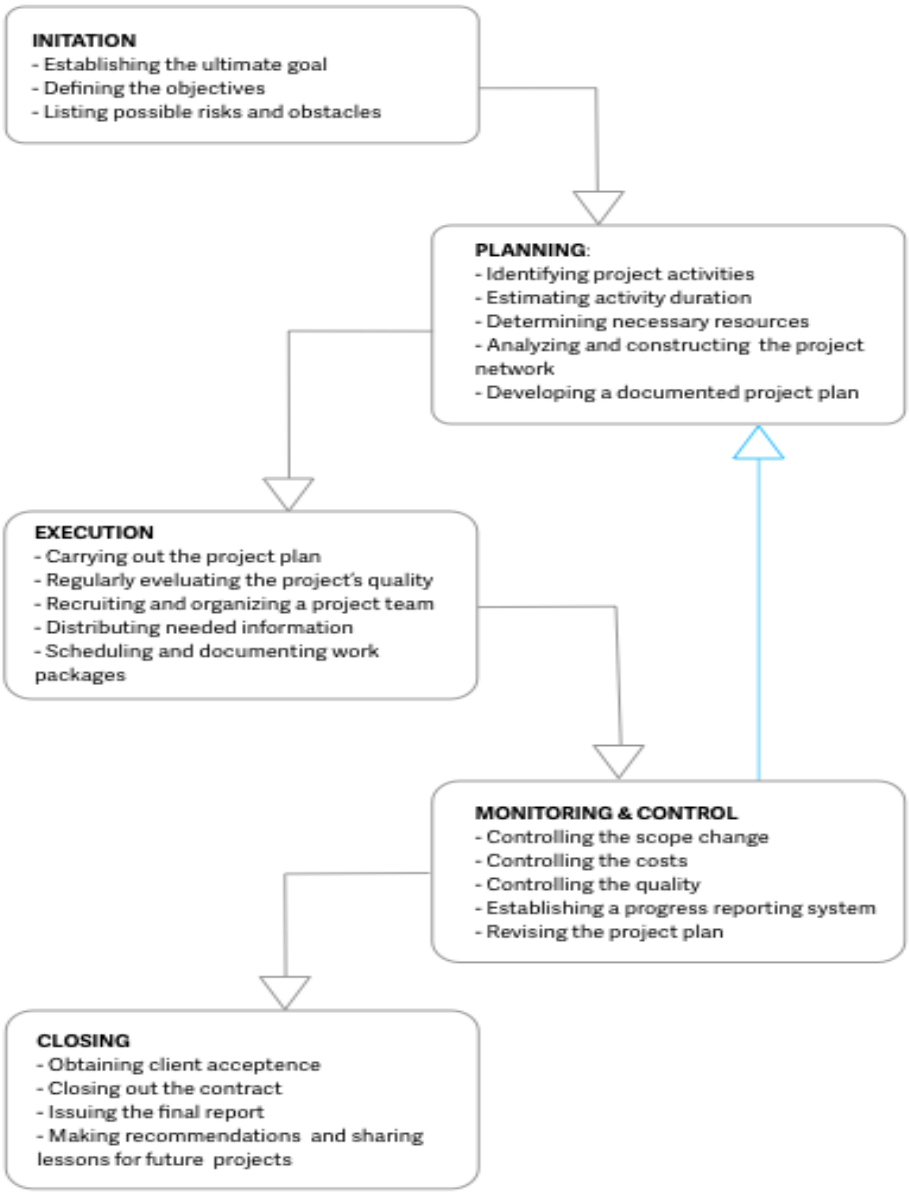

Figure 2.1 Traditional Project management cycle

The changes brought about by digital transformation on the business and the operating environment have made existing processes and business models obsolete (Parviainen et al., 2017). Such transformational changes have resulted in high levels of

uncertainty and businesses are endeavoring to adapt to the changing environment in several different ways.

The traditional project management approaches mainly focused on the technical aspects of the project and relied on the technical abilities and organizing skills of the project managers (Olson, 1971). Cleland (1994) shows that project management needed an understanding of the technical know-how and so, knowledge was a primary aspect of project management (Aranyossy & Juhasz, 2013). Project managers are expected to have deeper expertise in three areas and they were evaluated primarily based on knowledge, skill, and attitude.

Traditionally, project management methodologies can be brought under five categories - Best practices, standards and guidelines, sector-specific methodologies, organization-specific, customized methodologies, project-specific methodologies, and individualized methodologies Chin and Spowage (2010). The best practices are those that are not specific to projects, industries, organizations, or individuals but hold the potential to be applied to any project. Win and Kham (2018) show that traditional project managers of the previous decades relied on fax, interoffice memos, voice phone calls, etc. to establish coordination and communication between the stakeholders involved in a project.

Garg and Sharma (2021) compared the two common project management methodologies- the waterfall methodology and modern agile methodology and showed that using agile methodology in project management yields better adaptability, client satisfaction, and employee satisfaction and enhances the quality of project outcomes.

From the literature, it can be seen that in traditional project management methodologies, the key attributes like the scope of the project, the processes involved, time frame, resource allocation, budget, and expected outcomes are determined and

clearly defined before the project begins. The projects followed the predetermined path and there was no space for iterations, feedback, and enhancements in the project flow. They followed a rigid approach and had no/minimal customer involvement in the process. Such methods are appropriate as long as the scope of the project is clear and there are no possibilities for changes and modifications. On the other hand, the traditional methodologies don't go well with projects that are liable to changes in between. They cannot be applied to projects for which you do not have a clear picture of the requirements before you start the work, as well as in projects that require continuous improvements and testing in between the processes.

The rigidity of the traditional project management methodologies limits their application and utility in the digital-centred world where project activities happen under uncertainties with remote teams and rapidly changing trends.

2.6 Modern project management methodologies

The digital transformation has produced a pronounced impact in the project management arena and several new tools and methodologies like a digital library, digital twin framework, age automation, AI, agile methods, etc. have evolved. The birth and evolution of modern project management methodologies date back to 2001 when agile methodologies were first introduced (Erickson, Lyytinen, & Siau, 2005). Following the introduction of agile methodologies and the understanding of the features, functionalities, and abilities of the methodology, organizations in the software development industry first started adopting agile project management. Observing the impact that the agile-led projects and businesses demonstrated, businesses from other industries also started utilizing the agile project management methodologies (Conforto, Salum, Amaral, da Silva, & de Almeida, 2014).

SCRUM, XP, LEAN, TDD, ADD, SOLID, Pair programming, RUP, ASD, APF, DSDM, etc. are some of the commonly used modern project management methodologies (Fitzgerald, Hartnett, & Conboy, 2006; Polesie, 2013). With digital transformation, several software solutions evolved and became mainstream in the project management landscape. This led to the development of dedicated platforms and applications for project management. Such tools have redefined planning, organizing, scheduling, managing, collaborating, and tracking of the processes in project management. They provide room for an iterative approach as against the incremental approach of traditional project management methodologies. Also, modern project management tools have increased the transparency of the processes and activities, as well as offer room for continuous monitoring, feedback, and improvement (Mangla, et al. 2020).

Butkus, V. (2011) shows that agile remains the most used project management methodology to build and deliver digital projects, and it has become the crucial driver of digital transformation. No matter, whether an organization uses Scrum, Kanban, or other Agile frameworks, all of them come under the Agile manifesto. The scope of agile in digital transformation extends the scope of hybridization and virtualization of project teams as well as quality outcomes.

According to Cervone (2011), adopting a standard technique enhances the likeness of delivering a project and achieving the expected outcomes on budget and time. The author calls out the digital library as one of the major components of project management. The digital library which is published by the Project Management Institute is also known as PMBOK. This contains all the accepted practices and approaches in the world of project management and so serves as a useful guide and reference to project management practices and theories. New or occasional project managers may find it difficult to perceive the materials and processes listed in the digital library. PMBOK has

many knowledge areas and processes, and the project managers must learn, become well-versed with it and adapt them to leverage the digital transformation and solve the challenges that they endure in the process of adapting to the digital transformation. The author also emphasizes the digital library as it is one of the critical components needed to navigate changes that happen due to digital transformation in project management.

Westermann,et al.,(2011) shows that the impact of digital transformation extends beyond the technologies used in the project management process to also impact the thought process, planning strategies, operational means, customer relationship management, as well as stakeholder expectations.

Kinelski (2020) shows that cognitive science, Artificial Intelligence, and other disruptive technologies help managers simplify their tasks and accelerate the completion of projects. The author recalls how various stakeholders of the project teams often carry different opinions causing a delay in decision-making and project completion. So, AI has the power to automate decision-making and other tedious tasks involved in project management.

Simion et al. (2018) state that project management is usually an evolving process. The authors state that the future can be affected by certain significant changes, focused on consumer-centricity, innovation, competition, etc. The future will also be dictated by the involvement of heterogeneous groups with members located across the globe connected beyond geographic locations.

Gemuenden and Schoper (2015) identify 12 major trends in project management including Projectification of Societies 2. Coping with Complexity 3. Trans nationalization of project management 4. Virtualization of project management 5. Professionalization of project management 6. Learning and Education 7. Projects as Business 8. Stakeholder management 9. Project management goes Boardroom 10.

Project-oriented organization 11. Women in project management 12. Project Management Research. A deeper observation shows that all of these trends are shaped by digital transformation. Also, of the twelve trends the study identifies that the first four have a notable impact and all of them are driven by the increased penetration of virtual platforms and digitalization.

The first six trends identified by Gemuenden and Schoper (2015) call out the improvements and advancements happening in the project management landscape. The second set of 6 trends refers to the stakeholders involved and the kind of disruptions they endure in the evolving landscape.

Mohamed Hashim et.al., (2022) shows that there are ample tools with the power to simplify the process of digital transformation and the success of organizations depends on how well they put those tools to use. The apprehension that project managers must possess an understanding of the technical nuances is far from reality. Knowing how to best use the project management tools to automate the repetitive tasks they perform and investing their time, efforts, and cost into performing other core operations helps achieve the business outcomes in a short span of time.

A PMI study titled The Project Manager of the Future: Developing digital-age Project Management Skills to Thrive in Disruptive Times (2018) shows that seven out of ten project leaders are using lean agile practices to navigate the challenges and hardships of digital transformation. Rajkumar, S. (2010) shows that project managers spend 90% of their time in communication.

Pruseth and Garimella (2017) show that agile methodologies have evolved as an alternative to traditional waterfall methodologies to navigate the challenges and leverage the opportunities and benefits that arise from digital transformation. Such methodologies not only help enhance the project outcomes but also lead to effective strategies that

promote collaborative efforts by bringing together the younger generation of team members who differ from the previous generations in almost every aspect.

Bierwolf et al. (2017) show the changes happening in the project management landscape. It reveals that the changes including the replacement of life-cycle approaches and modern project management methodologies lead a shift towards becoming more social rather than being operations-based.

There are five distinct steps in effectively managing a change process—in doing project management: Defining the change objective, developing a strategy and plans to achieve that objective, creating a project management group to effect the change, installing a control process to monitor progress, and managing the project by implementing the above four steps. Most change processes require a full-time management effort. In managing the change process towards its defined change objective, different skills located in different organizational units must be employed at different stages of the project.

COC shows that while defining and identifying a project management methodology it is important to create and customize the methodologies to that particular context. First, the stakeholders and project managers must identify the objectives and requirements of a project, understand the intricacies and components of each of the project management methodologies, and pick relevant elements and components from each of the methodologies to create a customized approach suitable for that particular project. This requires keen attention to the details of the project and an in-depth understanding of each of the project management techniques. In the digital world, where each project is different and demands unique, innovative approaches, creating a customized project approach helps.

The use of AI helps prioritize and plan the project management tasks and automate the process of resource allocation by analyzing the data and this helps manage the optimal allocation of resources (Musienko, 2019).

The modern project landscape has evolved so much that it requires a greater room for flexibility in various aspects like the addition of new members to the team, easy replacement of the existing team, demand for increased transparency in reporting, training, clearly demarcated responsibilities, and so on (Cockburn, 2006). The demand for flexibility and continuous innovation in the digital project management landscape has impacted project management in not just software development but extends beyond to cover all industries. Such requirements have navigated the project management landscape and led to a quantum leap from the traditional project management methodologies that follow a linear approach towards modern methodologies that are iterative with more space for flexibility, creativity, and innovation (Aguanno, 2004; Williams, 2005).

As elaborated in the previous sections, traditional project management methodologies are rigid in terms of planning, scheduling, workflow, processes, and so on. Agile methodologies follow an iterative approach and offer room for customer feedback. Such methods ensure greater transparency in the process and pave the way for deeper collaboration among the stakeholders. Common agile methodologies like Scrum and Kanban require that projects be divided into smaller tasks so as to promote continuous improvement and iterative development of the expected outcomes. There are a number of project management methodologies that have evolved in the digital landscape. Identifying the right methodology based on the requirements of that particular project helps the teams achieve the desired outcomes within the budget, resources, and time constraints.

Beyond several Industry 4.0 technologies like AI, cloud computing, and the Internet of Things have the ability to automate processes, promote deeper collaboration and bring about data-driven decision-making. Organizations should explore beyond the modern project management methodologies, and identify the right set of tools, software solutions, and processes available for technological transformations. While choosing the methodologies and tools for a project, they should consider the complexities involved in the digital transformation, work mode changes from in-person to hybrid and virtual, and identify opportunities for promoting collaboration between cross-functional, diverse teams. Also, project management methodologies should be flexible enough to look for feedback and work iteratively until the desired results are achieved.

From the literature survey, it can be concluded that the traditional project management methodologies do not have the ability to meet the requirements and challenges arising in the project management landscape. Businesses should consider Agile and other modern project management technologies to steer the projects successfully and achieve the desired outcomes.

2.7 Skills required for project managers to achieve digital transformation

Disruption is the latest normal and the success of project managers majorly depends on how they adapt themselves to the new technologies in the rapidly evolving landscape. A study conducted by Future and Dell Technologies[1] shows that more than 85% of jobs in 2030 haven't been discovered at all. This shows the pace of disruption and how important it is for project managers to continuously update themselves on the latest technological trends.

[1] The Next Era of Human Machine Partnerships: Emerging Technologies' Impact on Society and Work 2030, Institute for the Future and Dell Technologies, 2017.

Project managers play a crucial role in the project management. They shoulder different activities relating to defining the scope and vision of the project, integrating different activities associated with project management, organizing the activities, monitoring and tracking them, and so on (Jalava and Virtanen, 2000).

Morris (1983) shows five steps for project managers to navigate the challenges and change management issues that arise from digital transformation. They include developing and defining the change management objectives, determining the strategy and steps to bring about the changes, building a group to work on addressing those challenges, identifying the opportunities, and effecting the changes. The last step is to implement the changes iteratively and keep track of the progress. As different processes in the course of digital transformation require different skills and competencies, project managers must equip themselves with holistic skills and competencies.

Alshaikhi, A. and Khayyat, M. (2021) identify that project managers must develop knowledge and holistic skills covering data science, complex problem solving, collaborative leadership, stakeholder management, legal & regulatory terms, security, privacy, and communication, etc. to be able to sustain the disruption caused by AI and other rapidly evolving industrial technologies.

A report by the Project Management Institute titled The Project Manager of the Future: Developing digital-age Project Management Skills to Thrive in Disruptive Times (2018) presents the following skills as the most important for project managers to upskill themselves to the requirements of digital transformation. It includes data science skills, an innovative mindset, security, and privacy knowledge, legal and regulatory compliance knowledge, the ability to make data-driven decisions, and collaborative leadership skills.

As project teams are increasingly diversified and spread across the world working through remote and hybrid platforms, the objective of the project manager is to focus on

enhancing the communication flow and strengthening the collaborative efforts between the teams. Effective communication, collaborative approach, comprehensive knowledge of lean, agile, digital technologies, dynamic learning, strong leadership, etc. are important skills that project managers must develop for successful project management in this era of digitalization. Beyond managerial abilities and decision-making skills, project managers must also equip themselves with technological know-how and competencies (Naheed, F., & AlMulla, L., 2021).

Boer et al. (2019) organized a study on the impact of digitization on the project management arena. The study also focuses on the skills needed for project managers to accommodate the changing needs of digital transformation and accomplish their objectives and goals successfully. The study shows that project managers must have sound technical skills such as the know-how of using project management software tools, and data analytics, beyond the typical soft skills like leadership, communication, and adaptability.

Fong and Chan's (2004) show that project managers need a blend of technical know-how, management abilities, business understanding, leadership skills, and communication fluency and abilities to be able to navigate the project toward successful completion.

The typical, traditional definition of the traits of project managers is ESTJ (Extraverted, Sensing, Thinking, Judging). However, several studies have shown that no one personality type fits the project management job and the nature of abilities that project managers need to navigate the challenges in the project management role is dependent on the work environment and that specific industry.

MBTI (Myers-Briggs Type Indicator) is a commonly used psychometric test to understand how individuals perceive the world. Shenhar and Wideman (2000) show that

many MBTI combinations worked well for project managers. Yet, ESTJ remains the preferred type when it comes to hiring a project manager for an organization. Davis (2011) shows that emotional intelligence has a crucial impact on the interpersonal competence of project managers. Dolfi and Andrews (2007) show that innate and learned optimism makes it easy for project managers to overcome the challenges associated with the work ecosystem.

As per Cervon (2011), project managers must have a deeper understanding of the processes and skills needed to manage different projects as their requirements vary. Project managers must develop expertise and understanding of the subtle nuances of the PMBOK. The framework covers critical parameters and key performance indicators when it comes to project management, such as scope, time, cost, quality, risk, human resources, integration, procurement management, etc. By developing strong expertise in this framework, the project managers working in the digital business landscape can identify the key problems and challenges in project management and prepare solutions to them in an impactful manner.

A lot of times, project managers particularly the more experienced are worried about the changes that digital technologies bring about and so, they resist such changes and adapt to the burgeoning technological trends and requirements. Against this contrary opinion, Obradovic et. al (2018) show that project management requires strong conceptual competency and so experienced project managers are in a better position than younger, inexperienced ones. Though technical skills and competencies are important, soft skills such as negotiation, relationship building, nurturing, critical thinking and the ability to foresee are some of the essential skills for project managers working in the digital era.

As digitalization has led to rapid changes and developments most of which are novel, the project managers must be able to upskill and reskill themselves at a greater pace to be able to adapt to such changes. Auth et.al (2019) show how Artificial Intelligence which is also a key part of the ongoing digital transformation helps project managers to adapt to constantly evolving scenarios. AI has the power to automate repetitive processes and reduce human dependence on decision-making.

Artificial Intelligence sheds enormous focus on making intelligent decisions and basing its actions on the inputs, data, and analytics that the system perceives as inputs from the environment. AI systems can adapt to change, act autonomously, make data-based planning, and set and track outcomes based on key objectives. Auth et.al. (2019) shows how data and analytics are evolving at an exponential pace and how AI systems that operate based on the data inputs can help businesses and project managers unlock new potential. Doing so has the power to disrupt the current models and tools used in the project management arena including statistical, mathematical user science, cognition, and methods and models.

To be able to leverage the fullest potential of AI and harness it to ease the workflow and overcome bottlenecks, project managers must gain skills and competencies to understand the intricacies of AI and its applications in a real-time business environment. Project managers must have creativity, strategic thinking, problem-solving skills, and intuitive abilities to be able to leverage AI and other evolving digital technologies.

Bierwolf et.al (2017) shows that project managers must have 14 core skills to be able to navigate the challenges that result from the digital transformation in the project management landscape. They include 1. Technical skill 2. Industrial Relations / Workplace Health and Safety / Environmental issues 3. Adaptability / Innovation /

Flexibility 4. People skills 5. Legal understanding 6. Client-related skill 7) Stakeholders management skill 8. Cost management skill 9) Computing skill 10. Risk management skill 11. Time management skill 12. Coaching / Transfer of knowledge skill 13. Networking skills and 14. Business knowledge. This shows that project managers must have a broad set of skills and competencies ranging from core technical skills and aspects to hard and soft skills.

Cervone (2011) shows how agile project management used to complement the Scrum methodologies can act as a productive methodology and technique to help project managers handle the challenges that they endure in different phases of project management. It becomes important that project managers become well-versed with Scrum and other agile project management tools.

As digital transformation has brought about far more changes to project management than technological transformations, a traditional waterfall mindset is obsolete. The evolving digital landscape demands scrum masters, agile developers, agile team members, and so on as it requires an altogether different mindset and skillset than the technological transformation initiatives of the previous decade (Anand Swaminathan, 2017).

Win & Kham (2018) state that employee resistance to digital transformation is normal and obvious. So, the study concludes that project management teams and managers must have a combination of hard and soft skills. They should be more conscious of their skills than the project managers in previous years. Though the project managers gain expertise and specialized technical skills in the domain of their interest, hard skills and soft skills will be a must-have in the digital transformation landscape to manage the autonomy and complexity that come with the digital transformation and implementation of industry 4.0 technologies. Moreover, as project management becomes

more decentralized with digital technologies, people will work from different parts of the world and so bringing about collaboration between them requires that project managers have the ability to manage people with different cultural identities.

A common thinking is that digital transformation is the role of the IT department in an organization and so, computer skills are perceived to be the most needed. A Project Management Institute, PMI titled The Project Manager of the Future: Developing digital-age Project Management Skills to Thrive in Disruptive Times (2018) study shows that project managers must build a comprehensive suite of digital skills that is beyond the typical computer-centred skills. The report identifies six skills as important requirements for project managers in the digital era. They include the following.

1. Data science covering data management, analytics, and big data
2. Innovative mindset,
3. Security and privacy knowledge and tools,
4. Understanding of legal and regulatory compliance,
5. Competency and skills to make data-driven, informed decisions,
6. Collaborative leadership.

The PMI study also shows that soft skills remain the most sought-after skill in the project management arena and this is followed by computer, web, and IT-related understanding and technological competency.

In terms of the broad-based skills and competencies needed for project managers to navigate the project management landscape, the PMI talent triangle serves as a crucial reference. It shows that project managers require a blend of technical project management skills, leadership abilities, strategic thinking, and business management skills. The technical skills include the ability to plan and prioritize the process, schedule, allocate budget and resources, and deliver successful project completion. Strategic and

business management skills are more about communicating the aspects of a business with its stakeholders like vendors, clients, senior management, and team members. Leadership skills include the ability to define a solid vision, problem-solving skills, motivating and inspiring the team, leading by example, and interpersonal skills like emotional intelligence, conflict management, data-driven, informed decision-making, and so on.

Figure 2.2 PMI's Talent Triangle

Source - The Project Manager of the Future: Developing digital-age project management skills to thrive in disruptive times (2018)

Artificial Intelligence, big data, cloud computing, and the Internet of Things are disrupting the digital world and digital transformation of businesses (Abad-Segura et al., 2020). As the expectations of customers and senior management in the organization increase in terms of time, cost, resources, and outcomes, project managers must evolve to leverage the functionalities of disruptive, Industry 4.0 technologies to be able to cater to those expectations.

Win & Kham (2018) show that critical thinking abilities are a must-have for project managers to navigate the hardships and challenges that pop up due to digital transformation. They should have a blend of technical, hard, and soft skills to be able to

leverage the benefits of digital transformation. Apart from these, communication skills play a significant role in the modern project management landscape. As project management and communication happen through several channels like virtual face-to-face meetings, phone calls, emails, and in-person me, the project managers should have the ability to identify the right channel to communicate their message. They should familiarize themselves with the implications and technical navigation of each of these channels so the project managers can decide what channel works best to accomplish a particular task.

Lei and Skitmore (2004) conducted a survey in Southeast Queensland, Australia to identify the important skills project managers should have to survive and thrive in the digital era. The study identifies the following skills – 1. Technical know-how, 2. People and talent management skills, 3. Understanding of the legal norms and measures, 4. Client-focused skills and abilities, 5. Stakeholder management skills, 6. Cost management skills, 7. Computing knowledge, 8. Risk management abilities, 9. Time management skills, 10. Coaching skills, 11. Networking competencies, and 12. Business understanding and knowledge.

According to Win and Kham (2018), though there are several tools available for project managers, they should be cautious in using these communication channels. The study calls out tools like webinars, phone calls, instant messages, document collaboration tools, etc. to be the most efficient project management tools and that the project managers must seek approvals from stakeholder organizations before choosing a particular tool and communication channel. Choosing the right communication channel and tool has an impact on the tangible and intangible outcomes of a project.

De Pace F, et al (2018) shows that Augmented Reality has the potential to accelerate the pace of project planning and execution and accelerate the development of products and completion of projects. Gokalp, et al. (2016) show that big data analytics play a huge role in project management and enhance the quality of project outcomes. Słoniec, J.(2015) shows that cloud computing, which essentially promotes the virtualization of resources has the potential to enhance the resource's utility. A variety of cloud computing project management software tools like cloud phones, virtual messaging tools, CRM tools, virtual collaboration tools, etc. have evolved. They promote virtual collaboration without upfront costs. As businesses pay only for what they use, such cloud computing tools reduce costs and so businesses have increased their reliance on cloud computing tools. So, project managers must also become familiar with cloud computing tools and learn to put them to use effectively.

Cloud computing has revolutionized the project management arena and has made it possible to use PM tools from the cloud. Commonly called the SaaS (Software as a Service), the cloud offers the users, the ability to access software tools and applications from the server and pay only for the usage. So, it becomes important that project managers understand the subtle nuances of cloud computing. Project managers need more soft skills like planning the change, education and technological know-how, and the ability to manage the resistance to change. Cloud computing and software applications help manage the project by promoting collaboration and communication among the team members (Topor, 2018).

As per Rajkumar, S. (2010), project managers spend around 90% of their time in communication. So, developing communication skills and the ability to build an effective communication strategy to connect and collaborate with various stakeholders like clients, vendors, team members, senior management, etc. The study lists four steps as crucial to

developing an effective communication plan – 1. Identifying and understanding the requirements of business communication, 2. Identifying the 5W's and 1H's (Why, What, When, Where, Who, How). 3. Identifying and analyzing the factors that affect the business environment including organizational culture, marketplace requirements, risk management, etc. 4. Understanding the organizational processes and procedures with respect to process measurement, defect management, risk management, configuration management, etc. So, communication remains a crucial skill for project managers in the digital era.

El-Sabaa (2001) conducted a study on the skills required for project managers in the country of Egypt. The study used the three-skill approach designed by Katz's (1974) and adds 18 characteristics as the most needed for project managers- 1. Human skills include communicating with the stakeholders, delegating tasks effectively, conflict management, negotiation, enthusiasm, leading by example, and mobilizing resources effectively. 2. Conceptual and organization skills that cover defining the vision and goals followed by planning, organizing, managing, monitoring, and tracking the performance to ensure that the project outcomes are achieved within the allocated resources, time, and budget frame. To be able to achieve the intended project outcomes, project managers must develop a strong sense of orientation with the problem and scope of the project. 3. Technical skills include methodologies, processes, tools, approaches, collaborative platforms, project management automated software solutions, and technical know-how to be able to leverage the benefits of the latest project management methodologies.

Einsiedel,A.(1987) shows the project management landscape is often fluid, and in matrix organizations, there are challenges in terms of scarce information, role ambiguity, conflicts, and erosion. So, to overcome the challenges in project management in such

environments, project leaders and managers must have credibility, creativity, problem-solving skills, tolerance for ambiguity, flexibility, and effective communication.

Moore Ben (2021) shows that a major chunk of the daily activities of project managers can be automated by leveraging the potential of Artificial Intelligence, Industry 4.0 technologies, and digital transformation. So, project managers should enhance their skills and abilities to be able to cope with the requirements of the evolving business environment. As digital transformation primarily intends to automate mundane, repetitive tasks, project managers and employees can shed their focus on critical tasks that require their attention. They need to focus on building the skills to perform tasks that can be performed only with human intelligence and not with artificial intelligence. The project managers must develop skills that are needed to work in sync and alignment with artificial intelligence and together drive positive outcomes.

With remote teams collaborating from different parts of the world, managing diversity is a crucial skill. Musienko (2019) shows that in addition to skills needed to manage diversity, project managers and team members must have hard project management skills, soft skills, and skills needed in the technical aspects of Information and Communication Technologies (ICT). Brownlee (2019) shows that AI, data analysis, design thinking, automation, robotics, machine learning, and security aspects, etc. of the ICT industry are needed for project managers to thrive and survive in the changing digital world. Rastogi (2019) shows that project managers need psychological abilities, social skills, creativity, emotional intelligence, organizational skills, etc. are needed to navigate the challenges of digital adoption.

The review of existing literature on project management shows that traditional project management skills like process management and team management are not sufficient to deliver successful project outcomes. Project managers must develop holistic

skills including technical competencies, team management skills, social skills, emotional intelligence, organizational skills, and so on. They should also have stakeholder management abilities and the skills to achieve the project outcomes within the costs, resource allocation, and time constraints.

Given that the teams have become remote and widespread crossing boundaries, cross-cultural competencies are a must-have for project managers. They should also have a technical understanding so the project managers can leverage automation tools and collaboration platforms to save the time and cost that they can invest in performing and enhancing the core critical business operations. The literature survey shows that project managers need hard skills, soft skills, as well as technical competencies to navigate evolving trends. However, they do not show the level that project managers need when it comes to technical competencies.

2.8 Need for training and education

Digitalization has a broad-based, strong impact on project management, and project managers have a crucial role in implementing digital and Industry 4.0 technologies (Win & Kham, 2018; Kinelski, 2020; Michelotti, B., 2020; Simion et al., 2018). Businesses endure struggles when it comes to digital transformation and project managers lack knowledge and skills about the nuances of digital tools and platforms (Harisson et.al., 2016; Wang et.al.,2016; Issa et.al., 2018).

Kutcher (2022) shows that project managers and leaders must equip themselves with competencies in digital technologies. Win & Kham (2018) show how project managers lack skills and competencies in using technological tools and systems to achieve project outcomes. Project managers require effective training and skills to manage the sudden changes brought about by digitalization in project management.

When it comes to project management, beyond project managers, employees, and team members also endure challenges. So, project managers as well as employees must be trained to effectively put to use digital technologies and components like internet aspects, system integration, additive manufacturing, augmented reality, autonomous systems, simulation, cyber security, cloud computing, and big data.

Bullock (2022) shows that training is a crucial aspect of navigating project managers through the challenges of digital transformation and for businesses to keep pace with the evolving digital trends. Training and enhancing the skills of the employees help enhance the efficiency of project managers in handling projects as they learn to promote efficient use of resources and achieve the intended project outcomes within the costs, time, and resource constraints.

Mohnmed Hashim et. Al (2022) presents interesting statistics that emphasize the need for training in the project management landscape. More than 50% of companies that have succeeded in digital transformation have trained their employees while on the other hand, only 14% of organizations under the low-performing category have offered employee training opportunities. This highlights the importance of training the employees and project managers periodically, so they become aware of the evolving trends and the know-how of modern project management, collaboration tools, and communication platforms.

Thamhain, H. (1991) has analyzed the need for training of project managers and the study shows that they must be trained in interpersonal, technical, and administrative skills. Interpersonal skills include offering direction, problem-solving, communication, and the ability to deal with people without exercising authority. Technical skills include understanding the essential aspects of the project and learning to communicate in the language that is perceivable to the technical support team. Administrative skills include

planning, organizing, managing, and controlling the workflow. Traditionally, project managers are trained in planning projects, managing the scope, estimating, scheduling and planning, team management, decision-making skills, etc. The skills required by the project managers depend on the profile of the project and with digital transformation becoming the mainstream, the people skills are relevant and important.

Obradovic et. al (2018) shows that though technical skills are important for project managers, soft skills and the ability to foresee the future are more essential skills. So, organizations must invest their efforts, time, and resources into enhancing the soft skills of the project managers in the organization. Project managers and other stakeholders in the organization must also have the mindset to accept the changes and respond to them in a positive manner to be able to achieve success in their project management roles.

Crawford (2005) shows that knowledge, skills, experience, performance, and personal competence covering attitude, behavior, personality, and characteristics are essential competencies for project managers. Darnall (1997) describes the skills needed to become a project manager and manage client requirements and expectations. They should have the ability to define the vision to be able to achieve the success of projects.

A lot of times, organizations are reluctant to invest in training programs as they are concerned about the upfront training costs. Bullock (2022) reveals that training programs lead to a virtuous, positive reinforcement cycle and the money that the organization puts into training the project managers and the employees is an investment and not an expenditure. The study shows that when employees and project managers perform well, business productivity, the quality of project outcomes, as well as the impact of value offered by the organization, improve. When project managers are well trained,

they work more efficiently and effectively enhancing the odds of success of an organization.

So, organizations must weigh the benefits and costs of training at a broader level and invest sufficiently in training employees, so they become reliable assets. When businesses evaluate the training cost against the enhancements in business outcomes, it is clear that the amount spent was an investment and not an expenditure.

Thomas and Mengel (2008) show that project managers are not sufficiently educated on the importance of exercising transformational leadership in their thoughts and actions. This helps them perceive the different trends and conditions associated with project management and business efficiency and prioritize their activities accordingly.

Project portfolios are frameworks for management decisions. Traditionally used for selection A PMI study titled 'Success Rates Rise: Transforming the high cost of low performance (2017)' survey shows that 28% of project managers believe that the inability to navigate change management remains the cause of failures and about 30% agree that poor communication led to adverse outcomes. So, it is important for project managers to develop change management skills and communication abilities to be able to survive the requirements of the changing business environment.

Eskerod and Blichfeldt (2004) reveal that assumptions and beliefs about culture and knowledge transfer exist among project managers. Factors like the uniqueness of a project, time frame, cognitive capacity, performance evaluation, project ownership, etc, influence the learning process among project managers.

The available literature shows the gap that exists between the skills required by project managers and the competencies they possess at the moment. As digital transformation happened at a rapid pace, project managers found it difficult to evolve at the same pace. Organizations, on the other hand, were also reluctant to invest in training

and educating the project managers and project teams because they were uncertain about the returns on investment. However, research studies show the gap and call out the importance of training and education so that project managers and teams can cope with the rapidly evolving digitalization trends. Organizations should not view the amount they spend on project team training as an expenditure, rather it should be considered as an investment because the benefits are long-lasting and tend to outweigh the costs.

2.9 Summary of literature review

The survey of existing literature shows that digital technologies and the transformation of businesses are happening at a rapid pace. So, businesses endure numerous challenges in adapting to the requirements of the digital trend. When COVID-19 emerged, businesses were forced to speed up their digital infrastructure as they were left with no choice but to cope with the emerging business needs. Because the transformation happened in haste, businesses found it hard to allocate the resources, cost, and time needed to accommodate the requirements of digital transformation.

Beyond time and cost, businesses found it difficult to find the technical expertise and digitally empowered employees to drive the transformation. They fail to understand that digital transformation is an ongoing process, and they commonly perceive it to be a one-time step. So, they fail to plan and allocate sufficient resources. Studies show that businesses that have been adept at adapting to the requirements of digital technologies stand a better chance of success in the competitive business environment. As digital transformation is expected to stay on forever and bring about incremental and revolutionary enhancements to businesses, businesses have no choice but to adapt to modern trends and ensure their survival.

Though there are several studies that discuss digital transformation and the challenges involved, studies analyzing the impact of digital transformation on project management specifically are very limited. This is despite the fact that project management is a crucial component of business operations and a key determinant of business success.

The literature review also shows that traditional project management methodologies lack the flexibility and framework that the modern digital world demands. There exists no room for flexibility, feedback, and customer involvement in the process. Given that the customers expect a higher degree of personalization and customization, such rigid project management methodologies become obsolete. On the other hand, modern project management methodologies like Agile have the power to accommodate the flexibility needs of the business in the digital era.

Artificial intelligence has the power to automate data collection, analysis, and data-driven decision-making. The Internet of Things has the ability to promote deeper collaboration and maintain an efficient line of communication with internal and external stakeholders. This means the project managers and the project teams can automate the mundane processes and invest their resources, time, and efforts into performing other crucial business operations. The studies reviewed as a part of the literature analysis show that there exists a huge gap between the skills required to navigate project management in the digital world and those that the project managers and teams possess. Yet, there are no studies that offer a reliable framework for project managers with a detailed analysis of the real-time challenges they endure at work and the solutions available at their disposal.

Though there are several studies that have researched the skills required by project managers, they do not produce a solid understanding of the same. Some studies

put forth technical skills as a major requirement, while others emphasize the need for both hard skills and soft skills to navigate the rapidly changing business landscape.

Similarly, there are very limited studies that discuss the solutions available for project managers. Most studies suggested training and education as the solution to support project managers in overcoming the challenges they endure. Often, businesses are reluctant to invest in training their project teams. But studies show that though there are challenges involved in bringing about the digital transformation, the benefits outweigh the cost and so businesses must come forward to invest in the digital transformation process.

In the next chapter, I have covered intricate details of the methodological approach that I use to analyze the qualitative data from the literature review, interviews, observations, journals, and so on.

CHAPTER III:

METHODOLOGY

3.1 Introduction

In this section, I have outlined the key aspects of the methodology I follow to evaluate the impact of digitalization on businesses, the project management arena, and the project manager's skill sets and competencies. As detailed in the previous chapters, the key objective of the research is to examine the gap that exists between the skill requirements of traditional and modern project management methodologies and explore the need for training and skilling programs. Academic studies use two types of research, namely qualitative and quantitative approaches. The qualitative approach is generally used for studies that deal with individual or organizational behaviors and processes. The data is collected through interactions on the ground and the process focuses on analyzing the beliefs, opinions, experiences, etc. of the relevant group.

A good qualitative study must place a convincing argument backed by real-time data and inputs that reflect the opinions and beliefs of the set of people that have close relevance and association with the objective of the study. It should deliver strong evidence and proof for the claims the study makes (Pratt, 2009).

Quantitative research studies are generally used to quantify the problem based on the numerical data available collected either from secondary sources or reliable sample population and primary sources (Creswell, 2014). The data is collected through structured means like interviews, questionnaires, general surveys, etc. In qualitative studies, the data is descriptive and primarily collected through interviews and group discussions.

Quantitative studies focus on using the data to either justify or controvert the initial hypothesis and assumptions. The data is usually analyzed following statistical procedures, numeric models, and estimation tools. In the qualitative approach, the data is

collected by observing the attitude, belief structure, and thought patterns of the individuals and analyzed over a specific period of time.

A major difference between quantitative research and qualitative study is that the former focuses on using numeric data to make estimations and forecasts to perform quantitative analysis. And the latter focuses on using soft data like textual information, imagery, sentences, symbols, etc. to analyze the behavior, thoughts, and opinions of the informant (Creswell, 2014). However, the two common methods of research, quantitative and qualitative studies promote different methods when it comes to data collection and analysis, and an appropriate one is usually chosen based on the objective of the study. For studies of this kind, where we evaluate the impact of digital transformation on the project management space and the gap between the skills required and those possessed by the project managers, we do not require statistical significance estimates (Saunders et al., 2015). A qualitative study conducted through interviews and focus group discussions would be more relevant to eliminate the bias and enhance the credibility of the analysis ((Leavy, Saldana & Beretvas, 2011).

Qualitative research studies use different methodologies and exploratory research is one of the important methods a researcher uses to analyze and understand the problem statement and objective of the research more deeply. In qualitative studies, the data is primarily collected from human experiences and so is more powerful than the quantitative approach. To collect data using qualitative methods, different instruments are used based on the objectives. Questionnaires, surveys, and checklists are used when the data has to be collected from a wider audience and at a quicker pace of time. They are commonly used when anonymity is important. The data collected can be easily compared and analyzed. Interviews are used when the research intends to analyze the experiences, beliefs, and thoughts of the audience in-depth. Focus groups come into the picture when

the objective of the study is to explore the thought patterns of a set of people and understand why they behave so. They are useful when the study is performed on a homogenous group of participants and the researcher can choose those that hold relevant experience, skill set, and educational background (Pv, R., & Peremans, L., 2007). However, in this study, to understand the skills required for project managers to succeed in the evolving digital landscape, I intend to use qualitative analysis and take up data collection through interviews.

A majority of qualitative studies rely on interviews to collect and document real-time data. It helps perceive data and information about the perspectives, feelings, behaviors, and opinions of an individual or a group. Such interviews also offer facts and real-time data (Sutton, 2015). The stakeholders and participants of the interviews conducted to derive information and insights about the objective of the study are carefully selected and they range from top management executives and project managers to the team members and clients. To conduct the interview, I seek appointments from the stakeholders and fix the time and location of the interviews after confirmation with the stakeholders. Based on the requirements of the study, the stakeholders were interviewed more than once. Sometimes, the interviews are also conducted spontaneously without prior appointments, like a project manager from a different industry whom I meet in a tech forum or conference (Leavy, Saldana & Beretvas, 2011).

I have summarized the overall framework adopted for the study in the below chart.

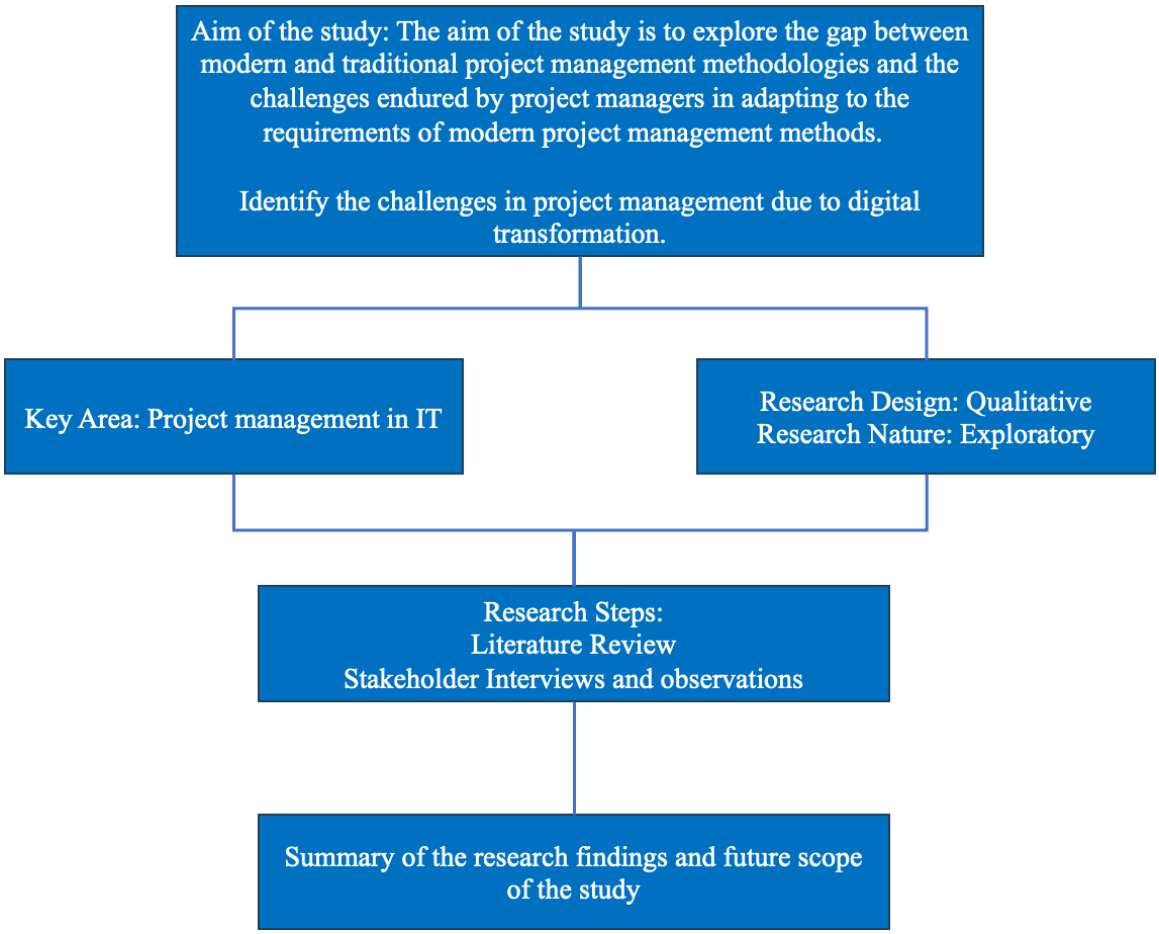

Figure 3.1 Framework for the study

Valon (2011) presents the steps involved in collecting data through interviews. I intend to do a semi-structured interview with all the stakeholders and collect relevant data for the research.

1. Spend 45 to 60 minutes for each of the interviews and have relevant questions prepared before we conduct an interview.
2. Determine and set a time period to collect data.
3. Dish out emails specifying the objective and purpose of the study and request appointments and approvals prior.

4. Send follow-up emails if needed, so we can determine the time and location to conduct the interview.
5. Elaborate the objective of your study in detail.
6. Conduct open-ended interviews so we can draw more information and study their thought patterns.
7. A digital recording would help in summarizing the findings and presenting evidence as a part of the study.

I prepare a transcript right after the interview or within a few days so I don't lose track of the information. Doing so helps avoid data losses, gaps, manual errors, and bias. I did make a note of their reactions and emotions rather than investing their focus and efforts in making transcriptions and notes. To capture the fullest emotions, thought patterns, and behaviors of the participant, it is important to keep the questions open-ended. While conducting the interviews, I pay attention to the subtle dynamics and approach the interview with an open mind without prejudices or preconceived notions.

In the coming sections of this chapter, I have covered the subtle nuances of the research design, instrument, population and sampling techniques, data collection, participant selection, and data analysis methodologies.

3.2 Research purpose

The basic objective of this study is to analyze the impact of digital transformation on project management. The analysis of existing literature shows that digital transformation has produced a pronounced impact on all the components of a business including project management. It shows the difference in skills and competencies gap that exists between traditional project management methodologies and modern

methodologies. Though the literature review provides from the existing studies, there are a lot of gaps and limitations in the research.

Through this study, I intend to call out the following.

- The key features and functionalities of the traditional project management models and methodologies,
- The skills possessed by traditional project managers,
- The impact of digital transformation on different verticals of the business, with a special focus and emphasis on the project management vertical,
- The requirements, features, pros, and cons of modern project management methodologies,
- Check if the modern methodologies have the power to align with the changes brought about by digital transformation,
- Understand the implementation challenges in modern project management methodologies and frameworks,
- Analyse the degree of digital transformation that has happened in the project management arena in real-time,
- Analyse the impact of digitalization from the purview of different stakeholders including team members, project managers, and the CEOs, executives, and leaders at the higher end of the hierarchy,
- Analyse the significance and degree of influence of various demographic factors like gender, income, designation, educational background, professional experience, etc.
- Capture the skills that project managers must possess to navigate the challenges and requirements of modern project management methodologies and digital transformation,

- Analyse the need for training and educating the project management teams to enable them with the skills and competencies needed to navigate the evolving project management landscape.

Though the existing studies present an extensive analysis of the skills and competencies required by project managers, there is a mixed picture as some studies call out the need for analytical and technical skills, while others suggest that project managers must enhance their communication and collaborative skills.

There are several approaches to conducting the qualitative study and the key ones include ethnography, phenomenology, and grounded theory as identified by Merriam (2002). Ethnographic studies mainly focus on the interactions to understand the culture and specifics of life, and it requires that the researcher spends ample time on the ground. I may not be able to use ethnographic methodologies because the research participants remain occupied professionally and they do not agree to spend more time on the ground. Phenomenological studies focus on understanding the basic structure and theory that underlines a phenomenon. It explores the subtle nuances of a phenomenon and researches what people go through when they experience a phenomenon. Phenomenological studies are more appropriate for understanding and researching human social experiences. As the study is intended to analyze a specific research question and not about a particular phenomenon and the human experiences behind it, the phenomenological approach may not work for my study (Moustakas,1994; Van Manen, 2014).

The grounded theory, a common methodology followed in qualitative studies aims to explore and construct a theory based on the data collected. It was formulated by Glaser and Strauss and follows a comparative analysis of the data (Chamberlain-Salaun J, Mills J, Usher K, 2013). The results of the analysis are formulated as theories and postulations. However my research is exploratory, and the findings are majorly based on

empirical analysis of the available literature and the data collected from relevant stakeholders. In that case, findings are objective, and arriving at a theory may not be feasible. So, I disregard the grounded theory for my analysis. Therefore, to achieve the purpose and objective of the study, I intend to follow the exploratory-qualitative approach as the focus of my research is 'digital transformation' and this requires some amount of background understanding and knowledge.

I collect descriptive data from the key stakeholders and experts involved in project management through interviews. I have included open-ended questions to understand the behavior, thoughts, and emotions of the participant without limitations and interventions. To analyse the data collected from the interviews I use lexical and thematic analysis. Lexical analysis helps gain insights and information based on the vocabulary and terms used by the responder during the interview. On the other hand, thematic analysis helps spot patterns and themes in the descriptive data and arrange them into categories and clusters based on different themes.

3.3 Research design

The literature review reveals studies on analyzing the impact of digital transformation on the skill gap and requirements of project management are very limited and the available studies have used quantitative methods to estimate the benefits of digital transformation. The gap that existed in the literature motivated me to choose qualitative analysis to conduct the study. therefore, the design I have used to conduct the study is qualitative and exploratory analysis. As mentioned in the earlier section, I use a combination of effective qualitative methods like interviews and observations to conduct the study (Creswell, 2014). After data collection, I analyze the thought patterns, opinions,

words, sentences, and other soft data collected as a part of the data collection process (Choy, 2014).

Throughout this study, I intend to contribute to the available literature on the impact of digital transformation on project management and discover new insights and real-time perspectives from different stakeholders involved in project management. To achieve the objective of the study, having a real-time understanding of matter because digital transformation is novel, and views and opinions from the stakeholders on the ground would help me structure the analysis and present the findings. Starting from the literature review, preparation of research questions, data collection, and conducting stakeholder interviews, to the analysis, I follow the guidelines put forth by researchers for conducting qualitative studies.

For the research steps and procedure, I take inspiration and references from Eisenhardt (1989).

- Perform an extensive review of the literature
- Analyse the research methodologies and choose the one that is relevant to the study
- Choose a data collection method that is appropriate for the objective of the study
- Prepare research questions and issue the questionnaire to the sampled population
- Analyse the collected data,
- Report the findings and make a conclusion.

Qualitative research which uses descriptive data is preferred as the study involves identifying the gap that exists in the skills required for project managers to navigate the digital transformation initiatives in a business. Specifically, I intend to use an exploratory

research design as I intend to investigate the research question and gain deeper insights through literature review, stakeholder interviews, and expert opinion. The data is descriptive, and mostly derived from interviews, interpretations, behaviors, and events.

The literature review showed that the researchers have mostly relied on quantitative methods for data collection and analysis. It also shows that the studies determining the skills and tools required for project managers in the digital landscape are very limited. So, based on the gaps identified as a part of the literature review, I chose a qualitative research design to understand the nature of skills and competencies required for project managers and evaluate the need for training and development at the organizational level.

To achieve the research objective, I conducted semi-structured interviews with different stakeholders using open-ended and closed questions. Other common methods of research like ethnography, grounded theory, historical data, etc. could not be used as they were not in alignment with the purpose of the research. The semi-structured interviews help gain a real picture of the thought patterns of the stakeholder which is more important in identifying the skills gap that exists when it comes to project managers in the digital landscape. Beyond it would also help understand the benefits of digital transformation in project management and different strategies that project managers adopt to leverage the features and functionalities of digital technologies. Apart from merely identifying the gaps, doing a semi-structured interview with all the important stakeholders of project management will help gain perspectives of each of them when it comes to digital transformation in project management.

The following figure summarizes the gaps in the literature and how I aim to bridge them through this qualitative exploratory analysis.

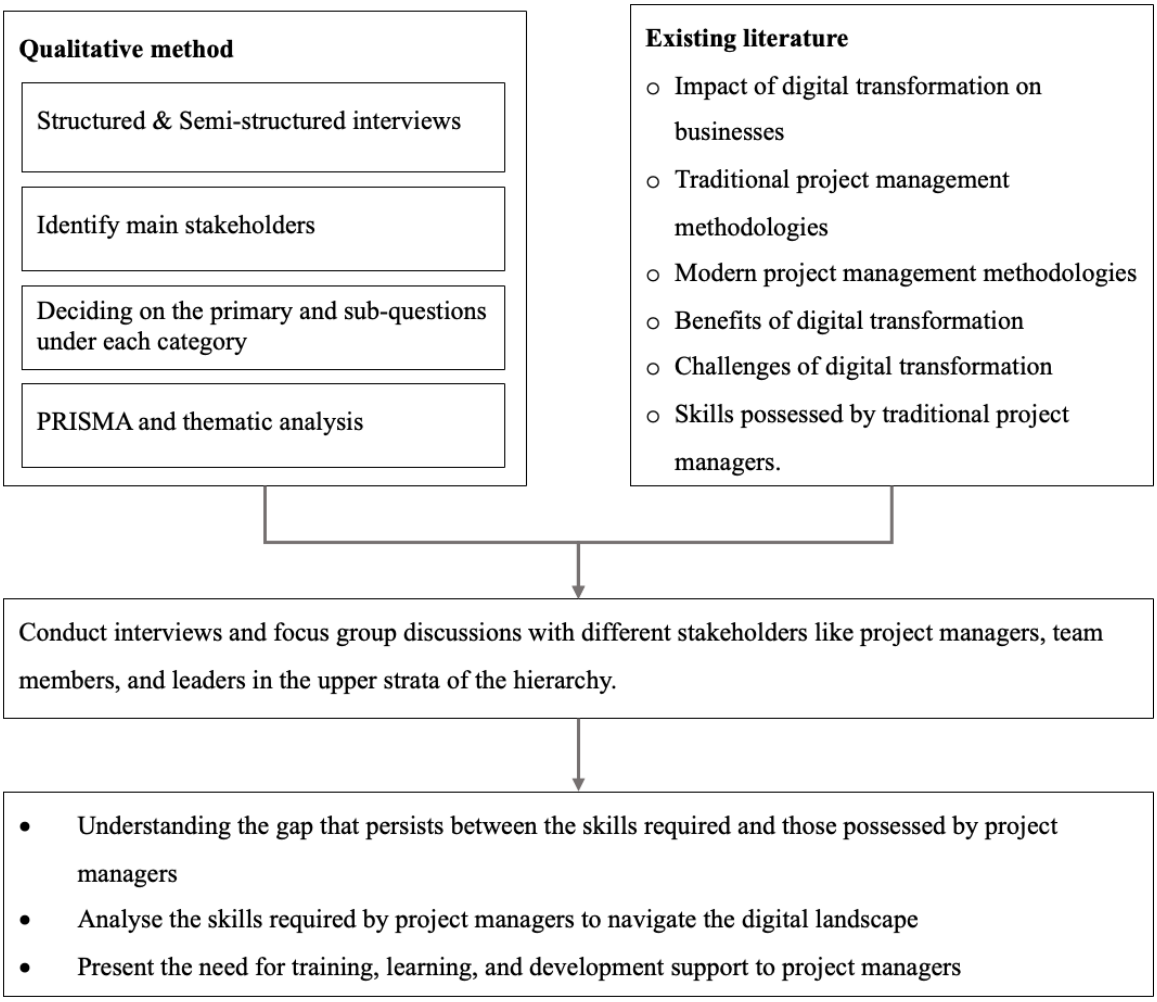

Figure 3.2 Addressing literature gaps with qualitative exploration

Data collection is more about obtaining all the essential details, information, and data relevant to the purpose of the study (Silvermann, 2016).

Overall, I have employed two different types of data in this research:

Primary data:

The primary data for the study is collected from semi-structured, in-depth interviews with the primary stakeholders relevant to the purpose of the study including project managers, team members, and leaders at the executive level. I took written notes and made observations for reference. To conduct the study I use a questionnaire and the

order of questions may vary based on the flow of discussion with the participant. I also used a questionnaire to augment the data collected from interviews. The questionnaire has 18 multiple-choice questions and I seek answers through email, and social media platforms like LinkedIn, etc.

As the questions asked during the interview serve as the main part of the study, I did enough rehearsals and checks post preparing the interview questions.

Secondary data:

The secondary data for the study is collected from literature reviews, published journals, and magazines that are relevant to the purpose of the study. I have reviewed 100s of research publications and tried to cover a majority of the studies available in the digital transformation and project management space.

The detailed processes involved in each step of the research, from preparing the questionnaire to requesting participation from stakeholders, conducting the interview and analysing the data collected are presented in the coming sections.

3.5 Research questions

As discussed in the previous section, the key objective of the study is to evaluate the skills gap that exists between the requirements of modern project management methodologies and the digital landscape and that of the skills possessed by traditional project managers and teams.

Here, the key stakeholders and the recipients of the research are the project managers, team members, and business executives high up in the hierarchical ladder. The study is expected to deliver an extensive qualitative analysis of the impact of digital

transformation on project management technologies and the skills required for project managers to successfully navigate the rapidly evolving business landscape.

Research questions

Research primary question 1: What are the skills needed for project managers to navigate the changes due to digital transformation?

Sub-question 1.1: In your experience, what are the potential obstacles or barriers that project managers might encounter during digital transformation initiatives?

Sub-question 1.2: How important is it for project managers to have a strong understanding of emerging digital technologies relevant to project management?

Research primary question 2: What are the tools that organizations are using to drive digital transformation? How effective is their adoption?

Sub-question 2.1: What are the new tools that you are using post-digital transformation, say post-2021?

Sub-question 2.2: What additional digital tools or technologies would you like to see implemented in project management processes?

Research primary question 3: How can organizations support project managers in developing the skills required for successful digital transformation in project management?

Sub-question 3.1: How do you stay updated and informed about the latest trends and advancements in digital technologies relevant to project management?

Sub-question 3.2: Does your organization provide training and development to help you adapt to the requirements of digital transformation? If so, what kind of training?

As explained in the previous section, I have kept the questions open-ended to be able to conduct in-depth interviews as the focus is on understanding the activities of an organization, business operations, intricacies of the project management landscape, and

perceive if there are any changes required to achieve the intended objectives. Open-ended questions are more useful than closed-ended ones that expect the participant to reply with a ‘yes’ or ‘no’. Instead, I have included questions with ‘how’, ‘what’, and ‘why’ to capture elaborate answers and replies.

Also, I follow a semi-structured interview, where I ask questions based on the answers provided by the participant. I have not fixed the sequence of the flow of questions before taking up the interview. I decided on the order based on the answers and responses from the participants. I make sure that I listen to the responses accordingly. Beyond the verbal responses, I also observe the body language and emotions of the participants as I conduct the interview. As the interviews are conducted one-on-one, the entire information is absorbed and analyzed without peer pressure or group influences.

3.6 Research Instrument

The study primarily focuses on understanding the skills required for project managers to navigate the requirements of the project management landscape in the digital arena and overcome the challenges that arise from digital transformation. I chose the qualitative-exploratory approach to my research because the critical aspects of what qualifies for an exploratory or interpretive study as defined in Merriam (2009) align with the methodological approach I follow in this study. The study defines that the interpretive or exploratory approach should focus on understanding the real-time, worldly experiences of the stakeholders or research participants and examining the thought patterns, behaviors, and opinions of the participants when they go through an experience. The study also suggests that the person leading the research, which in this case is I, should be the main instrument driving the study. Merriam (2009) also suggests that the researcher should carry an open mind and be flexible at the research site. The main

instrument who is usually the researcher has the power to engage in verbal and non-verbal communication, capture human emotions, behaviors, and data, and process them immediately. This becomes an advantage in qualitative research where descriptive data is the main driver while capturing the data and processing it requires intuition and exploratory skills, Austin (2014).

On the ground, I use two types of research instruments- One, I conducted one-on-one interviews with different stakeholders related to the study including project managers, team members, and top-level business executives. Two, I also prepare and distribute questionnaires across digital media, social media platforms like LinkedIn, and in person at different organizations to expand the audience for my data and ensure that the data I gather is reliable and usable without bias and subjectivity (Kabir, 2016).

The two instruments are used for different purposes and different procedures were followed while collecting data through them. Intricate details of both of the research instruments are described in the coming sections.

3.6.1 Interviews

Interviews are usually conducted to broaden the researcher's knowledge and understanding of a specific research topic. Interviews can be structured, semi-structured, and unstructured. In structured interviews, the interviewer prepares the questions prior to the interview and asks the questions in the same order to all the research participants. Doing so makes it easy to compare the answers. Structured interviews are mostly closed-ended and can be used when time is a constraint. They are less common in qualitative research studies and more appropriate for doing quantitative studies (O'Cathain,2004). However, I disregard structured interviews for my study as I intend to explore the

emotions, thoughts, and opinions of a group with specific professional expertise (DeJonckheere,2019).

Unstructured interviews are data collection methods in which the questions are not determined prior to the interview. Here, the researcher is asked a set of open-ended questions decided as per the conversation flow and answers received from the participant (Zhang). Unlike the structured interview, the number of questions or sequence of the flow of discussion is not decided prior to the interview. The researcher should be skilled and competent in asking questions and extracting the relevant information from the interview. The researcher should have abilities to control the flow of conversation and ensure that the discussion with the participant does not deviate and stray away from the topic and purpose of the research (Jamshed,2014) (DeJonckheere,2019). It takes up more time and requires more financial resources. As my study has limitations when it comes to both, time and cost, unstructured interviews may not be appropriate. Also comparing the data collected and arriving at a conclusion picture based on the analysis is hard with unstructured interviews. Considering all these limitations, I ruled out unstructured interviews for my study (Ross,2019).

On the other hand, with semi-structured interviews, questions are mostly open-ended. As the name suggests, semi-structured interviews are between structured and unstructured interviews and have some questions prepared prior to the interview, while other questions are decided and asked on the floor (Pollock,2019). In semi-structured interviews, the researcher prepares a guideline with a set of questions to cover during the interview. The researcher takes some level of autonomy to change the order of questions and may take up new questions wherever appropriate. So, this has the blend of both structured interviews as questions are prepared in advance, and unstructured interviews as the researcher fine-tunes the order and nature of questions based on the requirements

(Surbhi,2017). Semi-structured interviews are more appropriate for qualitative studies that follow the exploratory or interpretive design. Such interviews are used in studies that follow a thematic framework and aim to capture the opinions, emotions, feelings and thought patterns of a particular group of people (Sutton,2015) (Longhurst,2009). As semi-structured interviews contain a balance between flexibility and structure, it is more appropriate for my research. Also, considering the limitations in terms of time and cost, I choose semi-structured interviews for my research (Mashuri.et.al,2022).

I follow the guidelines used by Valon (2011) to organize, conduct, and facilitate the interview for my research on understanding the skills required for project managers to successfully embrace and leverage the benefits of digital transformation.

Based on the guidelines from Valon (2011), I use the following steps to collect data using semi-structured interviews.

1. I prepared a set of open-ended questions to be asked in the interviews.
2. I shortlisted the appropriate stakeholders for my interview and sought prior permission and appointments from them for conducting the interview.
3. While sending them emails requesting their approval and permission from the participants, I elaborated on the purpose of the research and included some specific questions to help them understand the significance of the study. I have also included content on how their contribution would add value to the purpose of the study. The email template is attached to the Appendix.
4. I received an email confirmation and approval from each of the participants before the start of the interview.
5. I also prepared a consent form and sought a signature from them prior to the interview. The consent form is attached in the Appendix.

6. I conducted one-on-one interviews through Zoom and Google Meet at the convenience of the participant.
7. I asked five questions to each of the participants and sometimes changed the sequence of the questions based on the flow of conversation and response from the participant.
8. I made notes of the thoughts, opinions, and cues of the participants during the interview to capture data relevant to my analysis.
9. I took approximately 30 minutes to 90 minutes to interview each of the participants and mostly, I gave the interview questions prior so, the participant was ready with the answers to the questions before the start of the the interview. This gave them sufficient time to think of the answers before the interview.
10. I made a transcription of the data collected during the interview, immediately after discussing it with each of the participants.

During the interview, I started with an introduction of the purpose of the study and asked a set of 5 open-ended questions. I also asked them about the details of their role, designation, experience, and educational background before the start of the study.

I used the following 5 questions for conducting the interview.

Question 1: How do you feel about working in a digitally equipped business environment?

Question 2: What are the challenges you face to navigate this relatively new environment?

Question 3: What do you think are the skills requirements for project managers to navigate the digital environment?

Question 4: What is the importance of training and educating the project managers, from the purview of helping them navigate the challenges in the digital landscape?

Question 5: How would you describe your role before and after the digital transformation?

While conducting the semi-structured interviews, I made sure that I followed the ethical considerations for research as listed by Beauchamp and Childress (1989).

I approached 60 participants and 42 of them agreed to the interview. Of the 60 I approached, 40 of them were project managers, 10 of them were team members and 10 of them were top-level executives in the leadership position of the organization. All the stakeholders were from the software and information technology domain as project management holds a more crucial relevance in the software industry. Finally, of the 40 I interviewed, 28 of them were project managers, 8 of them were team members and 4 of them were top-level executives. Many were reluctant to be recorded as they wanted to maintain confidentiality in line with the terms of their contract. Being committed to the ethical considerations of the research, I made sure that I respected their request and stayed away from recording the conversation.

3.6.2 Questionnaires

For those who could not afford their time for the interviews, I sent the questionnaire with closed-ended questions to be able to collect data from a broad list of stakeholders and strengthen the data, analysis, and findings of the study. I also sent the questionnaire to those participants whom I interviewed as well. As the interview was more of an open-ended, semi-structured discussion, circulating the questionnaire and

seeking the answers from the participants helped rule out the bias and subjectivity of the researcher. It also helped me rank the factors and understand the priorities when there were so many answers to a question, particularly on the nature of skills needed by project managers to survive the digital landscape.

The questionnaire had 18 questions, of which 9 were based on the impact of digital transformation, 8 on the skills and tools needed to achieve the project goals in the digital era, and 1 was on the experience. I also circulated the questionnaire to 70 project managers with whom I connected over LinkedIn and other digital platforms. Each of the questions I had on the questionnaire had a score of 1 to 5 for each of the questions and the questions were majorly related to understanding the benefits, challenges, skills required, and training support needed for project managers to succeed in the digital era. When it came to skills, I listed 7 different skills and let the participants rank the skills in the order of what they perceived as important. At the end of the question, I also included another option to let the participant pick and list the skills he/she feels are relevant and not listed in the questionnaire. The ranks help identify the order of prioritization that the stakeholders attach to each of the factors.

When creating the questionnaire, I adhered to the guidelines recommended by various studies for gathering information. With these guidelines in mind, I employed the following process to craft a questionnaire that would yield high-quality, accurate data for my analysis.

1. First, I prepare a conceptual framework for the study and to do so, I follow the guidelines listed in the Malays Fam Physician (2006). I identify all the dependent and independent variables that must be analysed as a part of the study. This way, I can ensure that I do not leave off variables that are crucial to the purpose of the study and not include

those that are not relevant to the objective of the study. When I do so, I list down the following,

Demographic parameters: Age, gender

Geographic parameters: Location of the organization, Residence whether they come from rural, urban, or semi-urban places.

Professional attributes: Designation, role, experience, educational background

Business parameters: Scale of the organization

Research attributes: Digital transformation, benefits, challenges, traditional project management, modern project management, skills required, present skills, skills gap.

Considering all these attributes, I prepared the questionnaire in such a way that the questions encompass all the variables, attributes, and parameters listed above.

2. I use both closed-ended and open-ended questions wherever appropriate. If the scale or range of responses is known prior, then I use closed-ended questions, and if they are not, and require deliberation from the participant, I have used open-ended questions. More specifically, I have used open-ended questions to collect data from one-on-one interviews with the stakeholders, and for data collection from others over digital platforms, I have used a questionnaire with closed-ended questions.

3. Based on the conceptual framework I prepared after brainstorming, I have listed all the options that may be required for the respondent to answer. I also fine-tuned the questions based on the inputs I received as responses from interview participants. I have made conscious efforts to not limit the scope of questions and I have included "Others, Please specify", wherever needed.

4. I have maintained the logical sequence of questions that are suggested by research studies including Malays Fam Physician (2006). I start with simple questions

and then gradually move ahead to the complex ones. I have also included questions on demographics and professional backgrounds like age, gender, designation, experience, etc. in the beginning to be able to understand if there is any relevance between these variables and the purpose of the study.

5. I have tried to avoid ambiguity and confusion and kept the questions as specific and succinct as possible.

6. I have used formal language and avoided the use of offensive or discriminatory language in the study while formulating the questionnaire and conducting the interview.

3.7 Ethical Considerations of the Research

As my research involved one-on-one interviews with different stakeholders, following the ethical principles of interviews and qualitative research became more important. While I followed the guidelines, I made sure that I maintained the privacy aspects and confidentiality of the research participants. Hughes and Tight (2010) suggest that maintaining privacy and confidentiality are crucial aspects when it comes to research. As suggested by Goodwin (2002), I made sure that I explained the ethical principles to the research participants at the beginning of the interview to help build trust in their minds. This is an attestation of the authenticity as I commit to following the ethical guidelines and principles relevant to the purpose of the study.

Denzin & Lincoln (2011) show that the very first step in ethical research is obtaining consent even before the start of the study. I informed the participants of the following:

- What I intended to ask,
- Type of data and information I seek,
- The purpose of the study,

- The usage of data,
- A degree of commitment is needed from them,
- Ethical considerations I follow,
- Consequences, if any

I follow other ethical considerations listed as ten points of ethical principles in Bryman and Bell (2007) that include the following.

1. I obtained proper consent from the research participants before conducting the interviews. I also obtain a consent letter before conducting the interview with each of the 11 participants. I conveyed to the participants about the data being collected, how the data should be used, and the steps that I take to ensure the security and privacy of the information collected.
2. I ensure that the privacy of the participants is maintained. I have prioritized privacy and security throughout the research process.
3. As a part of the research, I have maintained the confidentiality of the data and information collected. I have paid more attention to the confidentiality of sensitive data.
4. Ensuring transparent and honest communication is a must while engaging with research participants. I ensure that there is an open line of communication with the research participants right from the beginning until the very end.
5. I did not have any conflict of interest in terms of funding or other terms.
6. If the participant requested anonymity, I make sure that their personal details are not recorded, and the complete anonymity of the research participants is preserved.
7. While doing research, I have made sure to not knowingly or unknowingly harm the professional and personal thoughts, emotions, and beliefs of the research participants.

8. Good research should avoid exaggerating the research objectives. I have made sure that the objectives of the study are conveyed to the research participants in a clear manner and realistic way. I did not engage in exaggerating the purpose beyond its scope and scale.
9. I have reported the data in the original form as how it was collected during the study. I have consciously avoided bias, subjectivity, and misrepresentation of data.
10. I have respected the dignity of the participants at all stages, right from when I dished out emails to get their consent, time, and approval for the interview until the completion of the study.

I did not force the participants to participate in the research. Their participation was subject to voluntary acceptance, and they were allowed to withdraw from the study anytime they felt uncomfortable with the questions asked or the discussion in general. The research participants shared their opinions and thoughts without any concern. To ensure that they trust the process and provide reliable answers to the questions, I elaborated on the objectives, purpose, and significance of the study before conducting the interviews. I also explained to them the nature of the questions asked and how their answers would help achieve the purpose of the study. As I adhered to the ethical guidelines of the study, I did not experience any notable difficulties in the course of the study.

3.8 Population & Sampling

Population refers to the entire group whose behaviors, thoughts, and opinions I am interested in collecting for the purpose of the study. The population is selected based on the objective and purpose of the study and it is important that the researcher defines the population clearly at the beginning of the study. While choosing the population, it is

important to choose participants with characteristics and backgrounds relevant to the study. It is essentially a subset of the study population and wider than the sample we draw to actually do the research. In other words, the population for the study can be defined as all those people to whom the results of the study can be applied, related, or inferred.

In my study, I choose project managers, executives, and leaders at the top of the hierarchy, and team members as my target population as I intend to observe, infer, and research what each of them thinks about the skills needed for successful project management. I also used sampling for my study because it was impossible to conduct the study on the entire population. The population I have defined above is very broad. As I have to complete the study within a short time frame and financial constraints, I choose a sample from the population.

A sample is defined as the subset of the population frame and it is actually a fraction of the whole population selected for the study (Brink, 1996; Polit and Hungler, 1999). The target population refers to the individuals about whom I intend to draw observations, inferences, and conclusions. On the other hand, the sample population refers to the individuals who are actually chosen to participate in the study, and a good sample is usually representative of the entire population. In research studies, a sampling strategy is usually followed to represent the perspectives and experiences of the target population (Ziebland & McPherson, 2006).

A good sample is one that is proportionate to the entire population and the researcher must ensure that the size of the sample is proportional to the size of the population. The sample must help the researcher in achieving the objectives and goals of the study (Shukla S, 2020). A sample is small when compared to the size of the population yet can help the researcher derive meaningful observations, data, and

information relevant to the objective of the research (Creswell, 2003). Drawing a sample from the population makes the research easy, fast, and relatively less expensive. It not only simplifies the process of data collection but also reduces the complexity of the data analysis (Shukla S, 2020). A sample must be well aligned with the overall objective and purpose of the study (Punch, 2004).

An advantage of using the interview method is that a small sample is good enough to conduct the study, make inferences, and draw conclusions (Genise, 2002). There are different types of sampling and as the study is focused on analyzing the skills needed for project managers, I primarily use purposive sampling. In purposive sampling, the researcher relies on judgment to choose participants who have the ability to answer the research question and help achieve the objective of the study (Abdullah et al., 2015). In qualitative studies, a relatively small sample selected following the purposive sampling strategy can be deployed to understand the opinion and behavior of the research participants (Miles and Huberman, 2015).

Purposive sampling is generally used when a researcher aims to do intensive research on a smaller sample. Such a sampling strategy helps figure out participants who can deliver the appropriate information and helps conduct research when the study is bound by time and resource constraints (Palkinas et al., 2015). The general assumption in purposive sampling is that there are people with specific characteristics or professional backgrounds that are important to the objective and purpose of the study. They may carry different opinions, viewpoints, and beliefs about a subject (Trost, 1986). The purposive sample may also contain the relevant experience and expertise to address the research objective and add a deeper perspective to the purpose of the research (Robinson, 2014)).

3.9 Participant selection

While doing purposive sampling, I identify the members of the population who possess a certain set of characteristics. As my focus is primarily on understanding the skills needed for project managers to navigate the challenges arising from digital transformation, the sample for my study is carefully chosen based on the following characteristics.

1. Role and designation

My study intends to understand the challenges in project management from digital transformation. As digital transformation is relatively novel and emerging at rapid speeds, the participants must not only have expertise in project management but also be project managers or relevant stakeholders at present to be able to offer information and drive the purpose of the study. Beyond that, project management and understanding the skills required demand opinions and thoughts of stakeholders who are not just project managers, but also at the nearest levels of the hierarchy. So, for the study, I choose project managers who are currently in the role, along with team members who are being led by the project managers as well as the executives and leaders at one level higher than the project managers.

2. Experience

As my research objective is to understand the skills required by project managers to adapt to modern project management methodologies and to navigate the challenges arising from digital transformation, experience plays a key role. I intend to understand the challenges endured by project managers with different experiences and exposure to be able to draw fruitful conclusions. So, when I choose participants for the interview, I make sure that their professional experience is broad, varying, and diverse. So, out of the 60 participants I approached for the study, I chose team members and project managers with diverse experience. Of the 10 team members, one had an experience of 2 years and others

had 5 years and 7 years of experience. Similarly, when it came to project managers, of the 40 participants I approached and requested to be a part of the study, 22 of them had an experience of over 10+ years, 10 had an experience of 7+ years, and 8 had a 4-year experience. Experience is an important factor that influences the opinion and challenges they face in the workplace while navigating the needs of digital transformation. So, I prioritize experience as a factor while choosing the sample for the study.

3. Geography

Apart from experience, geographical location plays a major role. The primary focus of my study is on understanding the challenges of digital transformation and the skills gap. I focus on India as project management is a broad field and due to the time and financial constraints of the study, I may not be able to study from all locations. Also, doing so may distort the result findings. As the adoption of digital technologies is different in different countries, the results may become distorted and may not reflect reality.

It must be noted that digital penetration is uneven, where rural parts of the country have lower access to digital infrastructure, and in urban areas, internet and digital technologies are widespread. Considering this, the skills possessed by project managers from rural areas may be different from those who evolve in the urban areas and so, this could be a crucial factor in shaping the objectives of the study. Also, the rural infrastructure in organizations plays a critical role in determining the skills gap among project managers. Of the 40 project managers I chose for the study, 30 of them are from organizations located in rural areas, 6 from semi-urban areas, and 4 from urban areas.

4. Gender

I also wish to understand if gender played a role in influencing the skills gap needed for project managers in organizations. Several studies (Eagly and Karau, 1991;

Paustian-Underdahl et al., 2014) have established that gender differences have an influence on leadership style. As project management involves leadership and management skills, I have also considered gender as a factor in selecting the sample for the study. So, I ensure that the sample I choose has a mix of all genders.

5. Educational background

The typical role of a project manager is to marshal the resources involved in the design and development of the project and ensure its completion within the predefined timeframe, budget, and performance criteria. Though education is being ignored often in modern times and experience and skills are being prioritized, it cannot be denied that education has a direct impact on employee skills. So, I have also included education as a factor in deciding the sample for my study. I have also focused on interviewing project managers with varied educational degrees and in my study some have Bachelor's degrees while many others have Masters in their educational portfolio.

6. Industry

Though project management as a role evolved in the Information Technology and Software development industry, it has now spread across other industrial domains. The level of skills required for project managers differs with industrial needs and business structure. As there are a lot of industrial domains, it is hard to cover all of them in a single study. The level of digital transformation varies from one industry to another, and so are the skills needed to navigate the landscape. So, analyzing all the industries in one go may yield skewed observations. So, to not dilute the purpose of the study with too many factors, I consider only the project managers and teams working in the software development and IT industry.

So, I have chosen the research participants based on a wide range of factors including role and designation, experience, geography, industrial background, gender, and educational background.

3.10 Data Analysis

As elaborated in the previous sections, in qualitative research, the researcher serves as the main instrument for collecting and analyzing the data. The primary data is collected through interviews and the secondary data through literature review. The data collected through interviews are transcribed and analyzed.

To analyze the data, I follow two different approaches, thematic analysis, and lexical analysis. Thematic analysis is used to process the qualitative data and transcripts collected during the interview and determine common themes, patterns, and ideas. Braun and Clarke (2006) show that thematic analysis is one of the widely used methods. Qualitative thematic analysis helps gain an understanding of themes from qualitative data (Arolker and Seale, 2012). King (2004) shows that using thematic analysis helps when the study uses data from different sources. The analysis helps establish cross-references between different sources, organize them, and present them in a comprehensive report.

Fusch and Ness (2015) show that the triangulation approach to understanding the themes and patterns in the data collected can help understand the existence and prevalence of phenomena or trends. Patron (1999) shows that triangulation as an approach helps build an exhaustive understanding of a pattern, phenomenon, or trend. This method helps validate the data collected from different sources and here in my study, it is more appropriate because it helps cross-verify the data obtained from different sources including interviews, literature reviews, and surveys and draw inferences about the existence of patterns and trends.

Marshall and Rossman (1999) show how thematic analysis helps bring together the data collected from various sources and establish a structure and order for the analysis and interpretation of data.

Fusch and Ness (2015) analyze the data by creating a matrix for the themes and identifying patterns and trends. I follow the same approach and to ensure the accuracy of the data and analysis, I check the data with the interviewee after the interview is conducted and the transcript is performed. I have implemented the corrections and suggestions offered by the research participant and updated the results of the analysis.

Once the transcripts are verified for accuracy, I then feed them into the NVivo software which is commonly used by researchers to codify the data and extract themes from the same. I uploaded the transcripts and the literature into the NVivo software.

I also augment the thematic analysis with lexical research which involves analyzing the terms and vocabulary often used by the respondents while answering all the questions. It is based on the assumption that the nature of words and kind of language used by the respondent is a direct reflection of their thoughts and opinions. So, it is appropriate for qualitative research and analysis that is grounded on the experience and thought patterns of human beings (Sandelowski, 2005).

To do thematic as well as lexical analysis, the first step is to become familiar with the data used. I listened to the respondent very carefully and made transcripts and notes of the interview. Immediately, I prepared a transcript and then checked the same with the respondent to weed out bias and judgements from the data. Then I read the transcript several times and tried to decipher the opinion, thoughts, and emotions of the person as he/she responded to each of the questions put in front of them.

Reliability and Validity

Validation of data and research and its reliability is based on Guba & Lincoln (1988) which shows that credibility, transferability, dependability, and conformability are the key principles of validating the reliability of analysis. Here in my study, I check for reliability and validity and examine the trustworthiness by choosing qualified research participants after a proper evaluation of their background and professional expertise. I also delivered a copy of the transcript of their explanation and response so as to verify the authenticity of the data collected.

Yin (2015) shows that the reliability of the data collected and analysis is ensured by checking and verifying the transcript of the responses with the respondents themselves. Fusch and Ness (2015) also confirmed that qualitative studies often depend on checking the data and findings with the research participant to validate the findings and analysis. I made sure that all the researchers were offered enough time to verify the accuracy of the data that had been transcribed. As the data collected has been checked multiple times with the research participant, the accuracy of the analysis improves. Proctor (2017) shows that integrity, reliability, and conformability are a test of validation and the data and analysis must be validated to ensure the credibility, trustworthiness, and validity of the study.

3.11 Research design limitation

As is the case with any research, I have made assumptions at several points while building the research design, data collection, and analysis. Some of the assumptions I have made in the study include the following.

1. I assumed that project managers in the IT industry would be representative of the whole project managers in the country. Based on the background understanding that

project management as a module evolved to meet the requirements of the software development and IT industry, I made this assumption.

2. I also assume that the sample I have chosen based on demographic attributes, educational background, and degree of professional expertise is representative of the entire project management community.
3. I assume that the research participants offer their honest feedback and opinions in response to the questions and key objectives put forth in the study.
4. I assume that the research participants have knowledge of the challenges experienced by the project managers in their endeavour to adopt and embrace digital transformation.
5. The research has not accounted for the hesitation that respondents might have had in responding to the questions frankly and openly.

3.12 Conclusion

In this chapter, I have elaborated on the methodology I have followed to conduct the study. I also presented in detail, the research design, data collection techniques, research instruments, population and sampling strategies, and methodology for the data analysis section. The design of the study shows the logical rationale behind choosing methods and processes for data collection and analysis. I have also reviewed the possibilities for the application of qualitative and quantitative methods. Based on the findings from the review, I chose qualitative design as it has a rationale to support my research objectives and strengthen my analysis. As explained in this chapter, I have used interviews as the main instrument for collecting data from the project management community. I have also used questionnaires to augment the missing pieces and weed out bias that may intervene when I choose to use just the interviews. The steps followed in

each step of the process from data collection and sampling to data analysis is clearly presented. The limitations of the research design and assumptions are called out in the final section of the chapter. Also, a detailed report on the data analysis part is included and the methodologies, particularly, the thematic and lexical analysis are explained thoroughly.

CHAPTER IV:

RESULTS & DISCUSSION

4.1 Introduction

In Chapter 3, I have covered the methodology, research design, data collection techniques, population and sampling, and instruments used for data collection. This chapter covers the findings from the research and analysis of the data collected through interviews, questionnaires, and general surveys. As mentioned in the previous chapter, I collected data pertaining to the objective of the research in three different ways. The first method was the literature while the second and third followed a deeper, real-time data collection and analysis as we collected data and observations from interviews and questionnaires circulated through social media. In this chapter, I have primarily focused on addressing the findings and results from the research participants of the study.

I begin the chapter by analyzing the responses and observations collected from stakeholder interviews in accordance with the questions of the research. In the second part of this chapter, I have analyzed the findings from the questionnaires that I circulated across email and social media platforms like LinkedIn.

As explained in the previous chapters, the study focuses on understanding the impact of digitalization on businesses, and the challenges the project managers endure in terms of adapting to the changes that digitalization brings in.

4.2 Sample details

Before I dive into presenting the results, I have covered the sample details used in the study to ensure that the demographic representation is comprehensive and reflective of the diverse backgrounds within the project management domain. As explained in the methodology, I have conducted a semi-structured, one-on-one interview with 47

participants in various designations relevant to project management, predominantly covering project managers, team members, C-level executives, and senior managers. A common observation is that the participants had an average age of 30-50 with a technical educational background in electronics and communication, information and technology, etc. The interviews lasted for an average of 45-70 minutes. The extensive details of the participant along with their experience and educational background, and the interview time are presented in Table 4.1.

Table 4.1 Sample details of the interview participants

S.No.	Designation	Location of the organization	Age	Educational background	Experience	Interview time
1	Project Manager	Urban	38	ME (IT)	6	50
2	Project Manager	Urban	41	BE (IT)	8	65
3	Project Team Member	Rural	31	BE (CS)	3	50
4	Project Manager	Semi-Urban	36	MCA	4	65
5	Business Analyst	Urban	30	BE (ECE)	1	45
6	CEO	Urban	49	ME (CS)	20	70
7	Project Manager	Urban	42	BCA	9	60
8	Project Manager	Rural	39	BE (ECE)	5	50
9	Project Source Manager	Urban	33	BE (IT)	2	45
10	Project Manager	Urban	36	BE (CS)	4	55
11	COO	Urban	50	MCA	17	75
12	Project Manager	Semi-Urban	35	BE (IT)	5	50

13	Project Manager	Semi-Urban	43	BCA	9	60
14	Project Manager	Urban	35	ME (CS)	5	50
15	Project Manager	Rural	40	ME (IT)	13	55
16	Project Manager	Urban	47	BE (ECE)	7	45
17	Project Manager	Urban	37	ME (IT)	4	60
18	Business Analyst	Semi-Urban	33	BCA	2	50
19	Project Manager	Urban	48	ME (ECE)	11	65
20	Project Manager	Urban	42	ME (IT)	10	50
21	Project Manager	Urban	36	MCA	5	45
22	CFO	Urban	48	ME (CS)	15	65
23	Project Source Manager	Rural	44	BE (ECE)	9	75
24	Project Manager	Urban	45	MCA	7	55
25	Project Manager	Urban	38	ME (IT)	5	60
26	Project Manager	Urban	47	MCA	10	80
27	Business Analyst	Urban	32	BE (IT)	1	45
28	Project Team Member	Semi-urban	38	BE (ECE)	6	45
29	Project Source Manager	Urban	36	ME (ECE)	3	50
30	Project Manager	Urban	41	MCA	11	70
31	Project Manager	Urban	33	BCA	3	60
32	Project Manager	Semi-Urban	47	BE (IT)	14	65

33	Project Sponsor	Semi-Urban	39	ME (IT)	5	45
34	Project Manager	Urban	43	MCA	12	80
35	Project Manager	Urban	30	BE (CS)	1	50
36	Project Sponsor	Urban	36	BE (IT)	4	65
37	Project Manager	Urban	49	ME (ECE)	15	75
38	Project Manager	Rural	41	BCA	8	45
39	Project Manager	Semi-Urban	35	MCA	4	50
40	Project Manager	Rural	38	ME (ECE)	6	60
41	COO	Rural	50	ME (IT)	20	75
42	Project Manager	Urban	40	BE (ECE)	10	60
43	CEO	Urban	50	MCA	18	80
44	Project Manager	Semi-Urban	32	BCA	1	45
45	Project Manager	Urban	40	BE (IT)	6	60
46	Project Manager	Urban	47	ME (ECE)	11	75
47	Project Sponsor	Rural	39	BE (IT)	7	45

The data collected during the interview for each of the semi-structured questions are aggregated and the observations are presented using thematic analysis. I had around 6 questions and asked them in different orders and ways based on the flow of the conversation. During the interview, I recorded notes and soon after each interview, I made a detailed observation of the data collected and the responses of the participants to each of the questions asked. I also verified the same with the participants to ensure that the data collected is accurate, reliable, and has the potential to add value to the objective of the study.

The data collected from the 47 participants is used to conduct thematic analysis and based on the data, common themes are identified. I have presented the demographic intricacies and details of each of the interview participants in the coming section.

4.3 Demographic characteristics of research participants

I begin the qualitative study with the project managers, team members, and C-level executives in different organizations, with narration covering their age, education, experience, designation or employment category, and professional background.

4.3.1 Age distribution

Figure 4.1 shows the age distribution of the participants involved in the study. Generally, they were between 30 and 50.

Of the 47 participants interviewed in the study, a majority are in the age group of 36-40 and they make up to 42% of the sample. Around 28% of the sample were in the group 41-45 and the least was 30-35. I have included age as a demographic characteristic in the research as several studies from the existing literature showed that age has an influence on digital adoption. Studies by Heponiemi et al. (2022), Schirmer, W. et al. (2022), and Menzfeld (2023) show that people of older age have far greater challenges in adopting digital change than younger ones. So, to check if age has an influence on the challenges the project managers endure with digital transformation, I have included it in the interview discussion.

Table 4.2 Age distribution of the research participants

Age group	**No. of Participants**	**% of Participants**
30-35	9	19%
36-40	20	42%
41-45	13	28%
46-50	5	11%

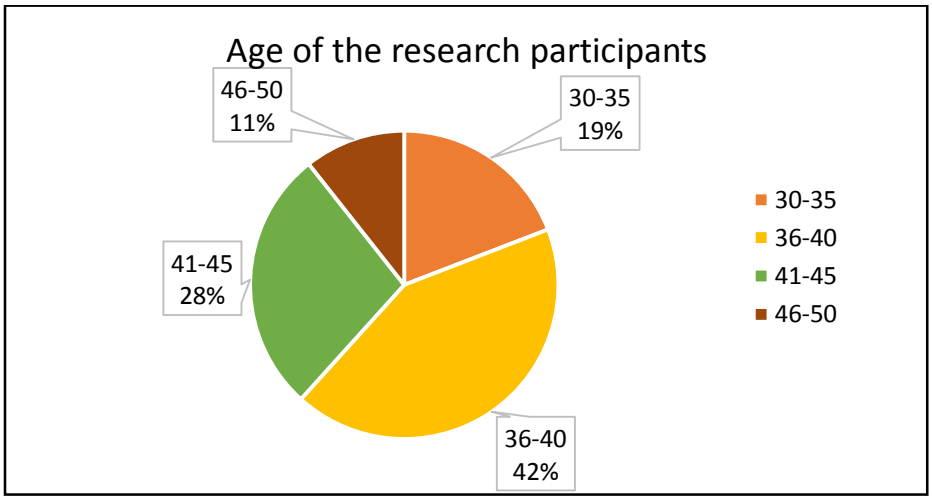

Figure 4.1 Age distribution of the research participants

4.3.2 Educational background

An analysis of the educational background distribution of the research participants is presented below. The preliminary analysis shows that 62% of the participants have a bachelor's degree and 38% have a master's degree. A majority of the participants, which is around 64% of them have a background in computer science engineering and IT.

Table 4.3 Educational background of the research participants

Qualification	**Number of Participants**
BCA	2
BE (CSE)	10
BE (ECE)	6
BE (IT)	11
MCA	3
ME (CSE)	3
ME (ECE)	5
ME (IT)	7

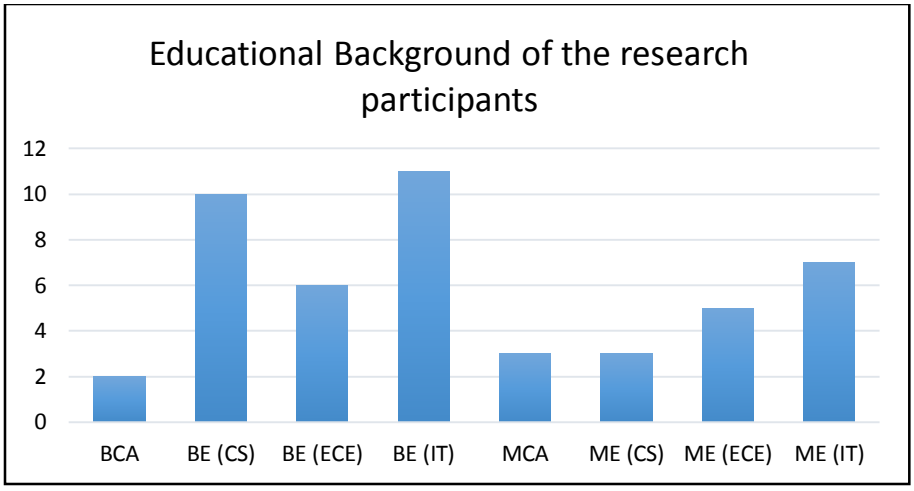

Figure 4.2 Educational background of the research participants

4.3.3 Experience

Experience plays a crucial role in project management. Several studies including Salvador, et.al. (2021), and Semeradova (2015) show that the breadth of experience that project managers hold in a field plays a crucial role in project performance. So, to understand if experience has an influence on digital transformation, I have included experience as a key factor in the research. Of the 47 research participants, I interviewed, 17 i.e. 36% of them had an experience of 11 to 15 years and 28% had an experience of 15+ years. Only around 7 out of the 47 participants had an experience of less than 5 years and they are predominantly team associates and employees who work on projects under the guidance and supervision of the project managers.

Table 4.4 Experience of the research participants

Number of Years of Experience	**Number of Participants**
11 to 15	17
15+	13
6 to 10	10
Less than 5	7

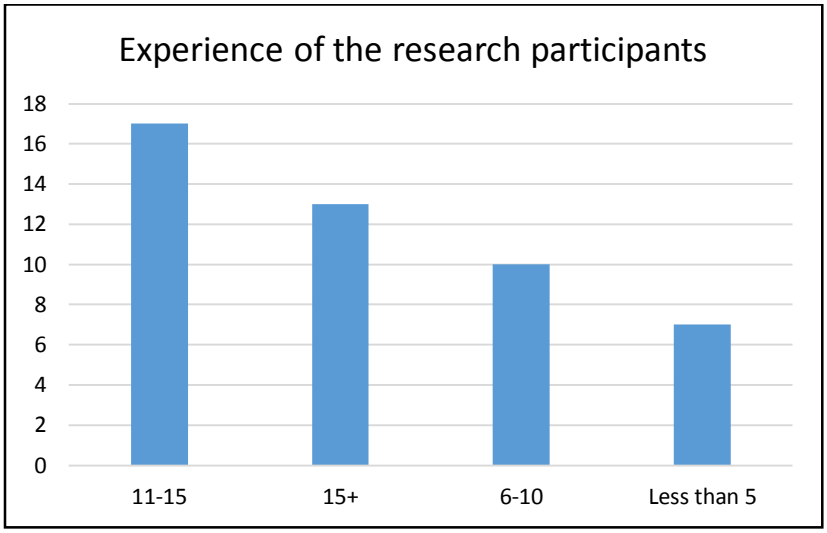

Figure 4.3 Experience of the research participants

4.3.4 Designation

I focused on interviewing different stakeholders that contribute and exert an influence on the project management role to gain a balanced, comprehensive view of the problem statement and so the research participants are from different designations and roles in their organization. I interviewed project managers, team members, and senior executives to understand their views on the digitalization of project management. The distribution of the research participants based on the designation and roles is given below in Table 4.5 and Figure 4.4.

Table 4.5 Designation of the research participants

Designation	**Number of Participants**
Business Analyst	2
CEO	2
CFO	1
COO	2
Project Manager	33
Project Source manager	3
Project Sponsor	2

Project Team Member	2

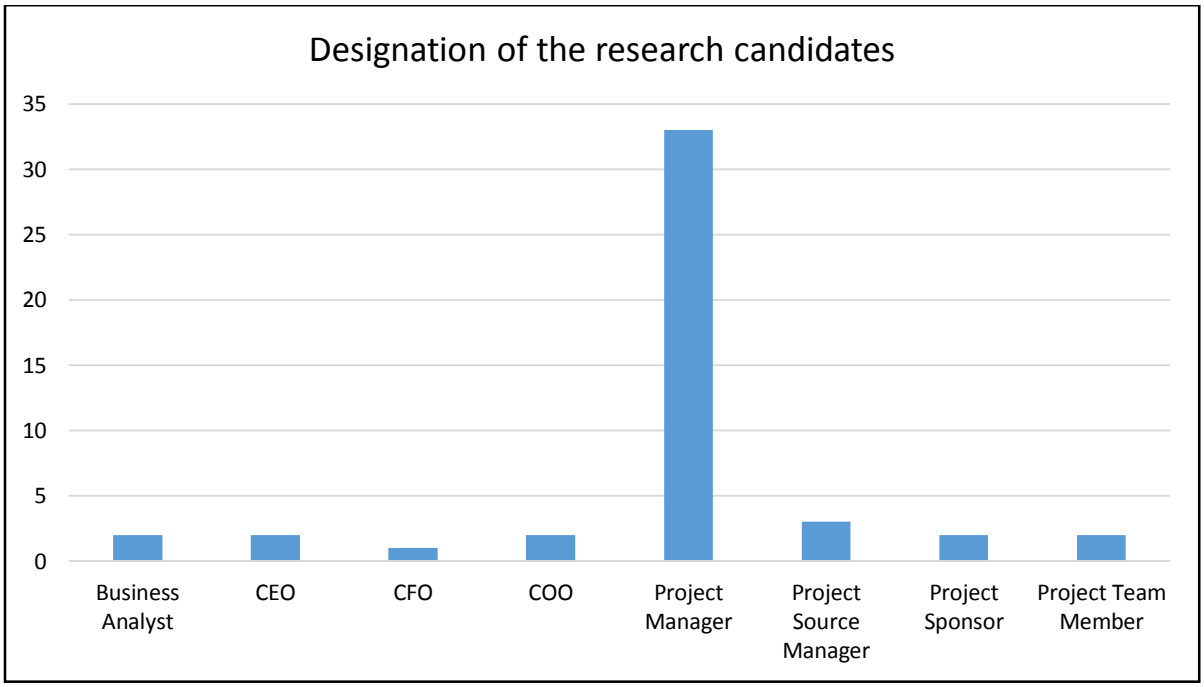

Figure 4.4 Designation of the research participants

It can be seen that a majority, i.e., almost 77% of the participants or 36 out of 47 participants are project managers, while 11% (5 out of 47) of the participants are business analysts and team members who work under project managers. Apart from project managers and their subordinates, I have also covered C-grade executives, who make up 12% or 6 out of 47 participants in the study. Interviewing all the stakeholders that have a predominant influence on the project management role added a broader perspective to the study.

4.3.5 Location of the organization

The location of the organization is expected to influence the study because digital transformation requires infrastructural competency. I focused on India as a geography, and in the country, as of 2021, there are almost 25000 villages that do not have reliable

internet connectivity as per the Ministry of Communication. So, the location of the organization may have an impact on the digitalization objective, the challenges they endure, and the implementation means.

The distribution of the location of the interview participants is given in Figure 6. Of the 47 participants I interviewed, around 77% of them, or 36 out of 47 participants are from urban areas, 6 out of 47 participants (12%) are from semi-urban areas, and the remaining 11% are from rural areas.

Table 4.6 Location of the research participants

Designation	**Number of Participants**	**% of Participants**
Rural	5	11%
Semi-urban	6	13%
Urban	36	76%

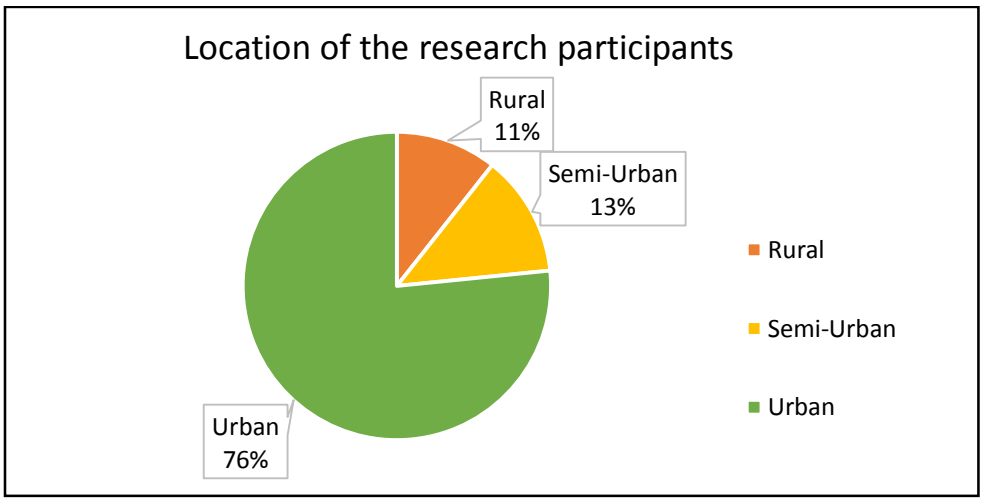

Figure 4.5 Location of the research participants

It is seen that the interviewed candidates come from a varied set of different companies to ensure a comprehensive correlation and analysis, we also examined the candidates, considering factors such as company type (service or startup), digital

transformation status (mandatory or optional), funding (funded or bootstrapped), work environment (office or remote), and company scale (small, medium, or large).

4.3.6 Type of company

The majority of the interviewees are employed in services-based companies, totaling 39 participants that were interviewed again. This predominance suggests a significant presence of established, stable organizations within the sample, which typically offer various professional services across industries. Services-based companies often provide a range of opportunities for employees, including job stability, structured career paths, and diverse project experiences. These companies may include IT consulting firms, financial services providers, and other professional service organizations.

On the other hand, a smaller segment of the interviewees, specifically 8 participants, are working in startups. Startups are often characterized by their innovative approaches, dynamic work environments, and potential for rapid growth. Working in a startup can offer unique challenges and rewards, including the opportunity to wear multiple hats, contribute to groundbreaking projects, and experience a fast-paced, entrepreneurial culture.

The significant difference in numbers between services-based companies and startups among the interviewees highlights the varied employment landscapes. Those in services-based companies might benefit from more predictable work structures and resources, while those in startups could enjoy a more agile, innovation-driven environment. This distribution reflects the diverse career preferences and opportunities available to professionals in the current job market, illustrating a balance between the

security and diversity of services-based companies and the excitement and potential of startup environments.

Table 4.7 Type of company

Startup/Service-based	Interviewees
Service	39
Start-up	8

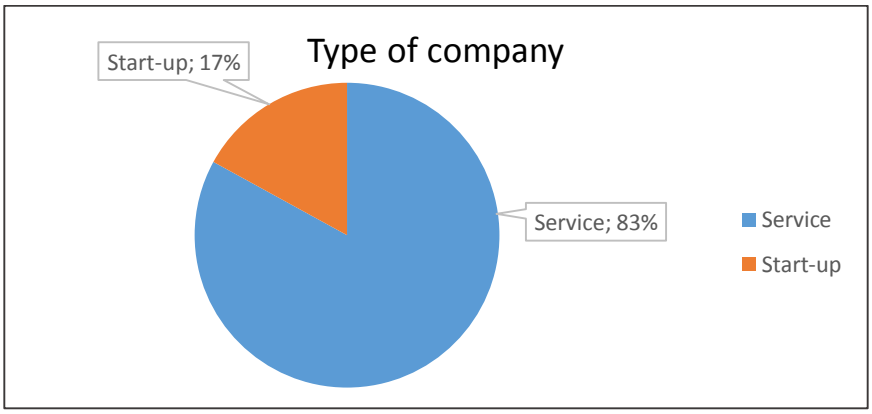

Figure 4.6 Type of company

4.3.7 Requirement of digital transformation training

There is a noticeable disparity in the distribution of participants regarding the requirement for digital transformation training. In some organizations, digital transformation training is deemed optional, accounting for 27 participants. These companies may offer training as a supplementary benefit, allowing employees to choose whether or not to participate based on their interest or perceived need for such skills. This optional approach might be seen in organizations that are either in the early stages of digital transformation or those that already have a relatively tech-savvy workforce.

Conversely, in other organizations, digital transformation training is mandatory for employees, with 20 participants falling into this category. This compulsory approach reflects the organization's commitment to ensuring that all employees possess the necessary digital skills and knowledge to navigate and thrive in an increasingly digital

business environment. These organizations likely prioritize digital transformation as a strategic imperative, recognizing its critical role in maintaining competitiveness, driving innovation, and improving operational efficiencies.

The unequal distribution between optional and compulsory training underscores the varied approaches and levels of emphasis that organizations place on digital transformation. It highlights the different stages and strategies of digital adoption across companies, with some viewing it as an essential requirement and others as an optional enhancement.

Table 4.8 Requirement of digital transformation training

Requirement of Digital Transformation Training	Interviewees
Optional	27
Compulsory	20

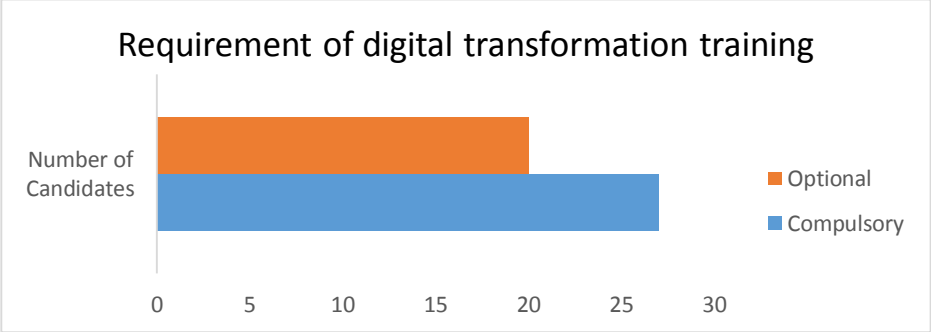

Figure 4.7 Requirement of digital transformation training

4.3.8 Funding

A significant portion of the participants are employed by companies that have received funding, indicating a trend towards working in financially backed environments that potentially offer more stability and resources. This preference may stem from the

perceived advantages such as access to capital, better infrastructure, and opportunities for growth that funded companies can provide. On the other hand, a smaller yet notable segment of the participants is associated with bootstrapped companies. These companies, relying on self-funding, often cultivate a culture of innovation, resilience, and close-knit teamwork due to their leaner operations. The mix of participants from both funded and bootstrapped companies highlights the diverse entrepreneurial landscape and the varying experiences and challenges faced by professionals in different funding environments.

Table 4.9 Funding

Funding	Participants
Funded Company	35
Bootstrapped Company	12

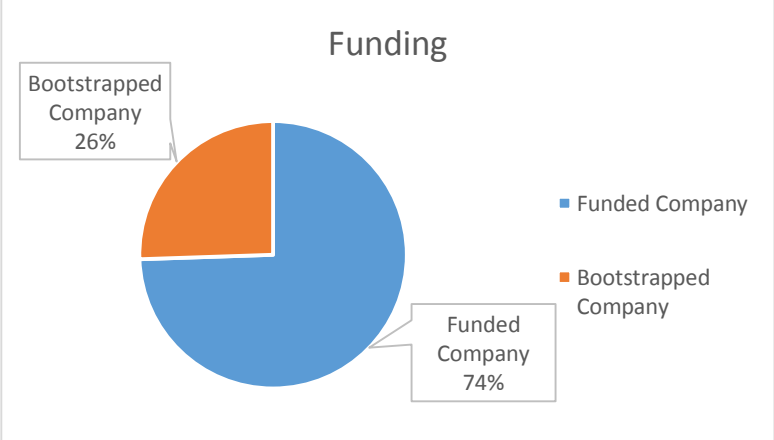

Figure 4.8 Funding

4.3.9 Work environment

The data reveals a nearly even split between remote and in-office work arrangements among participants, with 22 working remotely and 25 in-office. This close distribution suggests a growing acceptance of hybrid work models, reflecting a shift in

workplace dynamics influenced by recent global trends. Remote work offers flexibility and potential productivity gains, appealing to those who prefer managing their own schedules and avoiding commutes. In contrast, in-office work fosters collaboration, direct communication, and access to resources, benefiting those who thrive in a structured environment. The balanced numbers highlight the importance of offering flexible work options to accommodate diverse employee preferences and optimize overall job satisfaction and productivity.

Table 4.10 Work environment

Type	Participants
Remote	22
In-Office	25

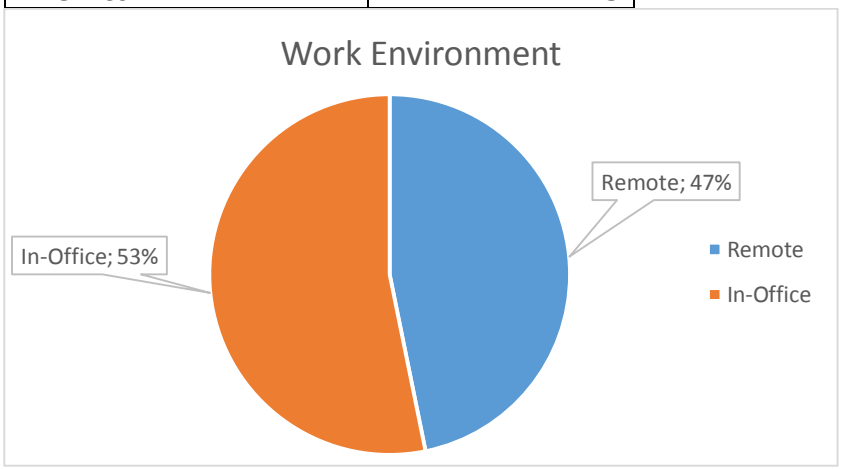

Figure 4.9 Work environment

4.3.10 Company scale

The data illustrates a clear distinction in the scale of companies between MNCs and Indian companies. Notably, none of the MNCs fall into the small company category, whereas 17 participants from Indian companies are from small-scale enterprises. This indicates a significant presence of smaller-scale businesses within Indian companies. In

the mid-sized category, both MNCs and Indian companies have equal representation, with 6 participants each, suggesting that mid-sized firms are equally prevalent in both types of organizations. Interestingly, 13 participants are from large MNCs, while no Indian companies fall into this category, highlighting a greater prevalence of larger-scale operations among MNCs. Additionally, 5 participants are from enterprise-level MNCs, with no representation from Indian companies, further underscoring the dominance of MNCs in larger organizational scales.

Table 4.11 Company scale

Scale of Company (Small/Mid/Large/Enterprise)	**MNC**	**Indian Company**
Small	0	17
Mid	6	6
Large	13	0
Enterprise	5	0

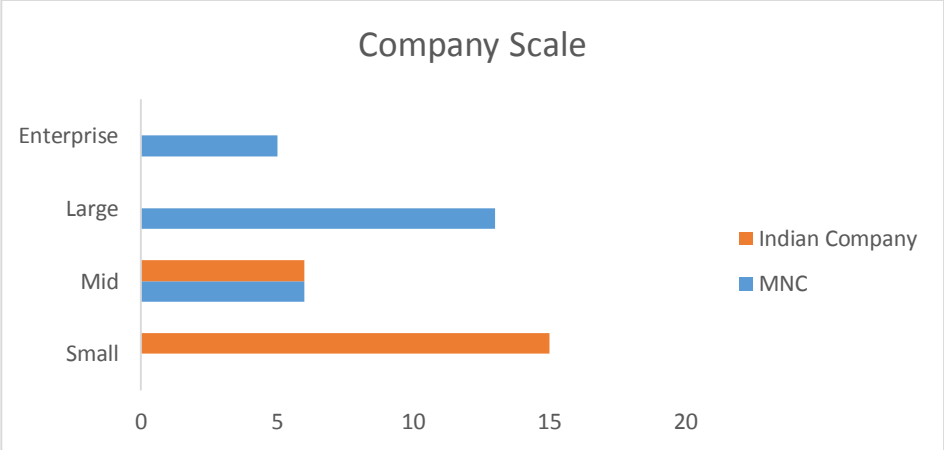

Figure 4.10 Company scale

4.4 Findings from the Interview

The data collected during the interview for each of the semi-structured questions are aggregated and the observations are presented using thematic analysis.

Overall, the following themes are observed for the question on project manager skills and competencies, digital tools in project management, and the organization's role in digital skills enhancement.

Table 4.12 Observations from the Interviews

Parameters	**Major Themes**
1. Project manager skills and competencies	
1.1 Obstacles endured by project managers	A. Drastic shift in their responsibilities, B. Understanding of the evolving technologies, C. Adapting to the rapid pace of digital adoption, D. Managing remote teams, E. Championing the change in people, processes, and systems.
1.2 Importance of understanding digital technologies	A. To enhance the productivity of teams, B. To achieve effective outcomes under the allocated budget and estimated timeline, C. To promote collaboration and clear communication with remote team members, D. To stay competitive in the market and drive informed decisions. E. To adapt to the evolving pace of technologies and stay relevant.
2. Digital tools in project management	
2.1 New tools in project management and their impact	A. Tools used depend on the size of organizations. B. Enhanced project outcomes, C. Timely delivery of projects, D. Status tracking, E. Data-driven decision-making.

	F. Reduced manual errors, G. Mitigate project risks.
2.2 Challenges in Adopting Digital Tools	A. Learning curve, B. Technical glitches, C. Shift to new workflows, D. Perceived time investment E. Fear of being replaced by digital technologies.
3. Organization's role in digital skill enhancement	
3.1 Mode of updating digital skills	A. Online resources and blogs, B. Events and forums, C. Research publications and newsletters, D. Conferences and webinars, E. Social media resources, F. Online learning platforms and courses, G. Community discussions,
3.2 Need for training programs	A. Existing programs focus on - Agile project management, - Change management. B. Training needed on - Digital literacy, - Cloud computing, - Data analytics, - Digital leadership, - Remote leadership, etc.

In this section, I summarize the findings and observations gathered from the interview with the research participants on the objectives of the study. I have presented the results by question to enhance the cohesiveness of the presentation.

4.4.1 Project manager skills and competencies

The first primary question of my research is to understand the obstacles that project managers endure in the aftermath of the digital revolution and the skills and

competencies required to overcome those obstacles. To navigate the changes due to digital transformation, project managers need the following skills:

1. Adaptability: To stay current with rapid technological advancements.
2. Data Analysis and Interpretation: To manage and make sense of large volumes of data.
3. Risk Management and Cybersecurity Knowledge: To protect digital assets from cybersecurity threats.
4. Change Management and Communication: To overcome resistance to change and effectively communicate benefits.
5. Technical Integration Skills: To ensure seamless integration of new technologies with existing systems.

These skills enable project managers to effectively address the challenges posed by the digital revolution.

In your experience, what are the potential obstacles or barriers that project managers might encounter during digital transformation initiatives?

The first broad theme that emerged out of the analysis on the challenges that project managers endure in their role during the digital transformation initiative is the change in the scope of work of project managers. Traditionally, project managers were engaged in planning the activities of the project, scheduling them determining milestones, and monitoring the progress to ensure that the project was delivered on time. Today, several project management tools have evolved to automate the process of planning and monitoring. So, there is a paradigm shift in the KPIs and organizational roles for project managers

Participant 20 who is a project manager with experience of around 10-15 years stated that, “Previously, we had to do more of planning the tasks and scheduling them, but today it is much more than that”.

Before digitalization became mainstream, it was assumed to be the responsibility of the IT department in an organization. However, with organizations adopting digital technologies in almost the entire string of their operations, there is a democratization in the adoption of disruptive technologies. The stakeholders in other departments are also expected to master the technical nuances of the evolving technologies. So, project managers must now understand the technological aspects of the projects to be able to complete them successfully.

Participant 30 who is a project manager said, “Previously, when we were allocated a project, it was more of dividing the work, allocating them, and getting things done on time. But today, we need to evaluate the technical requirements and see how best we can deliver”.

To be able to cater to the requirements of the projects in the digital era and drive them to successful completion, project managers must possess the technical know-how to understand the technological requirements of a project. The parameters and factors impacting the success of a project completion have widened, and the technical competency of a project manager has become an important determinant. When we compare the technical requirements of the software development and information technology-related projects of the last decade with those of today, it can be seen that the evolving technological requirements are far more complex and demand a deeper technical understanding. However, project managers must stay updated on the latest innovations and disruptive technologies. It required extensive critical thinking skills and problem-solving skills apart from an extensive knowledge of the subtle nuances of the

evolving technologies. Doing so would help the project managers gain an understanding of leveraging these technologies to solve problems, automate processes, and get things done quickly.

The second broad theme that emerged as a challenge that project managers face when it comes to the implementation of digital technologies is that the technologies emerged so fast that the organizations, project management teams, and project managers struggled to cope with the digital revolution. A McKinsey study showed that COVID-19 accelerated digital adoption by almost seven years. This goes in accordance with our findings from the interview, where participants have quoted that as the pace of adoption was too quick, they struggled to gain hold of the new technologies and amp up their skills and knowledge to meet the evolving requirements. Most of the technologies emerged to meet the crisis and when they became mainstream, the project management world endured hardships in adapting to the requirements of the crisis.

Participant 11 who is the COO of an organization said, "Until COVID-19 emerged, social skills, communication, and planning abilities were considered crucial for project managers. But with the pandemic, there was a far greater emphasis on promoting empathy, leveraging productivity and project management tools, and managing the change."

Digital adoption in project management evolved as a solution to the COVID-19 lockdown and health crisis but became mainstream at a pace that was unexpected. This digital adoption was also accompanied by a drastic shift to remote modes of working. So, with both, digital adoption and remote work becoming mainstream, it was a double challenge for project managers.

32 out of 47 research participants spoke about the challenges they endure in managing a remote team. Participant 24 said, "Fostering collaboration and

communication between team members as well as with clients who stay distributed across geographies was a demanding task and it required extra efforts for project managers. A lot of times, working from remote meant a loss of control over the balance between personal and professional lives." Some participants reported the difficulties they endured in coordinating people who work in different time zones and have differences in communication and cultural aspects. With team members aspiring to continue working remotely even after the pandemic, it became hard to build coordination and communication with the team members. It required project managers to have extensive knowledge of IT systems and infrastructure to be able to leverage different communication and collaboration tools to automate the processes and streamline the tasks in project design, delivery, execution, monitoring, and management.

The next significant theme that was discussed by a majority of the research participants was the challenges in change management. With digital evolution, project managers became the change leaders championing the adoption of digital technologies in designing, developing, monitoring, and completing a project. Digital transformation requires extensive planning, and if it is not planned properly, it might become a costly affair and result in a never-ending loop. So, project managers had to shoulder the burden of digitalizing the entire string of activities from design and development to monitoring and delivery.

Beyond championing the leap to digital technologies, they also had to lead and manage the changes from traditional modes of working to remote and distributed means.

Participant 15 who is working as a project manager with 13 years of experience in a leading organization stated that, "Traditionally, the communication was through emails, status updates were recorded in excel sheets, and presentations happened in board rooms. But with digital technologies, there was a drastic shift, and digital tools evolved for

communication, project management, and virtual meetings. Getting acquainted with these tools and enhancing the skills and competencies to be able to leverage them to meet the project requirements remained a challenge as it all happened so fast". Project managers may face several obstacles during digital transformation initiatives. Rapid technological changes can pose a significant challenge, which can be overcome by being adaptable and continuously learning new tools. Managing and interpreting large volumes of data, or data overload, requires strong data analysis skills. Cybersecurity threats are a major concern and can be mitigated with robust risk management and cybersecurity knowledge. Resistance to change from team members and stakeholders can be addressed through effective change management and communication skills. Finally, integration issues with new technologies and existing systems can be solved with strong technical integration skills. Developing these competencies enables project managers to effectively navigate and overcome these barriers.

So, overall, the challenges for project managers due to digitalization included adapting to the drastic shift in their roles and responsibilities, gaining a deeper understanding of the evolving technologies, adapting to the rapid pace of digital adoption, establishing collaboration and communication within remote teams, and championing the change in people, processes, and systems.

How important is it for project managers to have a strong understanding of emerging digital technologies relevant to project management?

Almost all the research participants highlighted the importance of having exposure to and knowledge of the evolving technologies to successfully adapt and drive the change in project management. It is important for them to stay educated and informed about the technologies so they can explore how best they can leverage the project

management tools and methodologies to enhance the project outcomes. A major theme that came out in response to this specific research question is productivity enhancements. Almost 42 out of 47 participants acknowledged that digital technologies help enhance the productivity and efficiency of project management teams. Participant 37 who works as a project manager with an experience of 15+ years said, "I see that there are several challenges in digital adoption. Yet, we cannot deny the fact that the latest tools and technologies bring automation and optimization capabilities to the table. So, for project managers to achieve more in low time, cost, and effort, we must get acquainted with the intricacies of these technologies".

Overall, the understanding is that project managers who understand digital technologies get an opportunity to adopt them to streamline their tasks, reduce manual work, and increase overall team productivity. Another notable theme around this question is the competitive advantage that project managers, and eventually, organizations gain when they adopt digital technologies.

Participant 24 said "As far as I know, most of the organizations have shifted to digital mediums post COVID-19. If an organization does not adapt to the pace, it stands a chance of losing the race. The same is the case with us, the project managers at the individual level. If we overlook digital technologies, we stand a chance of getting outdated in the field and losing our relevance in the field."

A broader opinion is that digital technologies and their adoption are evolving at an extremely rapid pace and for organizations to stay competitive in the market, it becomes important that they adapt to them swiftly. Similarly, project managers must develop an understanding of the innovative tools and ways of leveraging them to achieve their objectives. When they do so, their careers get future-proofed while they continue to remain a valuable asset to the organization despite the emerging skills and competency

requirements. An important point that evolved out of this opinion and observation is that project managers have perceived the reality that digital technologies are not a 'one-time' solution but an ongoing evolution. Gaining knowledge and updating it frequently helps them stay tuned to the current trend and deliver better outcomes in the rapidly evolving landscape.

Another notable theme that emerged from the study is that project managers find it important to be familiar with digital technologies as they are tasked with managing a distributed workforce. As Participant 8 who is a project manager with 5 years of experience noted, "A prominent trend that emerged with COVID-19 is that the teams started becoming remote and distributed. Without knowledge of digital technologies, managing the remote workforce could become complicated and productivity may be affected."

A deeper analysis shows that having knowledge of digital technologies helps project managers facilitate clear and timely communication with the team members. This emerged from the interviews with the team members, and they suggested that project managers with skills and competencies in digital technologies design innovative onboarding and training programs for new team employees. They get to use data and monitoring tools to effectively manage the project team and plan an optimal allocation of resources based on the project requirements.

Another theme that emerged from the study is that using digital technologies helps project managers focus more on critical tasks that navigate them toward the results rather than on coordination and monitoring tasks. Participant 32 who is a project manager with 14 years of experience in project management said, "Previously the primary responsibility of a project manager was to assign tasks to the team members, promote

coordination between them, and bring about effective collaboration. But today, with tools doing all of them, there is an entire shift in the focus from processes to results."

A key observation during the discussion is that the project managers get more time to focus on strategy and goals rather than collaboration and coordination tasks which enhances the effectiveness of the outcomes. They get more time to work on critical tasks and processes and this adds to improvements in the efficiency and productivity of project managers. In other words, they are expected to work on tasks that solely require human intelligence and automate most of the usual tasks with artificial intelligence.

The third major theme that I made out for this question is that educating themselves with digital technologies helps them leverage analytics and insights to drive informed decisions. A keen observation of the data evolving over a specific period shows the emerging trends and patterns that enhance project outcomes. Robust reports generated using data and information from digital technologies help ensure that the projects are on track with the budget constraints and time requirements. The data can be broken down into several pieces to help understand different parameters and functions, say, performance monitoring, budget, resource allocation, etc.

Participant 18 who happens to be a business analyst with an experience of around 2 years said, "Digital technologies help project managers as well as the team members help evaluate the current project performance and benchmark against industry standards or similar projects in the past and understand the scope for improvements". The impact of digital technologies in the project management arena extends beyond project managers to help different stakeholders including team members and the executives at the higher end of the hierarchy. As the data is available for access by all the stakeholders including the team members and the executives, there is transparency in the process.

However, overall, the project managers must gain skills and competencies and a deeper understanding of the digital tools to be able to automate repetitive processes to enhance the productivity of teams, achieve effective outcomes under the allocated budget and estimated timeline, promote collaboration and clear communication with remote team members, stay competitive in the market, and drive informed decisions. The majority of the participants think that digital transformation is not a one-off process but an ongoing, continuous process and the trends to become normal. So, they must become equipped with the technologies to be able to adapt to the evolving pace, and they think they stand a chance of losing relevance if they do not update themselves constantly. Based on the above thesis the project managers having a strong understanding of emerging digital technologies relevant to project management is crucial. With the increasing digitization of projects, familiarity with tools like project management software, collaboration platforms, data analytics, and automation technologies becomes essential. The understanding enables project managers to make informed decisions, streamline processes, optimize resource allocation, and enhance project outcomes. Moreover, it empowers them to adapt to changing technological landscapes, stay ahead of competitors, and drive innovation within their projects.

The importance of project managers having a strong understanding of emerging digital technologies relevant to project management is increasingly critical, as indicated by the data. There is a direct correlation between the necessity of this knowledge and the rising emphasis on digital transformation training, as well as the growing prevalence of remote work.

As digital transformation training becomes more widespread, the need for project managers to be proficient in relevant digital technologies intensifies. This trend underscores the vital role that digital expertise plays in effectively managing and

executing projects in an environment that is continually evolving due to technological advancements. Project managers who are well-versed in digital technologies can better navigate the complexities of modern projects, leverage new tools and platforms, and drive innovation within their teams.

Additionally, the data shows a significant number of participants working remotely, further highlighting the importance of digital proficiency. For remote project managers, understanding and utilizing emerging digital technologies is essential for maintaining seamless communication, collaboration, and project coordination across dispersed teams. These technologies enable remote project managers to overcome the challenges of physical distance, ensuring that their teams remain productive and aligned with project goals.

In conclusion, the interview data clearly demonstrates that as digital transformation training increases and the number of remote work participants grows, the importance of project managers having a strong understanding of emerging digital technologies becomes even more pronounced. This knowledge is crucial for effective project management in today's digitally-driven and remote work environments.

4.4.2 Digital tools in project management

One of the significant aspects of digital adoption is the ability to streamline and automate repetitive processes in project management with the help of project management and other digital tools. While the first question intended to understand the challenges in digital transformation and the skills needed to achieve digital adoption in project management, I am presenting the responses about using digital tools and technologies in the coming section. I asked two questions when it comes to tools in project management. The first one is about the new tools that they used after

digitalization gained prominence, and the next question is about the benefits and challenges they experienced in using the tools.

What are the new tools that you are using post-digital transformation, say post-2021? What is their impact on project management tasks?

The data collected from both, the literature review as well as the interviews, revealed that a key benefit of digital transformation is the evolution of tools and technologies that help automate and streamline different processes in project management. All the participants of the study highlighted how digital tools have helped them improve communication and collaboration in the process. An overall observation from the interviews is that depending on the size and scale of the organization, project managers rely on tools and technologies to streamline the processes. If they are working in a small business or an emerging startup, they use tools like MS Teams that have the basic features and functionalities for project management. And if they work in large businesses, they use tools with advanced, sophisticated functionalities.

An important theme that emerged out of this question is that project managers in large organizations use tools that can offer support in automating the end-to-end processes of project management. Around 39 of the 47 participants I interviewed, emphasized the benefits that project managers can derive from automating the mundane, repetitive processes. One of the participants said that automation abilities of the project management tool help estimate an accurate timeline which in turn helps mitigate delays in project delivery.

Participant 19 who is a project manager with 11 years of experience said, “Before digitalization, we had to manually estimate the project deadlines, and this resulted in errors. A lot of times we had to either overburden our team or seek extra time from the

client and this was an extremely challenging task as a project manager. Now with project management tools, we can easily forecast an optimal deadline considering various aspects like workforce availability."

One of the key responsibilities of a project manager is to be aware of the status of a project at any point in time. Status reports and updates are crucial for them to be informed of the progress made in the project. Previously it was through email and team meetings conducted at specific intervals. Now with digital technologies, project managers can view and assess the real-time status of a project and propose relevant action plans.

Participant 12 also added, "With Kanban boards, we can automate the entire project management tasks including the process flow, assigning a project to a team member, seeking updates, etc. We also have pre-determined templates that help prepare a status report that can be used to update the team and other stakeholders involved in the project."

Another theme that emerged out of our interviews with project managers is that digitalization helps them promote deeper collaboration and seamless communication with team members, senior managers, cross-functional teams, vendors, and clients. Participant 34, who is a project manager with 12 years of experience said, "Previously, with traditional project management methodologies and tools, we needed to come to the office desk and compose an email when there is a change in priority of the tasks. Now all it takes is a broadcast message and a few clicks to alter the project workflow in the project management tool."

Project coordination, communication, and collaboration remain key activities for project managers, and as digital tools like video conferencing, VPNs, and cloud-based systems help automate the processes, they enhance the effectiveness of team coordination

leading to better project outcomes. Also, digital technologies promote the sharing of files and other information in just a few clicks.

Participant 32 who is working as a business analyst in a reputed IT firm said, "Previously it was physical document sharing, and then when emails became mainstream, we had to compose a formal email to be able to share digital documents. But, with digital technologies and cloud-based tools, we get to share them over project management tools like Slack or Jira, in just a click or two. They help save time and enhance the accessibility of files and data".

Another important theme that I could gather from the research participants is the role of data in promoting effective decision-making. Using digital technologies, project managers gain access to vast amounts of data and information which serve as critical inputs to driving major decisions in project management. Based on the data, the project managers can assess the performance at the individual as well as team level, spot trends and patterns, workforce efficiency, etc. to be able to make crucial decisions like resource allocation, priority assessments, etc. The complex data can also be fed into business intelligence tools to be able to derive sound analytics and visuals. For example, using analytics on Kanban, you can take a look at the breakdown charts and see the status of the tasks distributed among the team members on a visually appealing dashboard. It also has a timer that helps track the accurate amount of time invested into each project. For example, in the Kanban Tool, there is a time tracker that starts the moment a project is assigned to a team member and stops when it is complete. The time tracker helps assess the accurate amount of time invested in doing an activity of the project.

A significant theme that emerged from the study as a response to this particular question is that emerging technologies help project managers mitigate the risks and uncertainties in the process. The data gathered from digital technologies help managers

make more reliable estimates which in turn enhance the odds of the success of an event. Participant 17 who is a project manager said, “With AI-equipped tools, we get to make predictive analysis which in turn highlights potential bottlenecks and issues. This helps avoid client escalations and project delays.”

A key feature of digital tools is the notification and alert functionality. Project managers and all the relevant stakeholders involved in the project get notified of new task assignments, due dates, status changes, upcoming deadlines, etc. Previously the project managers had to inform the team in person and the project stakeholders had to organize the information in a formal email every time they had an update. The participants put forth that it was time-consuming and a cluttered process, and highlighted how the emergence of digital technologies helped them automate the notification process and organize the communication efficiently. Also, most project management tools come with calendars and Gantt charts that help team members and project managers visualize the schedules and timelines. Doing so helps project managers plan and organize the entire string of activities in that particular project. However, the overall themes of observation for the question on digital tools and their impact the enhanced project outcomes, timely delivery of projects, status tracking, better collaboration and communication, and data-driven decision-making. The research participants mainly spoke of the automation abilities of digital tools and highlighted how leveraging them helped increase the efficiency of projects and decisions made. They said that the technologies supported reduce manual errors and automate mundane, repetitive processes. Also, they spoke of how project management tools help organize the communication process, send out notifications, and mitigate risks in project management. Post-2021, organizations have increasingly adopted advanced project management tools and technologies such as AI-driven project management platforms, blockchain for project tracking and transparency,

virtual reality for remote project visualization and collaboration, and machine learning algorithms for predictive analytics in project planning and risk management. These tools have facilitated better decision-making, enhanced communication and collaboration, improved project tracking and monitoring, and ultimately led to more efficient project outcomes.

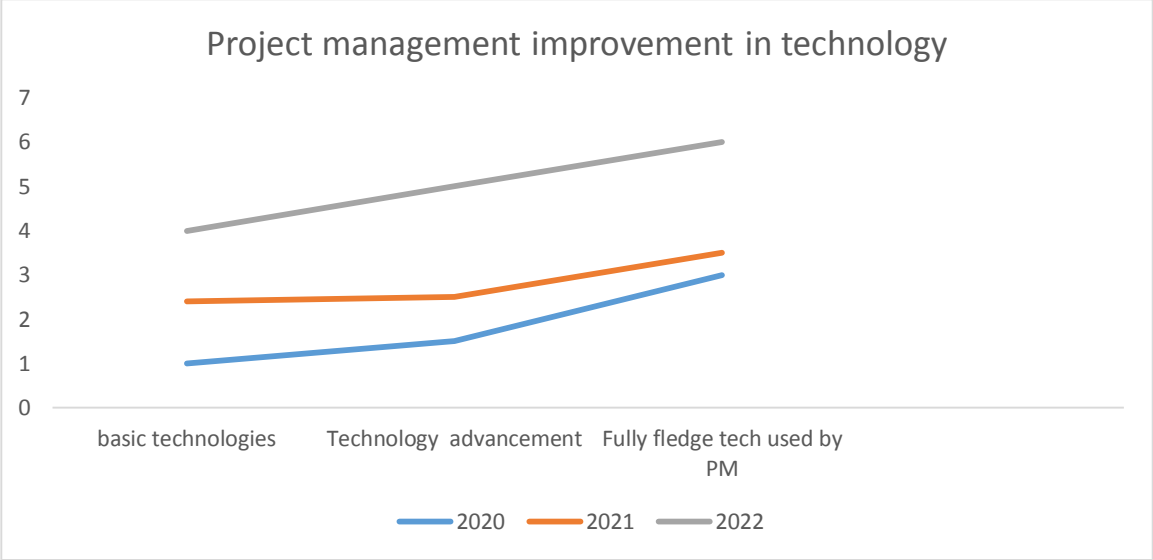

Figure 4:11 Project management improvement in technology

What are the challenges you endure in using digital tools?

While the previous question helped me identify the importance of digital tools in project management, as a follow-up question, I researched the challenges that project managers endure when it comes to using digital tools in real-time project management.

A major theme that emerged from this question on the challenges of using digital tools for project management is the learning curve. Participant 13 who is a project manager working in a multi-national enterprise said, “Initially when COVID-19 emerged and people started moving to use digital project management platforms like Slack, many

project managers including me did not invest much of our energy, thinking it was a temporary transition and we would revive back to normalcy soon. The return to pre-COVID normal never happened, and we had to put in more effort to master the nuances of the technologies."

The learning curve was steep and often required more time and effort to learn how best they could put the tools to use. It required technical competencies and skills some of which were hard to learn and equip by self. To get acquainted with complex nuances in digital tools, project managers required training and education support. Such an observation led to the follow-up question on training and support, and I have covered the answers in the next section.

A significant observation is that around 39% i.e., 18 of 47 participants in our study came from the age group of 41-50, and around 15 of them (83%) reported the complexities in learning to get acquainted with the digital tools. On the other hand, only 12 out of the remaining 29 participants reported a steep learning curve. This finding is in accordance with Heponiemi et al. (2022), Schirmer, W. et al. (2022), and Mansfield (2023), that people in the older age groups have more challenges than those in the younger age groups.

Another notable theme about the challenges in project management is the technical glitches and issues that they experience in the process. A majority of the research participants, including the project managers, team members, and C-level executives said that they sometimes endure technical problems and bugs while using the tools which in turn results in downtime and delays in projects.

The third significant theme that I observed about the challenges in adopting digital tools is the resistance to adoption. Participant 26 who is a project manager said, "It

was hard for us to adapt the digital tools in the beginning. What was hardest was navigating the team members to accept and adapt to the change."

The research participants put forth that the business teams were accustomed to using traditional methods for project management and execution, and when they had to shift to using digital tools, there was tangible and intangible resistance from the stakeholders. There was a challenge of shifting to new workflows and processes as the team members were used to the existing flow of operations and activities. The underlying cause for resistance to digital tools is the lack of understanding of the benefits of the new tools and technologies. Some of them perceived that when they shifted to using digital tools, they reduced their control over specific tasks. Many project managers also suggested that they overcame this particular resistance by involving the team members in the selection and implementation process to offer them a sense of ownership.

The next theme is the perceived time investment, where the team members and project managers may feel that using digital tools takes too much time and they are afraid that that might impact their productivity. They overlook the fact that the project management tools, in the long term, help automate several repetitive processes, save time, and enhance their productivity, and instead get carried away by the fear of the time they must invest in learning and setting up the project management tools.

There is also a general fear among project managers that with time, digital tools may automate their roles and responsibilities, and displace them eventually. This was put forth by several research participants and those specifically at the top of the hierarchy. For instance, participant 41, who is a COO of the firm said, "Initially when we proposed digital tools to replace the repetitive, manual tasks in team coordination and collaboration, there was a notable resistance from project managers, and this was mainly driven by the underlying fear that they might lose their relevance if digital tools could do

what they are doing." The participants also spoke of how they had to engage in open discussions with such project managers, involve them in the selection of tools, and set them up helped overcome this resistance to a notable extent.

One of the most frequently mentioned challenges is the cost associated with implementing and maintaining these tools. Many participants highlighted that the financial burden of acquiring licenses, subscriptions, and the necessary hardware upgrades can be substantial, particularly for smaller organizations or those outside the technology sector.

Interestingly, this concern was less prevalent among companies operating in the technology field. These organizations often have better infrastructure and budget allocations for digital tools, making the cost less of an issue. In contrast, non-tech companies, which might not have the same level of familiarity or budget flexibility, reported higher levels of concern regarding the financial impact of digital transformation.

Overall, the main challenges in implementing project management tools and technologies include the learning curve, technical glitches that lead to downtime, resistance to adoption and the shift to new workflows, processes, and activities, perceived time investment, and fear of being replaced by digital technologies.

4.4.3 Organization's role in skill enhancement for project managers

The previous questions revealed the gap that exists in terms of skills and competencies needed for project managers to achieve the desired digital adoption and the challenges in adapting to novel tools and digital technologies. And, in the coming section, I have covered the need for offering training, education, and skills development to achieve the intended outcomes.

How do you stay updated and informed about the latest trends and advancements in digital technologies relevant to project management?

In continuation to the question on the challenges that project managers and teams endure in scaling digital technologies across the team, the next question is about understanding how they stay updated about the latest trends in project management. The broader understanding is that they depend more on online resources, events, and forums to update their knowledge, and their reliance on structured training programs and courses is much less.

For example, Participant 18 said, "I usually visit tech-related websites like TechCrunch and look for research publications, updates, and resources from professional associations like Project Management Institute, which offers dedicated field-related inputs through blogs, webinars, conferences, and resources."

Apart from blogs and tech-related sites, some of them said that they follow hashtags related to project management on social media platforms like LinkedIn and Twitter to stay in touch with the latest updates and trends on the same. Such social media platforms help project managers network with counterparts in the industry and share updates, best practices, and case studies. Though social media may serve as a platform for learning the emerging digital technologies, they are subjective to the opinions and beliefs of the other person and may not serve as a reliable source of information and learning.

Another common theme is that many participants enrolled in online courses and webinars related to project management and digital tools. They use reputed platforms like Coursera, LinkedIn Learning, edX, Udemy, etc. to stay updated on the latest topics and technologies. The problem with these types of platforms is that the project managers have to pay a hefty fee to be able to take up the course.

Participant 17 who is a project manager with 17 years of experience said, "In the beginning when digital tools gained prominence, I started taking online courses. But after

a point, I realized that it is an endless game as technology keeps evolving and it may not be feasible to take extra courses beyond office hours. Such courses are not financially viable that I could not afford a fixed amount out of my salary every month to pay for them."

A notable theme is that some of them said that they listen to podcasts and attend conferences and events that are related to using digital technologies. These events and conferences often feature keynote speakers and workshops on the latest trends and tools. Some of them reported that they attend online forums and community discussions that are focused on project management and digital technologies. They said that they can refer to websites like StackExchange, Reddit, and other forums that let project managers and relevant stakeholders ask questions and share knowledge.

Another theme is that project teams, managers, and other stakeholders refer to newsletters from technology publications and blogs. These newsletters curate top stories and trends from the field which in turn saves their time in updating their knowledge. They also refer to e-books and books penned by industry experts and thought leaders. Those books offer in-depth insights and data on specific digital tools and technologies and their application in project management. However, the major theme around how project managers stay updated on the latest technologies is they depend on online resources, events, forums, research publications, conferences, webinars, blogs, social media resources, online learning platforms and courses, community discussions, newsletters, technology-related publications, books, and e-books, etc. Project managers primarily stay updated on emerging digital technologies through online resources, events, and forums. They rely on tech blogs, professional association publications, social media platforms like LinkedIn and Twitter, online courses from platforms like Coursera and LinkedIn Learning, podcasts, conferences, community discussions on forums like

StackExchange and Reddit, newsletters, and books. These methods offer flexible and accessible learning opportunities, though cost and time can be constraints for structured training programs.

Based on the data collected from interviews for our research paper, staying updated and informed about the latest trends and advancements in digital technologies relevant to project management varies significantly between candidates working in startup environments and those in service-based companies. Candidates working in startups frequently mentioned having more opportunities for self-help training. These individuals often engage in online courses, webinars, and industry forums to keep abreast of new developments. The dynamic and fast-paced nature of startups fosters a culture of continuous learning and adaptation, where employees are encouraged to independently seek out and utilize the latest tools and methodologies.

In contrast, candidates from service-based companies reported relying more on structured training programs provided by their employers. These organizations typically offer formal training sessions, workshops, and certifications to ensure their teams are equipped with up-to-date knowledge. While these structured programs provide comprehensive learning opportunities, they may not always be as agile or immediately responsive to the latest technological trends compared to the self-driven learning approach seen in startups.

Overall, the startup environment appears to provide more flexibility and encouragement for self-help training, enabling employees to stay current with the rapid advancements in digital project management technologies.

Does your organization provide training and development to help you adapt to the requirements of digital transformation? If so, what kind of training?

Having understood the major sources of references for updating their knowledge, skills, and expertise, to the project managers, I moved ahead to understanding if organizations provide formal training on the evolving technologies. 85% of the participants gave a positive response when asked about the training and learning support that organizations provide to employees and project managers. But when I dived deeper and posed more specific questions, it revealed the following. Most organizations offer training on project management, more specifically agile project management methodologies. They help project managers enhance the agility and flexibility of the project management process and build the end solution by iterative means. This enhances the accuracy of the processes while reducing the cost and time involved. Also, at the beginning of every project, the managers are trained with the technical know-how and understanding of the latest technologies relevant to the specific project domain. However, they do not provide regular support and training in digital technologies.

As put forward by Participant 10, "The problem with digital technologies is that it is constantly evolving and providing a one-time training or support may not be sufficient. Also, digital tools gained mainstream adoption in project management during the pandemic, and they evolved to be tools to handle crises. What started as a crisis-management tool evolved into the mainstream space to stay on and advance forever. As the adoption and scaling process happened in no time, organizations did not find the space to design and organize formal training programs."

The interviews revealed that the participants received training and support on project management and other basic aspects like change management and soft skills development, the project managers do not receive formal training when it comes to digital technologies in specific. As a majority of research participants said no when it came to training on digital technologies, I dived deeper to understand their expectations

regarding the requirements and design of formal training and support programs. A notable theme that emerged as a response from almost all the participants is that they look for training and support programs to gain a foundational understanding of digital tools and technologies. They expect ongoing programs to help participants gain digital literacy. The project managers also look for training on software tools and fundamental technologies like cloud computing, data analytics, and business intelligence as they form the foundation for managing any project.

Another major theme in the training expectations of the participants is the workshops for digital strategy, digital leadership, data analytics, data security, and remote leadership. Such training programs and workshop programs could help project managers gain an understanding of the intricacies of digital transformation, and learn from experts, the best practices in digital transformation and project management. These training programs could also help project managers understand the organization's digital transformation strategy, goals, and their role in the process.

Getting the participants trained in data analytics would help them gain an understanding of data analysis, visualization, and interpretation to support data-driven decision-making. Digital leadership training helps the project managers lead digital transformation efforts, foster innovation, and create a culture of continuous learning while remote leadership programs help them develop an understanding of the nuances of remote work and managing the distributed workforce in an effective manner. However, the overall understanding of the themes around the question of the importance of training and development for project stakeholders reveals that the current training programs are mainly focused on agile project management and other basic nuances like change management. The technical training is project-based, and the project managers get trained on the technical requirements of a particular project they are taking up. The study showed

that there is a huge need for training and building workshops on digital literacy, cloud computing, data analytics, digital leadership, remote leadership, etc. Putting forth such programs on a periodic basis would help project managers update themselves on the latest developments in the industry and help them stay attuned to emerging trends.Several organization provides training and development to help adapt to digital transformation. We receive training in agile project management and specific project-related technologies. However, ongoing training in digital technologies is lacking. Current training focuses on basics like change management and soft skills, but there is a strong need for regular training in digital literacy, cloud computing, data analytics, digital leadership, and remote leadership. These programs would help project managers stay updated on industry trends and effectively manage digital transformation efforts.

There was a direct correlation between participants working in multinational corporations (MNCs) and the provision of training and development programs to help adapt to the requirements of digital transformation. Employees in MNCs reported that their organizations often mandate comprehensive training initiatives to ensure that their workforce is equipped with the necessary skills to navigate digital transformation effectively. These programs typically include structured courses, workshops, and certifications aimed at fostering digital literacy and proficiency among employees. In contrast, participants working for Indian companies indicated that there were no such mandates for digital transformation training. While some Indian companies offer optional training programs, the emphasis and requirement for such training are significantly less compared to their multinational counterparts. This disparity highlights the varying levels of commitment and approach to digital transformation across different organizational contexts.

4.5 Findings from the Questionnaire

To complement the findings from the interview, I have also added the findings from the questionnaire that I circulated across the professional circle and social media platforms like LinkedIn. Around 91 project managers took up the questionnaire and a summary of the findings is presented below. I used Google Forms to prepare the questionnaire and circulate the questions to research participants, and the results were curated in Microsoft Excel. I have articulated the key findings under two broad areas – the impact of digital management, and the skills and tools needed to achieve digital transformation.

4.5.1 Impact of digital transformation

I have included 9 questions to seek responses from the research participants and understand the impact of digital transformation. An overall analysis of the results reveals that almost 96% (87 out of 91 participants, Mean = 1.28, Standard Deviation = 0.39) agreed that digital transformation produced a positive impact on project management outcomes.

Table 4.13 Impact of digital transformation

	No. of Participants	% of Participants
Very Negative	1	1%
Negative	1	1%
Neutral	2	2%
Positive	54	60%
Very Positive	33	36%

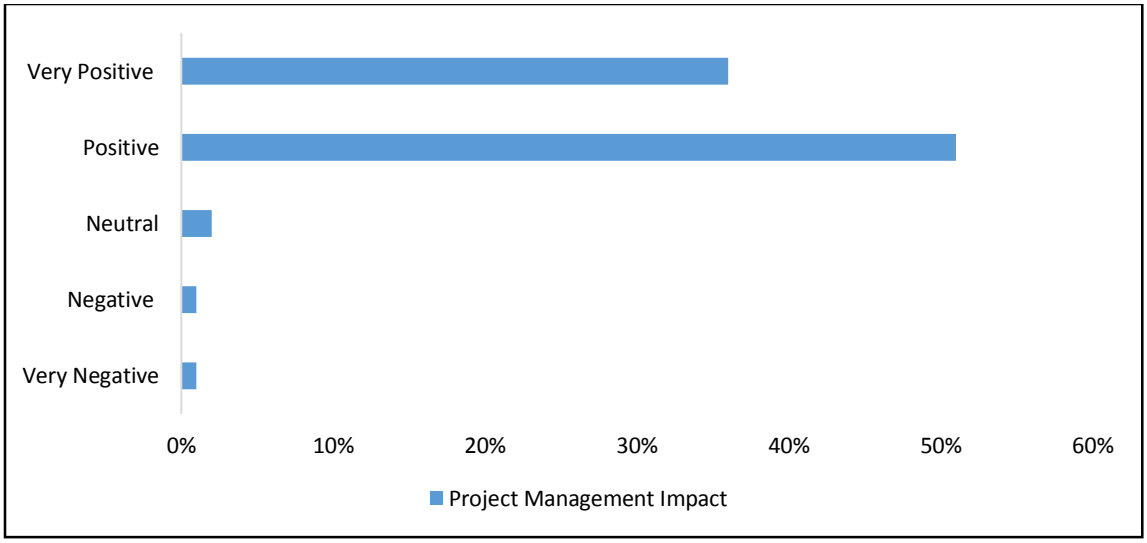

Figure 4.12 Impact of digital transformation

While that was about the net impact, I had included specific questions to gauge the real impact of digitalization on project management and the findings reveal the following.

On the scale of digital transformation in businesses, 40.65% of participants agreed that there is moderate transformation, and around 48.35% agreed that they are witnessing a significant digital transformation. And around 7.69% of participants reported that they are experiencing a complete digitalization (Mean = 0.59, Standard Deviation = 0.35).

From the literature review and the interview responses, I have curated the major impacts of digital transformation around efficiency enhancements, accessibility to project data, collaboration and communication improvements, project planning efficiencies, cost optimization, and so on. I have analysed the impact of digital transformation on each of these attributes.

Regarding the question of the impact of digital transformation on the efficiency of the project management process, a majority of participants, 68.13% agreed that digital transformation has produced a significant increase in efficiency. And around 27.47%

reported that their efficiency has improved moderately (Mean = 0.65, Standard Deviation = 0.36). Also, 96.7% of participants agreed that digital transformation has brought about significant improvements in the accessibility of data, which is an important revelation of the survey (Mean = 0.97, Standard Deviation = 0.40).

Around 58.24% of participants agreed that digital transformation has improved communication significantly and 19.78% of participants reported moderate improvements in collaboration (Mean = 0.50, Standard Deviation = 0.35). A majority of participants also agreed that digital transformation has enabled partial remote/ distributed project management.

Next, I have analyzed the impact of digital transformation on project planning, and cost tracking and optimization abilities. 81% of the participants agreed that the digitalization of project management has a positive impact on project planning (Mean= 1.24, Standard Deviation = 0.44). And, when it comes to cost tracking and managing project costs, 43% of the research participants agreed that the cost optimization abilities enhanced moderately, and 43% reported a significant improvement (Mean= 1.25., Standard Deviation = 0.44).

Table 4.14 Impact of digital transformation on project planning and cost optimization

	Project Planning	**Cost Optimization Abilities**
Declined significantly	1%	1%
Declined moderately	2%	1%
No significant impact	15%	12%
Improved significantly	34%	43%
Improved moderately	47%	43%

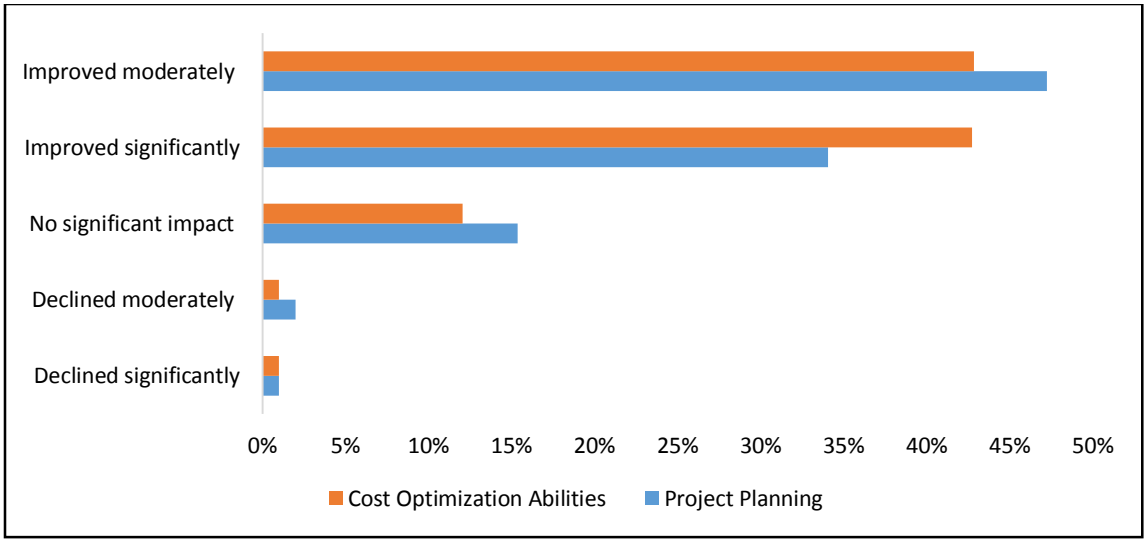

Figure 4.13 Impact of digital transformation on project planning and cost optimization

Around 55% of participants agreed that digital transformation in project management moderately improved the overall success rate of projects and 36% of participants reported a significant improvement in the success rate (Mean = 1.42, Standard Deviation = 0.47).

Overall, a majority of participants in the research agreed that digital transformation has resulted in a pronounced impact on project management, particularly on accessibility of data, efficiency, planning activities, collaboration and communication, managing remote workforce, and cost optimization.

4.5.2 Skills and tools needed to achieve digital transformation

In this section, I had questions about the current abilities of project managers, the obstacles they endure in bringing about digital transformation, the skills/ tools they use to handle digital transformation, and the methods they follow to stay updated about the latest developments in digital transformation.

By asking several experienced project managers it's clear that they need skills in technical proficiency, change management, leadership and communication, strategic

thinking, and agility to navigate digital transformation. Analyzing educational background, experience, and designation, we find moderate to strong positive correlations between these variables: education and experience ($r = 0.6$), experience and designation ($r = 0.8$), and education and designation ($r = 0.5$). This indicates that higher education and more experience are associated with higher professional designations, which better equip project managers to manage digital transformation effectively.

For the question on the ability of the skills and competencies that the project managers possess in engaging with stakeholders at present, around 71% of employees agree that they are in the moderate scale and there is a scope for improvements. And around 26% agree that the project managers have the skills and competencies needed to engage with the stakeholders at present (Mean = 1.20, Standard Deviation = 0.43).

The next question was about understanding the obstacles that project managers endured in bringing about digital transformation in project management. Almost 93% of research participants agreed that they are hindered by the resistance they endure from team members in adapting to the changes. The next highest response was for integration challenges they endure when it comes to connecting the existing systems with digital tools and technologies. Almost 87% of participants agreed that they experience challenges in getting the integration right. When it comes to the technical skills possessed by project managers, 83% of participants agreed that they experienced challenges in terms of technical skills and abilities in understanding and scaling digital technologies across the length and breadth of the organization.

Overall, project managers have reported that they endure struggles when it comes to change management and getting the team members in alignment with the digital tools, integrating the new technologies with the existing tools, and a lack of technical skills

among project managers in adapting to the digital tools and skills. It must be noted that the participants were allowed to choose multiple options.

Table 4.15 Challenges in digital transformation of project management

Parameters	**% of Participants**
Security and data privacy concerns	18%
Inadequate resources and budget constraints	53%
Lack of technical skills among project team members	83%
Integration challenges with existing systems and processes	87%
Resistance to change from team members	93%

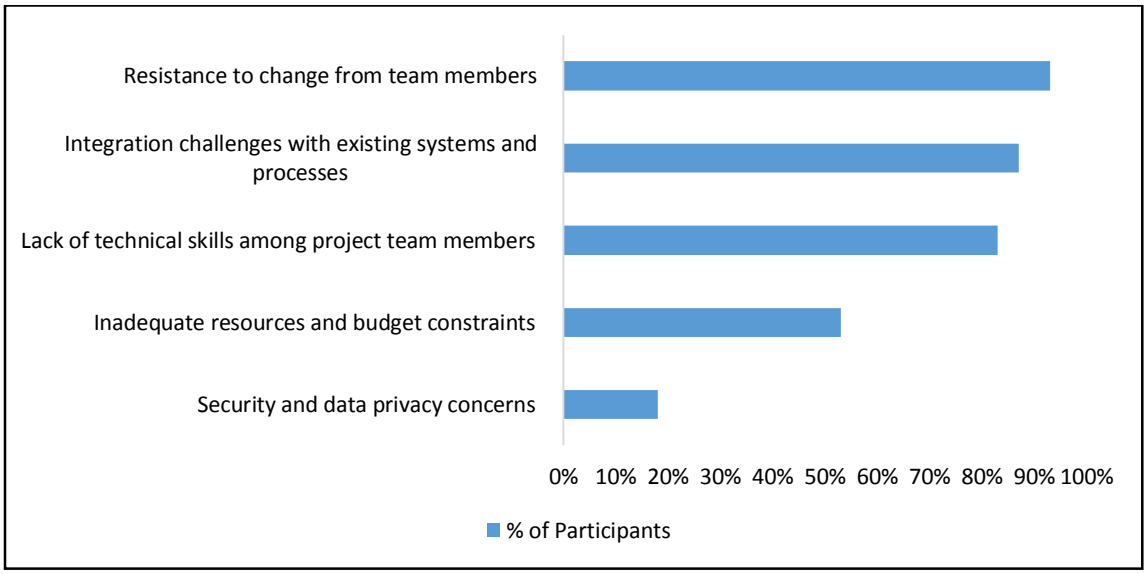

Figure 4.14 Challenges in digital transformation of project management

On the question of skills needed to navigate the digital transformation, I listed all the skills that I found from literature and preliminary interviews and requested inputs from the participants. They were allowed to choose multiple options. The responses show that around 92% of research participants agree that it is important for project managers to have the willingness to learn new tools and techniques and adapt them in real-time project management. As new tools evolve at a rapid pace, it becomes important for

project managers to learn them and put the tools to use. The literature review demonstrated that they must have the mindset and willingness to learn the new tools, and this is confirmed by the responses from the participants.

The next one is strategic thinking and problem-solving skills. 89% of research participants agreed that critical thinking and problem-solving skills are important when it comes to digital transformation. This is a major shift in the role of project managers as the traditional roles required collaboration and communication skills more, and as the digital transformation has automated a lot of collaboration activities and communication flows, it becomes important for project managers to build their strategic thinking and problem-solving skills. In other words, project managers must invest their time in building skills and competencies to perform tasks that are critical to the core purpose of the project and cannot be substituted with automation or artificial intelligence.

Around 87% of participants agreed that technological knowledge and proficiency are important when it comes to navigating the challenges of digital transformation and 83% agreed that project managers must have sufficient skills to navigate the participants to manage the change and stay competitive at both, the individual and team levels. This also aligns with the findings from the literature which shows that project managers endured difficulties in navigating the digital transformation scape as it evolved rapidly due to the COVID-19 emergence.

Table 4.16 Skills needed to navigate digital transformation in project management

Parameters	**% of Participants**
Project risk management and cybersecurity knowledge	53%
Strong communication and collaboration skills	74%
Data analysis and interpretation skills	76%
Change management and leadership abilities	83%

Technological literacy and proficiency	87%
Strategic thinking and problem-solving skills	89%
Adaptability and willingness to learn new tools and technologies	92%

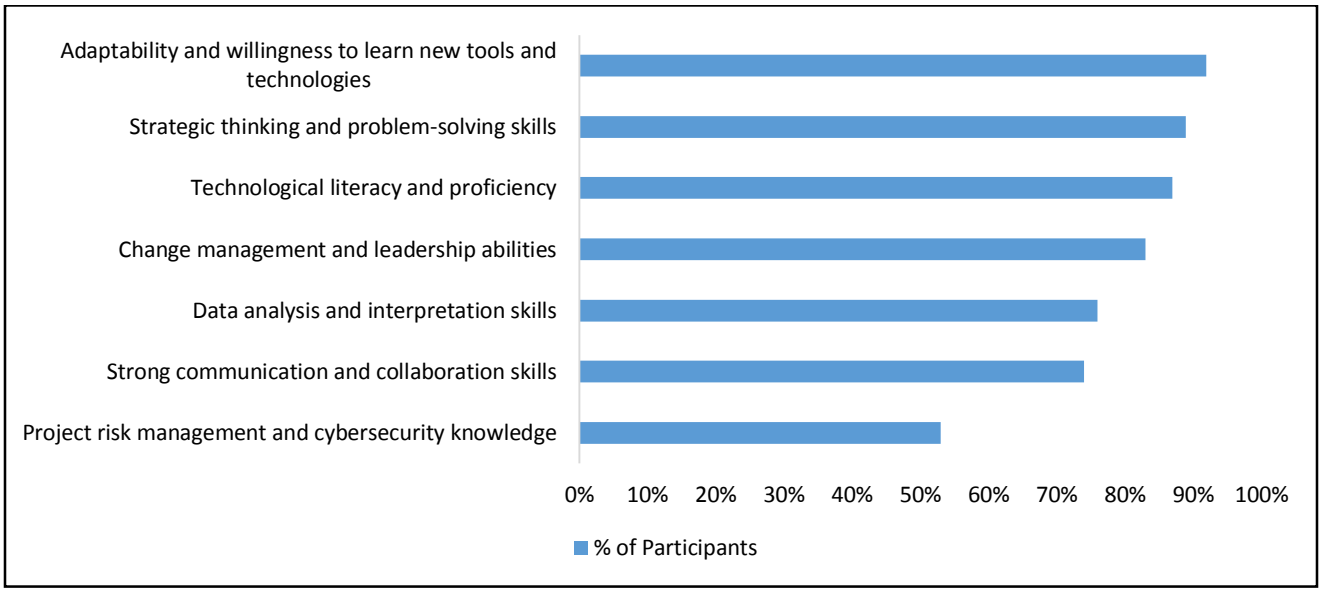

Figure 4.15 Skills needed to navigate digital transformation in project management

76% of participants agreed that data analysis is an important skill for project managers. A notable advantage of digital transformation is the vast amount of data it produces. Project managers must have the skills and acumen to interpret the data and draw insights from the same. Previously, major business decisions were driven by intuition, and with digital tools, it is possible to put forth data-driven, informed decisions. So, it becomes important for project managers to develop skills and competencies with data. They should have the ability to interpret the data and put them to use in decision-making, whether it is about timelines, budgeting, staffing, etc.

The next question was about the project management tools that are commonly used by organizations in the endeavor to digitalize the workflow and processes. 96% of research participants revealed that they used virtual communication and conferencing tools. When COVID-19 emerged and people had to be confined to their homes, virtual

communication tools gained prominence and they stayed on from there. While managing remote employees and a distributed workforce has become the norm, such tools help communicate seamlessly with the team members.

Around 86% agreed about using task management and collaboration platforms, and project management software tools. A major advantage of using digital tools is that they help promote deeper collaboration between team members and so, most organizations have started automating the process of task assignments, status updates, and reviews. This reduces the burden on the project manager who can in turn put in more focus on core tasks that are critical to the organization.

The above data says that project managers must overcome significant barriers such as resistance to change, integration challenges, skill gaps, budget constraints, and security concerns. To do so effectively, they need a combination of adaptability, strategic thinking, technological proficiency, and strong change management skills. These competencies are essential for leading successful digital transformation initiatives in a rapidly evolving landscape.

Around 79% of participants agreed that the knowledge of cloud-based tools and technologies is important when it comes to project management. For a deeper understanding of cloud technology, one can take up certification courses with cloud providers like Amazon AWS or Azure. But, for project managers, it is important to have a foundational understanding of the cloud-based tools and storage options as most organizations operating in not-so-sensitive industries like healthcare or defense rely on cloud-based systems for data storage and access.

The last theme was about analyzing the need for training and formal engagement programs. When asked about how project managers stay updated with the latest trends and advancements in digital technologies, around 87% agreed that they take up online

courses. Several educational institutes and online academies have come up with courses on digital tools and technologies, and as they let the employees learn at their own pace and at their convenient timing, online courses remain the preferred mode of learning for project managers. 76% of participants agreed that they educate and update themselves by networking and collaborating with other professionals and counterparts in the same field.

Table 4.17 Need for training and formal engagement programs

Parameters	**% of Participants**
Organizational training programs	23%
Regularly attend industry conferences and events	54%
Follow industry blogs, publications, and thought leaders	65%
Network and collaborate with other professionals in the field	76%
Engage in continuous learning through online courses	87%

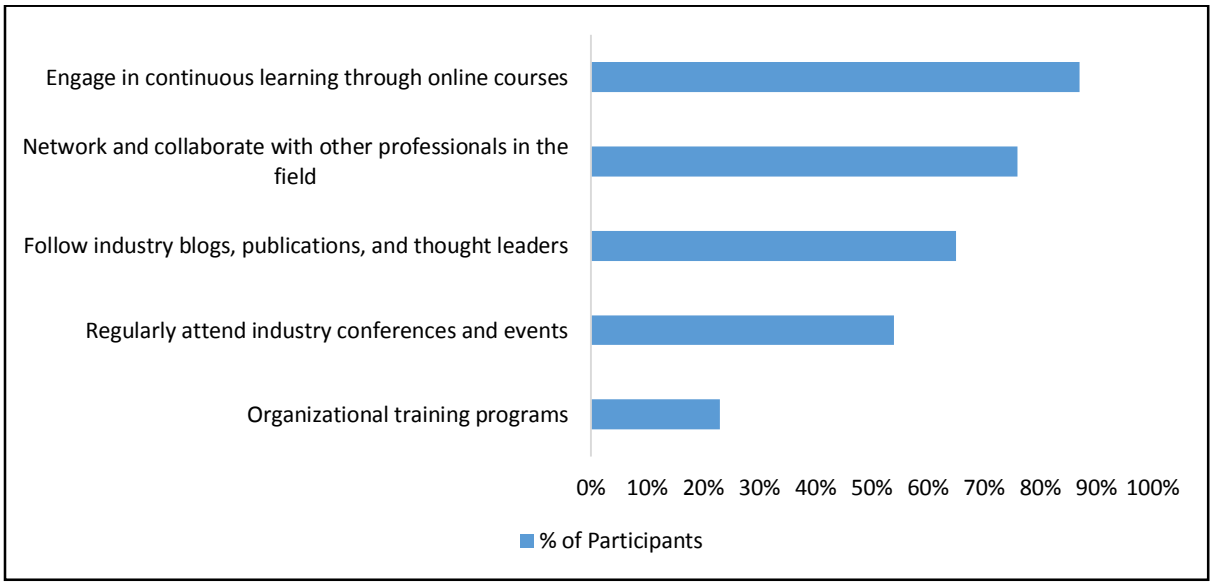

Figure 4.16 Need for training and formal engagement programs

Around 65% of research participants agreed that they follow industry blogs, publications, and thought leaders to update themselves. The main focus was on the formal programs offered by organizations, and it must be noted that it ranked the lowest

in the order with only around 23% of participants agreeing that they learn through the training programs offered by the organization (Mean = 0.47, Standard Deviation = 0.34).

This led to a follow-up question on whether the organization they worked at offered formal training programs to help project managers and team members navigate the change.

Table 4.18 Does organizations provide formal training

Does organizations provide formal training	**% of Participants**
Yes	27%
No	73%

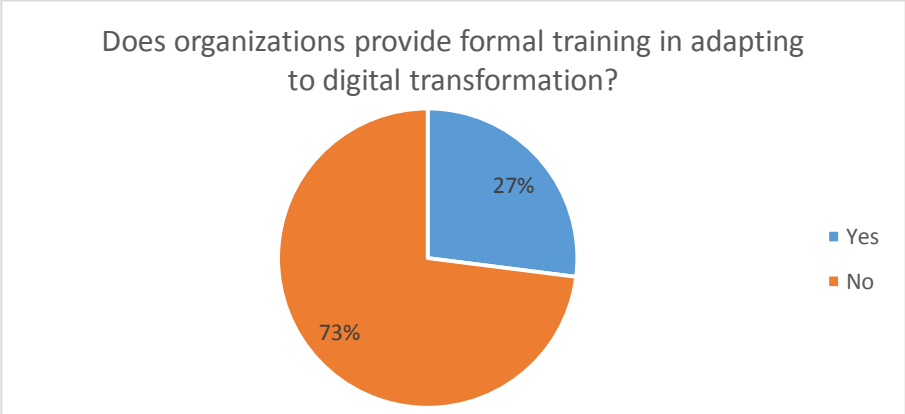

Figure 4.17 Does organizations provide formal training

Almost 27% of the participants answered yes, and 73% responded with a no showing that a majority of organizations do not offer formal training programs to employees in navigating the challenges of digital transformation (Mean = 0.26, Standard Deviation = 0.51). Most of the organizations assume that digital tools are easy to use and employees can learn to use them on their own. But in reality, when businesses offer training programs focused on their core business aspects, employees will find it easy to navigate the change. This is more important for senior managers and employees from rural areas where the scope for digital education and literacy is limited.

4.6 Summary

As mentioned in the previous sections, the main objective of the study is to understand the gap that exists between the skills needed by project managers to navigate digital change and those that they possess currently. I have put forth the subtle details of the sample at the beginning of this chapter followed by an analysis of the demographics.

The findings from the interview conducted with project managers, team members, and C-level executives are summarized by themes. The key findings from the questionnaire survey are also summarized under two important themes, including the impact of digital transformation and the skills and tools needed to achieve digital transformation. I have added quotes from participants at certain points to strengthen the analysis around the themes identified. Doing so helps capture the emotions and feelings in their own terms which in turn adds more value to the study.

The final chapter of the dissertation offers a summary and leads a discussion of the findings based on the themes identified from interviews, surveys, and literature reviews. The potential possibilities for future research are also explored in a broad sense in the next chapter.

CHAPTER V:

DISCUSSION AND CONCLUSION

5.1 Introduction

The research study led to an exploration of the impact of digital technologies on project management, the gaps that persist in the skills possessed by project managers, and the need for training on digital tools and technologies. The study focused mainly on India and the study was primarily motivated by the implications of digital technologies on project management methodologies and the gaps that exist in the available literature. The ground analysis and research primarily depended on the responses from interviews and surveys conducted using a questionnaire. The research questions were primarily articulated based on the findings from the literature. To achieve the main goal of the study, I based my literature review and ground research on five key objectives.

The first step in all the aspects of the research was about understanding the benefits and opportunities that come from digital transformation. The objective helped me investigate the benefits that project managers can gain from implementing digital technologies and opportunities that they should leverage to gain benefits in terms of cost savings and efficiency gains. The second step was about understanding the challenges involved in digital transformation. This objective helped me identify the factors that are hindering the adoption of digital technologies in the project management arena. It must be noted that I started the interview and survey with questions about the intensity of digital adoption in their organization and the challenges they encountered in the process.

The third step in the process was about understanding the key aspects of the competencies and skills possessed by traditional project managers in their endeavor to deliver the project on time within the agreed-upon cost. This objective played a key role in understanding the skills that project managers possess at the moment and served as a

primary input to analyzing the nuances around the next objective. The next step was around understanding the skills needed by project managers to successfully navigate the digital landscape. This step also helped me evaluate the gap that persists between the skills demanded to meet the requirements of modern project management methodologies and that of the traditional landscape. The final and fifth steps revolved around evaluating the need for formal training and support for employees and project managers. Though project managers have their own way of gaining skills and competencies with regard to digital transformation, there is a scope and need for formal training so they get an opportunity to equip themselves with knowledge of industry-specific technologies.

An elaborate discussion of the outcomes of the analysis covering literature review, interviews, and survey questionnaires is undertaken in the previous chapters. In this chapter, I have presented a summary of the results covering the key findings and observations from interviews and surveys, important themes identified as a part of the research, research contributions, and limitations.

5.2 Summary of findings and themes

The literature review shows that digital transformation is a continuous process contrary to the common understanding that it is the sole responsibility of the IT and system department in an organization. Digitalization helps businesses stay ahead of their competitors. The technology also brings about enhancements in terms of cost reductions, productivity improvements, enhanced innovation outcomes, minimized transaction costs, workflow automation, and so on. Studies indicated that though there could be upfront costs in digital transformation, there are potential benefits and advantages in the long run.

Despite the opportunities identified, there are real-time challenges in terms of the pace of digital adoption. COVID-19 accelerated the speed of digital adoption, and this

has challenged implementation in several organizations. The rapid and disruptive nature of digital technologies makes it hard for organizations to stay updated with the pace of evolution. Also, finding a skilled workforce with digital competencies also remains a challenge for businesses. While implementing digital transformation, organizations experience resistance from employees. As employees who have been with the organization get comfortable with the existing system and processes, they exhibit resistance to digital transformation initiatives. As customers and users have far more access to markets, businesses endure a higher scale of competition in scaling their business. Specifically in project management, digital technologies have the potential to enhance the speed of project delivery and strengthen collaboration between different team members.

The literature review also shows that digital technologies pave the way for informed business decisions as they have the power to record and document accurate information and data than manual methods. The studies show that there is a huge gap in terms of the skills required for project managers and those possessed by them. Yet, the literature is limited in terms of offering a detailed framework for managers presenting the solution for each of the challenges they endure.

After the literature review, I conducted interviews with project managers, team members, and top-level executives from several leading firms in India. The findings from the interview and the questionnaire suggest that project managers endure struggles due to a rapid shift in their roles and responsibilities, comprehending the evolving technologies and adapting to them. While there is a broader understanding of the benefits and importance of digital transformation, they endure a lot of challenges in navigating the change, including time investment, steeper learning curves, and accelerated adoption of digital technologies.

The stakeholders and research participants agreed that digital transformation offers enormous benefits in terms of enhancing productivity outcomes, competitiveness, and strengthening the collaboration between team members. The main challenge in adopting these tools is that there is a bit of a learning curve and reluctance to learn them due to perceived time investment.

Most participants agree that they depend on informal sources like online courses, networking and forums, industry publications, blogs, thought leaders, and conferences to gain knowledge of the latest technologies and stay relevant in the field. Organizations provide very limited training and there is a need for industry-specific training programs so they can update themselves with industry-centric knowledge and skills. Doing such programs helps impart the knowledge and skills needed to meet specific organizational requirements. Also, the existing programs are very generic and focused on change management and agile project management methodologies, there is a need for training in data analytics, cloud computing, digital tools, remote leadership and collaboration, etc.

The survey that I conducted using questionnaires revealed that participants' willingness to learn and adapt new tools and technologies is the primary skill that project managers must develop to be able to navigate the digital transformation. The project managers must also have problem-solving skills and competencies as well as technological proficiency to leverage the benefits of digital technologies.

Specifically, when I analyze the results of the interviews and online surveys in relation to the demographics, the results indicate that the more experienced and aged professionals find it difficult to adapt to digital transformation. Also, those living in rural and semi-urban areas reported far more challenges in adapting to digital transformation than those living in urban areas and metro cities.

5.3 Research contributions

The research on project management in the digital world contributes to the wide body of knowledge and project management practices. A significant contribution of this study is the deeper and ground insights it offers to the research objective of understanding the challenges, benefits, and skills required in implementing digital technologies in the project management arena. The study has also explored the need for formal training which in turn has the potential to solve a majority of challenges in implementation and scaling. The research also evaluated from interviews and surveys, the skills that project managers possess at present, and the skills needed to achieve successful scaling of digital technologies.

The key contribution of the study is identifying the skills and competencies needed for project managers in the digital transformation context and the need for formal, organizational training concerning digital transformation tools and technologies. It also contributes to project management practices in businesses, where it adds enormous value in identifying the possibilities for digital transformation The study explores the opportunities that lie ahead to scale digital technologies and leverage them in various forms like collaborative mechanisms, automation, enhancing data accuracy, estimating timelines and budgets, and so on.

The results from the findings could help project managers build skills that are relevant and needed to leverage digital transformation and gain more benefits. It helps project managers understand how they can leverage data to generate insights and information that they can use to make quality, impactful decisions when it comes to managing people, projects, and processes. From an organizational point of view, the study indicates the need for a formal training program and framework while scaling digital technologies within an organization. So, the study provides insights into the

process, gaps that exist in the present landscape, and how project managers should enhance the process outcomes using digital technologies. Beyond technical skills, the study has also revealed that collaboration, communication, and soft skills are important to achieve the objectives of the study.

5.4 Assumptions and limitations of the study

The study adds significant information and captures ground reality on the skills needed for project managers to navigate the digital transformation requirements. Delimitation refers to the boundary determined by the researcher to narrow down the project objectives so as to contain the study within the desired time frame and budget. In that case, the study has certain limitations when it comes to generalizing the findings from the study. The sample is small so it may not be possible to generalize the findings to represent all the project managers in the country. Also, the methodology I have followed is purely qualitative while a combination of qualitative and quantitative methods would have added more insights and value to the research. Several aspects were considered while evaluating the methodologies and I arrived at the qualitative methodology as it helps understand and process the information collected through interviews and surveys that served as the primary elements of the study. Yet, while investigating the findings and observations from the interviews and surveys, I observed that some of the findings would have added more value if they had been analyzed through quantitative methods.

I have sorted out this limitation to the extent that I have reported certain results, quantified in the percentage format to augment the theoretical understanding and observation. Also, the study is focused on project management in the IT and software industry and also restricted the country to India. So, it may not be feasible to generalize the findings in terms of other industries and the global scenario. Even in India, given its

size population, and economy, it may not be accurate to generalize the findings gathered from around 150 research participants.

5.5 Scope of further research

While I have organized the study around identifying the skills needed for project managers to achieve digital transformation objectives and the need for formal training from organizations, there is an extended scope for building an implementation framework and execution strategy for both organizations and project managers. Also, the study could be extended to cover research participants from other industries because project management has moved beyond the fringes of IT and software industries towards other broad industries. Also, the study can be extended to apply quantitative methods to analyzing the results and findings as it would help add deeper insights and analytical information to the body of research. Finally, I recommend that the study be ctime period to cover more facets and add more depth to the findings.

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APPENDIX A - QUESTIONS

A1. Interview questions

Research primary question 1: What are the skills needed for project managers to navigate the changes due to digital transformation?
Sub-question 1.1: In your experience, what are the potential obstacles or barriers that project managers might encounter during digital transformation initiatives?
Sub-question 1.2: How important is it for project managers to have a strong understanding of emerging digital technologies relevant to project management?
Research primary question 2: What are the tools that organizations are using to drive digital transformation? How effective is their adoption?
Sub-question 2.1: What are the new tools that you are using post-digital transformation, say post-2021?
Sub-question 2.2: What additional digital tools or technologies would you like to see implemented in project management processes?
Research primary question 3: How can organizations support project managers in developing the skills required for successful digital transformation in project management?
Sub-question 3.1: How do you stay updated and informed about the latest trends and advancements in digital technologies relevant to project management?
Sub-question 3.2: Does your organization provide training and development to help you adapt to the requirements of digital transformation? If so, what kind of training?

A2. Questionnaire

Impact of digital transformation on project management

Name: Date:
Organization:
Designation:
Gender:
Highest Education degree:
Experience:

1. How long have you been working as a project manager?
a) Less than 1 year
b) 1-3 years
c) 3-5 years
d) 5-10 years
e) More than 10 years

Impact of digital transformation

2. How would you rate the level of digital transformation in your organization's project management processes?
a) Not at all
b) Limited
c) Moderate
d) Significant
e) Fully digitized

3. How has digital transformation impacted the efficiency of your project management processes?
a) Improved significantly
b) Improved moderately
c) No significant impact
d) Declined moderately
e) Declined significantly

4. Have digital tools improved the accuracy and accessibility of project data?
a) Yes, significantly
b) Yes, moderately
c) No significant impact
d) No, it has led to more challenges
e) Not applicable (we don't use digital tools)

5. How has digital transformation influenced collaboration and communication among project team members?
a) Improved collaboration and communication significantly
b) Improved collaboration and communication moderately
c) No significant impact
d) Hindered collaboration and communication moderately
e) Hindered collaboration and communication significantly

6. To what extent has digital transformation enabled remote or distributed project management?
a) Enabled fully remote/distributed project management
b) Enabled partially remote/distributed project management
c) No significant impact
d) Hindered partially remote/distributed project management
e) Hindered fully remote/distributed project management

7. How has digital transformation affected project planning and scheduling?
a) Improved significantly
b) Improved moderately
c) No significant impact
d) Declined moderately
e) Declined significantly

8. How has digital transformation influenced the ability to track and manage project costs and budgets?
a) Improved significantly
b) Improved moderately
c) No significant impact
d) Declined moderately
e) Declined significantly

9. Has digital transformation enhanced the overall success rate of projects in your organization?
a) Yes, significantly
b) Yes, moderately
c) No significant impact
d) Declined moderately
e) Declined significantly

10. Overall, how would you rate the impact of digital transformation on project management in your organization?
a) Very positive
b) Positive
c) Neutral

d) Negative
e) Very negative

Skills and Tools Needed to achieve digital transformation

11. Do you believe that current project managers possess the ability to effectively communicate and engage stakeholders throughout the digital transformation process?
a) Yes, they are highly effective
b) Moderate, they are in the middle ground and there is scope for improvement.
c) No, they are not there yet.

12. In your experience, what are the potential obstacles or barriers that project managers might encounter during digital transformation initiatives? (Select all that apply)
a) Resistance to change from team members
b) Lack of technical skills among project team members
c) Inadequate resources and budget constraints
d) Integration challenges with existing systems and processes
e) Security and data privacy concerns
f) Other (please specify)

13. In your opinion, what are the key skills needed to navigate digital transformation in project management? (Select all that apply)
a) Technological literacy and proficiency
b) Adaptability and willingness to learn new tools and technologies
c) Data analysis and interpretation skills
d) Strong communication and collaboration skills
e) Change management and leadership abilities
f) Strategic thinking and problem-solving skills
g) Project risk management and cybers0065curity knowledge
h) Other (please specify)

14. How important is it for project managers to have a strong understanding of emerging digital technologies relevant to project management?
a) Very important
b) Moderately important
c) Somewhat important
d) Not very important
e) Not applicable (no digital technologies used)

15. What digital tools or technologies are currently being used in your project management processes? (Select all that apply)
a) Project management software
b) Cloud-based storage and collaboration tools

c) Virtual communication and conferencing tools
d) Task management and collaboration platforms
e) Data analytics and reporting tools
f) Other (please specify)

16. How do you stay updated and informed about the latest trends and advancements in digital technologies relevant to project management?
a) Regularly attend industry conferences and events
b) Engage in continuous learning through online courses and webinars
c) Network and collaborate with other professionals in the field
d) Follow industry blogs, publications, and thought leaders
e) Other (please specify)

17. Does your organization provide training and development to help you adapt to the requirements of digital transformation?
a) Yes, they do provide.
b) No, they don't provide.

18. Overall, how confident do you feel in your ability to navigate digital transformation in project management?
a) Very confident
b) Confident
c) Somewhat confident
d) Not very confident
e) Not applicable (no digital transformation observed)

APPENDIX B - INTERVIEW PROTOCOL

Interview: Impact of digital transformation on project management

I begin the in-person and virtual interviews with a brief introduction to the purpose and objectives of the study. I outline the topic of research and the significance of the study.

Following is the protocol I follow for the study.

A. In the beginning, I send an email requesting participation in the study and explain the significance of the participant's value add.
B. If they respond, I thank them for consenting to be a part of the study.
C. I elaborate on the usage of data collected and guarantee the confidentiality of the personal data collected during the study.
D. I request 30 minutes of interview time and decide on a virtual and physical location based on the convenience of the participant. The time schedule is also decided based on mutual convenience.
E. I request the participant's consent for the interview to be recorded and let them know that I will record the meeting only if they give consent.
F. In case they agree to be recorded, I announce the participant when I begin to record. But none of them agreed to being recorded.
G. The interview lasts for 30 minutes, and I ask 5 primary questions. The questions are open-ended and based on the flow of discussion, I change the order of questions and take follow-up questions whenever needed.
H. I thank the participant and leave the space.
I. I prepare the transcript of the data right after the interview, so I don't lose out points or track of the discussion. I also seek verification of the transcript to ensure the accuracy of the data collected.
J. Once the participants confirm the data collected, I send a thank you note and acknowledge their participation in the study.

APPENDIX C - EMAIL TEMPLATE

Subject: Requesting your kind participation in the academic study on the "Impact of digital transformation on project management."

Email body:

I am Hitesh Bedi, working as Head IT P&S at Cinepolis India. I am doing my Ph.D. from Swiss School of Business and Management, Geneva. My doctoral thesis is on studying the impact of digital transformation on project management.

The objective of the study is to understand the challenges that project managers endure in the digital era, identify the skill gap that persists between what project managers possess and what they are expected to have, and the need for training and education. The study involves qualitative methodologies and as a part of it, I am doing semi-structured interviews with project managers from different organizations.

From the primary survey of available literature in this space, I could conclude that there is no solid study that has identified the skill gap and the need for training project managers. Your contribution to the study will add enormous value to the objective of the study as well as to the project management arena at the global level.

The interview will last for around 30 minutes and the primary questions are as follows:

A) What are the skills needed for project managers to navigate the changes due to digital transformation?
B) What are the tools that organizations are using to drive digital transformation? How effective is their adoption?
C) How can organizations support project managers in developing the skills required for successful digital transformation in project management?

I will elaborate more on the structure of the interview and the intricate details of the questions once I receive your acceptance of the study.

Looking forward to hearing from you.

Thank you
Hitesh Bedi

APPENDIX D - CONSENT FORM

Project Title: Impact of digital transformation on project management

Principal Details:

[Name]

[Address]

[Phone]

[Email]

Purpose of study:

I request your participation in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please read the following information carefully. Please ask the researcher if there is anything that is not clear or if you need more information.

The purpose of this study is to understand the challenges that you face in the midst of the digital revolution and understand the skills that project managers need to navigate digital transformation.

Study procedure and purpose:

The methodology of the study is of two folds. As a first step, we do a literature review to understand the existing studies that focus on the scope of digitalization, challenges of digitalization, the impact of digitalization on project management, traditional project management methodologies, modern methodologies, skills needed for project managers, and need for training and education.

After completing the literature review, I do a qualitative analysis where I conduct semi-structured interviews. The interviews are usually conducted for 30 minutes, and I have 6 questions that I will ask you. The questions are focused on three main topics- skills needed for project managers to navigate the changes due to digital transformation, potential obstacles or barriers that project managers might encounter during digital transformation initiatives, and how can organizations support project managers in developing the skills required for successful digital transformation in project management.

I am open to doing, either a one-on-one interview at a physical location or a virtual interview. The interview will last for 30 minutes and if you prefer virtual meetings, then the discussion will be scheduled over a Zoom call. Upon your consent, the interview will be recorded so the researcher does not lose track of the information and data you provide. This is purely to enhance the quality of analysis and research. If you do not agree to be recorded, the researcher will make only notes during the meeting and use the same for analysis. Right after the meeting, the researcher will prepare a transcript of the data collected during the meeting with you. It is up to you to read through the information and ensure the accuracy of the data collected.

Risks

You may decline to answer any or all questions and you may terminate your involvement at any time if you choose.

Benefits

There will be no direct benefit to you for your participation in this study. However, we hope that the information obtained from this study may serve the overall project management community to evolve from the challenges it is currently facing due to disruption from digital technologies.

When applicable, disclose alternative procedures or courses of treatment, if any, which might be advantageous to participants.

Confidentiality

Your responses to this study will be anonymous and the personal data will be kept confidential. If you seek anonymity, the researcher will make sure that your comments are kept anonymous. However, the data relevant to the objective of the study, collected during the interview will be presented as a part of the study.

Contact information

If you have questions at any time about this study, or you experience adverse effects as a result of participating in this study, you may contact the researcher whose contact information is provided on the first page.

Voluntary participation

Your participation in this study is voluntary. It is up to you to decide whether or not to take part in this study. If you decide to take part in this study, you will be asked to sign a consent form. After you sign the consent form, you are still free to withdraw at any time and without giving a reason. Withdrawing from this study will not affect the relationship you have, if any, with the researcher. If you withdraw from the study before data collection is completed, your data will be returned to you or destroyed.

CONSENT FORM

I have read and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

Participant's signature _____ Date _____

Name:

Designation:

Organization: