

Leadership, strategic alignment and perceived digital operational efficiency: Evidence from middle level managers in India

Tamal Chakravarty

Research Scholar, Strategic Management, Indian Institute of Management (IIM), Ranchi, India

*Correspondence: tamal_chakravarty@yahoo.com

Abstract

Technology investment alone does not reliably improve operational performance, and the roles of leadership and strategic alignment in converting digital initiatives into efficiency gains have rarely been examined together. Drawing on the resource-based view, dynamic capabilities theory, and strategic alignment theory, this study examines how leadership approaches and behaviours and strategic alignment between digital and organisational strategies relate to perceived digital operational efficiency, covering process velocity, cost savings, error reduction and productivity. A structured questionnaire was administered to 100 middle level managers in manufacturing, information technology, services and retail organisations in India, and responses were analysed in SPSS using multiple regression, correlation and one way analysis of variance. Four leadership behaviours jointly explained 62.4% of the variance in the outcome measure ($R^2 = .624$, $p < .001$). Clear communication of digital goals was the strongest positive predictor, while two other leadership items carried negative coefficients that warrant caution because predictors may overlap. Leadership guidance was positively correlated with digital vision alignment ($r = .434$), and vision alignment with strategy review and adaptation ($r = .601$). Managers who differed in their perception of leadership communication of a digital vision also differed significantly on all four efficiency outcomes (η^2 from .283 to .676) and on cross departmental collaboration and strategy review. Because the design is cross sectional, perceptual, self reported and based on a purposive sample, the findings indicate associations rather than causal effects. The study suggests that organisations should treat clear leadership communication and strategic alignment as complements to technology adoption.

Keywords: Digital Transformation, Digital Leadership, Strategic Alignment, Digital Operational Efficiency, Dynamic Capabilities, Resource Based View, Emerging Economies, Middle Managers

JEL Classification: M15, O32, O33

1. Introduction

Organisations all over the world are increasingly deploying advanced technologies including Artificial Intelligence (AI), cloud computing, and big data analysis with the aim of achieving operational efficiency (OE) (Aldoseri et al., 2023; Imran et al., 2021). Nevertheless, considerable expenditures on digital technologies do not guarantee better organisational performance showing that adoption of technology itself is not enough for successful digital transformation (DT) (Alliou & Mourdi, 2023; Vaz, 2021). Digital transformation success is dependent not only on technological factors but also on organisational capabilities including leadership practices and strategic alignment (SA) (Omol, 2024). The importance of leadership is especially relevant due to the fact that DT is associated with organisational change, innovation, risk management, and adaptation of employees. While the contribution of leaders to facilitating DT has been well recognised by the prior literature, there are still some questions about leadership approaches and behaviors that can ensure successful transformation outcomes (Tortorella et al., 2023). Leaders have to reconcile innovations and risks, overcome resistance to change, and steer employees toward the goals of the organisation (Kokot et al., 2021). The inappropriate adaptation of leadership practices to digital environment can hinder the pace of transformation and lower its expected efficiency (Jedynak et al., 2021). In addition, digital efforts should be properly aligned with the goals of the organisation. Inefficient SA can lead to fragmentation of digital initiatives, insufficient stakeholder engagement, ineffective use of resources, and inability to meet organisational needs (Bican & Brem, 2020; Van Veldhoven & Vanthienen, 2022). As such, DT is not merely about implementation of individual technologies but also involves organizational change concerning structure, process, decision-making, and resource management. From the process point of view, the value of DT can be seen in more efficient process execution, cost savings for operations, fewer errors, increased productivity of employees, and quicker response time. The aforementioned technologies can contribute to achieving the above-mentioned value through process visibility, faster information flow, less need for human intervention, and quicker decision-making. To achieve the benefits mentioned, however, it is important that digital initiatives are backed by leadership and strategy.

The connection among leadership, SA and digital OE can be established via the framework of RBV and DCT theories. According to the RBV theory, the creation of value from the digital resources is possible because of complementary human and strategic capabilities (Barney, 1991), and DCT highlights the significance of being able to sense, seize and reconfigure the resources based on the changing environment (Teece et al., 1997). In such a way, leadership can contribute to these processes, and SA will relate digital actions to the organisational goals. Thus, SA is positioned as the mediating process linking leadership initiatives and digital OE. While previous research has considered the relationship between leadership and DT performance (Tortorella et al., 2023) and SA and digital success (Bican & Brem, 2020), the combination of both concepts regarding specific operational outcomes has been neglected so far. This research gap seems

important since leaders play an essential role in alignment through vision, communication, and coordination, and SA brings these activities together with organizational goals (Culot et al., 2020). In this context, the current study aims at investigating the impact of leadership and SA on digital operational efficiency. The study is based on the perspective of Digital Leadership (Benitez et al., 2022; Jardak & Ben Hamad, 2022), SAT ((Venkatraman et al., 1993), and multi-level leadership (Erhan et al., 2022). Overall, the perspectives mentioned above form the theoretical background for investigating the interplay of leadership, strategic coordination, and digital initiatives at various organizational levels (Erhan et al., 2022). Therefore, the current study consider the four main operational outcomes such as process velocity, cost reduction, error rate, and productivity and will analyze the organizational practices and problems in terms of leadership and SA for the sake of digital operational efficiency. This study aims to achieve the following objectives:

1. To examine the influence of leadership approaches and behaviours on digital operational efficiency in the context of digital transformation.
2. To assess the contribution of strategic alignment between digital and organisational strategies to digital operational efficiency.
3. To examine the combined influence of leadership approaches and behaviours and strategic alignment on key digital operational efficiency outcomes, including process velocity, cost savings, error reduction, and productivity.
4. To identify organisational best practices and challenges associated with leadership and strategic alignment in achieving digital operational efficiency.
5. To develop practical recommendations for strengthening leadership and strategic alignment to support digital operational efficiency.

Based on existing literature, the following hypotheses are developed:

H1: Leadership approaches and behaviours significantly influence digital operational efficiency in the context of digital transformation.

H2: Strategic alignment between digital and organisational strategies significantly contributes to digital operational efficiency.

H3: Leadership approaches and behaviours and strategic alignment have a significant combined influence on digital operational efficiency outcomes, including process velocity, cost savings, error reduction, and productivity.

H4: Leadership and strategic alignment are significantly associated with organisational best practices and challenges in achieving digital operational efficiency.

Section 1 introduces the background, research objectives, and the significance of evaluating leadership and strategic alignment within digital transformation. Section 2 reviews relevant

literature covering the Resource-Based View, Dynamic Capabilities Theory, and digital operational efficiency while identifying the research gap. Section 3 outlines the research methodology, including the purposive sampling of 100 middle managers in India, the structured research instruments, and the statistical tools used. Section 4 presents the quantitative results, regression models, correlation matrices, and ANOVA tests. Section 5 provides an in-depth discussion of these empirical findings, and Section 6 presents the study's final conclusions, structural limitations, and recommendations for future research. .

2. Literature Review

2.1 Digital Transformation and Operational Efficiency

DT should not be considered merely as the use of sophisticated digital technology. Rather, it is a comprehensive organisational transformation aimed at restructuring operational systems, managerial practices, communication frameworks, and decision-making structures. Modern enterprises tend to use digital technologies, including AI, cloud computing, automation technologies, ERP, big data analysis, and digital platforms for increasing their flexibility and coordination (Imran et al., 2021). Regarding its application to the operations process, DT entails using advanced digital technologies in performing core business processes to make them faster, accessible, more coordinated, and data-driven. Thus, DT can be seen as a transformative approach to making an organisation structurally different by altering the way operational value is created and delivered (Aljuhmani et al., 2024). The effect of DT on organisational operations is observable from a set of measurable improvements in the dimensions of OE. For example, one of them is increased process velocity due to automated and digital process flows resulting in reduced process time and higher responsiveness within organisations. Moreover, DT increases OE through greater cost efficiency as the result of minimising manual operations, avoiding duplications, cutting down costs related to administrative tasks, and optimising resource allocation. Productivity improvement is another dimension of OE facilitated by DT through providing integrated digital platforms for employees to do their jobs effectively, fast and cooperatively. Error reduction is a further measure that demonstrates the effect of DT because it allows for decreasing operational inconsistency, increasing standardisation, and improving real-time monitoring capacities. Finally, organisational agility as one of the dimensions of OE benefits significantly from DT as the latter allows for constantly adjusting operational strategy and improving internal processes based on the performance data (Westerman et al., 2014a).

DT on its own, however, cannot guarantee increased efficiency. The successful implementation of digital technologies within organisational settings requires effective leadership and the existence of SA. Effective leadership is key in driving digital adoption, overcoming organisational resistance to change, sharing the vision regarding digitalisation and motivating employees towards engaging with the digital processes (Schiuma et al., 2024). At the same time, SA ensures that digital activities are aligned with organisational objectives and strategies. In the absence of an enabling and

supportive environment created by leadership and strategic thinking, digital technologies can only be used in a fragmented manner, thus failing to yield any operational efficiencies. Hence, leadership and SA play an enabling role in converting technological inputs into operational outputs through effective implementation and alignment of the digital activities.

2.2 Strategic Alignment and Digital Operational Efficiency

SA, therefore, entails the degree of coherence and cohesion between the technological initiatives, operational practices, organizational vision, resource utilization, and strategic goals within an organization. In the context of digitally transforming organizations, SA is the assurance that the DTs are coherent and cohesive enough to reflect the organizational needs, operational goals, and future competitive advantage of the organization rather than simply being technological exercises. Thus, SA entails a coherent organizational capability that involves integration of the technological focus, managerial decisions, and organizational performance (Venkatraman et al., 1993).

In DT organizations, SA functions through multiple dimensions. Strategic dimension entails ensuring that the digital initiatives are coherent with the organizational mission, strategic goals, and competitive priorities. Leadership dimension entails enabling the organizational leadership to create and communicate a coherent vision for the DT process, coordinating employee actions towards achieving the DT objectives. Operational dimension entails incorporating the digital technologies and tools within operational practices, management systems, and decision structures. Resource dimension entails the coherent allocation of organizational resources, workforce skills, technological resources, and managerial systems for the DT objectives. The significance of SA can be clearly seen from the impact it makes on organisational performance measures. Alignment positively impacts the coordination of organisational operations, reduces duplications, promotes inter-departmental communication, facilitates decision-making, and helps organisations respond more quickly to changing conditions. In addition, SA positively influences the speed of process flows by increasing workflow consistency and facilitating more rapid information transfer within organisational departments. Moreover, alignment leads to cost savings since resources are used in an optimal way, unnecessary investments are avoided, and better operational plans are developed. Besides, SA reduces the incidence of mistakes in the course of operations due to process standardization, systems integration, and increased control. Finally, organizations with high levels of SA are able to boost their efficiency due to the coordinated effort of all involved parties in achieving organisational goals.

Nevertheless, for SA to be effective, proper support from management and adaptability of the organisation are crucial elements. Indeed, even the most sophisticated digital tools will be unable to help achieve positive results in operations if DT efforts and corporate strategy are not properly aligned, and leadership is not consistent in its communications. As a result, SA operates as a bridging tool that translates DT strategies into concrete operational efficiency through ensuring alignment between technology adoption and strategic/operational initiatives.

2.3 Operationalization of Digital Operational Efficiency

DT in terms of Operational Efficiency (OE) is an indication of the organisation's ability to optimise the performance of its processes and services, efficient use of resources, and coordination and streamlining of activities through the use of information technology and strategic management approaches. While traditional OE has always focused mainly on labour productivity and efficiency, Digital Operational Efficiency (DOE) embraces the ability of an organisation to be responsive using information technology, automating workflows, integrating processes, making decisions in real time, and being agile. OE in the current study has been conceptualised using four important measurable dimensions. These include process velocity, cost efficiency, error reduction, and productivity enhancement. Process velocity involves acceleration of organisational operations and process speeds, time savings, and increases in organisational responsiveness due to DT. The construct evaluated respondents' perceptions regarding improvements in workflow responsiveness, task completion speed, operational turnaround time, and faster execution of organisational processes achieved through digital transformation initiatives. Cost Efficiency was operationalised as a reflective latent construct measured through managers' perceptions of operational cost optimisation achieved through DT. This construct consists of three sub-dimension such as, reduction in operational costs, activity duplications, resource wastage, and administration costs as a result of SA and DT. Both of these constructs were measured using 5-point Likert scale.

Error Reduction was measured using managers' perceptions regarding improvements in operational accuracy and workflow consistency after digital transformation implementation. It includes organisational accuracy improvements, workflow consistency, process reliability, and standardisation through the use of digital technologies. It is evaluated reductions in operational failures, communication gaps, process inconsistencies, and manual errors through digitally integrated systems. Productivity improvement, on the other hand, consists of organisational performance and efficiency gains as a result of implementing digital technologies.

The selection of the identified dimensions is based on their measurability and importance in evaluating operational efficiencies that are brought about by DTs within the organisation. A multilevel approach towards OE offers an advantage in evaluating digital operational efficiencies beyond a single measure of efficiency. In addition, this approach facilitates the interpretive capacity of the findings by connecting DT, digital strategies, and leadership practices with specific organisational outcomes.

2.4 Leadership Approaches in DT

Leadership is one of the key determinants that can shape DT success because it affects organizational flexibility, involvement of employees, coordination, and implementation of technology. Leadership in a digitally transformed organization goes well beyond management and embraces more guidance in technology implementation, change management, communication of digital vision, and linking operations with organizational strategy. Various leadership styles affect

the outcome of DT differently, hence the need to classify different leadership styles in the theory. Transformational Leadership can be said to be one of the most prominent styles of leadership in DT environments owing to its focus on visioning, motivating employees, fostering innovations, and managing changes. Transformational leaders encourage digital innovation among employees, help organizations learn from digital processes, and cope with the change associated with digitalization. Such a style of leadership fits well into RBV) because it stresses the building intangible organizational capabilities like innovation culture, knowledge, and commitment among employees (Dióssy et al., 2025). The transactional form of leadership revolves around performance monitoring, control of operations, task completion, and alignment with the goals of the organisation. In the context of DT, the transactional form of leadership helps ensure process standardisation and operational discipline in the implementation of digital systems. Transactional leadership, although more focused on control compared to transformational leadership, is not an innovation-driven form of leadership (Qiao et al., 2024).

The essence of adaptive leadership lies in organizational flexibility, sensitivity to changes in the environment, and managing uncertainties in changing business settings. In DT, adaptive leadership encourages learning and making adjustments quickly depending on changes in technology. Adaptive leadership fits with the concept of DCT as it ensures flexibility and strategic readiness in constantly changing organizational capabilities in a digital environment. However, digital leadership can be defined as one of the types of leadership where the leaders rely on technological knowledge when making strategic decisions. Digital leaders are those who leverage digital technologies into the organizational operations, innovate using the use of technology, collaborate with different organizational departments, and make data-driven decisions. The significance of digital leadership can be seen in terms of attaining DOE (Benitez et al., 2022). All leadership styles mentioned above complement each other in the process of ensuring digital transformation through the creation of organizational culture, flexibility of workers, strategic alignment, coordination, and efficient use of technology. For this study, the researcher will use the multi-dimensional approach to understand the role of leadership styles in facilitating SA and DOE in digitally transforming firms. Table 1 provides an overview of the key variables that will be examined to determine how leadership styles influence strategic alignment to ensure DT through improvements in operational speed, cost reductions, precision, and employee efficiency.

Table 1. Operationalization of Study Constructs

Construct	Dimension	Operational Definition	Measurement Focus
Leadership Approaches	Transformational, Transactional, Adaptive, Digital Leadership	Leadership capability to guide digital transformation, communicate digital	Vision communication, employee empowerment, change

		vision, support technology adoption, and align operational activities with strategic objectives	facilitation, strategic guidance, technology support
Strategic Alignment	Strategic Consistency, Leadership Alignment, Operational Integration, Resource Coordination	Degree of alignment between digital initiatives, organisational objectives, operational workflows, and business strategy	Alignment of DT initiatives with operational goals, workflow coordination, strategic integration
Process Velocity	Workflow Responsiveness	Improvement in operational speed and responsiveness through digital integration	Faster task completion, workflow execution speed, operational responsiveness
Cost Efficiency	Resource Optimisation	Reduction in operational inefficiencies and resource wastage through digitally enabled processes	Reduced operational costs, lower redundancy, improved resource utilisation
Error Reduction	Operational Reliability	Reduction in workflow inconsistencies and operational inaccuracies through digital systems	Fewer process failures, improved standardisation, reduced communication gaps
Productivity Enhancement	Workforce Effectiveness	Improvement in employee efficiency and operational output through digital transformation	Improved task efficiency, workflow coordination, operational output
Digital Operational Efficiency	Integrated Operational Performance	Organisation's ability to achieve operational responsiveness, coordination, automation,	Process optimisation, agility, coordination, digital workflow integration

and performance through
digital capabilities

2.5 Theoretical Background

Leadership, strategic management, and DT form an interesting area of Theoretical Background for study. The meeting point between leadership, strategic management, and DT provides a complete platform for understanding the processes involved in making an organisation makeover through complicated environments in order to achieve OE and competitive advantage. This Theoretical Background will focus on the basic theories of strategic management, their significance in leadership and organizational planning, and their applicability in DT.

2.5.1 Resource-Based View (RBV)

RBV assumes that tangible and intangible resources within organisations are important for gaining competitive advantage. The theory implies that organisations that are capable of successfully exploiting their unique resources and capabilities have high chances to prosper in their markets. Considering DT, organisations are encouraged to innovate their resources and capabilities in order to respond to customers' changing demands and innovations. The importance of leadership in RBV consists in creating such environment within organisations where optimising and improving resources and capabilities is seen as key priorities for the company. Thus, leaders who stimulate continuous learning, teamwork and agility can contribute to optimising organisation's resources. Thus, SA between the leadership's efforts and resource management will help reach OE in the end.

2.5.2 Dynamic Capabilities Theory

The DCT posits that firms should develop and redevelop their competencies in light of a constantly evolving environment. According to DCT, it is vital to be capable of identifying both the opportunities and the threats, taking advantage of them, and developing organizational capabilities in order to remain competitive. Dynamic capabilities in DT involve the firm's ability to adapt itself to technological changes and implement new technologies in its strategy. As such, when it comes to digitally transforming organizations, the efficiency of processes depends on their ability to adapt, integrate digital technologies into operations, and coordinate activities. In turn, DOE differs from efficiency theories in that it emphasizes constant digital integration, adaptability, and optimization, unlike traditional efficiency, which is viewed solely as productivity or cost-efficiency. Efficiency in an organisation going through digital transformation depends on its ability to integrate technology into the operational processes in such a way that makes it adaptable and responsive. This is why Digital Operational Efficiency is distinctively different from efficiency in that while efficiency depends on productivity alone, the former is technology-oriented. It is necessary to have effective leadership to create an enabling environment for digital innovations and organisational adaptation. The leaders must provide their teams the space to experiment with digital technologies, be comfortable with organizational changes and continue learning

strategically focusing on goal alignment with those of the organization. Digital Operational Efficiency can be achieved through dynamic capability and digital strategy alignment, process agility, workflow integration, technological coordination, and optimisation.

2.5.3 Stakeholder Theory

The theory of Stakeholder argues that businesses need to take into consideration the needs of all their stakeholders, which include customers, employees, suppliers, and community. The theory stresses the significance of having proper relations with different types of stakeholders in order to attain sustainable results. As we enter the digital age, it is vital for leaders to be more attentive towards their stakeholders in order to successfully develop a business model and digital tools. Properly managing stakeholder relations contributes significantly to increasing SA and promoting inclusiveness of DT.

2.5.4 Strategic Alignment and Long-term Planning

SA refers to the process by which resources and actions are aligned with the strategy of an organization. Organizations need to evaluate and change their strategies to adapt to the constantly changing digital environment. SA involves a critical role played by leadership since it creates a context for focusing on strategic objectives and utilizing available resources. Long-term organizational planning requires predicting future scenarios, potential risks, and developing strategies to cope with uncertainties. Applying the basic theory principles to develop an approach that integrates DT into organizations will allow considering both efficiency and strategic aspects of this transformation. Table 2 presents the operational and methodological framework that outlines the variables used in this study. This also defines variables' meaning and measurement scale.

Table 2. Identification of variables

Variables	References	Operational Definition(s)	Unit of Analysis	How are the identified variables measured	Scales of Measurement
Leadership Styles	(Dióssy et al., 2025)	1) Task-oriented LS: Focus on tasks and goals. 2) Relationship-oriented LS: Focus on team dynamics and support.	Firm, Country	Surveys assessing leadership effectiveness and employee feedback.	Likert scale (1-5 or 1-7) for LS perceptions

Variables	References	Operational Definition(s)	Unit of Analysis	How are the identified variables measured	Scales of Measurement
(DL)	(Qiao et al., 2024)	1) Promotion of digital initiatives. 2) Facilitation of employee engagement with digital tools.	Firm, Country	Surveys measuring leadership effectiveness and employee outcomes in digital settings.	Likert scale (1-5 for performance, 1-7 for commitment)
DT	(Yu et al., 2022)	1) Adoption of digital technologies. 2) Improvement in business processes due to digital tools.	Firm	Metrics such as adoption rates, efficiency improvements, and performance indicators.	Ordinal and continuous metrics depending on context
(OP)	(Dióssy et al., 2025) (Yu et al., 2022)	1) Efficiency metrics (e.g., production rates). 2) Quality measures (e.g., defect rates).	Firm	Quantitative measures such as KPIs, financial metrics, production statistics, and customer satisfaction ratings.	Continuous scale for efficiency metrics and ordinal scale for quality measures (e.g., rating scales for customer satisfaction)

2.6 Research Gap

Despite numerous contributions to research on individual factors affecting DT success, much less work has been devoted to how individual factors can interact with each other. The findings of (Dióssy et al., 2025) and (Qiao et al., 2024) make an effective point in terms of identifying the main factors that influence DT and organisational performance. As shown in the findings of (Dióssy et al., 2025), task-oriented leadership positively influences the OP achieved via DT implementation. Similarly, the study of (Qiao et al., 2024) shows the contribution of digital leadership to the improvement of performance and commitment of employees. Together with the

findings of (Benitez et al., 2022) and (Shin et al., 2023), it becomes clear that leadership plays a significant role in innovation creation and sustainable performance in the digital world.

Despite obvious relevance and importance of these studies' conclusions, they remain disconnected from other factors. Namely, they highlight a close interaction between leadership and technology but pay no attention to its strategic aspect. While (Dióssy et al., 2025) explore how DT mediates the relationship between leadership styles and OP, they ignore the role of SA. Further, while (Yu et al., 2022) prioritise the significance of DT capability and its effect on organisational OP as well as identify strategic orientation as an important antecedent, they fail to consider whether combining leadership and SA can help strengthen the digital effect. This is a particularly crucial point since the lack of strategic orientation may result in wasted efforts and resources and the absence of a response to core business challenges. The requirement for an integrative approach is also reflected in studies like (Khalayleh et al., 2024), where the role of leadership and organizational culture in DT has been emphasized. Despite recognizing the role of leadership in the adoption of DT, it does not consider the importance of SA in realizing OE. An integrative model seems conspicuously absent for the more complex topic of digital OE. This study aims to fill the gap left behind by previous studies because they only considered one independent variable at a time. Even if prior literature recognizes the significance of both variables – leadership and technology – the interrelationship between them has been left as a "black box."

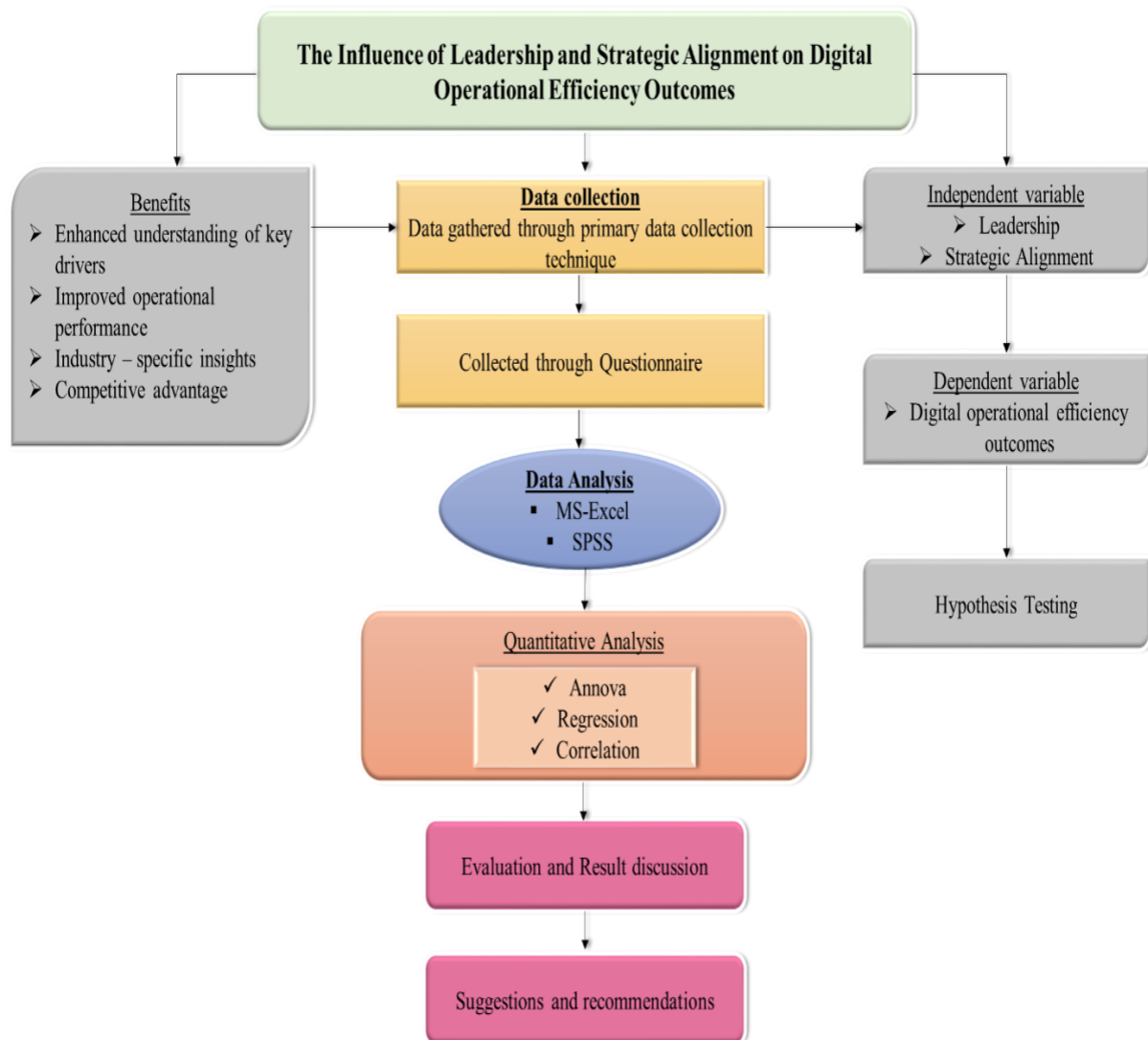
3. Methodology

3.1 Research Design

For this study, the quantitative approach is employed, which involves testing the validity of the theoretical model introduced in Section 2.1. This method allow exploring the interactions among leadership style, SA, and outcomes of digital operational effectiveness (OE) based on RBV, DCT, and ST (Mohajan, 2020). Structured surveys were completed by 100 managers of varying ranks in India. With the help of this design, we can be able to conduct a detailed investigation of the suggested links between the discussed constructs, making it possible for us to analyze the fundamental assumptions derived from theoretical sources (such as the role of leadership in creating dynamic capabilities and resource improvement for achieving digital OE). While the described cross-sectional design is effective in uncovering relations at one particular point in time and providing an empirical basis for the theoretical propositions under investigation, it is vital to acknowledge its main limitation – inability to determine any definite causation in relation to temporal or directional effects (like, for example, whether leadership affects OE or vice versa). All collected data analyzed using correlational, regression and ANOVA techniques via SPSS software. The use of such a methodology allows filling the gaps in current theoretical knowledge through obtaining contextualized and evidence-based findings that can be helpful to practitioners when improving digital operational effectiveness in SA and good leadership in developing countries

such as India, along with validating and expanding the application of RBV, DCT, and Stakeholder Theory in DT. The overall research design depicted in Figure 1.

Figure 1. Research Design



3.2 Study Area

To enhance the local relevance and applicability of our findings, this research was conducted in India where primary data collected from 100 middle-level managers across diverse organisations. This focus ensures that our aims are highly consistent with the specific organisational structures, leadership actions, and strategic approaches prevalent in Indian companies. While this concentrated approach simplifies data gathering and enhances the contextual validity of the insights within the Indian business environment, it also means that the external validity of the findings may be limited. Given the high heterogeneity in global DT practices, our results may not

directly transfer to other cultural, geographical, or industrial contexts. Nevertheless, this focused method allows us to specifically address the dynamic nature of DT and OE within the Indian context, offering actionable, contextually relevant insights for researchers and practitioners (Pandey & Pandey, 2021). To improve transferability, the present study: (a) gathered samples from manufacturing, IT, services, and retail sectors; (b) accounted for organizational tenure to reduce bias from experience; (c) cross-verified self-reports with archival data (e.g., company digital maturity indices) when possible. Although the results focus on Indian emerging-economy settings, the theoretical processes (e.g., leadership-alignment synergy) correspond with global DT models (e.g., (Westerman et al., 2014a)), indicating partial relevance to analogous institutional contexts.

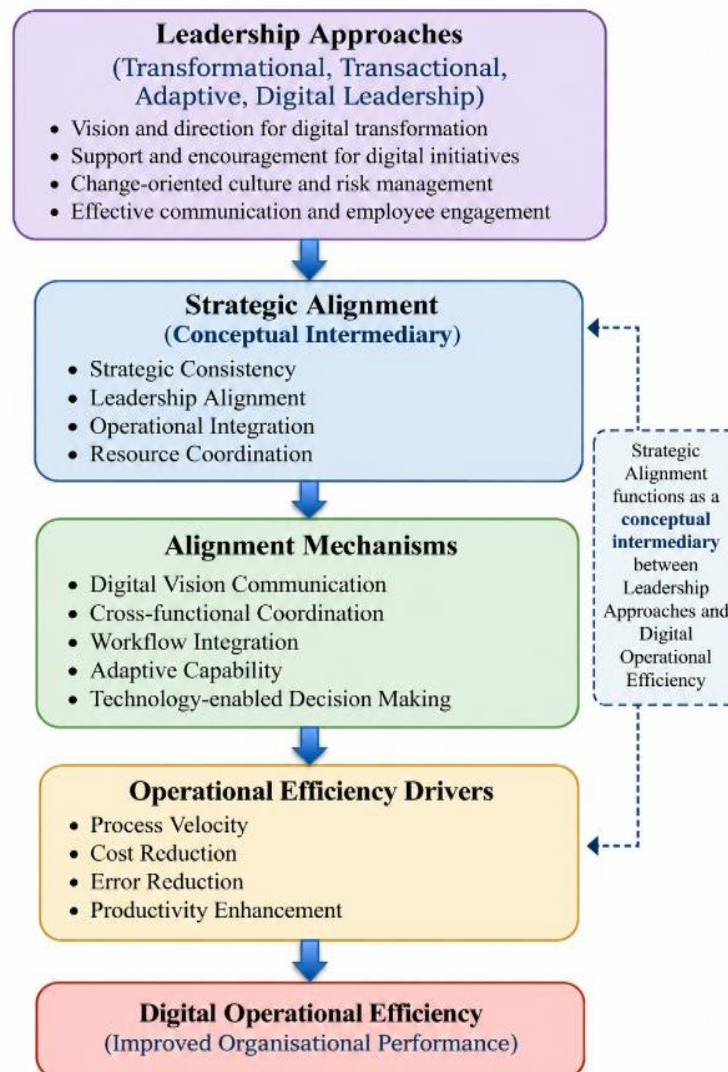
3.3 Sampling Techniques

Recognizing that sampling is crucial for obtaining data representative of a targeted population (Stratton, 2021), this research adopted a purposive sampling technique to select participants. We aimed to include managers who were both willing and capable of providing accurate and thoughtful responses to the survey. This method was chosen to ensure that the collected data directly supported the research's objectives, particularly in understanding the perceptions related to leadership and SA's influence on digital OE outcomes (Etikan et al., 2016). The study was conducted through a sample size of 100 mid-level managers from companies operating in the manufacturing, information technology, services and retail industry in India. Purposive sampling strategy was applied in this research where respondents were chosen on the basis of their significance to the research and their experience in digital transformation initiatives in their organizations. Amongst those organizations that participated in the research, managers who had considerable experience of leadership practices, strategic alignment and digital transformation were approached to participate. However, it is important to acknowledge that purposive sampling introduces a potential of selection bias. By only including managers willing and able to respond, the sample may be skewed toward individuals more positively inclined toward DT or more engaged with these concepts, potentially limiting the representativeness of the findings.

3.4 Conceptual Framework

Figure 2 shows the conceptual linkage between the leadership approach, strategic alignment (SA), alignment mechanisms, efficiency driver, and digital operational efficiency (DOE). The leadership approach can act as the source of direction and enable digital transformation, while SA acts as the intermediary concept linking leadership initiatives with organizational focus. SA acts as an intermediary concept between the two leadership theories and the DOE. SA serves to connect leadership intentions and their execution via the use of alignment mechanisms, including digital vision communication, cross-functional coordination, workflow integration, adaptability and decision-making capabilities through technology. These processes eventually result in operational efficiencies that include process velocity, cost reduction, error reduction, and productivity improvement, leading to digital operational efficiency.

Figure 2. Conceptual Framework



3.5 Research Instruments

To ensure content validity, questionnaire items were refined through expert evaluation and an extensive review of existing literature. The survey instrument adopted a 5-point Likert scale structure due to its established reliability in measuring organisational attitudes and perceptions (Joshi et al., 2015). A Likert-type scale was used in this study for five categories. The measurement scale had ratings ranging from 1 “strongly disagree” to 5 “strongly agree”. The design of these Likert-scale items was based on established tools used in leadership and digital change research. Regarding leadership approaches, (SA), (DT) and (OE). Leadership items were taken from (Avolio

et al., 1999), whereas SA indicators were adopted from (Venkatraman et al., 1993). Items for DT and Operational Efficiency were based on the studies conducted by and (Westerman et al., 2014b). The survey questions assessed how much the digital efforts were aligned with organizational goals, operational processes, coordination within departments, and business priorities. These were rated on the basis of Likert scale items for assessing aspects like clear communication, process integration, digital strategy adaptability, and alignment of digital efforts with organizational goals. In the context of leadership approaches, the following variables were selected as dimensions: transformational leadership approach, transactional leadership approach, adaptive leadership and digital leadership approach. Leadership behaviors included digital vision communication, empowering employees, facilitating change, strategic leadership and use of technology for DT. Operationalisation of SA involved dimensions such as leadership alignment, strategic consistency, integration, and coordination. Measurement of Digital Operational Efficiency entailed use of multidimensional criteria based on process speed, cost-effectiveness, reduction of errors, and increase in productivity. To ensure measurement reliability and validity, internal consistency was evaluated using Cronbach's Alpha, where all construct values exceeded the acceptable threshold of 0.70. Construct validity was further examined through Exploratory Factor Analysis (EFA), where factor loadings exceeded the recommended threshold of 0.60, confirming satisfactory convergent validity and construct reliability.

3.6 Data Collection

The research used the primary approach for collecting data, which involved using pre-set questionnaires for obtaining data directly from 100 middle-level managers (Taherdoost, 2022). Data were obtained through questionnaires, which involved structured questioning of 100 middle-level managers in different organizations across India. This approach has been chosen due to the capacity to obtain information firsthand that corresponds precisely to the goals of the study, without any pre-treatment or evaluations done on it (Mazhar et al., 2021). In other words, by collecting information, the study can have a more accurate description of what is going on within the targeted population. Therefore, the accuracy of findings can be improved substantially. This particular methodology was deemed appropriate in order to study the effect of leadership and SA on digital OE results within the Indian environment (Taherdoost, 2021). Nevertheless, the use of structured questionnaires as a method implies the issue of common method variance and the problem of social desirability when participants are likely to provide favorable answers.

3.7 Data Analysis

Data analysis is a significant process that entails analyzing the connections between empirical data and theoretical constructs and then makes the basis of making meaningful research findings (Cohen, Manion, and Morrison, 2017). Quantitative analysis has been utilized as the main method in this study and it will enable the researcher to study the collected data in a structured and systematic manner on the participants. It is an approach based on statistical, mathematical and

computational methods of converting raw responses into quantifiable and understandable outcomes. The findings of this study will be gathered through software engineers based on structured questionnaire and other sampling tools and the information obtained will be in numerical form. The quantitative analysis allows detecting patterns, associations, and trends between the variables of the study, as well as gives a foundation to test hypotheses and draw inferences (Ross & Willson, 2017). The research utilized Microsoft Excel as well as the Statistical Package of the Social Sciences (SPSS). The popularity of SPSS in the research domain and business analytics is explained by the flexibility of the software, its convenient user-friendly interface, and the ability to work with simple and complex data. Its capabilities facilitate work like survey analysis, data mining and predictive modelling. To test and validate the hypothesis, the study applied various statistical methods which include reliability analysis, , regression analysis, correlation analysis, and ANOVA (Almquist et al., 2020).

3.8 Ethical consideration

For the maintenance of the integrity and confidentiality of the research process, this research strictly followed the ethics codes of conduct. The participants gave their informed consent before collecting any data from them. It was essential for them to be aware of the purpose of the study and provide their voluntary consent (Mohajan, 2020). It was also important that the participants give their voluntary consent in order to provide information because ethical issues were not to arise at all, and it would increase the accuracy of the collected information (Almquist et al., 2020).

4. Results and Data Analysis

4.1 Demographic analysis

In the current research, 100 respondents were considered as a contributors. The demographic particulars of the participants are demonstrated in Table 3.

Table 3. Demographic Details

Demographic Factor	Parameter	No. of. Respondents	Percentage (%)
Age (Years)	18-25	15	15
	26-35	29	29
	36-50	42	42
	Above 50	14	14
Gender	Female	41	41

	Male	59	59
Education	Undergraduate	25	25
	Postgraduate	33	33
	Doctorate	42	42
Work Experience	1 to 5 yrs	34	34
	6 to 10 yrs	33	33
	11 to 15 yrs	26	26
	Above 15	7	7

The demographics of the respondent show the diversification, with 42 percent belonging to 36-50 years old, while 29 percent belong to 26-35 years, 15 percent belong to 18-25 years, and 14 percent are above 50. The gender ratio among the sample respondents is that of 59 percent males and 41 percent females. The respondents' level of education is diversified, with 42 percent having doctorate, 33 percent having postgraduate degree, and 25 percent having undergraduate degree. Among the respondents, 34 percent are working for 1-5 years, 33 percent for 6-10 years, 26 percent for 11-15 years, and 7 percent for more than 15 years. This is crucial for DT because different demographic characteristics result in a varied pool of digital skills and experience, which is important in the organisational change.

4.2 Statistical Analysis

Table 4. Case Processing Summary

		N	%
Cases	Valid	100	100.0
	Excluded ^a	0	.0
	Total	100	100.0

a. List wise deletion based on all variables in the procedure.

Table 5. Reliability Statistics

Cronbach's Alpha	No of Items
.875	27

From the Case Processing Summary, it is clear that all 100 cases have been found to be valid for testing since there have been no omissions from the cases because of missing data (Refer table 4). From the Reliability Statistics, the Cronbach's alpha value for 27 items is 0.875. It implies that the reliability level is high considering that the reliability coefficient of 0.70 is regarded to be satisfactory while 0.875 is an indication of very good reliability (see in Table 5).

4.4 Hypothesis Test Outcomes

H1: Leadership approaches and behaviours significantly influence the success of DT efforts in enhancing OE.

The following multiple regression analysis was performed in order to investigate the effect of leadership styles and behaviors on the success of digital transformation and digital efficiency. The results show that the regression analysis is statistically significant with $F = 39.477$, $p < .001$, where $R = .790$, $R^2 = .624$, and adjusted $R^2 = .609$.

Table 6. Multiple Regression Results for Leadership Approaches and Digital Operational Efficiency

Leadership Variables	B	β	t	p
Effective leadership guidance	0.209	0.220	3.286	.001
Support and encouragement for new digital tools/processes	-0.676	-0.822	-8.290	<.001
Leaders communicate DT goals clearly	1.157	1.214	10.319	<.001
Leadership fosters a change-oriented culture	-0.524	-0.540	-4.709	<.001

Note: $R = .790$; $R^2 = .624$; Adjusted $R^2 = .609$; $F = 39.477$; $p < .001$.

According to the results depicted in table 6, leadership styles and behaviors have statistically significant correlations with the successful completion of digital transformation. Leadership that can provide effective guidance ($\beta = .220$, $p = .001$) and effectively communicate digital transformation goals ($\beta = 1.214$, $p < .001$) show positive coefficients. In contrast, support and encouragement of employees regarding new digital practices ($\beta = -.822$, $p < .001$) and leadership that promotes a change-oriented culture ($\beta = -.540$, $p < .001$) show negative coefficients.

As negative coefficients reflect conditional relationships between variables in a multivariate regression model, each one can be viewed as a unique relationship of the corresponding predictor to the dependent variable while taking into account all other predictors in the model. Consequently, these coefficients cannot be taken as evidence of a decrease in digital operational efficiency due to leaders' encouragement of digital innovations and creation of a change-oriented corporate culture. The results suggest that various leadership aspects may be associated with the dependent variable in different ways when considered at once. The overall model can explain 62.4% of the variation in the dependent variable ($R^2 = .624$). The effect size, measured by Cohen's, equals approximately 1.66 and reflects a large effect of the model. Therefore, H1 is supported.

H2: SA between digital and organisational strategies contributes significantly to the enhancement of digital OE

Correlation analysis has been performed to determine the correlations between leadership, strategic alignment, and digital operational efficiency. As per the findings of correlation analysis, there is a significant positive correlation between the main variables. Leadership guidance has shown significant positive correlation with alignment of digital vision ($r = .434$, $p < .01$), whereas digital vision alignment has a significant positive correlation with reviewing and adapting strategies ($r = .601$, $p < .01$). Reviewing and adapting strategies have also significant positive correlation with alignment challenges ($r = .389$, $p < .01$). On the other hand, leadership guidance has significant positive correlation with reviewing and adapting strategies ($r = .248$, $p = .013$) and alignment challenges ($r = .212$, $p = .034$).

Table 7. Correlation Results for Strategic Alignment

Variables	Correlation (r)	Significance
Leadership guidance – Digital vision alignment	.434	< .01
Digital vision alignment – Strategy review and adaptation	.601	< .01
Strategy review and adaptation – Alignment challenges	.389	< .01
Leadership guidance – Strategy review and adaptation	.248	.013
Leadership guidance – Alignment challenges	.212	.034

From the correlation matrix, various positive and significant relationships between the concepts of leadership and DT can be observed. The outcome presented in Table 7. For instance, a perfect positive relationship exists between "Our leaders effectively guide the DT to improve OE" and "Strong leadership and strategy alignment have increased the speed of our processes". As seen from the results, there is a perfect positive relationship between guidance and SA in improving

processes. Also, the positive association ($r = 0.434$, $p < .01$) between the concept of clear communication of a digital vision with business strategy by leaders, and effective guidance shows that good communication plays an important role in effective leadership. Furthermore, it has been found out that there is a positive relationship ($r = 0.601$, $p < .01$) between communication of a digital vision and review/adjustment of strategies. It means that the process of communication is also important for making changes and reviewing digital strategies. In addition, regular review and adaptation of digital strategies have been positively related ($r = 0.389$, $p < .01$) to the fact that digital strategy alignment is not challenging anymore. Some other positive relationships exist: between effective guidance and regular adjustment/reviewing of strategies ($r = 0.248$, $p < .05$); and between effective guidance and alignment challenges ($r = 0.212$, $p < .05$). Therefore, H2 is supported

H3: Leadership and SA have a significant aggregate influence on OE drivers such as process velocity, cost savings, error rates, and productivity in digitally transforming organisations.

A one-way analysis of variance test was conducted to analyze the effect of leadership and strategic alignment on the main operational efficiency variables including process speed, cost saving, errors minimization, and productivity. All these effects have been statistically significant. The outcome is described in table 8.

Table 8. ANOVA Results and Effect Sizes for Operational Efficiency Outcomes

Operational Efficiency Outcome	Sum of Squares	Total SS	F	p	η^2
Process Speed	54.333	121.000	19.356	<.001	.449
Cost Reduction	97.333	144.000	49.536	<.001	.676
Error Reduction	57.333	129.000	19.000	<.001	.445
Productivity	28.333	100.000	9.390	<.001	.283

The ANOVA results presented in Table 8 demonstrate that the factor "Our leadership clearly communicates a digital vision that aligns with overall business strategy" has a highly significant impact on multiple operational outcomes related to DT. Specifically, there are statistically significant differences across groups in perceptions of increased process speed ($F = 19.356$, $p < .001$), reduced operational costs ($F = 49.536$, $p < .001$), decreased errors in digital operations ($F = 19.000$, $p < .001$), and improved productivity ($F = 9.390$, $p < .001$). From the ANOVA test results, it is clear that there is a statistically significant difference between groups in all four operational efficiency variables ($p < .001$). The eta squared values of these differences are as follows: 0.449 for process speed, 0.676 for cost reduction, 0.445 for error reduction and 0.283 for productivity. Thus, 44.9%, 67.6%, 44.5%, and 28.3% of the total variance are explained by these differences. Thus, it

can be said that the introduction of η^2 helps to see how much the differences are in addition to being statistically significant. Therefore, the above results reveal that the statistically significant findings are also accompanied by differences in the measured operational efficiency variables. Thus, H3 is proved.

H4: There are significant best practices and challenges associated with leveraging leadership and SA to maximize digital operating efficiency results.

The ANOVA was further carried out to determine the organisational practices and issues that arise from leadership and strategy alignment. It was found significant in terms of leadership support, cross-departmental coordination, performance measurement, and strategy evaluation. Table 9 shows outcome obtained by ANOVA analysis.

Table 9. ANOVA Results and Effect Sizes for Organisational Practices

Organisational Practice	Between-Group SS	Total SS	F	p	η^2
Leadership Support	15.667	129.000	3.283	.014	.121
Cross-departmental Collaboration	150.667	204.000	67.094	<.001	.738
Measurable Objectives	51.667	145.000	13.147	<.001	.356
Strategy Review and Adaptation	78.333	165.000	21.466	<.001	.475

It indicates that the way leadership communicates a digital vision and aligns it with overall business strategy has a significant and positive influence on several key aspects of DT. Specifically, there are statistically significant differences between groups in perceptions of leadership's active support for digital initiatives ($F = 3.283$, $p = .014$), effective collaboration across departments to achieve digital goals ($F = 67.094$, $p < .001$), the presence of specific and measurable objectives guiding digital initiatives ($F = 13.147$, $p < .001$), and the regular review and adaptation of digital strategies based on performance metrics ($F = 21.466$, $p < .001$). The eta squared statistics obtained were .121, .738, .356, and .475 respectively. This implies that approximately 12.1%, 73.8%, 35.6%, and 47.5% of the total variation was attributable to the observed differences between groups. The computation of the eta squared along with the p-value, gives an idea about the size of difference observed. These findings underscore that when leadership clearly communicates and aligns digital vision with business strategy, it not only drives more active support for DT but also enhances cross-departmental collaboration, goal clarity, and organisational agility factors widely recognized in research as critical for successful DT. Hence, H4 is accepted.

These results broaden the theory by: (1) Affirming RBV – the influence of leadership in maximizing digital assets for OE ($\beta=.220$, $p=.001$); (2) Reinforcing Dynamic Capabilities – the effect of alignment on flexibility ($r=.601$, $p<.01$); (3) Emphasizing Stakeholder Theory – interdepartmental cooperation ($F=67.094$, $p<.001$) as essential for comprehensive change. The negative β for changing culture ($\beta=-.540$, $p<.001$) indicates the "resource rigidity" threat of RBV, as misaligned cultural investments obstruct efficiency.

5. Discussion

The results of this research prove the existence of a considerable link between the leadership approach, SA, and DOE within the context of organizations involved in DT. These results support the idea that DT goes far beyond the application of digital technology, and also comprises the integration of technology with organizational processes, organizational strategy, leadership approach, and competencies of employees. This conclusion corresponds to the views of (Benitez et al., 2022) that organizational capabilities play an important role in transforming digital technology into value for the organization and (Shin et al., 2023) that organizational leadership plays an important role in the organizational response to digital changes. The current research contributes to these perspectives showing that leadership and SA operate as two connected mechanisms for digital investments' transformation into operational results.

According to the results obtained, leadership is a crucial factor in realizing DT and enhancing operational efficiency. Leadership activities related to communication of a digital vision, strategic management, empowerment, fostering change, and IT management were found to be associated with increased flexibility and process coordination. This is consistent with the findings of (Benitez et al., 2022) and (Shin et al., 2023), who in their research stress the importance of the organizational and leadership skills necessary for value creation through DT. It may be assumed that digital leadership is not only about having technical skills but also about being able to communicate priorities strategically, coordinate changes in an organization, foster employees' engagement and maintain connections between digital activities and operational needs.

SA was also recognized as one of the key organizational mechanisms by which digital efforts could lead to operational success. It is indicated that organizations with greater alignment of digital strategy, organizational vision, priorities, and resource management were more efficient and productive. This result provides support for one of the key propositions of Strategic Alignment Theory according to which technology efforts lead to higher organizational value when they are aligned with larger business goals. Furthermore, this result is complementary to the arguments made by (Benitez et al., 2022) who focus on the coordination of organizational resources and capabilities during digital transformation. At the same time, the found correlation between SA and DOE ($r = .601$, $p < .01$) suggests that alignment has its operational aspect and not merely strategic one.

The multi-dimensional nature of DOE is yet another finding. In the current study, DOE takes into account the process velocity, cost efficiency, error reduction, and productivity improvement. This more broad concept is in line with (Holopainen et al., 2024) where digitalization is linked with the technology-driven agility, integration, and process responsiveness. The current findings imply that digital technologies can help organizations increase process velocity thanks to automation and integration of information systems. Also, cost efficiency can come from the elimination of duplicate activities and effective resource utilization. Process standardization, workflow integration, and process monitoring are possible ways of achieving error reduction, while increased coordination and responsiveness will be helpful for productivity improvement.

The results thus contribute to recent research on digital transformation in showing that efficiency of operations should not be measured using a single performance measure. Digital transformation affects different aspects of organizational activities at once. However, the results also show that technology itself is not enough to account for the effects. Combination of technology and leadership behaviors and strategic priorities plays an important role in achieving operational efficiency. In this way, the current study adds to the research on digital transformation by examining the connection between technology-enhanced efficiency and organizational processes behind it.

The regression and ANOVA results further stress the importance of leadership communication and strategic integration. Leadership communication regarding a strategic vision of digitalization was linked to process speed, cost-effectiveness, reliability, and efficiency improvements. The result aligns with the findings of (Benitez et al., 2022) and (Shin et al., 2023), but offers an additional insight into the way in which leadership could help improve the digital transformation. Instead of considering leadership as a general context variable, the results show that leadership communication and strategic coordination could contribute to digital processes' adoption and implementation.

From the theoretical perspective, the results contribute to the Resource-Based View (RBV), Dynamic Capabilities Theory (DCT), and Strategic Alignment Theory (SAT). From the RBV perspective, leadership can be considered an intangible resource of the organization that allows for the effective deployment of digital resources. From the DCT perspective, the results suggest that the organization needs capabilities that would help in integrating and coordinating organizational and technological resources. Such interpretation is aligned with the capability-oriented perspective suggested by (Benitez et al., 2022). Finally, the results support SAT through the suggestion that digital strategy and organizational goals' alignment is linked to operational performance. Overall, the three perspectives offer an integrated view on the reasons behind different operational outcomes of digital investments across organizations.

Furthermore, the study offers several practical implications for organizations. Organizations aiming at operational gains due to DT cannot consider the technology adoption process as a

separate IT-related activity. Organizations' leaders need to articulate a digital vision, involve employees, provide adequate IT support, and make sure that all digital initiatives stay consistent with the goals of an organization. In terms of organizational-level activities, SA needs to be embedded in the organization through proper resource allocation, workflow redesign, performance goals setting, and operations-related decisions. This can help achieve positive changes in process velocity, cost efficiency, error rate, and productivity. In summary, the results obtained confirm and further develop the existing literature. The outcomes of DT are shown to be related to the interaction of technological adoption, leadership, and strategic alignment. The present study develops these aspects within the integrated Leadership-SA-DOE model.

6. Conclusion

This study has sought to establish the effect of leadership styles and SA on DOE in organizations undergoing DTs. From the results, it is evident that leadership and strategy alignment form key ingredients for turning DT activities into operational success. Some of the important contributions of leadership style towards OE are the communication of digital vision, provision of strategy, empowerment of employees, and technological support to processes leading to faster process, reduced cost, improved accuracy, and increased productivity. The study goes on to prove that SA forms the key organizational mechanism that facilitates connections between digital activities and organizational operations in terms of business priorities and strategic intentions. Organizations with high SA tend to be able to create sustainable operational efficiencies by aligning leadership vision, strategies, workflow management, and resource coordination. It therefore follows from this discussion that DT does not directly lead to operational efficiency but that leadership and SA work together to facilitate integration of digital technologies into the organizational system. One of the significant contributions made by the research relates to the definition and conceptualization of the difference between the traditional operational efficiency and the Digital Operational Efficiency. As opposed to conventional models of operational efficiency, which concentrate on labor productivity and cost reduction, Digital Operational Efficiency is characterized by the use of technologies allowing flexibility, automation of workflows, integration of digital coordination, and operational responsiveness.

Another theoretical contribution made by the paper relates to RBV, DCT, and SAT by proving that leadership and SA can be seen as interrelated capabilities allowing for successful exploitation of organizational resources and operational flexibility. According to the results of the research, organizations with high levels of leadership coordination and alignment capabilities have an advantage over their competitors during DT. In summary, this study identifies that DT will be successful not only by technological uptake, but also by how well an organisation can strategically align leadership, coordination, and digital proficiency within an organisational structure. Therefore, any organisation intending to enhance its Digital Operational Efficiency needs to focus

on leadership development, strategic alignment, coordination of activities, and technology-induced coordination.

6.1 Limitations of the study

There are few limitations in the study that should be taken into account in interpreting the results. First, the cross-sectional design of the research describes the relations between leadership, SA, and DOE only at one point in time and cannot demonstrate any causal or temporal relations. Second, the nature of the study requires the self-reporting of answers from the managers, which can cause response and common-method biases. Third, the purposive sampling method used in the study can bring about selection bias because the respondents were selected deliberately due to their relevance and experience in digital transformation. As a result, the sample selected for the study may not reflect the managers and organizations in general, making the results applicable only to the organizations that participated in the research within India.

6.2 Future Recommendations

Future research would benefit from employing longitudinal designs to more effectively capture the causal relationships and long-term effects of leadership and SA on digital OE. Expanding the study to include a greater variety of industry sectors and geographic locations would enhance the generalizability of the findings. Additionally, incorporating qualitative methodologies may provide a richer understanding of the processes and contextual variables underlying these relationships. Investigating the effects of new technologies and organisational diversity could further extend current understanding.

References

- Aldoseri, A., Al-Khalifa, K., & Hamouda, A. (2023). A roadmap for integrating automation with process optimization for AI-powered digital transformation. *Preprints.*, 1055, v1.
- Aljuhmani, H. Y., Awwad, R. I., Albuhisi, B., & Hamdan, S. (2024). The Impact of Digital Transformation Leadership Competencies on Firm Performance Through the Lens of Organizational Creativity and Digital Strategy. In *Innovative and Intelligent Digital Technologies; Towards an Increased Efficiency: Volume 1* (pp. 283-293). Springer.
- Allioui, H., & Mourdi, Y. (2023). Unleashing the potential of AI: Investigating cutting-edge technologies that are transforming businesses. *International Journal of Computer Engineering and Data Science (IJCEDS)*, 3(2), 1-12.
- Almquist, Y. B., Kvartr, S., & Brännström, L. (2020). A practical guide to quantitative methods with SPSS.
- Avolio, B. J., Bass, B. M., & Jung, D. I. (1999). Re-examining the components of transformational and transactional leadership using the Multifactor Leadership. *Journal of occupational and organizational psychology*, 72(4), 441-462.

- Barney, J. (1991). Firm resources and sustained competitive advantage. *Journal of management*, 17(1), 99-120.
- Benitez, J., Arenas, A., Castillo, A., & Esteves, J. (2022). Impact of digital leadership capability on innovation performance: The role of platform digitization capability. *Information & Management*, 59(2), 103590.
- Bican, P. M., & Brem, A. (2020). Digital business model, digital transformation, digital entrepreneurship: Is there a sustainable “digital”? *Sustainability*, 12(13), 5239.
- Culot, G., Nassimbeni, G., Orzes, G., & Sartor, M. (2020). Behind the definition of Industry 4.0: Analysis and open questions. *International Journal of Production Economics*, 226, 107617.
- Dióssy, K., Losonci, D., Aranyossy, M., & Demeter, K. (2025). The role of leadership in digital transformation—a paradox way to improve operational performance. *Journal of Manufacturing Technology Management*, 36(9), 88-113.
- Erhan, T., Uzunbacak, H. H., & Aydin, E. (2022). From conventional to digital leadership: exploring digitalization of leadership and innovative work behavior. *Management Research Review*, 45(11), 1524-1543.
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4.
- Holopainen, M., Saunila, M., & Ukko, J. (2024). The effects of digital business strategy on the collaboration performance of companies: the moderating effect of digitally enabled performance measurement. *International Journal of Industrial Engineering and Operations Management*, 6(1), 64-81.
- Imran, F., Shahzad, K., Butt, A., & Kantola, J. (2021). Digital transformation of industrial organizations: Toward an integrated framework. *Journal of change management*, 21(4), 451-479.
- Jardak, M. K., & Ben Hamad, S. (2022). The effect of digital transformation on firm performance: evidence from Swedish listed companies. *The Journal of Risk Finance*, 23(4), 329-348.
- Jedynak, M., Czakon, W., Kuźniarska, A., & Mania, K. (2021). Digital transformation of organizations: what do we know and where to go next? *Journal of Organizational Change Management*, 34(3), 629-652.
- Khalayleh, W., Rohaida, S., & Al-Khazaleh, S. M. (2024). The Impact of Leadership Practices on the Adoption of Digital Transformation: The Moderating Role of Organizational Culture in Jordanian Manufacturing Sector. *International Review of Management and Marketing*, 14(6), 178-185.

- Kokot, K., Kokotec, I. Đ., & Čalopa, M. K. (2021). Impact of leadership on digital transformation. 2021 IEEE Technology & Engineering Management Conference-Europe (TEMSCON-EUR), 1-6.
- Mazhar, S. A., Anjum, R., Anwar, A. I., & Khan, A. A. (2021). Methods of data collection: A fundamental tool of research. *Journal of Integrated Community Health*, 10(1), 6-10.
- Mick, M. M. A. P., Kovaleski, J. L., Mick, R. L., & Chirolì, D. M. d. G. (2024). Developing a sustainable digital transformation roadmap for SMEs: Integrating digital maturity and strategic alignment. *Sustainability*, 16(20), 8745.
- Mohajan, H. K. (2020). Quantitative research: A successful investigation in natural and social sciences. *Journal of Economic Development, Environment and People*, 9(4), 50-79.
- Omol, E. J. (2024). Organizational digital transformation: from evolution to future trends. *Digital Transformation and Society*, 3(3), 240-256.
- Pandey, P., & Pandey, M. M. (2021). *Research methodology tools and techniques*. Bridge Center.
- Qiao, G., Li, Y., & Hong, A. (2024). The Strategic Role of Digital Transformation: Leveraging Digital Leadership to Enhance Employee Performance and Organizational Commitment in the Digital Era. *Systems*, 12(11), 457. <https://www.mdpi.com/2079-8954/12/11/457>
- Ross, A., & Willson, V. L. (2017). Linear regression. In *Basic and Advanced Statistical Tests: Writing Results Sections and Creating Tables and Figures* (pp. 39-47). Springer.
- Schiuma, G., Santarsiero, F., Carlucci, D., & Jarrar, Y. (2024). Transformative leadership competencies for organizational digital transformation. *Business Horizons*, 67(4), 425-437.
- Shin, J., Mollah, M. A., & Choi, J. (2023). Sustainability and organizational performance in South Korea: The effect of digital leadership on digital culture and employees' digital capabilities. *Sustainability*, 15(3), 2027.
- Stratton, S. J. (2021). Population research: convenience sampling strategies. *Prehospital and disaster Medicine*, 36(4), 373-374.
- Taherdoost, H. (2021). Data collection methods and tools for research; a step-by-step guide to choose data collection technique for academic and business research projects. *International Journal of Academic Research in Management (IJARM)*, 10(1), 10-38.
- Taherdoost, H. (2022). Different types of data analysis; data analysis methods and techniques in research projects. *International Journal of Academic Research in Management*, 9(1), 1-9.
- Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic management journal*, 18(7), 509-533.



- Tortorella, G., Prashar, A., Antony, J., Mac Cawley, A. F., Vassolo, R., & Sony, M. (2023). Role of leadership in the digitalisation of manufacturing organisations. *Journal of Manufacturing Technology Management*, 34(2), 315-336.
- Van Veldhoven, Z., & Vanthienen, J. (2022). Digital transformation as an interaction-driven perspective between business, society, and technology. *Electronic markets*, 32(2), 629-644.
- Vaz, N. (2021). *Digital business transformation: How established companies sustain competitive advantage from now to next*. John Wiley & Sons.
- Venkatraman, N., Henderson, J. C., & Oldach, S. (1993). Continuous strategic alignment: Exploiting information technology capabilities for competitive success. *European Management Journal*, 11(2), 139-149.
- Westerman, G., Bonnet, D., & McAfee, A. (2014a). *Leading digital: Turning technology into business transformation*. Harvard Business Press.
- Westerman, G., Bonnet, D., & McAfee, A. (2014b). The nine elements of digital transformation. *MIT Sloan management review*, 55(3), 1-6.
- Yu, J., Wang, J., & Moon, T. (2022). Influence of Digital Transformation Capability on Operational Performance. *Sustainability*, 14(13), 7909. <https://www.mdpi.com/2071-1050/14/13/7909>