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The Role of Digital Leadership on Operational Performance through Logistics Digitalization and Adaptability

Thabet Banihani[1]*

[1] Department of Business Management, Irbid National University, Jordan.

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A B S T R A C T

The shifts in the international business world limit companies to using digital technology to improve their performance and competitiveness. This paper will examine digital leadership impact on operational performance based on logistics digitalization and flexibility in medium and large manufacturing organizations in Jordan. One of the main aspects of digital leadership allows organizations to develop efficient strategies, distribute resources properly, and establish internal cooperation and external alliances. The research has issued 120 questionnaires to the middle and top managers in different functions of the manufacturing company. The questionnaire was drafted through a five-point Likert scale and was administered offline and online by a Google Form link. The analysis of data was done using Partial Least Squares - Structural Equation Modeling (PLS-SEM) to analyze the outer model and inner model. The findings show that digital leadership influences the digitalization of logistics and flexibility greatly, yet it does not do so directly on operational performance. Rather, digital leadership influences the operational performance through the mediation of adaptability and the interaction of logistics digitalization and adaptability. Digitalization of logistics is a significant factor in improving flexibility, which will eventually translate into an overall change in the operational performance. These results prove that the digitalization of logistics does not only enhance the rate of information exchange and transparency but also reinforces the company to respond to market dynamics. The practical consequences of this study are that manufacturing ones will have to continuously develop digital leadership competencies that facilitate the investments of digital technologies, enhance an adaptive organizational culture, and create the synergy of internal and external functions. To scholars, the study has a conceptual contribution to explaining the mediating role of digital leadership, logistics digitalization, adaptability and operational performance in the age of digital transformation.

الملخص

تُقيّد التحولات في عالم الأعمال الدولي الشركات من استخدام التكنولوجيا الرقمية لتحسين أدائها وقدرتها التنافسية. تتناول هذه الورقة البحثية أثر القيادة الرقمية على الأداء التشغيلي استنادًا إلى رقمنة الخدمات اللوجستية ومرونتها

* Corresponding author.
E-mail address: th.banihani@inu.edu.jo
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في مؤسسات التصنيع المتوسطة والكبيرة في الأردن. يُمكّن أحد الجوانب الرئيسية للقيادة الرقمية المؤسسات من تطوير استراتيجيات فعّالة، وتوزيع الموارد بشكل سليم، وإقامة تعاون داخلي وتحالفات خارجية. وقد وُزّعت 120 استبانة على المديرين من المستويين المتوسط والعالي في مختلف وظائف شركة التصنيع. صُممت الاستبانة باستخدام مقياس ليكرت خماسي النقاط، ووُزّعت إلكترونيًا وورقيًا عبر رابط نماذج جوجل. وتم تحليل البيانات باستخدام نمذجة المعادلات الهيكلية باستخدام طريقة المربعات الصغرى الجزئية (PLS-SEM) لتحليل النموذج الخارجي والداخلي. تُظهر النتائج أن القيادة الرقمية تؤثر بشكل كبير على رقمنة الخدمات اللوجستية ومرونتها، إلا أنها لا تؤثر بشكل مباشر على الأداء التشغيلي. بل تؤثر القيادة الرقمية على الأداء التشغيلي من خلال توسطها في قابلية التكيف وتفاعل رقمنة الخدمات اللوجستية معها. تُعدّ رقمنة الخدمات اللوجستية عاملًا هامًا في تحسين المرونة، مما سيؤدي في النهاية إلى تغيير شامل في الأداء التشغيلي. تُثبت هذه النتائج أن رقمنة الخدمات اللوجستية لا تُحسّن فقط معدل تبادل المعلومات والشفافية، بل تُعزز أيضًا قدرة الشركة على الاستجابة لديناميكيات السوق. ومن النتائج العملية لهذه الدراسة ضرورة قيام الشركات الصناعية بتطوير كفاءات القيادة الرقمية باستمرار، بما يُسهّل الاستثمار في التقنيات الرقمية، ويُعزز ثقافة تنظيمية مرنة، ويُحقق التكامل بين الوظائف الداخلية والخارجية. أما بالنسبة للباحثين، فتُقدم هذه الدراسة إسهامًا مفاهيميًا في شرح الدور الوسيط للقيادة الرقمية، ورقمنة الخدمات اللوجستية، والقدرة على التكيف، والأداء التشغيلي في عصر التحول الرقمي.

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1. Introduction

Digital technologies have become a critical driver of organizational development and competitive advantage in an increasingly dynamic global business environment. Organizations are progressively adopting advanced information technologies to enhance their ability to design innovative products, optimize operational processes, and respond effectively to market changes (Jimenez-Jimenez et al., 2019). Information technology enables firms to establish integrated digital systems that facilitate efficient communication across organizational functions, thereby improving coordination and operational performance (Aamer et al., 2023; Ahmad Amouei et al., 2023). Moreover, digital transformation has significantly improved organizational efficiency by enabling real-time data access, faster decision-making, and enhanced innovation capabilities (Alvarenga et al., 2023; Garay-Rondero et al., 2019). These developments have allowed organizations to design and implement strategic processes that support long-term sustainability and competitiveness (Ionescu et al., 2022). In this context, digitalization is not limited to converting manual processes into automated systems; rather, it involves a comprehensive transformation of business models and strategies to maintain competitiveness in highly volatile markets (Al Tera et al., 2024; Karttunen et al., 2023).

In organizational operations, digitalization plays a vital role in integrating internal functions and enabling seamless interaction between departments. Such integration reduces operational errors, enhances organizational learning, and supports the generation of real-time information that improves decision-making processes (Jia et al., 2024; Li et al., 2024). Consequently, organizations can better anticipate external changes and respond more rapidly to evolving market conditions, thereby improving overall operational efficiency. A key enabler of successful digital transformation is digital leadership. Digital leadership refers to the ability of organizational leaders to leverage digital technologies, align resources, and develop strategic directions that support digital initiatives and organizational goals (Türk, 2023). Effective digital leaders utilize real-time data and technological tools to enhance decision-making processes, foster innovation, and guide employees toward adopting digital practices (Albannai et al., 2024; Lathabhavan & Kuppusamy, 2024). Furthermore, digital leadership plays a crucial role in driving organizational adaptability by facilitating rapid responses to environmental changes and promoting cross-functional collaboration (Ye, 2025).

In the context of supply chain and logistics management, digital leadership is particularly important for enabling logistics digitalization. Logistics digitalization enhances information sharing, transparency, and coordination among supply chain partners, which improves responsiveness and operational flexibility (Zhao

et al., 2023; Song et al., 2024). Through digitalized logistics systems, organizations can achieve real-time visibility of operations, improve communication with suppliers and customers, and optimize resource utilization (Cichosz et al., 2020; Li et al., 2024). Adaptability, as a dynamic organizational capability, represents the ability of firms to respond effectively to internal and external changes. It is closely linked to digitalization and leadership, as organizations that leverage digital technologies are better equipped to enhance flexibility, adjust operational processes, and maintain continuity under uncertain conditions (Dubey et al., 2018; Akhtar et al., 2022). High levels of adaptability enable organizations to balance supply and demand, improve coordination, and sustain operational performance in competitive environments.

Operational performance remains a central concern for organizations seeking to achieve efficiency, productivity, and customer satisfaction. Prior research suggests that digitalization and adaptability significantly contribute to improving operational outcomes by enhancing process efficiency, reducing costs, and ensuring timely delivery of products and services (Sunder & Prashar, 2024; Hanaysha & Alzoubi, 2022). However, the direct impact of digital leadership on operational performance remains inconclusive, as several studies indicate that this relationship is often mediated by factors such as digitalization and adaptability (Yang & Lin, 2024; Esangbedo et al., 2024). Despite the growing interest in digital transformation, there is still a lack of empirical evidence examining the integrated relationship between digital leadership, logistics digitalization, adaptability, and operational performance, particularly in the manufacturing sector of developing countries. Additionally, previous studies have reported inconsistent findings regarding the direct and indirect effects of digital leadership on organizational performance. Therefore, this study aims to address this research gap by investigating the role of digital leadership in enhancing operational performance through logistics digitalization and adaptability. Specifically, the study seeks to:

(1) examine the impact of digital leadership on logistics digitalization and adaptability,
(2) analyze the effect of logistics digitalization on adaptability and operational performance, and
(3) explore the mediating roles of logistics digitalization and adaptability in the relationship between digital leadership and operational performance.

2. Literature Review

2.1 Model Compression Techniques for Edge AI

Digital leadership has emerged as a critical organizational capability that enables firms to navigate the complexities of digital transformation and dynamic business environments. It refers to the ability of organizational leaders to effectively leverage digital technologies, coordinate resources, and align strategic objectives to achieve organizational goals (Türk, 2023; Salamzadeh et al., 2022). Through effective coordination and collaboration, digital leaders can identify strategic opportunities that enhance organizational performance and competitiveness (Albannai et al., 2024). Innovation is considered a key outcome of digital leadership, as leaders play a central role in fostering a culture that supports creativity, knowledge sharing, and continuous improvement. By leveraging digital tools and data-driven insights, organizations can develop unique capabilities that are difficult for competitors to replicate, thereby achieving a sustainable competitive advantage (Fang, 2023; Lathabhavan & Kuppusamy, 2024). In this context, digital leaders are better equipped to recognize environmental changes and respond proactively by transforming potential threats into strategic opportunities (Ye, 2025). Furthermore, digital leadership enhances organizational agility and resilience by enabling firms to adapt quickly to internal and external changes. Leaders who effectively utilize digital technologies can facilitate rapid decision-making, improve communication across organizational levels, and support the integration of business functions (Aftab et al., 2025; Trieu et al., 2024). This capability is particularly important in uncertain environments, where organizations must continuously adjust their strategies and operations to maintain performance and competitiveness.

Digital leaders also play a crucial role in managing organizational change and ensuring the successful implementation of digital initiatives. By aligning technological investments with organizational objectives, they can streamline processes, optimize resource allocation, and enhance operational efficiency (Türk, 2023; de Araujo et al., 2021). Moreover, digital leadership contributes to building strong internal structures and governance mechanisms that facilitate coordination and improve overall organizational performance. In

addition, digital leadership is closely linked to organizational resilience, as it enables firms to anticipate disruptions, recover quickly from challenges, and sustain operational continuity (Munir et al., 2022; Yang et al., 2025). By fostering a proactive and adaptive organizational culture, digital leaders enhance the firm's ability to respond to evolving market conditions and technological advancements.

2.2 Digital Leadership

A growing body of research has examined how digital transformation initiatives influence organizational performance, particularly in dynamic and uncertain environments. Recent studies highlight that the effectiveness of digital technologies depends not only on their adoption but also on how organizations integrate them into their operational processes and decision-making systems (Zhao et al., 2023; Song et al., 2024). Digitalization enhances real-time data processing, improves visibility across supply chain activities, and supports more informed and timely managerial decisions. Empirical evidence suggests that organizations that adopt advanced digital systems are better positioned to respond to environmental uncertainties and operational disruptions. However, the effectiveness of digitalization varies depending on the level of technological implementation and organizational readiness (Cichosz et al., 2020; Li et al., 2024). In particular, firms that align digital technologies with strategic objectives and operational processes tend to achieve higher levels of efficiency and performance. Moreover, the integration of digital technologies within logistics and supply chain systems has been shown to improve coordination, reduce operational inefficiencies, and enhance responsiveness to market changes (Garay-Rondero et al., 2019; Al Tera et al., 2024). These improvements are especially critical in environments characterized by high uncertainty, where the ability to adapt quickly to changing conditions determines organizational success. Despite these advantages, the implementation of digitalization is not without challenges. Some studies indicate that poorly aligned digital initiatives or inadequate integration across organizational functions may lead to inefficiencies and reduced performance outcomes (Karttunen et al., 2023). Therefore, it is essential for organizations to adopt a strategic approach to digital transformation that emphasizes alignment, integration, and continuous improvement.

2.3 Logistics Digitalization

Digitalization plays a critical role in enhancing business continuity by enabling seamless integration and coordination between organizations and their supply chain partners. In the context of logistics, digitalization facilitates continuous interaction with suppliers and customers through advanced information systems, thereby improving communication, coordination, and overall operational efficiency (Aamer et al., 2023; Zhao et al., 2023). Organizations increasingly adopt digital technologies to transform traditional logistics processes into intelligent and integrated systems. These systems often incorporate advanced technologies such as sensors, automation tools, and manufacturing execution systems, which enhance process consistency, accuracy, and real-time monitoring capabilities (Garay-Rondero et al., 2019; Cichosz et al., 2020). As a result, firms are better able to manage logistics operations efficiently and respond to changing customer demands. Furthermore, logistics digitalization supports the development of digital business models that enable organizations to maintain strong communication with geographically dispersed customers and partners (Wang et al., 2025). Through digital platforms, firms can share information, coordinate plans, and synchronize activities with suppliers in real time, which enhances supply chain integration and reduces operational delays (Li et al., 2024; Karttunen et al., 2023).

The adoption of digital technologies in logistics also enables the implementation of advanced practices such as e-procurement and just-in-time inventory management. These practices improve transparency and allow both organizations and their suppliers to monitor inventory levels, track material flows, and respond quickly to demand fluctuations (Song et al., 2024; Al Tera et al., 2024). Consequently, firms can optimize supplier selection, improve order fulfillment processes, and enhance overall operational efficiency. In addition, digitalization extends across various logistics activities, including e-distribution, e-manufacturing, and e-sales, which contribute to improving service delivery and customer satisfaction. Organizations that fail to adopt digital logistics systems risk losing market share and competitiveness in increasingly digitalized

markets (Lim et al., 2024). This is particularly important as customer expectations continue to evolve toward faster, more flexible, and service-oriented solutions. A key advantage of logistics digitalization is its ability to enhance visibility and transparency across the entire supply chain. Digital systems enable rapid data collection and sharing among stakeholders, which improves decision-making, coordination, and responsiveness to market changes (Jia et al., 2024). In the manufacturing sector, in particular, digitalization has been identified as a significant factor in strengthening competitiveness and supporting sustainable operational performance (Al-Khatib et al., 2024; Lim et al., 2024).

2.3. Adaptability

Adaptability represents a critical organizational capability that enables firms to respond effectively and rapidly to internal and external changes across their operational processes. It reflects the ability of organizations to adjust production activities, manage material flows, and ensure the continuous transformation of inputs into finished products delivered to customers (Dubey et al., 2018). In increasingly uncertain and dynamic environments, organizations strive to develop strategic and operational mechanisms that enhance their ability to cope with disruptions and maintain continuity. A key aspect of adaptability is the organization's capacity to balance internal capabilities with external environmental demands. This balance ensures the smooth flow of information and products across upstream and downstream supply chain activities, thereby supporting operational stability and efficiency (Akhtar et al., 2022). Organizations with high adaptability are better positioned to adjust their operational processes, reconfigure resources, and respond to fluctuations in demand and supply conditions. Furthermore, adaptability is closely associated with flexibility in operational systems and resource management. Firms that are capable of modifying their resources and processes in alignment with strategic objectives are more likely to enhance their competitiveness and performance (Pfaff, 2023). The ability to anticipate and respond to unpredictable market changes is also strengthened by the use of digital technologies, which provide real-time data and support informed decision-making (Khojasteh et al., 2026).

Environmental scanning plays a vital role in improving adaptability, as it enables organizations to identify emerging trends, detect potential threats, and implement proactive strategies to mitigate risks. Additionally, the integration of digital systems facilitates accurate and timely information flows, which enhance coordination across internal departments and external partners (Jia et al., 2024). This integration supports efficient communication and collaboration within supply chain networks, thereby strengthening organizational responsiveness. Organizational learning is another important driver of adaptability, as it allows firms to continuously improve their processes based on past experiences and environmental feedback. High-quality information and effective communication systems are essential in enabling organizations to adapt efficiently and maintain alignment with stakeholders (Li et al., 2024). Moreover, adaptability enhances cooperation among supply chain partners, which contributes to improved competitiveness and operational performance. Digital technologies further reinforce adaptability by increasing the speed and accessibility of information, enabling organizations to make timely decisions and adjust their strategies accordingly (Ngo, 2020). In highly competitive markets, adaptability becomes a crucial factor for organizational survival, as firms must continuously evolve and respond to changing customer needs and market conditions (Ionescu et al., 2022). Thus, adaptability enables organizations to maintain a continuous flow of operations, from raw material acquisition to final product delivery. The ability to implement rapid changes and respond effectively to uncertainties enhances organizational resilience and ensures sustained operational performance in dynamic business environments.

2.4. Operational Performance

Operational performance represents a multidimensional construct that reflects an organization's ability to efficiently utilize its tangible and intangible resources to achieve desired outcomes. It is a key indicator used by management to evaluate the effectiveness and efficiency of production processes, resource allocation, and overall business operations (Sunder & Prashar, 2024). Through continuous monitoring and evaluation of operational activities, organizations can identify inefficiencies, reduce waste, and improve process performance. A fundamental aspect of operational performance is the ability to maintain consistent

product quality while meeting customer requirements. Organizations that implement effective control and monitoring mechanisms can ensure that production processes align with established standards, thereby enhancing reliability and reducing operational disruptions (Hanaysha & Alzoubi, 2022). Additionally, detailed analysis of production processes enables firms to anticipate potential delays and optimize production timelines, ensuring timely delivery and improved service levels.

Customer satisfaction is another critical dimension of operational performance, as organizations must consistently meet customer expectations in terms of quality, delivery speed, and service reliability. Firms that are capable of fulfilling customer orders accurately and on time are more likely to achieve a competitive advantage and strengthen their market position (Aly, 2024). This capability is closely linked to the organization's efficiency in managing its internal operations and coordinating its resources effectively. Moreover, high levels of operational performance are often associated with strong cross-functional coordination and integration. Effective collaboration between departments ensures the smooth flow of materials, information, and processes, which contributes to continuous production and efficient order fulfillment (Akhtar et al., 2022). Integrated information systems further support this coordination by providing accurate and timely data that enhance decision-making and operational control (Li et al., 2024). In addition, the ability of organizations to manage information flows and align internal processes with external supply chain partners plays a crucial role in achieving superior operational performance. Efficient communication and information sharing enable firms to respond quickly to changes in demand and supply conditions, thereby maintaining operational stability and performance consistency (Jia et al., 2024). Thus, operational performance reflects the organization's capacity to deliver high-quality products, meet customer expectations, and optimize resource utilization. It is strongly influenced by factors such as process integration, information flow, and organizational coordination, making it a critical outcome variable in studies related to digital transformation, logistics digitalization, and organizational adaptability.

2.5. Relationship between research concepts

2.5.1. The relationship between digital leadership and logistics digitalization

Digital leadership plays a crucial role in facilitating the implementation of digital technologies across organizational functions, particularly in the context of logistics operations. Organizations led by digitally competent leaders are better able to align technological initiatives with strategic objectives, ensuring that digitalization efforts meet organizational needs and enhance operational efficiency (Türk, 2023; Salamzadeh et al., 2022). Moreover, digital leaders possess the capability to effectively manage and allocate resources required for logistics digitalization. By leveraging information technology and fostering a digital-oriented culture, they enable organizations to integrate digital systems into daily operations, thereby improving coordination and information flow across departments (Albannai et al., 2024; Fang, 2023). This integration is essential for transforming traditional logistics processes into more efficient and responsive digital systems. Digital leadership also enhances collaboration with external partners by supporting the development of digital platforms that facilitate real-time communication and coordination with suppliers, customers, and third-party service providers (Sharma & Joshi, 2023; Ionescu et al., 2022). Through these capabilities, organizations can improve transparency, streamline logistics activities, and strengthen supply chain relationships. Furthermore, the ability of digital leaders to identify technological requirements and engage internal functions accelerates the digitalization process within logistics systems. By promoting cross-functional alignment and encouraging the adoption of modern technologies, digital leaders contribute to building integrated logistics systems that enhance organizational competitiveness (Al Tera et al., 2024; Li et al., 2024). In addition, effective digital leadership supports decision-making by utilizing data generated from digital logistics systems. This enables organizations to respond more effectively to market changes and improve overall operational performance (Zhao et al., 2023). Consequently, firms with strong digital leadership are more likely to successfully implement logistics digitalization and achieve sustainable competitive advantages. On this explanation, it is possible to state hypothesis H1.

H1: Digital leadership influences logistics digitalization.

2.5.2. The relationship between digital leadership and adaptability

Adaptability is closely linked to digital leadership, as organizations led by digitally competent leaders are better equipped to respond to dynamic environmental changes. Digital leadership enhances coordination among internal and external stakeholders, enabling firms to develop flexible strategies that align with evolving market conditions and partner requirements (Karttunen et al., 2023; Salamzadeh et al., 2022). Moreover, digital leaders play a critical role in fostering organizational flexibility by effectively managing resources and facilitating collaboration across functional units. Through the use of digital technologies and integrated systems, such as enterprise resource planning (ERP), organizations can improve their ability to respond rapidly to unexpected disruptions and environmental uncertainties (Türk, 2023; Albannai et al., 2024). This capability allows firms to anticipate market changes and adjust their operations accordingly. In addition, digital leadership contributes to the development of structured organizational processes and a supportive culture that enhances adaptability. By promoting knowledge sharing, continuous learning, and innovation, digital leaders enable organizations to build dynamic capabilities that support sustained adaptability and performance improvement (Lathabhavan & Kuppusamy, 2024; Ye, 2025). Furthermore, effective digital leadership strengthens the organization's ability to align its strategic objectives with operational activities, thereby creating a flexible and resilient system capable of responding to both internal and external changes. This alignment facilitates quicker decision-making and enhances the organization's capacity to maintain continuity under uncertain conditions (Trieu et al., 2024). Thus, digital leadership acts as a key enabler of organizational adaptability by enhancing coordination, resource flexibility, and strategic alignment. Organizations that invest in digital leadership capabilities are more likely to develop higher levels of adaptability and resilience in rapidly changing environments. Based on the above discussion, the following hypothesis is proposed:

H2: Digital leadership has a significant positive effect on adaptability.

2.5.3. The relationship between digital leadership and operational performance

Digital leadership plays a pivotal role in shaping organizational strategies and achieving competitive advantage in dynamic business environments. Effective digital leaders are capable of defining appropriate performance objectives and aligning organizational resources to achieve these goals, thereby enhancing overall operational performance (Türk, 2023; Salamzadeh et al., 2022). Moreover, digital leadership contributes to the efficient utilization of organizational resources through improved coordination and integration across functional areas. Cross-functional collaboration enabled by digital technologies enhances work efficiency, reduces operational costs, and ensures smoother execution of business processes (Albannai et al., 2024; Trieu et al., 2024). This integration is essential for maintaining consistency in operations and improving productivity. In addition, digital leaders play a critical role in designing and implementing effective business processes that minimize inefficiencies and enhance operational outcomes. By leveraging real-time data and digital systems, organizations can coordinate internal operations more effectively and respond promptly to external disruptions (Sunder & Prashar, 2024; Akhtar et al., 2022). This capability ensures continuity in production processes and supports stable operational performance. Furthermore, digital leadership enhances the organization's ability to integrate various functions and respond rapidly to environmental changes. Through strategic decision-making and the use of digital tools, leaders can ensure that operational activities remain aligned with market demands, thereby improving responsiveness and efficiency (Lathabhavan & Kuppusamy, 2024). Thus, strong digital leadership capabilities enable organizations to improve operational efficiency, reduce costs, and enhance performance consistency. By fostering integration, coordination, and responsiveness, digital leadership serves as a key driver of operational performance in the digital era. Based on the above discussion, the following hypothesis is proposed:

H3: Digital leadership has a significant positive effect on operational performance.

2.5.4. The relationship between logistics digitalization and adaptability

Logistics digitalization is widely recognized as a key driver of organizational adaptability, as it enhances the integration of processes and improves the flow of information across supply chain activities. By

leveraging digital technologies, organizations can achieve higher levels of visibility and transparency, which support more accurate and timely decision-making, thereby strengthening their ability to adapt to changing conditions (Zhao et al., 2023; Jia et al., 2024). Moreover, the implementation of digital logistics systems enables firms to access and share information efficiently with both internal units and external partners. This improved information flow enhances coordination and allows organizations to respond more effectively to market dynamics and external disruptions (Li et al., 2024; Cichosz et al., 2020). As a result, firms can develop more flexible operational processes that support rapid adaptation. Digitalization also facilitates the use of advanced technological solutions such as e-procurement systems, big data analytics, and optimization tools, which enable organizations to anticipate changes in demand and adjust their operations accordingly (Song et al., 2024; Al Tera et al., 2024). In addition, real-time data collection and monitoring capabilities allow firms to detect environmental changes early and respond promptly to potential disruptions, thereby enhancing resilience and adaptability (Lim et al., 2024). Furthermore, increased visibility provided by digital systems enables organizations to better understand customer needs and market trends, allowing for faster and more informed responses. Effective communication and integration with suppliers through digital platforms further strengthen collaborative relationships and improve the organization's ability to adapt to external changes (Garay-Rondero et al., 2019; Karttunen et al., 2023). Thus, logistics digitalization enhances organizational adaptability by improving information visibility, coordination, and responsiveness. Firms that successfully implement digital logistics systems are more capable of adjusting their operations to dynamic environments and maintaining competitive advantage. Based on the above discussion, the following hypothesis is proposed:

H4: Logistics digitalization has a significant positive effect on adaptability.

2.5.5. The relationship between logistics digitalization and operational performance

Logistics digitalization plays a significant role in enhancing operational performance by enabling the integration of organizational processes and facilitating seamless information flow across departments. Through the use of digital technologies, firms can improve coordination among functional areas, resulting in more efficient operations and reduced process inefficiencies (Cichosz et al., 2020; Li et al., 2024). Moreover, digitalization supports the rapid circulation of information within the organization, which enhances decision-making speed and accuracy. The availability of real-time operational data (both internal and external) enables managers to respond effectively to environmental changes and optimize operational activities (Zhao et al., 2023; Song et al., 2024). This capability contributes to improved service levels and more reliable operational performance. In addition, digital logistics systems facilitate strong coordination with suppliers and customers, allowing smoother execution of supply chain activities and minimizing disruptions. Enhanced coordination reduces unnecessary adjustments in raw material flows, improves inventory management, and shortens operational cycles, thereby increasing efficiency and reducing costs (Garay-Rondero et al., 2019; Karttunen et al., 2023). Furthermore, the alignment between organizational functions and digital logistics systems ensures consistency in production processes and enhances the stability of operations. By leveraging integrated information systems, organizations can maintain competitive performance and continuously improve operational outcomes (Jia et al., 2024).

Digitalization also enables organizations to make informed decisions based on comprehensive data analysis, which enhances their ability to optimize resource utilization and improve overall performance. Firms that sustain and continuously develop their digital logistics capabilities are more likely to achieve higher levels of operational efficiency and competitiveness (Al Tera et al., 2024; Song et al., 2024). Thus, logistics digitalization contributes to improved operational performance by enhancing information flow, coordination, and decision-making capabilities. These factors collectively enable organizations to achieve greater efficiency, responsiveness, and competitive advantage. Based on the above discussion, the following hypothesis is proposed:

H5: Logistics digitalization has a significant positive effect on operational performance.

2.5.6. The relationship between adaptability and operational performance

Adaptability is a crucial capability that enables organizations to maintain strong relationships with both upstream and downstream supply chain partners, thereby enhancing overall operational performance. Firms

that demonstrate high levels of adaptability are better able to respond to changes in customer demand and coordinate effectively with suppliers, ensuring timely and accurate delivery of products and services (Akhtar et al., 2022; Zhao et al., 2023). Moreover, adaptable organizations can quickly adjust their operations in response to external environmental changes while maintaining performance stability. This flexibility allows firms to anticipate fluctuations in customer orders, optimize communication with suppliers, and ensure continuity in production and delivery processes (Jia et al., 2024). As a result, organizations are able to maintain high levels of service quality and operational efficiency. In addition, adaptability enables firms to respond effectively to both internal and external conditions by adjusting production volumes, modifying operational processes, and reallocating resources as needed. This dynamic capability supports the efficient management of inventory and improves resource utilization, which contributes to enhanced operational performance (Pfaff, 2023; Khojasteh et al., 2026). Furthermore, organizations with strong adaptability are more resilient to disruptions, as they can maintain operational continuity and overcome unexpected challenges. The ability to sustain workflow, ensure process consistency, and maintain productivity under changing conditions is a key determinant of superior operational performance (Dubey et al., 2018). Thus, adaptability enhances operational performance by improving responsiveness, flexibility, and coordination across organizational processes. Firms that develop strong adaptive capabilities are better positioned to achieve higher efficiency, maintain service quality, and sustain competitive advantage in dynamic environments. Based on the above discussion, the following hypothesis is proposed:

H6: Adaptability has a significant positive effect on operational performance.

2.5.7. The relationship between digital leadership and operational performance through logistics digitalization and adaptability

Digital leadership plays a fundamental role in enhancing organizational performance by supporting the development of integrated digital systems and ensuring the alignment of operational processes. Organizations with strong digital leadership capabilities are better able to establish robust digital infrastructures, allocate resources efficiently, and maintain consistent and effective operational procedures (Türk, 2023; Salamzadeh et al., 2022). Moreover, digital leadership facilitates the successful implementation of logistics digitalization by promoting the adoption of advanced information technologies and fostering continuous system improvement. Through these capabilities, organizations can achieve seamless integration of functions, enhance coordination among departments, and improve information exchange with external partners (Zhao et al., 2023; Li et al., 2024). This integration enables firms to strengthen their operational processes and improve overall performance outcomes. In addition, digital leadership contributes to enhancing organizational adaptability by enabling firms to respond effectively to market dynamics and environmental uncertainties. By leveraging real-time data and digital tools, leaders can support informed decision-making and facilitate rapid responses to external changes without disrupting operational performance (Lathabhavan & Kuppusamy, 2024; Ye, 2025). Furthermore, digital leaders play a key role in developing employee competencies and fostering a culture that supports continuous learning and technological advancement. This, in turn, ensures the sustainability of logistics digitalization and enhances the organization's ability to adapt to evolving market conditions (Albannai et al., 2024). The integration of digitalization and adaptability allows organizations to improve flexibility, optimize processes, and maintain high levels of operational efficiency. Consequently, the relationship between digital leadership and operational performance is not always direct, but rather operates through important mediating mechanisms such as logistics digitalization and adaptability. Digital leadership enhances logistics digitalization, which improves adaptability, and together these factors contribute to superior operational performance. Based on the above discussion, the following hypotheses are proposed:

H7: Logistics digitalization mediates the relationship between digital leadership and operational performance.

H8: Adaptability mediates the relationship between digital leadership and operational performance.

H9: Logistics digitalization and adaptability jointly mediate the relationship between digital leadership and operational performance.

Based on the proposed hypotheses, this study develops an integrated research model that examines the direct and indirect relationships between digital leadership, logistics digitalization, adaptability, and operational performance. The model suggests that digital leadership influences operational performance both directly and indirectly through the mediating roles of logistics digitalization and adaptability. The conceptual framework of the study is illustrated in Figure 1.

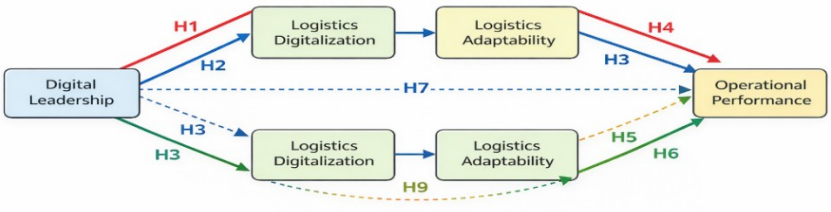

Figure 1. Research Model

3. Research Method

Four variables are used in the present study: digital leadership, logistics digitalization, logistics adaptability, and operational performance. Digital leadership is characterized by five measurement items adopted from Dhaundiyal and Coughlan (2022), which include digital vision capability (DL1), digital communication capability (DL2), digital innovation encouragement (DL3), capacity to promote digital transformation (DL4), and capacity to align digital initiatives with operational goals (DL5). Logistics digitalization is measured based on the items of Al Tera et al. (2024) and Song et al. (2024), including digital system operation in the purchasing department (LD1), production department (LD2), sales department (LD3), and warehouse department (LD4), as well as system accessibility for suppliers (LD5) and customers (LD6). Logistics adaptability is measured using six items based on the approach of Dubey et al. (2018), including the management capability to monitor external supplier conditions (LA1), the ability to monitor external customer conditions (LA2), the ability to create new suppliers (LA3), the ability to assess customer needs (LA4), the ability to ensure flexibility of production and logistics operations (LA5), and the ability to understand the condition of products and logistics operations (LA6).

Operational performance is measured using five items adapted from Sunder and Prashar (2024) and Yu et al. (2019), including production productivity (Op. P1), delivery service level (Op. P2), inventory level (Op. P3), product quality (Op. P4), and work safety (Op. P5). Data collection was conducted using both offline and online methods. Offline data collection was carried out by distributing questionnaires to industry practitioners in various regions in Jordan, including Amman, Zarqa, Irbid, Aqaba, and Sahab industrial areas. This process involved direct administration of questionnaires by the researchers. In addition, questionnaires were distributed to trained enumerators who were provided with clear instructions on how to complete them. The second phase involved online data collection through the development of a Google Forms questionnaire, which facilitated access to a wider range of practitioners across Jordan. The results of the direct distribution yielded 49 valid questionnaires, while 71 responses were obtained through the online survey. Therefore, a total of 120 valid questionnaires were used for analysis.

Table 1 presents the demographic profile of respondents, where 86 respondents were male (73%) and 35 were female (27%). The respondents represented various functional areas, including accounting and finance (19%), marketing and sales (30%), planning and inventory control (11%), logistics management (11%), production and operations (19%), purchasing and materials management (13%), engineering (5%), and information technology (3%). Regarding organizational position, the sample included top management (8%), managers (56%), supervisors and senior staff (11%), and junior staff (11%). In terms of work experience, 38% of respondents had more than 9 years of experience, 14% had less than 3 years, 27% had 3–6 years, and 20% had 6–9 years of experience. With respect to logistics digitalization technologies, most companies relied on self-developed systems (approximately 52–61%), while others used systems such as SAP (approximately 27–32%). Finally, the sample consisted mainly of medium and large organizations,

where 64% of firms had between 20 and 100 employees and 31% had more than 100 employees. Companies with fewer than 20 employees were excluded to ensure consistency with the study population criteria.

Table 1: Respondent Profile

Characteristic	Description	Frequency (n=117)	Percentage
Gender	Male	86	74%
	Female	35	26%
Functional Area	Accounting & Finance	23	18%
	Marketing & Sales	35	31%
	Planning Production Inventory Control & Supply Chain Management	13	10%
	Production & Operational	22	20%
	Purchasing & Material Management	15	14%
	Engineering	6	6%
	Information Technology	6	3%
Organizational Position	Top Management	10	6%
	Manager	56	58%
	Supervisor & Senior Staff	43	18%
	Junior Staff	11	17%
Working Experience in Industry	More than 9 years	45	38%
	6–9 years	24	20%
	3–6 years	32	27%
	Less than 3 years	17	14%
Application of Digitalization (ERP Systems)	SAP	32	27%
	ORACLE	12	10%
	BAAN, JD EDWARDS & MFGPRO	4	3%
	Microsoft Dynamics	9	8%
	Self-Development	61	52%
Company Size (Number of Employees)	More than 100 employees	37	31%
	20–100 employees	76	64%
	Less than 20 employees	5	4%

4. Results and Discussion

The additional data which can be further processed consists of 120 respondents of the medium and large industrial companies in Jordan which have already digitalized their logistics as the application system usage demonstrates. The company can provide information that is available to the suppliers and the customers about the current state of the company. The industrial companies already have an information system that can be utilized to access both the raw material and the finished goods warehouses data to the external partners. Data processing was done to obtain assessment criteria of fit validity greater than 0.500 on loading factors and average variance extracted AVE values. When the Cronbach Alpha and composite reliability have a value that is above 0.70, reliability test is considered to be satisfactory. Fig. 2 is the criteria of these test results.

Table 2: Measurement Model Assessment

Item	Mean	Factor Loading	Composite Reliability	Cronbach Alpha	AVE
Digital Leadership	**4.16**		**0.87**	**0.82**	**0.58**
DL1	4.05	0.82			
DL2	4.13	0.72			
DL3	4.23	0.79			
DL4	4.03	0.79			
DL5	4.37	0.67			
Logistics Digitalization	4.14		0.88	0.84	0.55
LD1	4.02	0.67			
LD2	4.06	0.74			
LD3	4.11	0.71			

LD4	4.14	0.81			
LD5	4.31	0.74			
LD6	4.20	0.77			
Logistics Adaptability	4.09		0.88	0.83	0.55
LA1	4.18	0.61			
LA2	4.00	0.80			
LA3	4.04	0.77			
LA4	4.13	0.71			
LA5	4.01	0.77			
LA6	4.17	0.75			
Operational Performance	4.24		0.85	0.78	0.53
Op.P1	4.25	0.64			
Op.P2	4.30	0.80			
Op.P3	4.19	0.67			
Op.P4	4.25	0.69			
Op.P5	4.23	0.81			

Evaluation of the outer loading validity criteria of the digital leadership with the lowest point of 0.67 of the item DL5 (ability to align digital initiatives with operational goals), AVE 0.58 of the item LD1 (the digital system running well in the purchasing department), the lowest point of 0.61 of the item LA1 (the ability to monitor external supplier conditions), the lowest point of 0.64 of the item Op.P1 (production productivity). Measurement items of each variable have passed the validity test requirements and their values are greater than 0.500. The criteria assessment of the outer loading in terms of reliability in Table 2 fulfils the requirements of above 0.700 in terms of composite reliability and Cronbach alpha. Digital leadership has an average of 4.16, and the measurement item scores are 4.05-4.37, which means that the digital leadership capability is a significant determinant in the policies of digital transformation, competitiveness, commitment to operational excellence. In the Resource-Based View (RBV) approach, digital leadership is a non-material strategic ability through which firms may exploit digital technologies as valuable, rare and difficult-to-copy resources. This ability improves the competitiveness of an organization since technological investment is matched with the operation goals. The digitalization of logistics was evaluated by an average of 4.14 and a mean of measurement items of between 4.02 and 4.31, which implies that the business entity has exchanged information with third parties and internal partners are able to receive data in real-time using the digital logistics system of the business entity. In line with the Dynamic Capabilities Theory, digitalization of logistics enables the firms to feel opportunities, capture technological benefits, and restructure the operational processes with the assistance of real-time data integration and interoperability of the systems. Adaptability of logistics has a mean value of 4.09 and mean value of measurement items of 4.00-4.18, which means that the logistics adaptability of the company can react to the extero changes by making quick and suitable adaptations. This observation contributes to the dimension of dynamic capability of organizational reconfiguration, where adaptability is the capacity of the firm to change logistics procedures, supplier relations, and distribution systems, in the context of environmental uncertainty.

Last, the variable of the operation performance whose mean is 4.24 and the measurement items have ranges of 4.19 to 4.30, denotes that the level of delivery quality and operation efficiency in the company is at an adequate level. The overall average value is rather high, indicating the positive connections between digital leadership-based logistics capabilities and the operational results, which contributes to the idea that the strategic alignment of leadership orientation and operational performance improvement. Based on the results of data processing, the value for the predictive model Q^2 was obtained as follows:

$$Q^2 = 1 – [(1 – 0.44) \times (1 – 0.56) \times (1 – 0.40)] = 0.85 = 85.5\%.$$

The predictive model shows that operational performance is highly dictated by digital transformation of the leadership and the adaptive ability of the logistics, which explain 85.6 and the rest 14.4 is contributed by the remaining variables that are not contained in the research model.

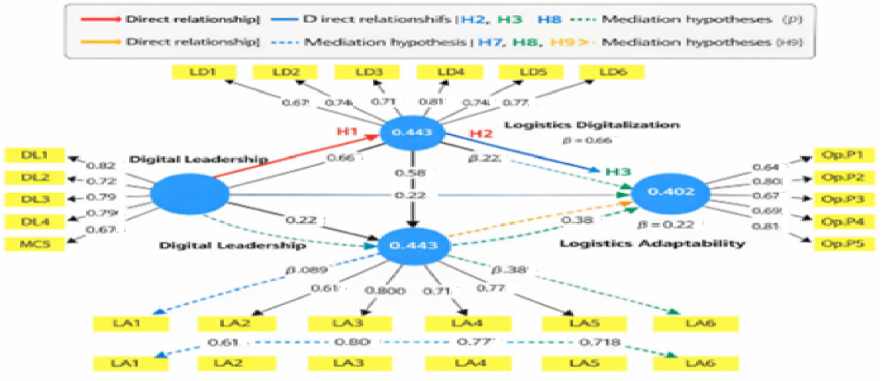

Figure 2. Hypotheses Testing Model

Table 3 Results of Hypotheses Testing

Hypothesis of Research	Path Coefficient	T statistics	P values
(H1) Digital Leadership → Logistics Digitalization	0.66	12.09	0.000
(H2) Digital Leadership → Logistics Adaptability	**0.22**	**2.50**	**0.013**
(H3) Digital Leadership → Operational Performance	0.08	0.68	0.493
(H4) Logistics Digitalization → Logistics Adaptability	**0.58**	**7.05**	**0.000**
(H5) Logistics Digitalization → Operational Performance	0.22	1.65	0.098
(H6) Logistics Adaptability → Operational Performance	**0.38**	**3.22**	**0.002**
(H7) Digital Leadership → Logistics Digitalization → Operational Performance	0.14	1.45	0.147
(H8) Digital Leadership → Logistics Adaptability → Operational Performance	**0.08**	**2.02**	**0.044**
(H9) Digital Leadership → Logistics Digitalization → Logistics Adaptability → Operational Performance	0.15	2.44	0.016

The initial hypothesis that investigates digital leadership and logistics digitalization had a t-statistic of 12.09 (>1.96) and a p- value of 0.000 (<0.050) which was reported to be accepted. The findings show that digital leadership is influential on the logistics digitalization with a coefficient of 0.66. The digital leadership of the company indicates the capability to define a digital vision, orchestrate digital efforts and align technological investments with operations goals, which largely determine the extent of digitalization of the logistics. This is done by coming up with integrated digital systems which run properly within the warehouses, production, and the purchasing departments and can be accessed by customers and internal employees. The findings confirm the findings of other researchers who underline the importance of digital leadership in increasing the level of digitalization in logistics (30); (42); (37). The second hypothesis, which is digital leadership as a determinant of logistics adaptability, had a t-statistic of 2.50(>1.96) and p-value of 0.013 (<0.050), and was thus accepted. Digital leadership has a great impact on the adaptability of logistics and the coefficient of 0.22. The capability of the firm to enhance digital collaboration, cross-functional alignment, and reallocation of digital capabilities contribute to the flexibility of logistics, allowing the firms to assess the demands of the customers and become more flexible in their processes. The findings are consistent with the existing studies that have stressed adaptability that is leadership-based (60); (65); (69). The third hypothesis, which tested the direct correlation between digital leadership and operational performance, got a t-statistic value of 0.68(<1.960) and p-value of 0.49 (>0.050) which rejected the hypothesis. The coefficient (0.089) is positive, but digital leadership does not have a direct impact on operational performance. This implies that leadership orientation towards digital transformation has to be transformed into operational capability before it can have an effect on performance outcomes. The results point to the indirect impact of digital leadership on performance under the influence of mechanisms of logistics digitalization and adaptability, but not the direct one. The 4 th assumption, that logistics digitalization influences logistics adaptability, registered a t-statistic of 7.05 (>1.96), and a p-value of 0.000 (<0.050); consequently, the assumption is accepted. The coefficient of 0.58 indicates that logistics

digitalization is a big determinant of logistics adaptability. The digital systems that are integrated in the production, sales, and warehouse divisions help the company to keep track of the external customer situations and modify operational procedures. This finding confirms the previous research in which digital integration is associated with adaptive logistics performance. The 5 hypothesis which was investigating logistics digitalization and operation performance reported a t-statistic of 1.65 (>1.65) and a p-value of 0.098 (<0.1), which is not significant at the 10% level. Digitalization of logistics positively impacts the performance of operations with a coefficient of 0.22. Online systems that are available to suppliers and customers help in enhancing the level of delivery service and inventory management. The fairly moderate value, however, points to the fact that without adapting ability digitalization is not enough. The sixth hypothesis, which was logistics adaptability and operational performance, provided a t-statistic value of 3.22 (>1.96) and a p-value of 0.001 (<0.05) which was accepted. The adaptability of logistics has a substantial impact on the operational performance with a coefficient of 0.385. The capability of the company to observe the conditions of the suppliers, create alternative suppliers, and react to the changes in the demand contributes to the higher productivity and the quality of the product. On the issue of mediation effects, the seventh hypothesis (digital leadership, logistics digitalization, operational performance) was not confirmed ($t = 1.45$; $p = 0.14$). Nevertheless, the eighth hypothesis (digital leadership digital leadership to logistics adaptability to operational performance) was accepted ($t = 2.02$; $p = 0.043$), which means a partial mediation. It also supported the ninth hypothesis, which determines sequential mediation using logistics digitalization and logistics adaptability ($t = 2.44$; $p = 0.015$). This validates the fact that digital leadership has an impact on the operational performance in a capability-building process. When applied to medium and large industrial enterprises with operations in Jordan, the results indicate that the digital transformation initiatives should be facilitated with the help of alignment (led by leadership) and adaptive logistics systems. The managerial dedication needs to be sustained continuously with the purpose of updating and maintaining digital infrastructure to be integrated into cross-functional departments. Transparency and coordination in operations are boosted by the participation of the suppliers and customers in the digital logistics platforms. Practically, managers of Jordanian industrial companies are encouraged to build on the power of digital leadership skills and investing in the integrated logistics models to become more adaptable and competitive. Academically, the results can be added to the Dynamic Capabilities Theory since they show the improvement of the logistics digitalization (seizing capability) due to the digital leadership (sensing capability) which, in turn, promotes the logistics adaptability (reconfiguring capability) to enhance the operational performance.

5. Conclusions

This paper investigates the place of digital leadership in the operational performance which deals with the influence of logistics digitalization and logistics adaptability. The results of the study are as follows. There is a great impact of digital leadership on the digitalization of logistics and logistics flexibility. Nonetheless, digital leadership does not have a direct impact on operational performance. Digitalization of logistics and logistics flexibility have significant effects on the performance of operations. As intended, the influence of digital leadership on operational performance operated through logistics adaptability and logistics digitalization. Digital leadership is a strategic capability that is involved in defining the overall performance of the company operations but its effect is not direct because it will work through the building of capabilities. The digital leadership is confirmed to stimulate the further digitalization of logistics processes and improve the logistics flexibility. Digitalization helps to make logistics actions more visible, transparent, and integrated, whereas adaptability allows business organizations to react to environmental unpredictability within a short period of time in a flexible manner. The digitalization of logistics and logistics flexibility contribute to the improvement of the performance of operations greatly. The findings affirm that the logistics digitalization that is facilitated by the integrated information technology systems serves as a factor of the logistics adaptability, which, in the turn, has a massive impact on the operational performance outcomes. The findings imply that the capacity to enhance digital leadership should be enhanced to support digital transformation efforts and contribute to the creation of adaptive logistical systems in the case of medium and large industrial corporations working in Jordan. Business organizations must be aiming at nurturing leadership capabilities that enhance digital alignment, cross-functional cooperation, and integration of technology to attain sustainability in operational excellence and long-term competitiveness.

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