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ENHANCING SUPPLY CHAIN RESILIENCE THROUGH DIGITAL INTEGRATION: A CASE STUDY OF MOROCCAN BUSINESSES

[1*]Fatima Zahra Fatih; [2]Safiullah Junejo
[1,2]Faculty of Economics and Business, Universitas Islam Internasional Indonesia
Email: fatima.zahra@uiii.ac.id; safiullah.junejo@uiii.ac.id

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Abstract:
This study examines Moroccan enterprises' digital transformation and supply chain resilience. To adapt to changing market situations, we examine digital integration attitudes and approaches. The results demonstrate that digital technologies are increasingly essential to corporate operations, responding strategically to market changes and strengthening supply chain resilience. This study offers a fresh perspective after the COVID-19 pandemic exposed global supply chain flaws. Digital technologies, remote supplier relationship management, and data security's rising importance in supply chain security are examined. Detailed supply contract analysis and supplier diversification are also critical. Health, safety, and operational continuity are stressed in this context, and effective staff management is essential to solving modern problems. Combining theoretical foundations with empirical investigation, this research examines digital integration and supply chain resilience. It advises Moroccan firms to enhance their defences against possible attacks. Digital transformation and strategic measures may help firms survive and thrive in today's dynamic business climate while maintaining a stable supply chain.
Keywords: Supply chain management, Resilience, Digital transformation, Moroccan companies

Introduction

Companies in today's cutthroat market must strike a careful balance between client happiness and cost-effectiveness in order to succeed. Even more so, the widespread impact of current information and communication technology has ushered in a new age of operations for businesses, one that transcends geographical borders and blurs national identities. Adapting to this new paradigm while still receiving the benefits of an increasingly linked society is a double-edged sword. Strategically modelling supply chain business operations has become a critical issue for major corporations in the current day. Market shifts, new rivals, and an expanding network of inter-business interactions have all forced a shift from conventional production management to supply chain management.

Developed countries and specific economic sectors were the main focus of global supply chain operations until recently. But things have changed dramatically in recent decades, with modernization bringing forth a greater inclusion of emerging nations in international supply

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networks. Throughout its entire industrial history, from sales forecasting to after-sales support, the supply chain is now generally accepted as the company's lifeline. Companies have recognized the potential presented by the ongoing technological revolution and have adapted their marketing and product offerings accordingly. However, there is still a lot of uncharted territory when it comes to incorporating these technologies into supply chain procedures. Early adopters ' dramatic productivity and operational efficiency increases have highlighted the potential advantages of a digitally empowered supply chain.

The COVID-19 epidemic was a wake-up call for businesses everywhere because of the havoc it wreaked on global commerce and supply networks. The prolonged interruption exposed severe weaknesses in the robustness of many businesses' supply chains. As a result, successful enterprises are emphasizing supply chain strategies that are customer-centric, data-driven, and technologically robust. The pandemic's difficulties serve as an illustrative case study of the need for businesses to make the transition from analogue to digital supply chains. In order to protect supply chains from potential disruptions, investing in cutting-edge technology like Blockchain and artificial intelligence is essential.

In this setting, our research sets out to discover how digitization has altered the supply chains of Moroccan firms. In order to obtain insight into the core competencies necessary for effective digital transformation, we will use a descriptive statistical research approach to gather primary data through questionnaires. Our goal in analyzing these empirical results is to help businesses better understand how to defend their supply networks in today's volatile and ever-changing economic climate. Our study's ultimate goal is to provide practical recommendations that help businesses successfully manage the digital transformation of their supply chains.

Literature Review

Resilient supply chains can adapt and bounce back from disruptions or difficulties promptly. It entails developing a robust and adaptable mechanism resistant to shocks and environmental changes. The number and severity of interruptions like natural catastrophes, political upheaval, and global epidemics have all increased recently, drawing much interest to this idea. Christopher (2022) stated essential characteristics may be found in a robust supply chain, it can foresee future interruptions and proactively prepare for them through risk assessment and contingency planning. This entails locating weak points in the supply chain and putting precautions in place to lessen the effects of any interruptions.

On the other hand, a robust supply chain could resume operations quickly in the event of an interruption. To achieve this, collaborators in the supply chain must work together seamlessly, have redundancy capacity, and have alternate sourcing choices. A resilient supply chain may also continually learn from interruptions and make improvements. Companies with a resilient supply

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chain culture can identify interruptions' root causes and effects and use what they learn in their subsequent activities and strategies.

Scholars came across an abundance of tactics and procedures to improve resilience in the supply chain. Kamalahmadi and Parast (2016) propose that regional diversification of suppliers might lessen a supply chain's susceptibility to localized interruptions. With this strategy, alternate supply and distribution routes are possible, reducing the effect of interruptions. Furthermore, Piprani et al. (2020) also assert that cooperation and forging solid bonds with collaborators in the supply chain can support resilience. Effective communication and information exchange can facilitate coordination of reactions and preemptive identification of possible interruptions.

Digital technology makes real-time data exchange, analysis, and gathering possible, increasing insight into operations and potential dangers (Tchana et al., 2020). Because of this visibility, businesses can better anticipate problems and promptly prepare backup plans (Gattorna & Walters, 2016). In this regard, Balakrishnan & Ramanathan (2021) suggest that companies can examine past and present information to forecast and evaluate possible hazards to their supply chains by utilizing sophisticated analytics and machine learning algorithms. This makes it possible to control risks proactively and create backup plans (Agrawal et al., 2019). Due to the automation and optimization of several steps in the supply chain made possible by technological advances, firms are more flexible and willing to respond to disturbances (Ivanov & Dolgui, 2020). For instance, firms may swiftly modify manufacturing schedules and reallocate employees using machines and robots (Balakrishnan & Ramanathan, 2021).

Korpela et al. (2017) emphasized that digital platforms and solutions enable supply chain partners to communicate and share information more quickly. Better collaboration, coordination, and decision-making are made possible, hastening the recovery process (Rasheed et al., 2020). Due to the digital revolution, companies may now improve their network of suppliers by considering variables like cost, speed, and resilience (Chen et al., 2022). Considering possible hazards and interruptions, network optimization models can assist in determining the best placements for logistics facilities, modes of transportation, and depots (Tripathi, 2021).

Businesses across the globe are implementing cutting-edge technology to lessen their environmental impact (Awan & Sroufe, 2022). Businesses understand the significance of advanced innovation as well as how consumer significance, for long-time profitability, and even viability are dependent on their capacity to integrate innovations and technological remedies (Wongverawatanakul, & Leelasantitham, 2022). Industry 4.0 technologies, such as the Internet of Things, artificial intelligence, robotics, 3D printers, and BCT, offer immense support to sustainability practices that include reuse, recycling, green procurement, and remanufacturing (Chang et al., 2019; Zhang et al., 2020). Industry 4.0 technologies, such as the Internet of Things, artificial intelligence, robotics, 3D printers, and BCT, offer immense support to sustainability

practices that include reuse, recycling, green procurement, and remanufacturing. These technological advances must be incorporated into the company's internal operation to reap all of the advantages (Mosser et al., 2022; Bazán & Estévez, 2021), as they may aid in the coordination and alignment of business partner goals (Richard et al., 2020), which in turn improves the whole supply chain (Tripathi & Gupta, 2020; Patrucco et al., 2020), including a particular emphasis upon sustainable (Queiroz et al., 2020; Alcácer & Cruz Machado, 2019)

Hu et al. (2023) found that blockchain technology (BCT) has sparked worldwide curiosity due to its potential to alter supply chain management and environmental efforts. Recognizing this, his study discussed the role of blockchain technologies in the supply chain. The study investigates the significance of BCT in moving supply chains towards environmental sustainability using bibliometric techniques and network cluster analysis. According to his findings, knowledge management procedures have a beneficial impact on the following aspects of supply chain resilience: supply chain preparedness, adaptability, and recovery. Furthermore, the study finds that the implementation of blockchain-based technologies positively moderates the links between KM processes and supply chain resilience, but the organization's inaction negatively moderates these interactions.

In recent years, various firms have used blockchain technology to manage their supply networks (Rejeb et al. 2021). Blockchain technologies are being recognized as a digital technology that may add an environmentally friendly dimension to supply chains (Trollman et al. 2022). Numerous components of this supply chain are connected, each possessing a unique reservoir of knowledge, but adequate communication between them is absent. Dujak and Sajter (2019) attribute the absence of communication and confidence in sharing data. Clauson et al. (2018) proposed blockchain technology as a means of safely sharing data while retaining the confidentiality of data. Blockchain technologies have piqued the interest of academics and professionals as a viable solution to social, environmental, and economic sustainability issues (Zhu et al. 2022).

In addition, Blockchain offers a safe and open platform for logging and tracking transactions and product movements across the supply chain logging and monitoring transactions and product movements across the supply chain. Blockchain technology offers a safe and open platform (Polas et al., 2022). This improves accountability, lowers imitations, and makes it easier to spot interruptions or abnormalities immediately (Quzmar et al., 2021). Throughout interruptions, technological platforms, such as online marketplaces and e-commerce platforms, provide additional revenue channels and procurement possibilities (Yang & Gu, 2021). According to Chen et al. (2022), these kinds of platforms offer more flexibility and access to a larger pool of suppliers and clients.

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Irfan et al. (2022) demonstrate that the privilege of concentrated rigid economically gained, exchanged, and incorporated market expertise by deploying technological innovations and specialized expertise, resulting in the development of a supply chain model that was resilient in addressing logistics and delivery challenges in uncertain as well as difficult circumstances. In this regard, resilience refers to a system's ability to return to its previous state after being interrupted (Christopher & Peck, 2004). It emphasizes the importance of properly handling the repercussions of challenges in comparison to preventing a disruption that may be beyond the network's immediate control (Shishodia et al., 2021; Berle et al., 2013). This latest COVID-19 epidemic highlighted the importance of resilience in supply chain and the impact that disruptions might have on the global network scale when individual supply chain connections and nodes fail. Previous research focused on resilience and sustainability at the same time because sustainability may assist in improving the efficiency of an organization (Nikian et al., 2022; Govindan et al., 2020). According to previous studies, firms that use resilient strategies have the essential capabilities to deal with disturbances while achieving higher profitability (Essuman et al., 2020; Yu et al., 2022). As a result, for such a promising topic of study, further actions must be taken to complete and promote this link. For example, consider the use of technical solutions (D'Silva et al., 2021), such as Blockchain technologies (Ma & Li, 2023; Bayramova et al., 2021). Considering to its versatility, Blockchain technologies permit gathering information regarding environmental conditions in tandem with the resilient supply chain to speed up the recognition of hazards and tension, because blockchain technologies enable a supply chain which be more resilient and transparent due to the permit's insight throughout all supply chain activities as well as facilitates immediate communication (Kim & Laskowski, 2018).

Methodology

Using a descriptive statistical approach, this study looks at how digital transformation is helping Moroccan businesses strengthen their supply chains. This strategy's systematic gathering and examination of quantitative data made it possible to illuminate the operational ramifications of adopting digital practices in supply chain management.

The questionnaire used in this study was carefully crafted to elicit valuable data on the core competencies required to put digital transformation initiatives into practice in Moroccan businesses. A thorough process of reviewing the available literature and considering actual experiences in supply chain management led to formulating these questions. The questionnaire was then validated to make sure it made sense to the intended responders and was easy to understand.

Purposeful sampling was used to choose people to question for this research. The sample was selected from a pool of 30 businesses operating in different sectors in Morocco. Participants were

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selected at random to provide a fair representation of both big and small businesses. This method aimed to get an all-encompassing picture of the panorama of digital change in the Moroccan corporate environment.

Participants were given questionnaires to fill out to gather information. One hundred surveys were sent out, and sixty usable replies were obtained. Reaching out to potential customers was made more accessible by using a variety of channels, including social media and professional networks like LinkedIn. This secured a large sample size from which to draw insights from a wide range of Moroccan businesses' supply chain management specialists.

After data collection is complete, descriptive analysis will be used to determine central statistical measures, including mean, median, standard deviation, and percentage. The industry-standard and competent statistical analysis program, SPSS, will be used to complete this task. These metrics will provide a big-picture perspective of the information, illuminating patterns and tendencies in the digital transformation of supply chains in Moroccan businesses.

Results and Discussion

There was a clear consensus among respondents that digital technology is now fundamental to the operations of most businesses (58.33%). This marked propensity for digital integration is consistent with modern corporate practices, where technology is used to spur innovation, efficiency, and competitive advantage(Saarikko et al., 2020). The outcome is consistent with the widespread agreement that digital transformation is not a luxury but a must in today's fast-paced business climate (Agustian et al., 2023) for survival. In addition, embracing digital technology will have a revolutionary effect on organizational structures, processes, and business models, paving the way for increased competitiveness and sustainability in the long term.

Respondents showed a sophisticated awareness of the possible effect when questioned about their organization's digital strategy goals. Thirty percent of respondents identified radical business process and model transformation as the top priority, demonstrating a keen understanding of the disruptive potential of digitalization. Companies worldwide are increasingly looking to digital technology to generate significant changes in their operations and value offerings (Favoretto et al., 2022). This goal for transformation is consistent with this more significant trend. The emphasis on the client is a common thread across the most effective digital strategies, and 21.7% of respondents specifically mentioned this improvement in engagement and experience. This focus on the customer is reflective of the strategic approach taken by many of the world's most successful businesses in recent years (Iftikhar et al., 2020), which has recognized that providing customers with a positive, consistent, and digitally enhanced experience is crucial to maintaining a competitive edge.

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68.3 percent of respondents agree that digital technologies have the capacity to radically modify organizational work processes, which is indicative of the disruptive power that technology is ascribed to have in redefining established operating paradigms. According to a large body of research, organizations that use digital technology well are more nimble, creative, and competitive (Sambamurthy et al., 2003). The ability to quickly respond to shifting market conditions and exploit new possibilities is being valued as a critical strategic objective. Furthermore, it is projected that incorporating digital technology would promote innovation across different aspects of organizational operations, from product creation to customer interaction, hence leading to sustainable growth and resilience(Ghobakhloo et al., 2021).

When we look at how many different kinds of digital technology Moroccan businesses use, we see they've come a long way. Cloud-based solutions, online apps, social media, and mobile technologies trailed ERP management software in terms of popularity. This shift indicates that businesses are making a concentrated attempt to incorporate digitization into their operations (Ivanov & Dolgui, 2021). It emphasizes an understanding of the wide variety of technologies and a curiosity in their applications. This forward-thinking attitude to technology adoption is consistent with industry standards, as successful businesses understand the need to be at the cutting edge of technological development. Furthermore, this use of several digital tools hints at a comprehensive strategy for digital transformation, one that recognizes how various technologies may complement one another to boost certain facets of an organization's performance.

Positively, on a scale from 1-10, 43.3% of people said they had a lot of faith in their company's digital transformation plan, giving it a 9. This overwhelming show of support shows that Moroccan businesses as a whole are confident in the success of digital strategy. This kind of assurance is indicative of a healthy business culture that welcomes change and innovation, and it also implies a desire to invest in digital projects. The effectiveness of an organization's digital endeavours is directly tied to the existence of a culture that encourages and supports employee participation in digital transformation. It also indicates that these businesses have a clear and unified understanding of digital transformation's role in helping them reach their long-term objectives.

Responses reveal respondents' forward-thinking attitudes toward the temporal significance of digital technology. Notably, 37 respondents think it's critical right now, 48 believe it will be more important in a year, and 55 believe it will be even more important in three years. This outlook on the future emphasizes the ever-changing character of technological environments. This represents the realization that digital transformation is a continuous process and that businesses must be flexible to succeed in a dynamic market (Khanom, 2023). This view is also indicative of

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the strategic foresight of these companies, as it shows that they see the long-term advantages of digital transformation and are prepared to seize new possibilities as they arise.

Of those polled, 63.3% saw little to no disruption in their field as a result of the introduction of digital technology, while 25% saw a moderate influence and 10% saw a major one. The different levels of digital maturity within sectors may help explain the resulting divergence in opinion. In contrast to the quick pace of change in specific sectors, others, such as those with more complicated and well-established procedures, may suffer a more gradual transition. The transformational potential of digital technology may appear in subtle but substantial ways inside businesses where disruption is seen as moderate or low, impacting processes, consumer relationships, and business models. This shows how important it is for businesses of all types to keep an eye out for and adapt to new digital trends.

All respondents saw digital technology as a positive development rather than a potential danger. There is widespread agreement that technical progress is generally beneficial and may help businesses expand. This view is consistent with the generally held belief that businesses may use digital technology to open new income streams, improve consumer experiences, and secure competitive advantages(Sinha et al., 2020). It indicates a forward-thinking approach to digital transformation, where businesses see technology as a facilitator rather than a threat and where digital tools are strategically integrated to open up new opportunities for value creation and corporate growth. The optimistic forecast aligns with current developments worldwide, where innovative businesses are embracing digital transformation to secure their operations' long-term viability and capture growth possibilities in a digitally-driven global economy.

In this light, it's important to stress that the study's findings confirm that leading digitally transformed businesses have innate capabilities and skills that enable them to use digital technology fully. To advance to the next level of digital maturity, businesses must be open to new ideas and willing to work together internally and with external partners (Rowles & Brown, 2017). All the more reason to cultivate a setting that rewards creative problem-solving and teamwork. In addition, these businesses have shown strategic foresight in adopting digital transformation, enabling them to take advantage of the advantages of early adoption and lay the groundwork for long-term success.

According to the literature, this ability to innovate is crucial in converting a business into a digital powerhouse (Uhl & Gollenia, 2014). It connotes a systematic approach to innovation, the formation of critical alliances, and the participation of customers as co-creators in the value-creation process. Only businesses that successfully manage their digital transitions will reap the rewards of increased efficiency and productivity, which will give them a leg up in today's increasingly digital and globally competitive business environment. This highlights the need for companies to make deliberate investments in promoting a culture of invention and cooperation as

a strategic enabler for digital transformation. It also emphasizes enterprises' need to seek and use external knowledge since collaborative ecosystems may be a rich breeding ground for new digital capabilities.

Moreover, it is clear that digital technologies are powerful drivers of competitiveness for Moroccan businesses. This is especially true when the general public improves its proficiency with digital resources. When considering the economy as a whole, the digital sphere offers fertile ground for the birth of brand-new businesses and occupations. As a result of these new enterprises, the business environment in Morocco will become more diversified, and the digital sector's contribution to GDP will increase, both of which are essential for the country's continued economic expansion. That effective adoption of digital technology may spur economic diversification, job creation, and the growth of a thriving digital ecosystem is a powerful example of the broader social effects of digital transformation. It also demonstrates how digital technology can be a force for good in the economy, opening doors for everyone from well-established businesses to new ventures and entrepreneurs.

Conclusion

This research thoroughly investigates the field of digital transformation within Moroccan businesses, illuminating the developing approaches that have been used. We learned a lot about how people feel and what they do regarding digital integration through a thorough poll. The findings prove without a shadow of a doubt that digital technologies are now deeply embedded in the fabric of organizational operations, reflecting a calculated effort to adapt to the dynamic needs of the market. In this setting, respondents showed a deep understanding of the disruptive power of digitalization. Significant numbers of respondents highlighted the critical importance of boosting customer interaction and experience while expressing a firm's will to transform corporate procedures and models. This focus on the client aligns with international standards of excellence and is crucial in creating long-term competitive advantages.

A thorough reevaluation of supply chain processes is necessary as businesses deal with the issues presented by the COVID-19 epidemic. The immediate priority is crisis management, but several other essential considerations need to be revisited considering the vulnerabilities that have been revealed in global supply networks. Telework and paperless contracting are only two examples of digital solutions that are gaining popularity. More robust precautions against cyber attacks are required in light of the growing dependence on digital infrastructure, highlighting the necessity of data privacy and security. Supply chain dependence on specific areas or suppliers must also be reevaluated considering the importance of identifying suppliers and diversifying sources of supply. In addition, evaluating force majeure provisions in supply contracts considering unusual events requires careful consideration. Finally, sound personnel management is still critical,

including health and safety, business continuity, and risk reduction procedures in light of persistent challenges.

Companies have taken the initiative to proactively address vulnerabilities and reinforce their operations to ensure long-term sustainability and success because of the COVID-19 issue, which has prompted a complete reevaluation of supply chain resilience.

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Appendix 1: Survey Responses

1. Digital is present in the activities of your organisation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Agree	25	41,7	41,7	41,7
	Strongly agree	35	58,3	58,3	100,0
	Total	60	100,0	100,0	

2. What do you think are the objectives of your organization's digital strategy?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Improve customer engagement and experience.	13	21,7	21,7	21,7
	Improve customer engagement and experience., Improves innovation., Increase efficiency (example: saving time and rapid access to information).	4	6,7	6,7	28,3
	Improve customer engagement and experience., Improves innovation., Increase efficiency (example: saving time and rapid access to information)., Helps me to be closer to my customers	1	1,7	1,7	30,0
	Improve customer engagement and experience., Increase efficiency (example: saving time and rapid access to information).	5	8,3	8,3	38,3
	Improves innovation.	2	3,3	3,3	41,7
	Improves innovation., Increase efficiency (example: saving time and rapid access to information).	1	1,7	1,7	43,3
	Increase efficiency (example: saving time and rapid access to information).	3	5,0	5,0	48,3
	Radically transforms business processes and / or business models.	18	30,0	30,0	78,3
	Radically transforms business processes and / or business models., Improve customer engagement and experience.	2	3,3	3,3	81,7

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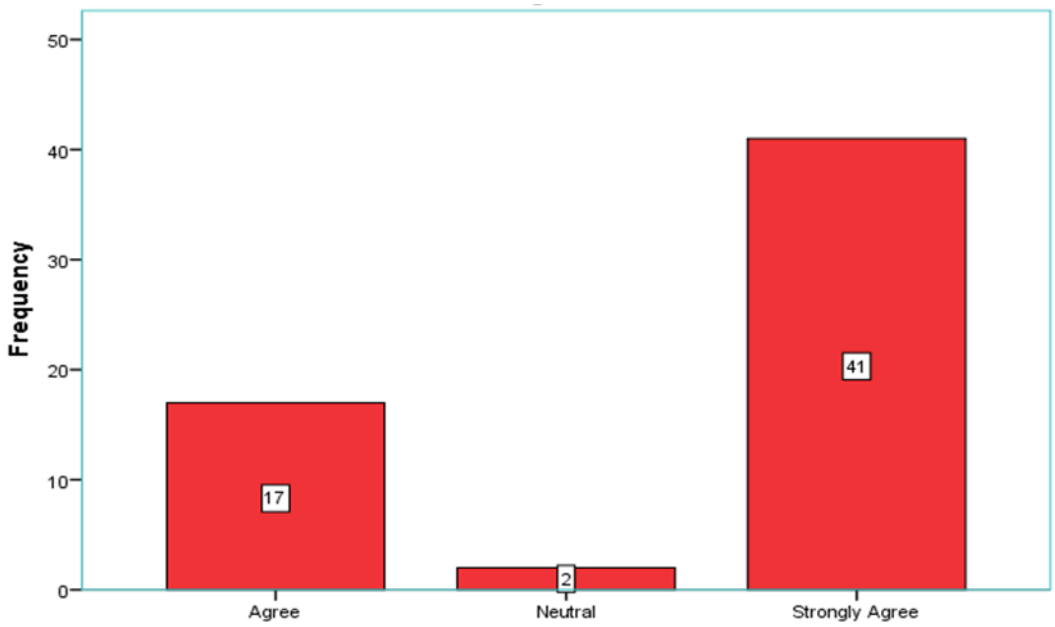
Radically transforms business processes and / or business models., Improve customer engagement and experience., Improves innovation., Increase efficiency (example: saving time and rapid access to information).	1	1,7	1,7	83,3
Radically transforms business processes and / or business models., Improve customer engagement and experience., Increase efficiency (example: saving time and rapid access to information).	1	1,7	1,7	85,0
Radically transforms business processes and / or business models., Improves innovation.	1	1,7	1,7	86,7
Radically transforms business processes and / or business models., Improves innovation., Increase efficiency (example: saving time and rapid access to information).	1	1,7	1,7	88,3
Radically transforms business processes and / or business models., Increase efficiency (example: saving time and rapid access to information).	7	11,7	11,7	100,0
Total	60	100,0	100,0	

3. Digital technologies have the potential to fundamentally transform the way we work in an organization?



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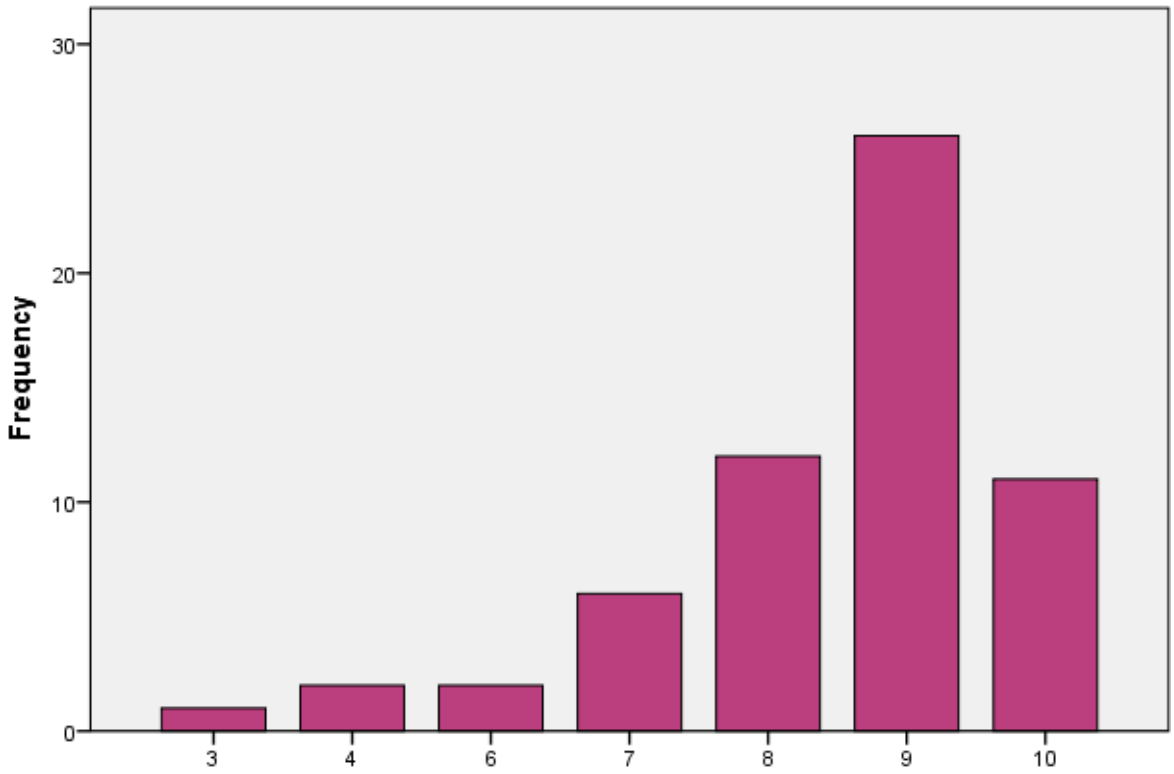
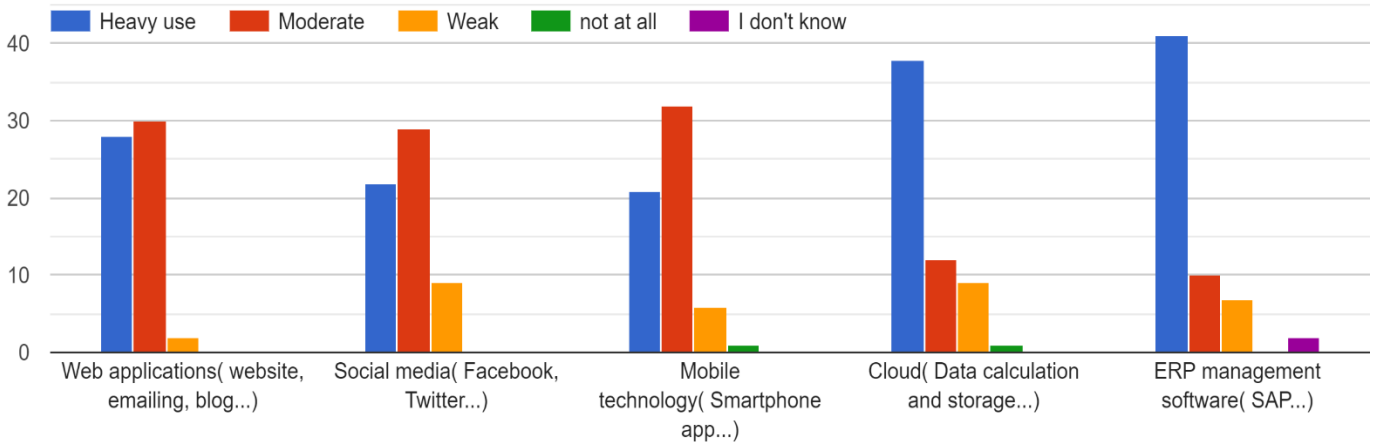


4. To what extent does your organization use the following digital technologies?
5. On a scale of 1 to 10, how would you rate your organization in its digital transformation strategy?

6. How important are digital technologies from a point of view temporal in your organization?



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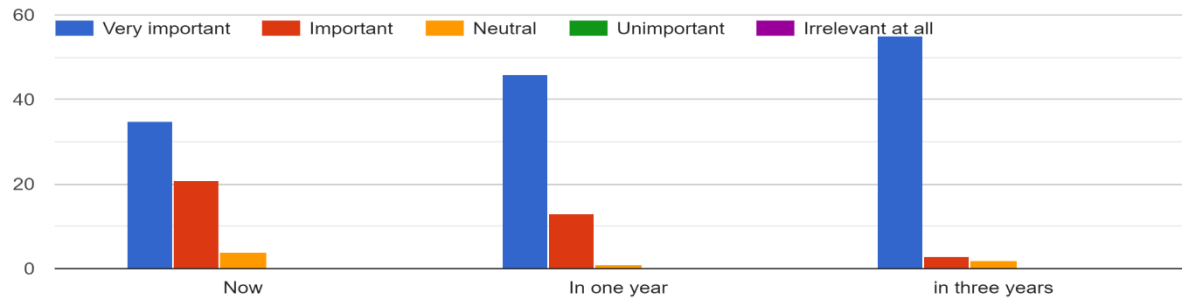

7. How big is the disruption of digital technologies in your industry or sector?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Large scale	6	10,0	10,0	10,0
	Moderate scale	15	25,0	25,0	35,0
	Not at all	38	63,3	63,3	98,3
	Small scale	1	1,7	1,7	100,0
	Total	60	100,0	100,0	

8. Does your organization see digital technologies as opportunities?