

Evaluating Workforce Readiness for Digital Transformation in the Automotive Industry: The Case of North Africa

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Abstract

Digital transformation has reshaped manufacturing across the global automotive industry, yet little is known about how ready workers in emerging economies are to adopt it. This study evaluates workforce readiness for digital transformation in the automotive industry of North Africa, covering Morocco, Algeria, Tunisia and Egypt. The research used a mixed-methods design combining a survey of 622 employees with semi-structured interviews and plant observations. It measured digital literacy, workforce adaptability and organizational support, and identified the barriers to adoption. The survey found persistent gaps in employees' digital skills: younger and better-educated respondents were more likely to report high proficiency, while older and less-educated groups were far less equipped. Across all groups, inadequate training and weak organizational support were the most frequently cited obstacles. Other impediments included poor infrastructure and cultural resistance to change. The interviews suggested that firms are investing heavily in automation and analytics, but that this investment is outpacing the training needed to make it pay off. The study concludes that closing the digital-skills gap in the region depends less on buying more technology than on tailored training, sustained leadership support and a workplace culture in which change is experienced as shared rather than imposed.

1. Introduction

Digital readiness has become a strategic goal for manufacturing companies. As automation, artificial intelligence and data analytics move from pilot projects to the core of operations, a firm's competitiveness rests less on deploying these tools than on whether its workers can use them. The automotive industry was an early adopter of modern production methods, taking up Industry 4.0 and lean principles to raise productivity (Alcácer & Cruz-Machado, 2019; Dachs et al., 2019). In North Africa this adoption is moving quickly, and it is placing new demands on a labour force that has not been studied in this context.

Access to machines is only part of the story. Employees' attitudes, self-efficacy and personal characteristics shape the pace of technology adoption, and the same variables are associated with job performance (Nguyen et al., 2023). Workforce readiness is therefore not an afterthought to digital investment but a precondition for it.

Despite growing global attention, empirical evidence from emerging regions remains scarce. Studies of digital transformation draw mainly on developed markets, and the specific features of the North African industry have received little research attention. This matters because Morocco, Algeria, Tunisia and Egypt are significant players in the global automotive supply chain, and the barriers they face (limited digital proficiency, uneven organizational support, infrastructure constraints and cultural resistance to change) differ from those documented elsewhere. The result is a disconnect between investment in technology and investment in the human capacity to realize its benefits.

The present study addresses that gap. It examines the factors affecting digital literacy and adaptability in the North African automotive workforce, assesses the barriers to adoption, and sets out practical

measures for bridging the skills gap. Three research questions guide the work:

RQ1. What factors influence digital literacy, and how does digital literacy affect the readiness and success of digital transformation in the North African automotive industry?

RQ2. How does workforce adaptability contribute to successful digital transformation?

RQ3. What are the main barriers to the adoption of digital tools and practices?

These questions frame the study and generate three testable hypotheses, shown in Fig. 1.

H1. Workforce digital literacy is positively associated with the success of digital transformation initiatives.

H2. Organizations with higher digital literacy and a culture and mindset receptive to technology are more likely to succeed in digital transformation.

H3. Lack of training, weak support, resistance to change and cultural barriers significantly hinder the achievement of digital transformation.

The figure sets out two pathways. The enabler pathway describes the conditions for successful transformation: firms that invest in training, build adaptability and support adoption create an environment in which a digitally literate workforce can engage with advanced tools, and in which leadership sets clear goals and allocates resources. The barrier pathway is its reverse: where skills are low and leadership support is thin, the gap between the workforce and the organization's technical goals widens, and cultural resistance compounds the problem. The two paths are not mirror images, and a single major barrier such as lack of training can hold back a transformation that is otherwise well resourced.

The study is quantitative and positivist in design, but it treats digital readiness as a fundamentally human question, namely how individuals accept, resist or make sense of technological change, and it connects to a wider literature on workplace culture in multinational firms. The remainder of the paper is organized as follows. Section 2 reviews research on digital transformation and workforce competencies. Section 3 sets out the methodology. Section 4 presents the quantitative results and Section 5 the qualitative findings. Section 6 discusses the findings against the research questions and hypotheses, and closes with practical implications and limitations.

2. Literature Review

Digital literacy is the capacity to use digital technologies effectively, manage information and communicate in digital environments (Belshaw, 2012; Eshet-Alkalai, 2004). In this study the terms digital literacy and technological literacy are used interchangeably to refer to an employee's ability to engage with the digital resources and processes that the automotive sector increasingly demands. Digital

transformation, in turn, is the integration of digital technology into all parts of a business, fundamentally changing how the organization operates and delivers value (Berman & Marshall, 2014).

Industry 4.0 has moved production from discrete automation to connected, data-informed manufacturing, often described as a smart manufacturing ecosystem (Alcácer & Cruz-Machado, 2019; Nambisan et al., 2019). The benefits are genuine, but so are the difficulties. Adoption is often hampered by cultural and structural barriers such as resistance to change and skills shortages (Westerman et al., 2014). The same technologies that improve productivity may also displace jobs and widen inequality if they are not well managed (Parviainen et al., 2017). Mhaske, Bhattacharjee, Haldar, Upadhyay and Mandal (2025) combine expert interviews with a systematic review to identify the determinants of this widening skills gap, finding that the principal enablers are accessible infrastructure, targeted investment in skilling, industry-aligned curricula and organizational digital maturity, while the principal barriers are weak managerial support and low digital maturity, a framing that maps closely onto the North African conditions examined here.

The same tension runs through the labour-economics literature, where digitalization both creates and destroys jobs. Automation can displace large numbers of jobs (Balsmeier & Woerter, 2019). Technology can raise productivity while destabilizing labour markets (Brynjolfsson & McAfee, 2014). A considerable proportion of current jobs is vulnerable to computerization, requiring both people and businesses to change their practices (Frey & Osborne, 2017). Industry 5.0 has been proposed in response, emphasizing worker well-being and human-machine collaboration rather than efficiency alone (Longo et al., 2020; Nahavandi, 2019). These aims are not purely technological; they also require cultural change, which places the human resource function at the centre of transformation (Ammirato et al., 2023).

A recurring theme is that technical skills are necessary but not sufficient. Whether employees can absorb technological change depends on transversal competencies such as critical thinking, problem solving, adaptability, teamwork and continuous learning. Cimatti (2016) links these soft skills to company quality and teamwork, while Hecklau et al. (2016) argue that organizations must move beyond technical training to develop them if human capital is to keep pace with innovation. Training pays off when it is tied to strategic goals. Sung and Choi (2014) found that internal training benefits organizational learning and creativity, whereas undirected financial support for external training does not. Sá and Serpa (2018) extend the argument to educational institutions, treating transversal competencies as essential preparation for technology-driven work. Evidence from Africa is consistent with this. In an assessment of higher education in sub-Saharan Africa, Ndibalema (2025) notes that twenty-first century digital skills remain underdeveloped, partly because of poor infrastructure and unprepared instructors, structural impediments that carry directly over to the regional workforce.

The risk from automation is unevenly distributed. Routine tasks are the most exposed (Dachs et al., 2019), but overall risk varies across countries and sectors, which implies that policy responses should be tailored rather than generic (Degryse, 2016). Some studies look specifically at how digitalization affects employee competencies. Grosheva and Bondarchuk (2019) offer a diagnostic method for assessing how

far workers' competencies match the requirements of a cyber economy. Varshney (2020) examined how organizations build a flexible workforce and found that skills shortages remain a persistent constraint. Ganz et al. (2018) show that digitized work environments call for new decision-making competencies, bridging human and technological interaction.

Employee well-being also affects outcomes. Selimović et al. (2021) show that meeting employees' expectations and psychological needs during the digital transition improves both performance and well-being, while Yoganathan et al. (2021) demonstrate how employees' social-media competence builds the online social capital that supports employer branding. Readiness is strongly conditioned by individual factors: Nguyen et al. (2023) found that attitudes, self-efficacy and personal characteristics influence both readiness and job performance, and Abdul Hamid (2022) showed that employees inclined to use technology display higher adaptive performance, an effect facilitated by job meaningfulness and reinforced by proactive personality. Taken together, these findings point to a common conclusion: technology adoption works only when firms invest in people as well as in systems.

2.1 The North African Automotive Scene

The North African automotive sector has grown quickly, led by Morocco, which produces several hundred thousand vehicles a year and has attracted major manufacturers such as Renault and Stellantis (EOS Intelligence, 2021; Oxford Business Group, 2019). Investment in infrastructure, in particular the Tanger Med port and the Casablanca-Tangier high-speed rail link, has strengthened supply chains and given the country efficient access to European markets, while suppliers such as Yazaki, Leoni and Valeo have deepened the local ecosystem (Automotive Manufacturing Solutions, 2020; EOS Intelligence, 2021). The Renault plant built outside Tangier in 2012, largely for export, marked a turning point for the sector.

The other three countries are differently placed. Tunisia specializes in components, particularly wiring harnesses for European manufacturers; Egypt has assembly plants but has struggled to scale up, largely because of political instability; and Algeria, despite efforts to attract investment such as the Renault plant opened near Oran in 2014, trails Morocco in production volume and supplier integration (Automotive Manufacturing Solutions, 2020; Oxford Business Group, 2019). The industry now employs more than 200,000 people in Morocco alone, which has made the digital readiness of its workforce an economic priority (Morocco Now, 2022).

Governments across the region have responded with national digital strategies. Morocco's Digital Morocco 2030 strategy, for example, aims to train a large cohort of young professionals and create tens of thousands of jobs in the digital sector (Ministry of Digital Transition and Administrative Reform, 2024). Similar ambitions for ICT education, infrastructure and e-government are visible in Tunisia's Smart Tunisia, Egypt's Digital Egypt and Algeria's Algeria Digital 2025 (Ministry of Communications and Information Technology, Egypt, 2021; Smart Tunisia, 2020). These signal clear intent, but a gap remains between policy ambition and the reality of the workforce on the factory floor. Recent evidence from the

sector bears this out. In a comparative study of Moroccan and Nigerian automotive firms, Ojubanire, Marhraoui, Sebti and Berbain (2025) find that the main obstacles to Industry 4.0 implementation in Morocco are resistance to change and high implementation costs rather than the availability of technology, underlining that the binding constraints are human and organizational.

This study is motivated by three gaps in the literature. First, empirical research on digital literacy in the North African automotive sector is limited. Second, the relationship between digital literacy and transformation outcomes is treated abstractly, with the two examined separately rather than as a linked process. Third, the particular obstacles facing employees and firms in this region, namely resistance to change, the need for continuous upskilling, and the alignment of digital operations with corporate goals, are not examined in detail. The study addresses all three through original survey and interview data from the four countries.

3. Methodology

3.1 Research Design

The study used a mixed-methods approach, combining quantitative and qualitative evidence to build a rounded picture of workforce readiness. The quantitative component was a structured questionnaire; the qualitative component drew on semi-structured interviews and direct observation in automotive plants. The design is summarized in Fig. 2.

3.2 Qualitative Strand

The qualitative work followed a case-study approach, tracking digitization initiatives in wire-harness plants in Morocco, Algeria, Tunisia and Egypt over roughly one year. During this period the research team was embedded in several plants and observed directly how employees interacted with newly introduced technologies. Industry experts and executives took part in semi-structured interviews, which provided deeper insight into the challenges and promise of digital transformation in the sector.

3.3 Quantitative Strand

A structured questionnaire was administered to a larger sample of automotive personnel to assess digital literacy, readiness and perceived organizational barriers. A stratified random sampling strategy was used to reach respondents across countries, age groups, education levels and tenure bands. The human resources departments of the main automotive firms in the four countries were briefed on the aims of the study and invited to distribute the questionnaire. It was circulated both electronically, by email and online platforms, and in print, at company meetings and seminars, so as to include employees with differing levels of digital access. Participation was voluntary and responses were anonymous.

3.4 Data Analysis

Qualitative data came from the case study, the plant observations and the interviews. The material was analysed thematically, coding the content to identify recurring patterns and themes across sites. The quantitative data were analysed in SPSS. Descriptive statistics were used to profile digital literacy levels and workforce characteristics. Cross-tabulation was used to examine the relationship between demographic characteristics (age, education and tenure) and digital literacy.

3.5 Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. All participants were informed of the aim of the study and gave informed consent. The research was approved by the ethics committees of the participating institutions in line with international standards, and anonymity was guaranteed.

4. Quantitative Results

4.1 Sample Profile

The survey yielded 622 valid responses from employees working in the automotive sectors of Morocco, Tunisia, Egypt and Algeria. The sample is relatively young and well educated. The modal age band was 25 to 34 years and the most common qualification a bachelor's degree. Most participants held junior or mid-level positions and had between one and six years of service. The full demographic breakdown is given in Table 1.

Table 1
Demographic characteristics of respondents (N = 622).

Measure	Item	Count	%
Gender	Male	272	43.7
	Female	320	51.4
	Prefer not to say	30	4.8
Age	18–24	120	19.3
	25–34	315	50.6
	35–44	135	21.7
	45+	52	8.4
Education	High-school diploma	100	16.1
	Bachelor's degree	300	48.2
	Master's degree	140	22.5
	Doctorate	22	3.5
	Other	60	9.6
Tenure	< 1 year	70	11.3
	1–3 years	200	32.2
	4–6 years	170	27.3
	7–10 years	120	19.3
	> 10 years	62	10.0
Seniority	Junior	220	35.4
	Mid-level	260	41.8
	Senior	142	22.8

By country, most respondents were Moroccan (48.7%), followed by Tunisian (30.2%), Egyptian (15.9%) and Algerian (5.1%). This distribution reflects the uneven development of the automotive sector across the four countries: Morocco is the regional manufacturing hub, Tunisia a centre for components, Egypt an emerging producer, and Algeria still at an early stage. Libya was excluded because of access restrictions and its small, import-dependent industry.

4.2 Digital Literacy

Self-rated digital literacy varied widely. One third of respondents assessed themselves as 'Good' (32.2%), with a further 28.0% rating themselves 'Neutral', indicating moderate confidence with digital tools. Only

10.9% rated themselves 'Very Good', while at the lower end 17.7% reported 'Poor' and 11.3% 'Very Poor' literacy. Taken together, these figures place close to a third of the workforce below a functional threshold of digital competence, a gap wide enough to hold back transformation across the sector.

4.3 Perceived Importance of Digital Transformation

Most respondents recognized the strategic importance of digital transformation. Of the 569 employees who answered this item, 35.0% agreed and 21.1% strongly agreed that it is critical to their firm's success. A sizeable minority were not convinced, however: 17.6% were neutral, 14.1% disagreed and 12.3% strongly disagreed. The split suggests that support for change is broad but not unanimous, and that pockets of scepticism will need to be addressed directly rather than assumed away.

4.4 Reported Barriers

Asked what was holding back digital transformation at their organization, respondents most often cited a lack of training (188 mentions) and a lack of support (155 mentions). Infrastructure and usability issues followed: poor internet connectivity (88), difficulty understanding the technology (66), and systems that remain hard to use even after digitization (44). The pattern is consistent: the binding constraints are human and organizational, not only technical.

4.5 Perceived Readiness and Impact

Readiness was mixed. Among the 511 employees who rated their firm's stage of transformation, the largest group described their company as 'Moderately Prepared' (32.9%), followed by 'Very Prepared' (27.2%) and 'Completely Prepared' (12.9%). At the lower end, 17.4% felt 'Slightly Prepared' and 9.6% 'Not at All Prepared'. Perceptions of impact were more favourable. Of the 509 employees who answered this item, 32.8% reported a 'Somewhat Positive' and 29.1% a 'Very Positive' effect on performance, against 13.0% 'Somewhat Negative' and 7.9% 'Very Negative', with 17.3% neutral. In short, most employees regard digital transformation as beneficial even where they judge their own organization only partly ready for it.

4.6 Advanced Tools in Practice

Plant observations gave specificity to the survey trends. Moroccan plants in particular expanded their use of new methods after the COVID-19 pandemic. The research team observed, and in some cases tested, VR-based training programmes (Fig. 3a and 3b) in which employees can practise complex operations without risk of physical injury, an approach that proved valuable when in-person training was restricted. AI-driven tools and digitized production lines were also installed (Fig. 3c and 3d), reducing the physical and cognitive load on operators. Such deployments show a sector moving towards digital competence, but their effectiveness still depends on people being properly trained and supported to use them.

4.7 Cross-Tabulation: Who Is Digitally Ready?

Cross-tabulating digital literacy by age, education and tenure reveals a consistent structure to the skills gap. Age shows a clear generational pattern (Table 2): 60% of employees aged 25 to 34 reported high literacy, against only 30% of those aged 45 and over, a third of whom fell into the low-literacy band. Education is closely linked to literacy (Table 3), rising from 35% high literacy among high-school graduates to 70% among doctorate holders. Tenure matters as well (Table 4): employees with more than ten years of service were more than twice as likely to report high literacy as those with less than a year, which points to the effect of sustained exposure to organizational systems and training.

Table 2
Digital literacy by age group.

Age group	High (%)	Moderate (%)	Low (%)
18–24	45	35	20
25–34	60	30	10
35–44	50	35	15
45+	30	40	30

Table 3
Digital literacy by education level.

Education level	High (%)	Moderate (%)	Low (%)
High-school diploma	35	40	25
Bachelor’s degree	55	35	10
Master’s degree	65	30	5
Doctorate	70	25	5

Table 4
Digital literacy by employment duration.

Tenure	High (%)	Moderate (%)	Low (%)
< 1 year	30	50	20
1–3 years	45	40	15
4–6 years	55	35	10
7–10 years	60	30	10
> 10 years	65	30	5

The three characteristics reinforce one another. The most digitally ready employees are young, educated and established in their firms; the least equipped are older, have less formal education and are new to

their companies. This pattern explains why undifferentiated training fails, since a single programme cannot serve groups whose starting points are so far apart.

5. Qualitative Findings

The interviews add organizational texture to the survey results. Table 5 sets out eleven recurring insights from several automotive manufacturers, showing how transformation is understood and managed from the inside.

Table 5
Key insights from the qualitative interviews.

#	Insight
1	Technology plays a decisive role in corporate development.
2	Transformation initiatives are introduced with cooperation across functions and plants.
3	Business value, not technology trends alone, should drive adoption.
4	Transformation requires collective effort across governance, operations, service, innovation, people, and technology.
5	Current IT focus areas are data analytics, process automation, Industry 4.0, communications, and AI.
6	The firm collects operational data from 45 sources (over 80 terabytes), aiming to shift from historical to predictive analysis.
7	44 processes are automated, saving about 1,100 hours of manual work per month, with further automation under review.
8	Smart-manufacturing solutions are expected to raise productivity and quality.
9	New communications apps have streamlined workforce communication.
10	AI tools are promising but carry security risks, especially with sensitive data.
11	Employees are encouraged to propose ideas for integrating AI into operations.

Three themes emerge from these insights. First, respondents consistently placed business value ahead of technology: tools are adopted to solve problems, not to follow trends (Insights 3 to 5). Second, the volume of data and automation now in place is considerable (45 data sources, over 80 terabytes, 44 automated processes), but the interviews presented this less as an achievement than as a capacity that must be matched by workforce capability if it is to pay off (Insights 6 to 8). Third, AI holds a double-edged status: it is welcomed for its promise but approached carefully because of data-security risk. Organizations are managing that tension by inviting employee input rather than imposing tools from above (Insights 10 and 11). In sum, the qualitative evidence suggests that successful transformation is as much a matter of governance and culture as of technology.

6. Discussion and Conclusion

The findings speak directly to the three research questions and hypotheses. The results of hypothesis testing are summarized in Table 6 and discussed in turn below.

Table 6
Summary of hypothesis testing.

Hypothesis	Result	Principal evidence
H1: Digital literacy is positively associated with successful transformation.	Supported	Cross-tabulation shows higher literacy among younger and more educated employees, indicating stronger readiness.
H2: Supportive culture and positive attitudes support successful transformation.	Supported	Survey and interview evidence establish the role of leadership support, training, and organizational culture.
H3: Barriers such as weak training and support negatively affect transformation.	Strongly supported	Lack of training (188) and insufficient support (155) were the most cited barriers.

6.1 Demographic and Educational Differences (RQ1, H1)

What stands out most is a generational and educational divide in digital literacy. Younger employees, particularly those aged 25 to 34, were considerably more proficient than colleagues aged 45 and over. This is consistent with the digital-natives argument that early and frequent exposure to technology produces fluency (Bennett & Maton, 2010) and with the finding of Nguyen et al. (2023) that age can affect both readiness and performance in digital settings. In wealthier economies the digital divide has shifted from access to use (Van Deursen & Van Dijk, 2014); in the North African automotive sector the two challenges coexist, since access to tools and training is itself uneven.

Education compounds the effect. Employees holding a bachelor’s or master’s degree consistently outperformed those with only secondary schooling, confirming formal education as an important predictor of readiness. In practice, mid-career employees with higher degrees tend to become informal digital champions, encouraging both junior and senior colleagues to adopt new systems. For those with only secondary education the learning curve is steeper. The policy implication is not to reward the already-skilled but to build mentorship and hands-on courses that reach those without formal higher education, so that the divide narrows rather than widens.

6.2 Support, Culture and Adaptability (RQ2, H2)

Workforce adaptability mattered, and it depends in turn on the organizational setting. Inadequate training was the most frequently cited barrier, echoing Parviainen et al. (2017) on the need for continual upskilling so that skills gaps do not obstruct adoption. The interviews made the problem concrete: one company has automated 44 procedures, saving more than 1,100 hours of manual work a month, but without proper training those gains risk alienating the very low-literacy employees they are meant to help. The second most cited barrier was weak organizational support, in line with Selimović et al. (2021) on the need for psychological safety and sustained support during transition. Adaptability is therefore

not simply an individual trait; it is built by leadership that provides direction, resources and a culture in which change is experienced as shared rather than imposed (Westerman et al., 2014).

6.3 Barriers and Enablers (RQ3, H3)

The data map onto the two pathways shown in Fig. 4. On the barrier side, lack of training, weak support and cultural resistance funnel organizations towards failed transformation. Employees made this concrete: one felt the training sessions were ‘too generic’ for the tools used daily, while another feared that adopting AI ‘might jeopardize our sensitive data’. These comments point to a skills gap and a trust gap alike. On the enabler side, aligned training programmes, active leadership support and workforce agility are among the success factors. Where firms invested in both technical and soft-skill training, employees developed their own use cases for AI and VR, producing the kind of bottom-up innovation that characterizes entrepreneurial cultures (Nambisan et al., 2019).

The figure places advanced technology as the mediating element: promising in itself, but yielding returns only to the extent that the surrounding barriers are contained and the enablers harnessed. This is the substance of H2. Transformation is not only about deploying technology but about building an ecosystem in which infrastructure, workforce readiness and organizational alignment reinforce one another. Transversal skills hold that system together. Digital literacy provides the technical base, but adaptability, problem solving and communication are what allow people to apply it as processes change (Hecklau et al., 2016). Embedding these capabilities in training, rather than assuming they are innate, is what produces a workforce that is both technically skilled and resilient.

6.4 Contributions and Practical Implications

The study extends the digital-transformation literature by contributing new evidence from a rarely studied setting and by linking digital literacy to transformation readiness through concrete demographic pathways. The practical point is straightforward: training cannot be uniform, because readiness varies by age, education and tenure. Companies need to balance structured onboarding for new employees, mentorship for longer-serving staff, and continuous learning for everyone. They also need to invest in leadership that treats digital change as a people challenge first and a technological problem second. For a region that aspires to be a global automotive hub, bridging the human-capital gap is not an adjunct to technology investment but a precondition for it.

6.5 Limitations and Future Directions

These findings carry several limitations. The cross-sectional design captures readiness at a single point in time and cannot trace how it evolves as transformation unfolds; longitudinal work would be more informative. Self-report measures are prone to social-desirability bias, and objective skill assessments would complement future work. Although the sample is substantial, it may not be fully representative of the sector, and the focus on four countries limits how far the findings extend to other regions and industries. Future work might broaden the analysis to other manufacturing sub-sectors, logistics and

services. It could also examine the effect of specific training interventions on different demographic groups, and the role of leadership style in the barrier and enabler pathways identified here.

Within these limits, the study offers empirical grounding and practical direction for a region that has been understudied. The digital transformation of the North African automotive industry will not be decided by technology alone. It depends on a workforce that is trained, supported and culturally prepared to make these technologies work, and on firms willing to invest in the people who use them.

Declarations

Author Contribution

M.S. was responsible for the conceptualization, methodology, investigation, data collection, formal analysis, interpretation of results, writing of the original draft, review and editing, and preparation of the final manuscript.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon reasonable request, subject to confidentiality and data-protection restrictions.

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Figures

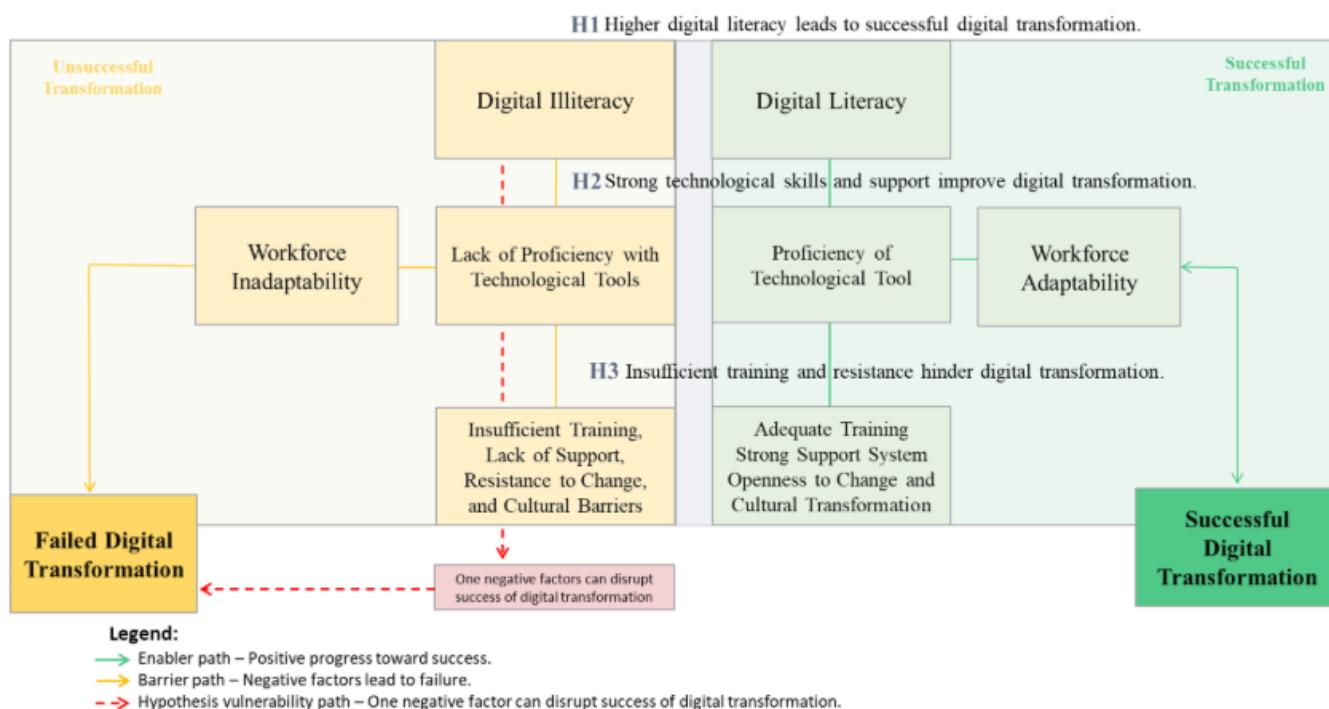


Figure 1

Hypothesis-driven model of the factors influencing digital transformation.

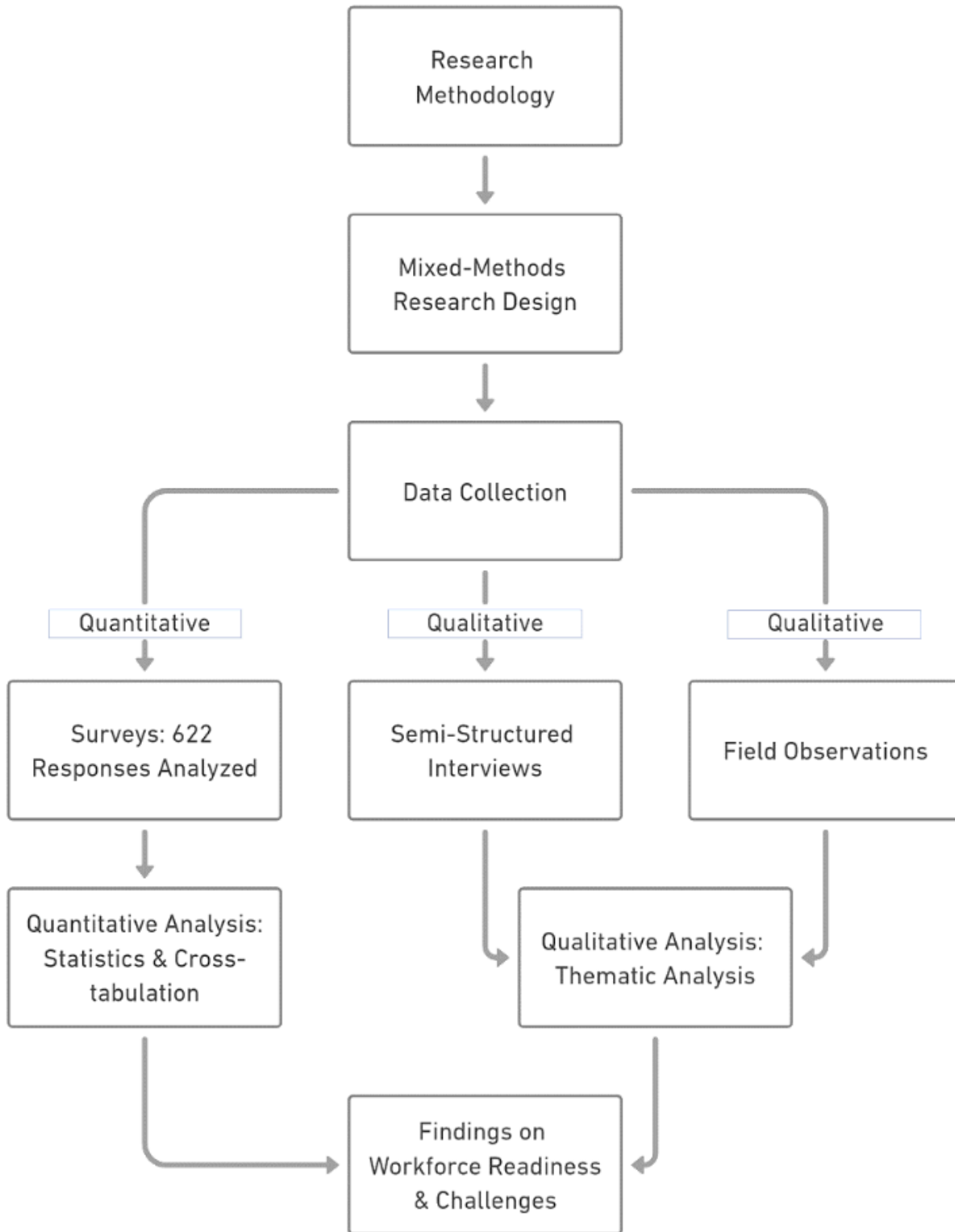


Figure 2

Research methodology framework.



Figure 3a.



Figure 3b.



Figure 3c.



Figure 3d.

Figure 3

Figure 3a. VR simulation training room.

Figure 3b. Employees in a VR training session.

Figure 3c. AI-driven simulation tool.

Figure 3d. Digitized production line reducing manual tasks.

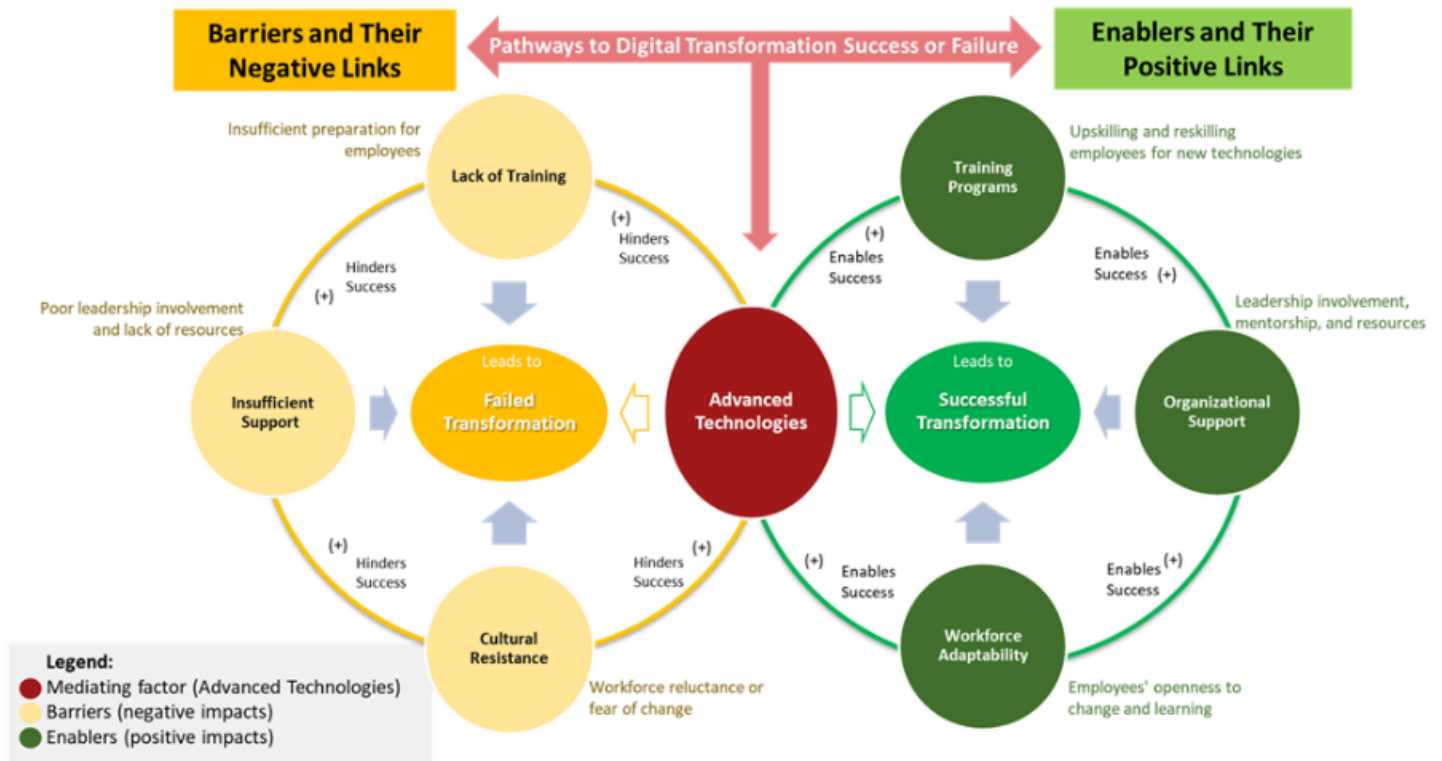


Figure 4

Pathways to digital transformation success or failure.