

Strategic human resource capabilities for digital transformation: Linking talent, leadership, competence and readiness to technology adoption



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Orientation: Digital transformation has become a decisive factor in enhancing competitiveness within manufacturing industries; however, many firms in emerging economies continue to face constraints related to workforce capability and organisational readiness.

Research purpose: This study examines the influence of digital talent strategy (DTS) and technology-driven leadership (TDL) on digital technology adoption (DTA), with digital competency development (DCD) and digital change readiness (DCR) acting as mediating mechanisms.

Motivation for the study: Although prior research highlights the importance of talent and leadership in digital transformation, existing studies often treat these dimensions separately and predominantly focus on advanced economies. The Indonesian manufacturing sector therefore offers a relevant context to explore how people-oriented strategies support digital adoption under systemic disruption.

Research approach/design and method: A quantitative survey was conducted involving 250 respondents from medium- and large-scale manufacturing firms across five industrial estates in West Java, Indonesia. Data were analysed using partial least squares structural equation modelling.

Main findings: The findings indicate that DTS has a significant direct and indirect effect on DTA through DCD and DCR. While TDL does not exert a direct influence on DTA, it demonstrates a strong indirect effect via DCR, highlighting the central role of organisational readiness in facilitating digital adoption.

Practical/managerial implications: Manufacturing firms are encouraged to institutionalise structured digital talent planning, continuous training, and recruitment aligned with digital requirements. Leadership efforts should prioritise strengthening readiness and fostering supportive organisational climates for transformation.

Contribution/value-add: This study advances the resource-based view and dynamic capabilities perspectives by integrating talent, leadership, competence, and readiness into a unified framework for digital transformation, offering both theoretical insight and practical guidance for organisations in emerging economies.

Keywords: digital talent strategy; technology-driven leadership; digital competency development; digital change readiness; digital technology adoption.

Introduction

Digital transformation has emerged as a critical force in redefining how organisations create value and compete in dynamic markets (Bharadwaj et al., 2013). The manufacturing sector, as the backbone of economic growth, is facing systemic disruption triggered by the integration of advanced technologies such as artificial intelligence (AI), the Internet of Things (IoT) and big data analytics (Ghobakhloo et al., 2022). While adoption rates are steadily increasing, firms in emerging economies continue to struggle with structural inertia, human resource readiness and organisational culture misalignment, which collectively undermine the effectiveness of technological implementation (Machado et al., 2021). Taken together, these challenges underscore that the true bottleneck of transformation lies not in access to technology alone but in the capacity of people and organisations to internalise and leverage it for sustainable performance

(Bindra et al., 2025). This is particularly critical in Indonesia's manufacturing sector, where systemic digital disruption intersects with workforce capability gaps, rendering human-centred strategies a decisive determinant of successful transformation (Vardarlier, 2019).

Research purpose and objectives

The purpose of this study is to investigate how digital talent strategy (DTS) and technology-driven leadership (TDL) influence digital technology adoption (DTA) in manufacturing firms. It further investigates the mediating roles of digital competency development (DCD), defined as the process through which employees acquire the knowledge, skills and attitudes required to effectively use digital technologies (Guerra et al., 2023) and digital change readiness (DCR), which reflects both structural preparedness and the psychological willingness of organisations to embrace transformation (De Carolis et al., 2017). By integrating these constructs into a unified framework, this study not only addresses critical managerial challenges but also enriches the strategic human resource management (SHRM) literature by linking people-oriented strategies to technology outcomes (Bondarouk & Brewster, 2016; Mahroof et al., 2025).

Review of key literature and research gap

Prior research has emphasised the significance of leadership in digital transformation (Promsri, 2019) and the strategic role of talent management in enabling organisational innovation (Guerra et al., 2023). However, existing studies often analyse these dimensions in isolation, leading to fragmented insights into how leadership and talent strategies jointly influence digital adoption. Moreover, most prior work has been concentrated in advanced economies or digital-native industries, leaving traditional sectors in emerging markets, such as manufacturing, underexplored (Sony & Naik, 2019). From a theoretical standpoint, the resource-based view (RBV) suggests that firms achieve sustainable competitive advantage by leveraging valuable, rare, inimitable and non-substitutable (VRIN) resources, including digital talent and leadership capacity (Bharadwaj et al., 2013; Teece, 2018). Yet, in highly dynamic environments, RBV alone is insufficient to explain how firms continually adapt to change. The dynamic capability (DC) framework extends this perspective by highlighting organisations' abilities to sense opportunities, seize them through strategic initiatives and reconfigure resources to remain competitive (Teece, 2018; Warner & Wäger, 2019). In the context of digital transformation, digital talent strategies and TDL function as critical enablers for developing DC, while digital competence and change readiness translate these capabilities into actionable adoption of technology (Hess et al., 2016). Despite their relevance, empirical research testing these interconnections in the Indonesian manufacturing sector remains scarce, creating an important contextual as well as theoretical gap (Burnes & Jackson, 2011).

Contribution

Addressing this gap, the current study develops and empirically tests an integrated model that links DTS, TDL, DCD, DCR and DTA within the SHRM domain. Theoretically, this study advances RBV and DC perspectives by demonstrating how human capital strategies and leadership translate into adaptive competencies that foster DTA in traditional industries (Bindra et al., 2025; Strohmeier, 2020). Practically, it provides actionable guidance for manufacturing firms in emerging economies, emphasising the need to design talent development and leadership practices that build organisational readiness, reduce resistance and accelerate digital transformation (Guerra et al., 2023; Vardarlier, 2019). By situating the research in Indonesia, the study offers contextually relevant insights while contributing to the broader discourse on sustainable digital transformation in labour-intensive sectors (Machado et al., 2020).

Literature review

Resource-based view and dynamic capabilities theory

The RBV provides the foundational theoretical lens for understanding how organisations leverage internal resources to achieve sustainable competitive advantage (Barney, 2001). According to RBV, firms that possess VRIN resources are better positioned to outperform competitors (Barney, 2014). In the context of digital transformation, human capital resources, particularly digital talent and leadership capabilities, represent critical VRIN assets that enable manufacturing firms to navigate technological disruption successfully (Bharadwaj et al., 2013; Teece, 2018). However, the static nature of traditional RBV has been critiqued for its limited explanatory power in highly dynamic environments marked by rapid technological change (Eisenhardt & Martin, 2017). The DC framework addresses this limitation by focusing on firms' abilities to integrate, build and reconfigure internal and external competencies in response to rapidly changing environments (Teece et al., 1997). Teece (2018) refined this conceptualisation by identifying three core DC: sensing opportunities and threats, seizing opportunities through strategic initiatives and transforming organisational resources to maintain competitiveness. Recent research has demonstrated the critical relevance of DC for digital transformation initiatives (Kraus et al., 2022; Warner & Wäger, 2019). In manufacturing contexts, organisations must continuously sense technological opportunities, seize them through strategic investments in digital talent and leadership and transform their human resource capabilities to enable effective technology adoption (Mikalef & Gupta, 2021). This theoretical foundation provides the basis for understanding why digital talent, leadership, competence and readiness underpin successful DTA.

Digital talent strategies

Digital talent strategies (DTS) encompass the systematic approaches organisations employ to attract, develop, deploy

and retain human capital with digital competencies (Guerra et al., 2023). In manufacturing environments, DTS becomes particularly critical because of the sector's traditional reliance on manual processes and the increasing integration of Industry 4.0 technologies (Ghobakhloo et al., 2022). Contemporary research emphasises that effective DTS goes beyond conventional talent management by incorporating digital-specific elements such as algorithmic thinking, data analytics capabilities and technological adaptability (Blanka et al., 2022). Organisations implementing comprehensive DTS demonstrate superior performance in digital transformation initiatives by ensuring alignment between human capital capabilities and technological requirements (Bindra et al., 2025). The manufacturing sector faces unique challenges in DTS implementation, including skills shortages in digital competencies, resistance to change from traditional workforce segments and the need to balance automation with human-centric approaches (Sony & Naik, 2019). Research by Xie et al. (2024) demonstrates that manufacturing firms with structured digital talent strategies achieve significantly higher levels of digital innovation and competitive advantage compared to those with ad hoc approaches. Furthermore, DTS effectiveness depends on organisational context factors, including firm size, digital maturity level and industry characteristics (Da Silva et al., 2025). In emerging economy manufacturing contexts, such as Indonesia, DTS must account for additional challenges, including limited digital infrastructure, varying levels of digital literacy among workforce segments and institutional constraints (Machado et al., 2020). In addition, research highlights that fostering psychological safety in technology teams enhances task performance, encourages knowledge-sharing behaviour and promotes organisational citizenship behaviour while simultaneously reducing turnover intentions (Liu & Keller, 2021). Collectively, DTS is expected to positively influence competence development, readiness for change and technology adoption supporting H1, H2 and H3.

Technology-driven leadership

Technology-driven leadership represents a contemporary leadership paradigm that integrates digital technologies into leadership practices while fostering organisational cultures conducive to digital transformation (Promsri, 2019). Unlike traditional leadership approaches, TDL emphasises digital vision articulation, technology-enabled decision making and the ability to inspire organisational members towards digital innovation (Cortellazzo et al., 2019).

Research indicates that TDL encompasses multiple dimensions, including digital intelligence, technological empowerment of followers, digital change management capabilities and strategic agility in technology adoption (Kane, 2019). Leaders exhibiting strong TDL characteristics demonstrate superior ability to navigate digital transformation challenges and to establish organisational conditions that facilitate technology acceptance (Hess et al., 2016). In manufacturing contexts, TDL

becomes particularly relevant because of the sector's hierarchical organisational structures and the need to integrate digital technologies with established operational processes (Amaral & Peças, 2021). Manufacturing leaders must possess both technical understanding of digital technologies and the interpersonal skills necessary to guide workforce adaptation to new technological paradigms (Blanka et al., 2022). Empirical evidence suggests that TDL influences organisational outcomes primarily through indirect pathways rather than direct effects on technology adoption (Schwarzmueller et al., 2018). Specifically, leaders create organisational conditions, including psychological safety and innovation climate that facilitate innovation capabilities and performance. Recent evidence further demonstrates that an organisational climate of psychological safety is positively associated with diverse innovation capabilities, including product, process, service and business model innovations (Andersson et al., 2020). Research highlights that digital leadership, innovation capability, and organisational readiness are critical drivers of technology adoption and digital transformation outcomes in organisations (Benitez et al., 2022; Chatterjee & Chattopadhyay, 2015; Maleki, 2016). Thus, TDL is theorised to affect competence development, readiness and adoption, supporting H4, H5 and H6.

Digital competency development

Digital competency development refers to the systematic processes through which employees acquire, enhance and apply digital skills, knowledge and attitudes necessary for effective technology utilisation (Ferrari & Punie, 2013; Murawski & Bick, 2017). In manufacturing environments, DCD encompasses both technical competencies related to specific digital technologies and meta-competencies such as digital problem-solving and adaptability (Kipper et al., 2021). Contemporary frameworks for DCD emphasise multidimensional approaches that integrate cognitive, technical and behavioural elements (Vuorikari et al., 2016). Research by Xie et al. (2024) demonstrates that manufacturing firms with systematic DCD programmes achieve superior digital innovation outcomes compared to organisations relying on informal learning approaches. The effectiveness of DCD initiatives depends on several factors, including organisational learning culture, availability of digital learning resources and alignment between competency development efforts and strategic objectives (Vieru et al., 2015). Recent research emphasises the critical role of contextual factors in shaping the effectiveness of digital competency development. Specifically, digital transformation effectiveness is contingent on organisational strategic resources and digital orientation, particularly in emerging economies where firms face unique challenges in capability building (Egala et al., 2024). The organisational climate for psychological safety: Associations with SMEs' innovation capabilities and innovation performance. In manufacturing contexts within emerging economies, organisations encounter significant barriers including resource constraints and varying levels of technological infrastructure that affect digital transformation outcomes

(Chong et al., 2024). Therefore, DCD is expected to directly improve change readiness and adoption, supporting H7 and H8.

Digital change readiness

Digital change readiness encompasses both the structural and psychological dimensions of organisational preparedness for digital transformation initiatives (Holt et al., 2007). Unlike general change readiness concepts, DCR specifically addresses the unique challenges associated with DTA, including technological complexity, pace of change and the need for continuous adaptation (Machado et al., 2021). Research identifies multiple dimensions of DCR including cognitive readiness (understanding the need for digital change), emotional readiness (positive attitudes towards digital transformation) and behavioural readiness (willingness to engage in digital change activities) (Weiner, 2020). In manufacturing contexts, DCR becomes particularly critical because of the sector's traditional resistance to change and the complexity of integrating digital technologies with established operational processes (De Carolis et al., 2017). Contemporary studies demonstrate that DCR serves as a critical mediating mechanism between organisational antecedents and digital transformation outcomes (Warner & Wäger, 2019). Organisations with higher levels of DCR demonstrate superior performance in DTA, implementation effectiveness and realisation of digital transformation benefits (Ghobakhloo et al., 2022). The development of DCR requires systematic approaches that address both individual and organisational factors (Burnes & Jackson, 2011). At the individual level, this involves building digital self-efficacy, reducing technology-related anxiety and fostering positive attitudes towards digital change (Rafferty et al., 2013). Accordingly, DCR is expected to directly increase DTA and mediate leadership and talent effects, supporting H9 and H12.

Digital technology adoption

Prior studies on technology adoption and organisational change emphasise the importance of leadership, organisational readiness, and innovation capability in shaping successful digital transformation initiatives (Klein & Knight, 2005; Rogers, 2003; Gilch & Sieweke, 2021; Heredia et al., 2022). Digital technology adoption in manufacturing contexts encompasses the processes through which organisations integrate digital technologies into their operational and strategic activities (Ghobakhloo & Ching, 2019). Unlike simple technology acceptance, DTA involves systematic implementation, integration with existing processes and achievement of intended performance outcomes (Nwankpa & Roumani, 2016). Research identifies multiple dimensions of DTA including adoption speed, implementation depth, process integration and routinisation of technology use (Sony & Naik, 2019). Manufacturing firms face unique challenges in DTA because of the complexity of production systems, safety requirements and the need to maintain operational continuity during technology

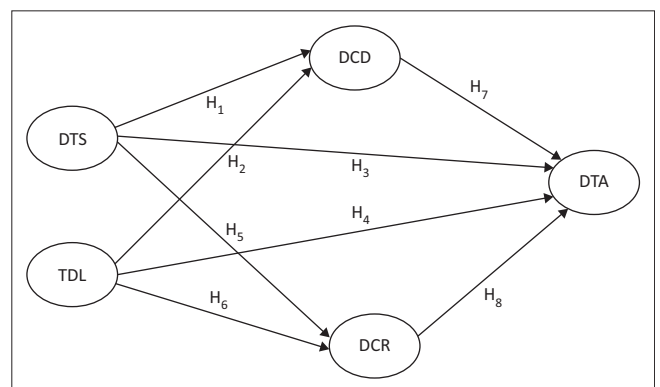
implementation (Machado et al., 2020). Contemporary studies emphasise that successful DTA depends on alignment between technological capabilities and organisational factors including human capital readiness, organisational culture and change management capabilities (Bharadwaj et al., 2013). Manufacturing firms with superior human capital capabilities, particularly within the ability, motivation and opportunity (AMO) framework tend to achieve greater success in digital transformation and innovation outcomes (Xu et al., 2024). The outcomes of successful DTA in manufacturing include improved operational efficiency, enhanced product quality, increased innovation capability and strengthened competitive positioning (Xie et al., 2024). However, realising these benefits requires systematic approaches that address both technological and organisational factors throughout all stages of the adoption process (Amaral & Peças, 2021). Thus, DTA serves as the ultimate outcome variable linking talent, leadership, competence and readiness.

Conceptual framework

Based on the theoretical foundation discussed in the previous subsection, this study proposes an integrated conceptual framework that positions DCD and DCR as central pathways linking DTS and TDL to DTA. The model reflects relational rather than causal interpretation, aligning with the nature of cross-sectional SEM-PLS analysis.

Figure 1 presents the full framework, illustrating how leadership capabilities and talent-oriented strategies relate to technology adoption through capability development and organisational readiness in digital transformation contexts.

In addition to the direct associations illustrated in Figure 1, this study also examines indirect relational pathways through DCD and DCR. These mediating mechanisms (H9–H12) reflect the theoretical perspective that talent strategies and leadership practices contribute to technology adoption not only through immediate relational pathways but also through capability-building and organisational readiness. Accordingly, the model proposes four indirect hypotheses:



DCD, digital competency development; DTS, digital talent strategy; TDL, driven leadership; DCR, digital change readiness; DTA, digital technology adoption.

FIGURE 1: Conceptual framework.

DTS → DCD → DTA, DTS → DCR → DTA, TDL → DCR → DTA, and TDL → DCD → DTA.

Hypotheses development

Based on the theoretical foundation and empirical evidence reviewed above, this study proposes 12 hypotheses examining the relationships among digital talent strategies, TDL, DCD, DCR and DTA.

Direct relationships of digital talent strategies

The RBV suggests that strategic investments in human capital development yield superior organisational capabilities (Barney, 2014). Research by Guerra et al. (2023) demonstrates that organisations with systematic digital talent strategies achieve higher levels of employee digital competency through structured learning initiatives, targeted recruitment and strategic workforce planning. Thus, DTS is expected to directly strengthen DCD.

H1: DTS is positively associated with DCD.

Leadership research indicates that transformational and technology-oriented leaders play crucial roles in fostering employee learning and development (Cortellazzo et al., 2019). Technology-driven leaders enhance DCD through modelling digital behaviours, providing learning resources and creating supportive learning environments (Kane, 2019). Thus, TDL is expected to directly enhance DCD.

H2: TDL is positively associated with DCD.

Contemporary research demonstrates that organisations with strategic approaches to digital talent management achieve superior technology adoption outcomes through better alignment between human capabilities and technological requirements (Bindra et al., 2025). This direct association highlights the centrality of human capital readiness as a key component linked to successful technology implementation and higher levels of digital transformation maturity (Xie et al., 2024). Therefore, DTS is expected to positively influence DTA.

H3: DTS is positively associated with DTA.

Research demonstrates that transformational leadership models have a significant impact on digital transformation adoption, with leadership playing a crucial role in overcoming digital technology challenges (Fenech et al., 2019). Accordingly, this hypothesis tests whether technology-driven leaders directly affect technology adoption through mechanisms such as resource allocation, strategic prioritisation and implementation oversight. Therefore, TDL is proposed to have a positive direct relationship with DTA.

H4: TDL is positively associated with DTA.

Dynamic capabilities theory indicates that strategic human resource initiatives create organisational conditions conducive to change and adaptation (Teece, 2018). Empirical evidence shows that effective talent management strategies

enhance organisational readiness for digital transformation by cultivating change readiness and enabling enterprises to navigate transformational challenges through leadership and employee empowerment (Mahroof et al., 2025). Accordingly, DTS is hypothesised to enhance DCR.

H5: DTS is positively associated with DCR.

Research by Promsri (2019) demonstrates that technology-driven leaders significantly influence organisational readiness for digital change through vision articulation, stakeholder engagement and creation of change-supportive climates. This relationship reflects leaders' critical role in shaping organisational attitudes and capabilities for digital transformation (Hess et al., 2016). Accordingly, TDL is hypothesised to strengthen DCR.

H6: TDL is positively associated with DCR.

Research consistently demonstrates that organisations with higher levels of digital competencies achieve superior technology adoption outcomes through better implementation capabilities, reduced implementation barriers and enhanced technology utilisation (Murawski & Bick, 2017). Thus, DCD is hypothesised to directly influence DTA.

H7: DCD is positively associated with DTA.

Change management research consistently demonstrates that organisational readiness is a critical predictor of change success, including technology adoption initiatives. Organisations with higher levels of DCR achieve superior outcomes in technology adoption by reducing resistance, enhancing implementation effectiveness and ensuring greater sustainability of change (Armenakis & Harris, 2017). Therefore, DCR is expected to directly influence DTA.

H8: DCR is positively associated with DTA.

This hypothesis examines the indirect pathway through which digital talent strategies influence technology adoption outcomes. Based on DC theory, strategic human resource enhances organisational competencies that, in turn, enable more effective technology adoption (Warner & Wäger, 2019). Thus, DCD is proposed as a mediator between DTS and DTA.

H9: DCD mediates the association between DTS and DTA.

This hypothesis examines the indirect pathway through which digital talent strategies influence technology adoption outcomes. Contemporary research demonstrates that effective talent strategies create foundation for organisational readiness by developing employees' digital mindsets, fostering adaptive capabilities and building psychological preparedness for technological transformation. Furthermore, recent evidence indicates that strategic talent management practices significantly enhance organisational change readiness by cultivating workforce agility and receptiveness to digital innovations (Borah et al., 2022). When organisations strategically develop digital talent capabilities, employees

become more receptive to technological changes, thereby facilitating smoother technology adoption processes. Thus, DCR is proposed as a mediating mechanism through which DTS influences DTA.

H10: DCR mediates the association between DTS and DTA.

This hypothesis examines the indirect pathway through which TDL influences technology adoption outcomes. Research by Machado et al. (2021) suggests that leaders' primary contribution to technology adoption occurs through shaping organisational conditions and cultivating attitudes conducive to digital change, rather than through direct involvement in technology implementation. Thus, DCR is expected to mediate the relationship between TDL and DTA.

H11: DCR mediates the association between TDL and DTA.

Research suggests that TDL influences technology adoption primarily through intermediate mechanisms, including competency development (Schwarzmueller et al., 2018). Accordingly, this hypothesis investigates whether the impact of leadership on technology adoption operates indirectly through strengthened organisational digital capabilities. Therefore, DCD is hypothesised to mediate the relationship between TDL and DTA.

H12: DCD mediates the association between TDL and DTA.

Research design

Research approach and method

This study employs a quantitative research approach grounded in the positivist paradigm, which emphasises objective measurement and statistical testing of hypothesised relationships among variables (Creswell & Clark, 2017). A survey method was chosen as the primary strategy for data collection, enabling the systematic capture of respondents' perceptions regarding digital talent strategies, TDL, competency development, change readiness and DTA. The use of a survey-based quantitative design is particularly suitable for this study as it enables the examination of structural associations within a theoretically grounded model informed by the RBV and DC perspectives (Hair et al., 2019; Sekaran & Bougie, 2016). By adopting this approach, the research seeks to validate a conceptual framework that links organisational resources and capabilities to digital adoption outcomes in the Indonesian manufacturing context.

Participants and sampling

The population of the study consists of all medium- and large-scale manufacturing firms operating in West Java Province, Indonesia. These firms represent a critical segment of the national economy and are currently undergoing extensive digital transformation initiatives. Sampling was conducted in two stages. In the first stage, proportional area random sampling was applied to identify industrial zones with the highest concentration of manufacturing firms. In the second stage, purposive sampling was used to select companies based on specific inclusion criteria: (1) medium- or large-scale

classification, (2) minimum of 5 years of operation and (3) documented evidence of digital transformation programmes (Etikan et al., 2016; Saunders et al., 2009). The research focuses on five major industrial estates that represent the core of manufacturing activity in West Java: Karawang International Industrial City (KIIC), East Jakarta Industrial Park (EJIP), Greenland International Industrial Center (GIIC), Jababeka Industrial Estate-Cikarang (JIEC) and MM2100 Industrial Town. These sites were purposively chosen to ensure diversity in subsectors and representativeness of firms with established infrastructure for digitalisation. A total sample of 250 respondents was determined using Hair et al. (2019) guideline of 5–10 times the number of measurement indicators (25 indicators). Respondents consist of staff, supervisors and managers directly involved in digital transformation initiatives, thus ensuring informed perspectives across operational and strategic levels. The exact population size of employees across the participating manufacturing firms is unknown, as staffing levels vary considerably by plant and production unit. Therefore, the sample size was determined using the guidelines of Hair et al. (2019), which recommend a minimum of 10 respondents per structural path in PLS-SEM. Given that the model includes eight direct paths and four indirect paths, the required minimum sample size is approximately 120. The 250 valid responses collected in this study therefore exceed the recommended threshold and are considered adequate for robust PLS-SEM estimation.

Measuring instruments

The study employed a structured questionnaire consisting of five main constructs, each measured through multiple indicators adapted from validated prior studies. All items were rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The constructs and their indicators are as follows:

Digital talent strategy

This construct was measured with five indicators: strategic digital talent planning, digital capability development, digital-based recruitment and retention, digital culture and leadership and ecosystem collaboration. These indicators were adapted from previously validated scales developed by Guerra et al. (2023), Nambisan et al. (2017) and Bharadwaj et al. (2013).

Technology-driven leadership

Technology-driven leadership was operationalised through five indicators: digital vision and transformation, digital intelligence, empowerment through technology, digital change management and strategic agility. The items were adapted from the works of Cortellazzo et al. (2019), Promsri (2019) and Kane (2019).

Digital technology adoption

Digital technology adoption was measured with five indicators: technology implementation level, process integration, adoption speed, adoption depth and routinisation

of digital use. The indicators were adapted from Ghobakhloo and Ching (2019), Nwankpa and Roumani (2016) and Sony and Naik (2020).

Digital competency development

This construct was assessed through five indicators: digital technical skills development, practice-based learning, adaptability to new technologies, digital problem-solving and digital collaboration. The indicators were adapted from prior instruments by Ferrari and Punie (2013), Vieru et al. (2015) and Murawski and Bick (2017).

Digital change readiness

Digital change readiness was measured with five indicators: digital change commitment, collective digital efficacy, infrastructure readiness, perceived value of digital transformation and leadership support. These indicators were adapted from Holt et al. (2007), Weiner (2020) and Rafferty et al. (2013). Internal consistency was tested using Cronbach's alpha and composite reliability (CR), while construct validity was examined through average variance extracted (AVE) and confirmatory factor analysis (CFA) (Hair et al., 2019).

All constructs were measured using previously validated scales. Reliability statistics from prior studies were reviewed to ensure the appropriateness of each scale, and the Cronbach's alpha and CR values obtained in the current study also exceeded commonly accepted thresholds. Each construct contained between three and six items; for example, DTS included items such as 'our organisation systematically develops digital skills among employees'. A short piloting process was conducted to ensure clarity of items, and the questionnaire also included a biographical section capturing gender, age, education, job level and organisational tenure.

Statistical analysis

The hypotheses were tested using structural equation modelling (SEM) with PLS, which is suitable for complex models with mediating variables and does not impose strict requirements on data distribution (Hair et al., 2019; Sarstedt et al., 2021). SEM-PLS was chosen because it allows simultaneous testing of both measurement and structural models, thereby providing robust estimates of direct and indirect effects among constructs. Model fit was assessed using standardised criteria such as the standardised root mean square residual (SRMR) and the normed fit index (NFI) (Henseler et al., 2016). Mediation analysis followed the bootstrapping procedure recommended by Hayes (2017), allowing rigorous evaluation of the indirect effects of DCD and DCR. Additionally, descriptive statistics and correlation analysis were conducted to provide contextual insights into the sample characteristics and variable relationships using SPSS 28.0 and SmartPLS 4.0 software.

Ethical considerations

Ethical clearance to conduct this study was obtained from the Universitas Pelita Bangsa Ethics Committee

(No. 002/EC-UPB/FEB/XII/2025). This research adheres to established ethical guidelines for social science studies. Participation was entirely voluntary, and respondents were assured of anonymity and confidentiality of their responses. Informed consent was obtained before data collection, and participants were informed about the study's objectives, data usage and their right to withdraw at any point. All data were stored securely and used solely for academic purposes. By adhering to these principles, the study ensures full compliance with ethical standards consistent with international best practices and with the requirements of leading journals.

Results

This section presents the empirical findings from the analysis of data collected from 250 respondents across medium and large-scale manufacturing firms in West Java, Indonesia. The results are presented in four main subsections: respondent demographics, descriptive statistics and correlations, measurement model assessment and structural model evaluation with hypothesis testing.

Profile of respondents

The demographic profile of the respondents is summarised in Table 1. The study involved 250 respondents drawn from medium- and large-scale manufacturing firms across West Java. The gender distribution was relatively balanced, with 117 male (46.8%) and 133 female (53.2%) participants.

TABLE 1: Profile of respondents.

Characteristic	Category	Frequency (n)
Gender	Male	117
	Female	133
	Total	250
Age (years)	< 25	194
	25–34	44
	35–44	5
	≥ 45	7
	Total	250
Education level	High school or vocational school	222
	Diploma	3
	Bachelor	19
	Master	6
	Total	250
Position in the company	Manager or Department Manager	14
	Operator or Staff	224
	Supervisor and/or Team Leader	12
	Total	250
Time working in the company (years)	1–3	187
	4–6	39
	> 6	24
	Total	250
Department	Engineering	8
	HRD/GA	17
	IT/IS	1
	Logistics	20
	Marketing	25
	Production	150
	Others	29
	Total	250

HRD, Human resource development; GA, general affairs; IT, information technology; IS, information systems.

A majority of respondents were below 25 years of age (77.6%), followed by 25–34 years (17.6%), 35–44 years (2.0%) and 45 years or above (2.8%). In terms of education, most respondents held a high school or vocational qualification (88.8%), while the remainder had a diploma (1.2%), bachelor's degree (7.6%) or postgraduate degree (2.4%). The majority were operators or staff (89.6%), with supervisors/team leaders (4.8%) and managers (5.6%) representing a smaller proportion. Tenure data indicated that most employees had been with their companies for 1–3 years (74.8%), while 15.6% had worked for 4–6 years and 9.6% for more than 6 years. Respondents were spread across departments, predominantly production (60%), with representation from marketing, logistics, human resource (HR), engineering, IT and other units. This profile reflects the demographic and organisational diversity of the manufacturing workforce in West Java.

Coefficient of determination (R^2)

The explanatory power of the structural model, as reflected by the coefficient of determination (R^2), is presented in Table 2. Before presenting the structural relationships, the key statistical outputs used in PLS-SEM are briefly explained. The coefficient of determination (R^2) indicates the predictive accuracy of the model and reflects the proportion of variance explained in each endogenous construct. The Stone–Geisser Q^2 value represents predictive relevance, while the effect size (f^2) assesses the magnitude of each predictor's contribution to an endogenous construct. Path coefficients indicate the strength and direction of the relationships between variables, and the significance of indirect effects is used to assess mediation. These indicators collectively provide a comprehensive understanding of model performance and the strength of relationships among constructs.

The results of the coefficient of determination demonstrate that the model has strong explanatory power. Digital competency development was explained by DTS and TDL with an R^2 of 0.652, while DCR achieved an R^2 of 0.557. The

TABLE 2: Coefficient of determination result (R^2).

Construct	R^2	R^2 adjusted
DCD	0.65	0.65
DCR	0.56	0.55
DTA	0.72	0.71

DCD, digital competency development; DCR, digital change readiness; DTA, digital technology adoption.

TABLE 3: Path coefficient result.

Relationship	Original sample (O)	Sample mean (M)	SD	t statistics ($ O/SD $)	p -value
DCD → DTA	0.23	0.23	0.10	2.32	0.021
DCR → DTA	0.38	0.39	0.12	3.23	0.001
DTS → DCD	0.43	0.42	0.12	4.07	0.000
DTS → DCR	0.21	0.20	0.09	2.31	0.021
DTS → DTA	0.21	0.22	0.08	2.56	0.011
TDL → DCD	0.41	0.43	0.12	3.58	0.000
TDL → DCR	0.56	0.58	0.08	7.26	0.000
TDL → DTA	0.12	0.11	0.09	1.45	0.147

DCD, digital competency development; DTS, digital talent strategy; TDL, driven leadership; DCR, digital change readiness; DTA, digital technology adoption; SD, standard deviation.

dependent construct, DTA, showed the highest explanatory power, with an R^2 of 0.718. These results indicate that DTS and TDL, through the mediating roles of DCD and DCR, account for a substantial proportion of the variance in DTA, signifying the robustness of the proposed model.

Path coefficients

The path coefficient results for the proposed relationships in the structural model are reported in Table 3. The path analysis results reveal several significant associations among the study variables. DTS shows a moderate positive association with DCD ($\beta = 0.434$, $p < 0.001$), a weak-to-moderate association with DCR ($\beta = 0.211$, $p = 0.021$) and a moderate association with DTA ($\beta = 0.212$, $p = 0.011$). Similarly, TDL demonstrates a moderate positive association with DCD ($\beta = 0.414$, $p < 0.001$) and a strong positive association with DCR ($\beta = 0.564$, $p < 0.001$) although its direct relationship with DTA is not statistically significant ($\beta = 0.125$, $p = 0.147$). Both mediators also show meaningful associations with DTA: DCD exhibits a moderate positive association with DTA ($\beta = 0.229$, $p = 0.021$), while DCR demonstrates a stronger association ($\beta = 0.376$, $p = 0.001$). In SEM-PLS, coefficients of 0.10–0.29 are typically interpreted as weak, values between 0.30–0.49 as moderate and coefficients above 0.50 as strong (Hair et al., 2019). Based on these interpretive thresholds, the pattern of results suggests that DTS and TDL relate to digital adoption primarily through increased digital competence and readiness rather than through direct pathways.

Specific indirect effects

The results of the specific indirect effect analysis examining the mediating roles of digital competency development and digital change readiness are shown in Table 4. The mediation analysis provides deeper insights into the mechanisms through which DTS and TDL impact DTA. Digital talent strategy significantly influenced DTA through DCD ($\beta = 0.100$, $p = 0.038$), while its indirect effect via DCR was positive but not statistically significant ($\beta = 0.079$, $p = 0.074$). Conversely, TDL demonstrated a significant indirect effect on DTA via DCR ($\beta = 0.212$, $p = 0.004$), highlighting the pivotal role of organisational readiness in translating leadership initiatives into technology adoption. The indirect pathway of TDL through DCD approached significance ($\beta = 0.095$, $p = 0.072$), suggesting a potential

TABLE 4: Specific indirect effect result.

Relationship	Original sample (O)	Sample mean (M)	SD	<i>t</i> statistics (O/SD)	<i>p</i> -value
DTS → DCD → DTA	0.10	0.10	0.05	2.08	0.038
TDL → DCD → DTA	0.09	0.10	0.05	1.80	0.072
DTS → DCR → DTA	0.08	0.08	0.04	1.79	0.074
TDL → DCR → DTA	0.21	0.22	0.07	2.93	0.004

DCD, digital competency development; DTS, digital talent strategy; TDL, driven leadership; DCR, digital change readiness; DTA, digital technology adoption; SD, standard deviation.

complementary mechanism. These findings confirm the mediating roles of both digital competency development and DCR, with stronger mediation effects observed for readiness.

Summary of hypotheses

The summary presented in Table 5 synthesises the statistical evidence for all 12 hypotheses tested in the structural model. Overall, most direct relationships (H1–H3, H5–H8) received strong empirical support, whereas the direct association between TDL and DTA (H4) was not supported. For the mediating mechanisms, two indirect pathways (H9 and H11) were fully supported, one pathway (H10) was not supported, and one pathway (H12) received marginal or partial support. These results collectively indicate that capability development and organisational readiness play a central role in explaining how talent strategies and leadership relate to DTA.

Discussion

The findings of this study offer important insights into the relational pathways linking DTS, TDL, DCD, DCR and DTA within Indonesian manufacturing firms. Consistent with the RBV (Barney, 2014) and DC theory (Teece, 2018), the results underscore the importance of capability development and organisational readiness in shaping technology-related outcomes. The discussion below is organised according to the 12 hypotheses tested.

Direct relationships

The results show that both DTS and TDL demonstrate positive associations with DCD. This finding aligns with recent research showing that talent development systems and digital capacity-building strategies significantly improve employee digital skills (Guerra et al., 2023). Strategic HR initiatives such as targeted recruitment, reskilling programmes and structured digital learning strengthen workforce competency, supporting earlier evidence that digital transformation success hinges on effective talent management practices. Likewise, TDL is increasingly recognised as a driver of digital learning environments that encourage experimentation and capability growth (Borah et al., 2022). Leaders who model digital behaviours, communicate future-oriented visions and encourage continuous learning contribute to capability formation, reinforcing the theoretical claim that leadership acts as a catalyst for capability development in digital contexts (Brunner et al., 2023):

TABLE 5: Summary of hypotheses.

Hypothesis	Relationship	Result
H1	DTS → DCD	Supported
H2	TDL → DCD	Supported
H3	DTS → DTA	Supported
H4	TDL → DTA	Not Supported
H5	DTS → DCR	Supported
H6	TDL → DCR	Supported
H7	DCD → DTA	Supported
H8	DCR → DTA	Supported
H9	DTS → DCD → DTA	Supported
H10	DTS → DCR → DTA	Not supported
H11	TDL → DCR → DTA	Supported
H12	TDL → DCD → DTA	Marginally or partially supported

DCD, digital competency development; DTS, digital talent strategy; TDL, driven leadership; DCR, digital change readiness; DTA, digital technology adoption.

H1 and H2: DTS and TDL are positively associated with DCD (Supported)

This result supports recent empirical studies showing that digital talent strategies are strongly associated with adoption outcomes because organisations with mature talent pipelines tend to possess higher absorptive capacity and readiness for technology integration (Rauniar et al., 2024). The finding is also consistent with RBV logic, which argues that a digitally competent workforce enables firms to leverage technological resources more effectively (Barney, 2014). Organisations that strategically invest in digital talent development demonstrate enhanced capacity to sense, seize and reconfigure digital opportunities (Ellström et al., 2022):

H3: DTS is positively associated with DTA (Supported)

Contrary to prior studies suggesting that digital leadership accelerates technology adoption by guiding strategic alignment and reducing uncertainty (AlNuaimi et al., 2022), the current results indicate that TDL does not directly relate to DTA. One plausible explanation is that leadership influence often manifests through indirect mechanisms such as motivational climate, digital readiness and shared meaning creation rather than through direct behavioural outcomes (Zhang et al., 2023). The significant mediation effect through DCR in this study supports the interpretation that leadership contributes more to contextual enablement than direct technology adoption:

H4: TDL is positively associated with DTA (Not Supported)

Both DTS and TDL show positive relationships with DCR, reinforcing studies that emphasise the role of talent practices and leadership behaviours in cultivating organisational adaptability (Teece, 2018). Digital talent strategy enhances readiness by supporting role clarity, change-oriented

mindsets and psychological empowerment, echoing findings from digital transformation research (Guerra et al., 2023). Similarly, leadership engagement in communicating digital goals, encouraging experimentation, and reducing uncertainty has been shown to foster readiness for change (Chakraborty et al., 2018). These findings substantiate the DC argument that readiness emerges from coordinated managerial and workforce-level capability-building efforts:

H5 and H6: DTS and TDL are positively associated with DCR (Supported)

Digital competency development significantly relates to DTA, consistent with prior work emphasising that digital competence is a key enabler of effective technology assimilation and usage (Wang et al., 2022). Organisations with higher levels of digital competency demonstrate superior capacity to implement and leverage digital technologies for competitive advantage (Sousa-Zomer et al., 2020). Similarly, DCR demonstrates a strong relationship with DTA, supporting empirical findings showing that readiness manifested through confidence, adaptability and openness to change is a crucial determinant of digital adoption outcomes. Together, these results emphasise that organisations must invest in capability and readiness development if they aim to achieve high-impact digital transformation:

H7 and H8: DCD and DCR are positively associated with DTA (Supported)

Indirect (mediated) relationships

The significant mediation via DCD supports human capital theories suggesting that skill development acts as a transmission mechanism linking talent strategies to performance-related outcomes (Barney, 2014; Guerra et al., 2023). This finding is consistent with recent studies showing that competency development mediates the relationship between HR practices and technology performance in manufacturing settings (Wang et al., 2022). Digital talent strategies create the foundation for capability building, which subsequently enables effective technology adoption and utilisation:

H9: DCD mediates the association between DTS and DTA (Supported)

Although DTS relates to both DCR and DTA, the mediated relationship is not statistically significant. This outcome diverges from studies reporting readiness as a key pathway in translating HR initiatives into digital transformation outcome (Muehlburger et al., 2022). A likely reason is that readiness influenced by talent initiatives may not be sufficient without reinforcement from leadership support, resource availability or organisational climate (AlNuaimi et al., 2022). This insight suggests that readiness cannot operate as a standalone mechanism for translating DTS into adoption outcomes without complementary organisational factors:

H10: DCR does not mediate the association between DTS and DTA (Not Supported)

The supported mediation effect indicates that leadership strengthens technology adoption primarily by shaping readiness rather than directly influencing adoption. This finding aligns with transformational and digital leadership research, showing that leadership facilitates change acceptance and technological confidence (Borah et al., 2022). It also reinforces DC arguments that leadership enhances sensing, seizing and reconfiguring capabilities through readiness-building processes (Zhang et al., 2023):

H11: DCR mediates the association between TDL and DTA (Supported)

The near-significant mediation suggests an emerging but not fully established mechanism. Some recent studies indicate that leadership may indirectly promote skill growth by fostering learning-oriented cultures (Zhu et al., 2022), although such influence tends to be weaker than direct training or talent strategy initiatives. The marginal effect observed in this study implies that leadership-driven capability formation may become more evident in organisations with mature digital ecosystems, a point echoed in longitudinal research on digital capability development (Ellström et al., 2022):

H12: DCD marginally mediates the association between TDL and DTA (Partially Supported)

Conclusion

Limitations and future research

The study provides empirical evidence on how DTS, TDL, digital competency development and DCR jointly influence DTA within manufacturing organisations. The results demonstrate that DTS consistently enhances digital competencies, strengthens readiness for change and directly promotes technology adoption. Technology-driven leadership also contributes meaningfully to competency development and readiness, although its influence on adoption emerges primarily through these indirect pathways. Digital competency development and change readiness both play critical roles in shaping technology adoption, suggesting that successful digital transformation is fundamentally contingent on workforce capability and psychological preparedness rather than on leadership directives alone. These findings highlight a strategic insight for manufacturing firms: investments in capability-building and readiness development form the core mechanisms that enable organisations to convert digital intentions into sustainable implementation outcomes.

Although the study offers important theoretical and practical contributions, several limitations should be acknowledged. The cross-sectional design restricts the ability to draw causal inferences; consequently, changes in competencies, readiness or adoption behaviours over time could not be captured. The use of self-reported data may introduce perceptual bias, particularly in constructs related to readiness and leadership behaviours. In addition, the study focuses on manufacturing organisations within a single regional context, which may

limit the generalisability of the findings to service industries or digitally mature sectors. The reliance on established measurement scales ensures reliability, yet it may not fully capture emergent dimensions of digital leadership, digital culture or evolving forms of workforce capability that are becoming increasingly relevant in advanced digital environments.

These limitations provide avenues for further research that can deepen the understanding of digital transformation dynamics. Longitudinal studies would allow researchers to capture how competencies, readiness and adoption behaviours evolve during different stages of transformation. Future studies could incorporate multilevel designs to examine how organisational structures, team dynamics and leader–employee interactions simultaneously shape digital outcomes. Expanding the research to include diverse industries – such as healthcare, logistics or financial services – would enable comparative insights into how sectoral characteristics influence the relationships modelled in this study. Researchers may also consider exploring additional constructs such as digital culture, organisational resilience or learning agility to further clarify the mechanisms that enable successful digital transformation. By extending the scope and methodological approaches, future research can offer richer theoretical explanations and more nuanced practical guidance for organisations navigating ongoing digital disruption.

Implications

The study offers several implications for theory and practice by demonstrating that DTS and TDL influence DTA primarily through digital competency development and DCR. From a theoretical standpoint, the findings extend the understanding of how human capital-centred frameworks, particularly the RBV and DC perspective, operate within digital transformation contexts. The results substantiate the argument that capability development and readiness represent critical micro-foundations that translate strategic initiatives into technology adoption outcomes. By empirically validating the mediating roles of digital competency and readiness, this study strengthens theoretical models proposing that workforce capability and psychological preparedness bridge the gap between organisational intention and technological implementation. The confirmation of indirect leadership effects also enriches digital leadership literature, suggesting that leadership functions more as a contextual enabler than as a direct driver of technology adoption.

For managerial practice, the findings emphasise the strategic value of investing in digital talent systems that systematically build the technical and adaptive capabilities of employees. Manufacturing organisations should prioritise talent development programmes, digital learning platforms and structured competency frameworks that ensure employees possess both the cognitive and technical skills necessary to utilise digital tools effectively. The results also suggest that managers should not rely solely on leadership influence to drive transformation. Instead, leaders should cultivate environments that encourage experimentation, reduce

uncertainty and promote continuous learning, thereby strengthening digital readiness. By aligning leadership behaviours with well-designed talent systems, firms can accelerate adoption while reducing resistance and implementation friction. These insights offer practical guidance for managers seeking to navigate the complexities of digitalisation in labour-intensive sectors where skill disparities are common.

The study further provides practical implications for policymakers, training institutions and industry associations aiming to elevate the digital maturity of the manufacturing sector. The strong effects of competency and readiness suggest that digital transformation initiatives should be supported by policy frameworks that encourage upskilling, certification programmes and industry-wide competency benchmarks. Collaborative partnerships between government bodies, universities and manufacturing firms could facilitate more accessible digital learning pathways and workforce transition programmes. For organisations at early stages of digitalisation, enhancing readiness through communication strategies, participative change processes and psychological safety initiatives may help mitigate resistance and enhance adoption outcomes. Collectively, the findings underline that effective digital transformation requires not only technological investment but also deliberate, sustained development of human capability and adaptive behaviour across the organisation.

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Competing interests

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CRedit authorship contribution

Muhamad Ekhsan: Conceptualisation, Formal analysis, Funding acquisition, Investigation, Methodology, Project

administration, Supervision, Writing – original draft, Writing – review & editing. Yuan Badrianto: Investigation, Methodology, Project administration, Resources, Writing – review & editing. Suwandi Suwandi: Data curation, Formal analysis, Investigation, Writing – review & editing. Hendrik Hermawan: Data curation, Investigation, Writing – original draft. Atikah Septiani: Data curation; Writing – review & editing. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication and take responsibility for the integrity of its findings.

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Data availability

The data that support the findings of this study are available from the corresponding author, Muhamad Ekhsan, upon reasonable request. Because of privacy and confidentiality agreements with participating firms, raw data cannot be shared publicly.

Disclaimer

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