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Human Capital Capability and Digital Transformation in Enhancing SME Performance: A System Thinking Perspective

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Abstract: Small and medium enterprises (SMEs) are under pressure to use digital technology while continuing to improve their business performance. In practice, however, buying technology does not automatically make an SME more productive. Employees still need the knowledge, skills, learning capacity, and ability to adapt that allow technology to be used well. This study develops a system-thinking framework explaining how human capital capability and digital transformation can work together to improve SME performance. A systematic literature review was combined with system-thinking analysis. Recent studies on human capital, digital capability, digital transformation, dynamic capabilities, organizational learning, innovation, and SME performance were reviewed and synthesized. The review shows that human capability is not a supporting issue outside digital transformation; it is part of the transformation itself. Human capital strengthens digital capability, digital capability supports digital transformation, and digital transformation creates opportunities for learning, innovation, and organizational adaptation. Better performance can then provide resources for further investment in people and technology. The study presents a reinforcing loop and a balancing loop that explain why digital transformation may accelerate when capability and resources grow together, but may slow down when the digital skill gap becomes too large.

Keywords: Human Capital Capability, Digital Transformation, Digital Capability, System Thinking, SMEs

INTRODUCTION

Digital transformation is no longer only a technology issue for small and medium enterprises. It changes how firms communicate with customers, manage information, run operations, make decisions, and develop new products or services. At the same time, SMEs usually have fewer financial and human resources than large firms, so the way they combine technology with their existing capabilities matters greatly (Sagala & Öri, 2024; Kallmuenzer et al., 2025).

For many SMEs, the practical problem is not simply whether a digital tool is available. The harder question is whether people in the business can use the tool, learn from it, and

connect it with daily work. Recent research shows that digital skills, digital capability, dynamic capability, and organizational agility are closely connected with digital transformation and SME performance (Prakasa & Jumani, 2024; Salim et al., 2025).

This point is also visible in Indonesia. Studies of Indonesian MSMEs report that digital transformation can widen market access and improve efficiency, but the level of adoption and the ability to manage digital activities remain uneven across firms (Purnomo et al., 2024; Surti, 2025). The issue therefore goes beyond access to technology. It also concerns digital literacy, managerial capability, infrastructure, and the ability to turn digital resources into useful business activities.

Human capital becomes important in this context because technology has to be interpreted and used by people. Evidence from SME research shows that managers' human capital can contribute to innovation and productivity, while newer studies connect human capital and digital transformation through the development of capabilities needed for digital work (Bananuka et al., 2022; Kaiser & Kanbach, 2026).

Digital transformation is also not a single event. It develops over time. An SME may start with social media, online payments, or digital bookkeeping and later move toward integrated customer data, analytics, automation, or artificial intelligence. The literature suggests that SMEs often benefit from an incremental approach that matches digital investment with their starting capabilities and continuous learning (Sagala & Öri, 2024; Paoloni et al., 2024).

These relationships make a system-thinking approach useful. A linear model may say that digital transformation improves performance. A system view asks a broader question: what happens after performance improves, how does that affect future investment, what happens when employee skills lag behind technology, and how do learning and innovation feed back into the transformation process? Research using system dynamics has already shown that SME digitalization can be represented through stocks, flows, skills development, and digitalization decisions, while more recent work argues that the drivers of SME digitalization interact in complex and non-linear ways (Kurniawan et al., 2021; Arranz et al., 2023).

Based on this background, the study addresses three questions: (1) how does human capital capability support SME digital transformation; (2) how do digital capability, organizational learning, innovation, and adaptability connect digital transformation with SME performance; and (3) how can these relationships be represented as a feedback system? The objective is to build a practical and theoretically grounded system-thinking framework that can later be tested using system dynamics or empirical methods (Saeedikiya et al., 2024; Prakasa & Jumani, 2024).

METHOD

This study uses a qualitative systematic literature review combined with system-thinking analysis. The review focuses on peer-reviewed research dealing with human capital, digital skills, digital capability, digital transformation, dynamic capabilities, organizational learning, innovation capability, organizational agility, and SME performance. The review period mainly covers 2021–2026, while older foundational works are retained only when they are needed to explain established theoretical concepts (Sagala & Öri, 2024; Paoloni et al., 2024).

Searches were conducted using combinations of terms such as “human capital” and “digital transformation” and “SME”, “digital capability” and “SME performance”, “dynamic capabilities” and “digital transformation”, and “system dynamics” and “SME digitalization”. Studies were screened for relevance to SMEs and for a clear connection to the constructs used in the proposed framework. This approach follows the general logic of systematic review research in the SME digital transformation field (Sagala & Öri, 2024; Paoloni et al., 2024).

The selection process is summarized in Figure 1. The numbers shown are the study-screening record used for this conceptual synthesis, rather than a claim that every published study on the topic was identified. The final set of 24 studies was used to build the thematic synthesis and the causal-loop structure (Sagala & Öri, 2024; Krismajayanti et al., 2024).

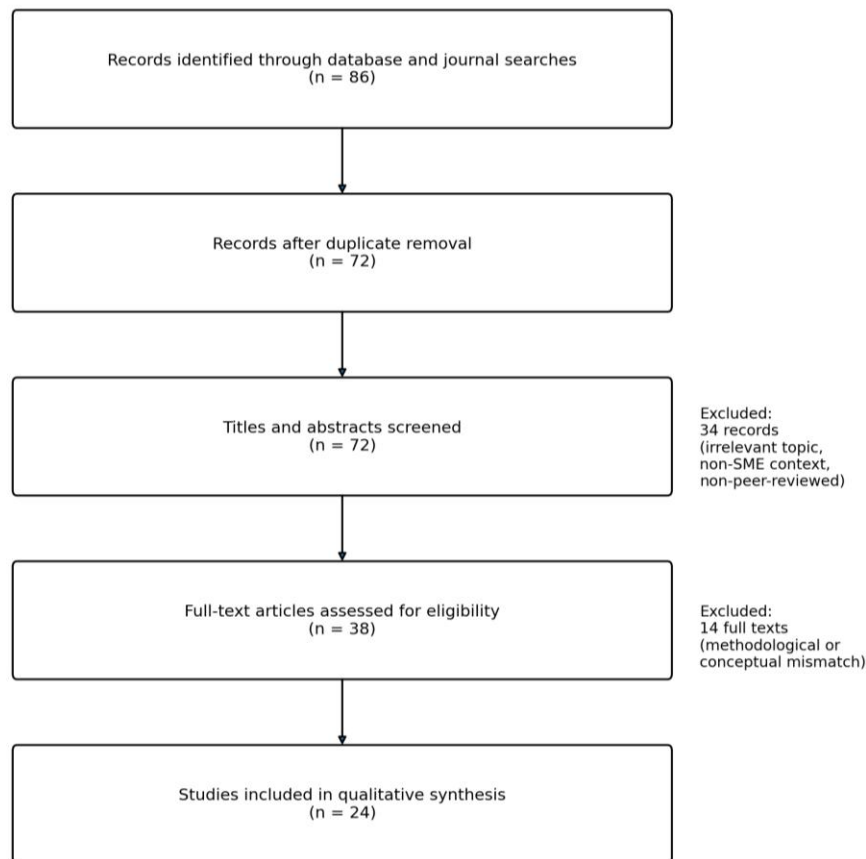


Figure 1. Literature selection process used for the systematic synthesis.

Source: Author's synthesis based on the systematic-review logic reported by Sagala and Öri (2024) and Krismajayanti et al. (2024).

RESULTS AND DISCUSSION

Human Capital as the Starting Point

Human capital can be understood in simple terms as what people know, what they can do, and how they use their experience to solve business problems. In an SME, this includes owners, managers, and employees. Their education, experience, digital literacy, problem-solving ability, and willingness to learn affect how the organization responds to new technology. Evidence from SMEs shows that managerial human capital can support innovation and productivity, which is important because digital transformation also requires changes in the way work is organized (Bananuka et al., 2022).

Recent work on HRM and digital transformation reinforces the same message. Human resources may act as an enabler of transformation, a source of technological innovation, a cultural mechanism, or, when capabilities are insufficient, a constraint. This means that digital transformation should not be planned only by an IT function; people and capability development need to be part of the same conversation (Kaiser & Kanbach, 2026).

The practical implication is straightforward. An SME that buys a digital system without preparing its people may create a new cost rather than a new capability. Training, coaching, knowledge sharing, and opportunities to practice are therefore part of the digital investment itself, not an optional activity added at the end (Sagala & Öri, 2024; Kallmuenzer et al., 2025).

From Digital Skills to Digital Capability

Digital skills are the individual foundation, while digital capability is the organization's ability to use digital resources repeatedly and effectively. This distinction matters because an employee may know how to use a particular application, but the firm needs routines that connect that skill with customer service, operations, marketing, finance, and decision-making. Research on small businesses in Indonesia found that digital capability is associated with digital business transformation and business performance, supporting the idea that capability is more important than simple technology ownership (Prakasa & Jumaní, 2024).

Other recent evidence reaches a similar conclusion. Digital capabilities have been linked with entrepreneurial performance through opportunity-related capabilities, while organizational agility and top management support also shape the ability of SMEs to transform digitally (Mendoza et al., 2024; Al-Surmi et al., 2024). The common thread is that technology becomes useful when the organization has the ability to sense change, make decisions, and act on digital information.

Research on 510 MSMEs in Java and Jakarta also reports that stronger digital skills support digital transformation and dynamic capabilities, which in turn are associated with better MSME performance (Salim et al., 2025). This is particularly relevant for Indonesia because it shows that digital capability is not an abstract issue; it is connected with the everyday performance of MSMEs in the region.

Digital Transformation as an Organizational Process

Digital transformation is broader than adopting a new application. It involves changes in processes, routines, decision-making, customer interaction, and sometimes the business model itself. A systematic review of technological transformation in SMEs found that technology assimilation and business model innovation are connected parts of the transformation process, while many SMEs still operate at relatively low transformation levels (Paoloni et al., 2024).

A recent systematic review of SME digital transformation also concludes that there is no single formula that fits every SME. Firms need to consider their starting position, limitations, and specific context. The same review highlights incremental improvement and continuous learning as important conditions for digital transformation success (Sagala & Öri, 2024).

Empirical work further shows that dynamic capabilities help SMEs use digital transformation more effectively. Sensing, seizing, and reconfiguring capabilities allow firms to recognize opportunities, act on them, and adjust resources when conditions change (Saeedikiya et al., 2024). In Indonesian MSMEs, dynamic capabilities have also been linked with digital transformation and business resilience, although the strength of the relationship can vary across business contexts (Ariyanto et al., 2023).

Organizational Learning and Innovation

Digital transformation creates new information, but information only becomes useful when people learn from it. For example, customer data can reveal changing preferences, digital sales data can show which products are moving faster, and online feedback can reveal service problems. When employees discuss these signals and change the way they work, organizational learning takes place. This learning process can then strengthen innovation capability (Bananuka et al., 2022; Saeedikiya et al., 2024).

Innovation is therefore positioned in the proposed framework as a bridge between digital transformation and organizational performance. The bridge can be small: a new way of serving customers, a faster ordering process, a better digital bookkeeping routine, or a new product based on customer information. Research on digital capability and SME

competitiveness similarly shows that digital capability can support innovation in value creation, value proposition, and value capture (Rahman et al., 2024).

The relationship is also dynamic. Successful innovation can improve performance, but the resulting improvement may create resources for more training, better systems, and further innovation. This is one reason why a feedback perspective is useful: the effect of a capability today can change the conditions that shape the capability tomorrow (Arranz et al., 2023; Kurniawan et al., 2021).

Table 1. Main Constructs and Their Role in the Proposed System

Construct	Role in the SME system	Main supporting evidence
Human capital capability	Provides knowledge, experience, digital literacy, and learning capacity.	Bananuka et al. (2022); Kaiser & Kanbach (2026)
Digital capability	Allows the firm to use digital resources in repeatable business routines.	Prakasa & Jumani (2024); Mendoza et al. (2024)
Digital transformation	Changes processes, customer interaction, decision-making, and technology use.	Paoloni et al. (2024); Sagala & Ōri (2024)
Organizational learning	Turns digital information and experience into improved routines.	Saeedikiya et al. (2024); Arranz et al. (2023)
Innovation capability	Converts learning and digital resources into new or improved value.	Bananuka et al. (2022); Rahman et al. (2024)
Organizational adaptability	Helps the SME respond to market and technology changes.	Al-Surmi et al. (2024); Salim et al. (2025)
SME performance	Represents the economic and strategic outcome of the system.	Kallmuenzer et al. (2025); Prakasa & Jumani (2024)
Reinvestment resources	Creates capacity for additional training and technology investment.	Arranz et al. (2023); Kurniawan et al. (2021)

Source: Author's synthesis based on Bananuka et al. (2022), Kurniawan et al. (2021), Arranz et al. (2023), Prakasa and Jumani (2024), Paoloni et al. (2024), Sagala and Ōri (2024), Saeedikiya et al. (2024), Mendoza et al. (2024), Rahman et al. (2024), Al-Surmi et al. (2024), Kaiser and Kanbach (2026), and Salim et al. (2025).

The Causal Loop Diagram

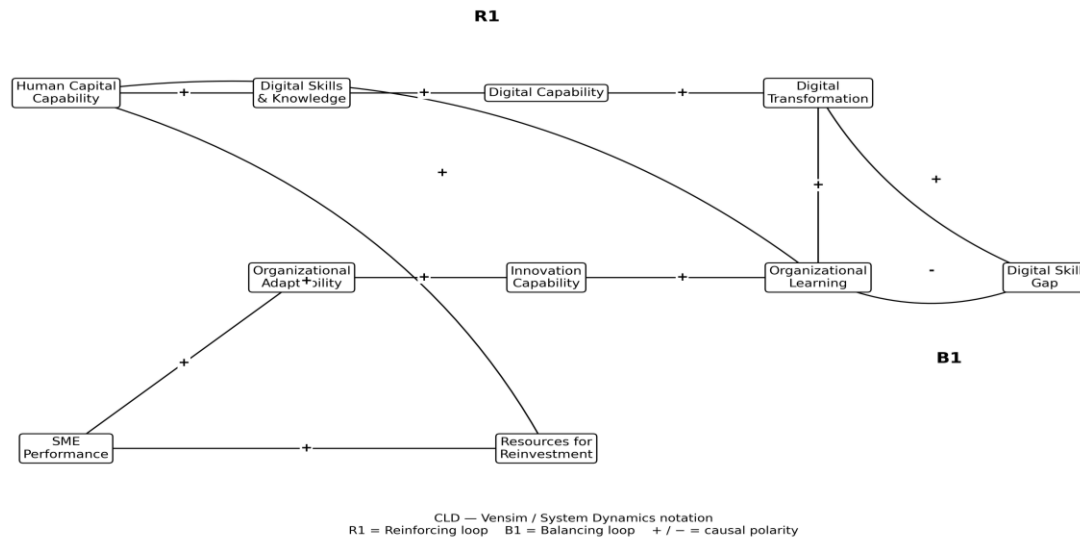


Figure 2. Causal Loop Diagram (CLD) developed using Vensim/System Dynamics notation.

Source: Author's model developed from the reviewed literature using Vensim/System Dynamics causal-loop logic (Kurniawan et al., 2021; Arranz et al., 2023; Saeedikiya et al., 2024).

Source: Author's model developed from the reviewed literature using Vensim-style causal-loop notation and system-dynamics logic (Kurniawan et al., 2021; Arranz et al., 2023; Saeedikiya et al., 2024).

Reinforcing Loop: Capability–Performance

The first major loop is a reinforcing loop, labelled R1. The logic is simple: better human capital improves digital capability; stronger digital capability makes digital transformation more effective; digital transformation creates opportunities for learning and innovation; learning and innovation improve adaptability and performance; and better performance can provide more resources for training and technology. The loop can therefore reinforce itself over time (Arranz et al., 2023; Saeedikiya et al., 2024).

This does not mean that every SME will automatically enter a positive cycle. The loop depends on management decisions, resource availability, employee participation, and the fit between technology and business needs. The evidence on SME digital transformation suggests that alignment with the firm's baseline capability is important, particularly because SMEs face resource constraints (Sagala & Öri, 2024; Soluk et al., 2023).

From a managerial perspective, the implication is that a small improvement in people capability can have a larger effect when it is connected with actual business processes. Training becomes more valuable when employees immediately apply what they learn, share the results, and use the experience to improve the next process (Kaiser & Kanbach, 2026; Saeedikiya et al., 2024).

Balancing Loop: The Digital Skill Gap

The second loop is a balancing mechanism. Technology can develop faster than employees can learn. When the required digital competence grows faster than actual competence, the digital skill gap becomes wider. A wider gap can increase mistakes, resistance, rework, or underuse of digital systems, which reduces the effectiveness of transformation (Kaiser & Kanbach, 2026; Sagala & Öri, 2024).

This balancing mechanism explains why simply increasing technology investment may not always produce proportional performance gains. Research on SME digital orientation shows that the relationship between digital orientation and performance can be non-linear,

suggesting that firms need to manage the pace and depth of digital investment while building the capabilities needed to absorb it (Kindermann et al., 2024).

In practical terms, the solution is not to stop digital transformation. Instead, the firm should synchronize technology investment with capability development. A new system should come with training, clear roles, practical use cases, feedback, and periodic review. This approach is consistent with the literature's emphasis on continuous learning and incremental digitalization for SMEs (Sagala & Óri, 2024; Kallmuenzer et al., 2025).

Implications for SME Managers

For SME managers, the framework suggests that digital transformation should be managed as a business change program, not simply as an IT purchase. Before buying a new system, managers should identify the business problem, the people who will use the system, the skills they already have, the skills they still need, and the performance measure that will show whether the investment is useful (Prakasa & Jumani, 2024; Al-Surmi et al., 2024).

Managers should also create a simple learning cycle. Employees use the technology, discuss what works and what does not, record useful lessons, and adjust the process. Over time, this turns individual digital skills into organizational capability. The literature on dynamic capabilities and SME digital transformation supports this emphasis on sensing, learning, seizing opportunities, and reconfiguring resources (Saeedikiya et al., 2024; Soluk et al., 2023).

Finally, SMEs should monitor both performance and capability. Sales, productivity, customer response, and cost are important, but they should be accompanied by indicators such as employee digital skill, system utilization, learning activity, and the time needed to adopt new digital processes. Monitoring both sides makes the feedback structure visible and gives managers an early warning when the skill gap starts to slow transformation (Salim et al., 2025; Kallmuenzer et al., 2025).

Theoretical Contribution

The main theoretical contribution of this study is the integration of human capital, digital capability, digital transformation, organizational learning, innovation capability, and SME performance in a feedback-oriented framework. Existing empirical studies often test direct, mediating, or moderating relationships. Those approaches are valuable, but a system-thinking perspective adds the question of how today's performance changes tomorrow's resources and how skill gaps can counteract the expected benefits of technology (Arranz et al., 2023; Kurniawan et al., 2021).

The framework also extends the interpretation of digital transformation from a technology adoption issue to a capability-building process. This is consistent with research showing that SMEs need dynamic capabilities to use digital transformation effectively and that digital transformation itself can create new organizational capabilities (Saeedikiya et al., 2024).

The proposed model should be treated as a conceptual foundation rather than as a statistically proven causal model. Its next step is empirical testing using system dynamics simulation, longitudinal SME data, or a combination of PLS-SEM and system dynamics. This distinction is important because a CLD expresses a theory of relationships, whereas empirical data are still needed to estimate the strength and time delay of those relationships (Arranz et al., 2023; Kurniawan et al., 2021).

CONCLUSION AND SUGGESTIONS

Conclusion

This study shows that SME digital transformation is easier to understand when technology and people are viewed as one connected system. Human capital capability supports digital capability, digital capability supports digital transformation, and transformation creates opportunities for organizational learning, innovation, and adaptation. These processes can

improve SME performance and, when performance generates additional resources, can support another round of investment in people and technology (Bananuka et al., 2022; Saeedikiya et al., 2024).

The proposed causal loop diagram adds a feedback perspective to the discussion. The reinforcing loop explains how capability and performance can strengthen each other, while the balancing loop explains how a widening digital skill gap can slow the benefits of technology. The framework therefore suggests that SMEs should synchronize digital investment with human capability development instead of treating training as a separate HR activity (Kaiser & Kanbach, 2026; Sagala & Öri, 2024).

The model provides a basis for future empirical work using Vensim or another system-dynamics platform to build stock-and-flow models, estimate delays, test scenarios, and examine which interventions are most likely to improve SME performance over time. Such testing would turn the present conceptual CLD into a measurable dynamic model (Kurniawan et al., 2021; Arranz et al., 2023).

Limitations

This study is based on secondary literature and therefore does not estimate the strength of the causal relationships in the proposed CLD. The selection process is intended to provide a transparent conceptual synthesis, but it cannot eliminate all publication and database-selection bias. Future research should test the model using primary SME data, time-series information, or system-dynamics simulation and should compare sectors because the pace and form of digital transformation may differ between manufacturing, services, agriculture, and creative businesses (Sagala & Öri, 2024; Kallmuenzer et al., 2025).

Recommendation

Future research is recommended to empirically test the proposed system-thinking framework using primary data from SMEs across different sectors. Further studies may apply system dynamics simulation, longitudinal analysis, or PLS-SEM to examine the strength, direction, and time delays of the relationships among human capital capability, digital capability, digital transformation, organizational learning, innovation, adaptability, and SME performance. Comparative studies across industries and regions are also recommended to identify differences in digital transformation processes and capability requirements.

Author Contribution

The author was responsible for the conceptualization, literature review, methodology, data synthesis, system-thinking framework development, analysis, interpretation of findings, visualization, and preparation of the manuscript. The author also reviewed and revised the manuscript and approved the final version for publication.

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