INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN BUSINESS & SOCIAL SCIENCES

Vol 16, Issue 1, (2026) E-ISSN: 2222-6990

Digital Literacy and Work Engagement in Malaysian Manufacturing SMEs: A Self-Determination Perspective

Nurhidayah Md Setamam, Fauziah Sh Ahmad

Universiti Teknologi Malaysia Azman Hashim International Business School

Email: dayah_2007@yahoo.com, fsa@utm.my

DOI Link: http://dx.doi.org/10.6007/IJARBSS/v16-i1/27404

Published Date: 17 January 2026

Abstract

This study examines the role of digital literacy in shaping work engagement among employees in Malaysian manufacturing small and medium-sized enterprises (SMEs) through the lens of Self-Determination Theory (SDT). Manufacturing SMEs play a vital role in Malaysia's economy, yet many continue to face persistent challenges related to employee productivity, skills development, and digital transformation. Drawing on SDT, this paper conceptualizes digital literacy as an enabling resource that supports employees' psychological needs for autonomy, competence, and relatedness, thereby fostering work engagement. Work engagement is operationalized as a positive work-related psychological state comprising vigor, dedication, and absorption. Through a comprehensive review of the literature, the study synthesizes evidence on how digital literacy influences engagement by shaping employees' motivational experiences, while also considering structural barriers to digital transformation and the role of organizational resilience. The paper further discusses managerial implications for manufacturing SMEs, emphasizing capability development, supportive leadership, and inclusive digital upskilling initiatives. By integrating digital literacy, work engagement, and SDT, this study contributes a theoretically grounded framework for understanding how digital capabilities can enhance employee work engagement and productivity in resource-constrained manufacturing contexts.

Keywords: Digital Literacy, Work Engagement, Self-Determination Theory, Manufacturing Smes; Employee Productivity

Introduction

Small and Medium Enterprises (SMEs) are widely recognized as a cornerstone of Malaysia's economic structure, particularly in manufacturing, where they contribute to employment creation, industrial output, and value-added activities. Beyond their economic role, manufacturing SMEs are crucial for sustaining Malaysia's industrial competitiveness and ensuring inclusive growth, as they employ a large proportion of semi-skilled and skilled workers and serve as key suppliers within domestic and regional value chains. Understanding

how work engagement can be improved in these firms is therefore essential not only for employee productivity and performance, but also for national economic resilience and workforce sustainability. In Malaysia, however, official economic statistics are reported under the broader Micro, Small and Medium Enterprise (MSME) classification, which aggregates micro, small, and medium-sized firms. Within this classification, SMEs constitute the principal productive segment, especially in manufacturing-related activities. Accordingly, this study retains a conceptual focus on manufacturing SMEs, while drawing on MSME-level data where SME-disaggregated statistics are not separately reported. This approach aligns with national statistical practices and ensures consistency with prior Malaysian SME research.

Based on official data from the Department of Statistics Malaysia, MSMEs contributed 39.5% of Malaysia's Gross Domestic Product (RM652.4 billion) in 2024 and accounted for approximately 48.7% of total employment, representing about 8.10 million workers. Across the MSME economy, the services and manufacturing sectors jointly accounted for 84.7% of MSME GDP, underscoring their dominant role in economic activity. These figures reflect a continuation of trends observed in earlier years, with MSMEs consistently contributing close to 39% of GDP between 2021 and 2023. Despite these contributions, productivity performance in manufacturing SMEs remains uneven, highlighting the need for research that identifies practical and human-centered mechanisms for improving employee performance.

Against this economic backdrop, the present study focuses on manufacturing SMEs, given their strategic importance in strengthening Malaysia's industrial base and enhancing economic resilience. Despite their significant contributions, manufacturing SMEs continue to encounter structural challenges related to employee productivity, workforce capability development, and effective utilization of organizational resources. Such challenges are widely acknowledged in the SME literature, where limited resources and capability constraints often restrict firms' ability to respond effectively to environmental and technological changes (Ngah & Wong, 2020). This creates a strong need for research that helps SMEs improve productivity without relying solely on costly technological or structural investments. Within this context, work engagement has emerged as a critical mechanism linking employee experiences to productivity and organizational performance, particularly in work environments characterized by operational complexity. In this study, work engagement is operationally defined as a positive and sustained work-related psychological state, comprising three core dimensions: vigor, reflected in high levels of energy and resilience; dedication, indicated by a strong sense of enthusiasm, meaning, and involvement in one's work; and absorption, characterized by deep concentration and immersion in work activities (Schaufeli et al., 2006). Together, these dimensions capture the extent to which employees are cognitively, emotionally, and behaviorally invested in their work roles.

However, fostering high levels of work engagement within manufacturing SMEs remains challenging due to resource constraints, uneven skill development, and organizational rigidities, which may limit employees' motivation and capacity to fully engage with their work (Ngah & Wong, 2020). Drawing on Self-Determination Theory (SDT), which emphasizes the fulfillment of individuals' basic psychological needs for autonomy, competence, and relatedness (Deci & Ryan, 2000), this study examines how digital literacy can serve as a key enabler of work engagement. Enhanced digital capabilities may empower employees by increasing control over work processes, strengthening task-related

competence, and facilitating collaboration and communication. This focus is particularly useful for SME owners and managers, as it highlights low-cost, capability-based approaches to improving engagement and productivity. Overall, this study is important for three key groups: SME managers seeking practical ways to improve workforce productivity, policymakers designing human capital and digitalization initiatives, and researchers aiming to extend engagement and productivity theory in resource-constrained manufacturing contexts. By addressing employee work engagement through the lens of digital literacy and psychological needs, this study provides a practical and effective pathway for enhancing employee productivity in Malaysian manufacturing SMEs.

Conceptualizing Work Engagement in Manufacturing SMEs

Building on the foundational understanding of work engagement outlined earlier, this section elaborates on the theoretical dimensions of engagement as they apply to manufacturing SMEs. Work engagement is conceptualized as a multidimensional psychological state that captures how employees allocate their energy, attention, and emotional commitment toward their work. The framework proposed by Schaufeli et al. (2006) comprising vigor, dedication, and absorption provides a well-established basis for examining engagement as a dynamic and sustained work-related experience, and continues to inform contemporary engagement scholarship (Bakker et al., 2014).

The vigor dimension reflects employees' energetic and resilient involvement in work activities. Rather than merely indicating effort, vigor represents the capacity to sustain motivation and remain proactive under demanding conditions. In manufacturing SMEs, where operational disruptions and time pressures are common, vigor manifests in employees' willingness to persist with complex tasks and adapt to changing production requirements. Research suggests that such energetic engagement is particularly relevant in environments characterized by technological change and process intensity, as it supports adaptive problem-solving and continuous task engagement (Bakker et al., 2014).

Dedication captures the motivational and meaningful aspects of engagement, emphasizing employees' sense of purpose, enthusiasm, and identification with their work. In SME manufacturing contexts, dedication is closely linked to employees' internalization of organizational goals, especially where formal role boundaries are fluid. Employees who experience high dedication are more likely to align their efforts with improvement initiatives and demonstrate commitment beyond prescribed job requirements, reinforcing long-term organizational capability (Schaufeli, 2021). The absorption dimension represents a state of deep attentional focus, in which employees become fully immersed in their work activities. This dimension is particularly salient in manufacturing settings that require sustained concentration, precision, and coordination across interdependent tasks. High absorption enables employees to maintain task continuity and minimize cognitive distractions, contributing to consistent work quality and reduced operational errors (Bakker & Albrecht, 2018).

From a motivational standpoint, Self-Determination Theory (SDT) offers a useful lens for understanding the conditions under which these engagement dimensions are likely to emerge. SDT posits that engagement is strengthened when work environments support employees' needs for autonomy, competence, and relatedness (Deci & Ryan, 2000). In

manufacturing SMEs, these needs are increasingly influenced by employees' interactions with digital work systems. The ability to competently use digital tools, exercise discretion in task execution, and collaborate effectively with colleagues creates conditions that foster sustained engagement across vigor, dedication, and absorption (Ryan & Deci, 2020). Within this theoretical framing, digital literacy functions as an enabling resource that supports engagement by shaping employees' motivational experiences rather than directly determining performance outcomes. Digital literacy enhances employees' sense of competence by reducing task ambiguity, supports autonomy by allowing greater control over work processes, and facilitates relatedness through improved coordination and communication. Empirical research on digital skills development indicates that such capabilities play an important role in strengthening employees' motivational states in technology-intensive work environments (van Laar et al., 2020).

By emphasizing the theoretical dimensions and motivational mechanisms underlying work engagement, this section extends beyond descriptive explanations and provides a focused conceptual foundation for examining engagement within Malaysian manufacturing SMEs. This perspective supports subsequent analysis of how digital literacy can serve as a strategic lever for fostering employee engagement and productivity under conditions of technological and resource constraint.

The Role of Digital Literacy in Work Engagement

In this study, digital literacy is understood as employees' ability to use digital technologies effectively, critically evaluate information, and interact responsibly within digitally mediated work environments (Nikou et al., 2022). Within manufacturing SMEs, digital literacy has become increasingly relevant as digital systems are integrated into production planning, monitoring, and coordination processes. Rather than being viewed solely as a technical skill, digital literacy is conceptualized as an enabling capability that shapes how employees experience and sustain work engagement in their daily work activities. Aligned with the work engagement framework adopted in this study, digital literacy influences how employees experience vigor in technology-supported work settings. Employees who are competent in using digital tools are less likely to encounter disruptions or frustration arising from unfamiliar systems or poorly understood workflows. This allows them to conserve cognitive and emotional resources, supporting sustained energy and persistence when managing routine tasks or responding to operational challenges. In this way, digital literacy facilitates smoother task execution rather than intensifying work demands.

Digital literacy is also relevant to dedication and absorption. Employees who feel capable of engaging effectively with digital technologies may perceive their work as more manageable and purposeful, particularly in environments undergoing digital change. Familiarity with digital systems reduces task-related interruptions and uncertainty, enabling deeper concentration and continuity in work activities. Consistent with motivational perspectives such as Self-Determination Theory, these conditions support employees' sustained involvement, focus, and commitment to their roles (Deci & Ryan, 2000; Ryan & Deci, 2020).

Taken together, digital literacy contributes to work engagement by shaping the psychological conditions under which vigor, dedication, and absorption are experienced, rather than acting as a direct driver of performance outcomes. In manufacturing SMEs where

digital adoption often occurs alongside constraints related to resources and workforce capability employees' ability to use digital tools meaningfully determines whether digitalization supports or undermines engagement. Framing digital literacy as an enabling resource therefore provides a coherent bridge between work conditions and motivational outcomes.

Self-Determination Theory as a Theoretical Framework

Self-Determination Theory (SDT) provides a robust theoretical framework for explaining how digital literacy functions as an enabling resource that connects digitally mediated work conditions to employee engagement outcomes. Originally developed by Deci and Ryan (1985) and refined in later work, SDT posits that sustained motivation and positive work-related states are most likely to emerge when individuals' basic psychological needs for autonomy, competence, and relatedness are satisfied (Deci & Ryan, 2000; Ryan & Deci, 2020). From an SDT perspective, autonomy refers to employees' experience of volition and discretion in performing their work. In manufacturing SMEs, digital tools can support autonomy by enabling employees to organize tasks, access information, and make operational decisions with greater independence. Digital literacy enhances this experience by allowing employees to interact confidently with work systems, reducing dependence on constant supervision and supporting self-directed task management. Such experiences of autonomy are associated with sustained motivation and engagement.

Competence reflects employees perceived effectiveness in handling work demands. Digital literacy contributes to competence by equipping employees with the skills required to navigate digital systems, interpret operational information, and respond to production challenges. When employees feel capable of using digital tools effectively, they are more likely to approach their work with confidence and persistence, supporting sustained effort and task focus under demanding conditions (Deci & Ryan, 2000).

Relatedness refers to employees' sense of connection and belonging within the workplace. In manufacturing SMEs, digitally mediated communication and coordination tools facilitate interaction, collaboration, and information sharing. Digital literacy enables employees to engage meaningfully with these platforms, supporting ongoing social interaction and reinforcing a sense of inclusion within work groups. Such social connections contribute to a supportive work environment that sustains engagement over time (Ryan & Deci, 2020). Taken together, SDT explains how digital literacy supports work engagement by fostering psychological need satisfaction rather than directly determining performance outcomes. By enabling employees to feel more autonomous, competent, and connected in digitally mediated work settings, digital literacy creates conditions that are conducive to sustained engagement. This theoretical perspective is particularly relevant for manufacturing SMEs, where the effectiveness of digital initiatives depends not only on technology adoption but also on employees' capacity to use digital tools meaningfully.

Barriers to Digital Transformation in Manufacturing SMEs

Despite the potential benefits associated with digital literacy and digital transformation, manufacturing SMEs continue to face a range of structural and organizational barriers that constrain effective adoption. One of the most frequently cited challenges relates to resource constraints, particularly limited financial capacity. Compared to larger firms, SMEs

often operate with tighter budgets, which restrict their ability to invest in advanced digital infrastructure, system upgrades, and continuous employee training. International evidence indicates that insufficient financial resources remain a key obstacle to digital adoption among SMEs, limiting both technological implementation and workforce capability development (OECD, 2021; World Bank, 2020). In manufacturing contexts, these constraints may reduce employees' opportunities to develop digital competencies, thereby weakening the conditions that support sustained work engagement.

Beyond financial limitations, skill gaps among employees represent another significant barrier to digital transformation. Manufacturing SMEs often employ a heterogeneous workforce with varying levels of exposure to digital technologies, resulting in uneven digital proficiency across teams. Research on digital skills development suggests that such disparities can hinder effective use of digital systems, disrupt workflow integration, and create coordination challenges within organizations (van Laar et al., 2020). From an engagement perspective, uneven digital capability may undermine employees' confidence and limit their ability to fully engage with work tasks, particularly in roles that increasingly rely on digital tools for monitoring, communication, and decision-making.

Resistance to change further complicates digital transformation efforts in SMEs. Employees may be hesitant to adopt new technologies due to concerns about increased work demands, loss of control over familiar processes, or uncertainty about their ability to adapt to new systems. Such resistance is often reinforced in environments where digital initiatives are introduced without sufficient support, training, or communication. Organizational research suggests that poorly managed technological change can negatively affect employees' motivation and psychological attachment to their work, thereby weakening engagement (Bakker et al., 2014). In manufacturing SMEs, where work processes are closely tied to established routines, resistance to digital change may disrupt collaboration and reduce employees' willingness to invest effort in organizational initiatives.

Taken together, these barriers highlight that digital transformation in manufacturing SMEs is not solely a technological challenge, but also a human and organizational one. Addressing constraints related to resources, skills, and change readiness requires a coordinated approach that integrates leadership support, targeted capability development, and employee involvement. Without such efforts, digital initiatives may fail to enhance work engagement and may instead exacerbate disengagement by increasing uncertainty and work strain. Recognizing and addressing these barriers is therefore essential for understanding the conditions under which digital literacy can effectively support sustained work engagement and productivity in manufacturing SMEs.

The Intersection of Digital Literacy and Organizational Resilience

Digital literacy is increasingly recognized as an important factor not only in shaping employee engagement but also in supporting organizational resilience, particularly in small and medium-sized enterprises operating in dynamic environments. Organizational resilience refers to an organization's capacity to anticipate, respond to, and adapt to disruptions while maintaining core functions. For manufacturing SMEs, resilience is especially critical due to exposure to market volatility, technological change, and operational uncertainty. In this context, digital literacy enhances employees' ability to work with digital systems that support

monitoring, coordination, and decision-making, thereby strengthening the organization's adaptive capacity (OECD, 2021).

From an employee-level perspective, digital literacy contributes to resilience by enabling individuals to respond more effectively to changing work demands. When employees possess the skills to interpret digital information, adjust workflows, and utilize technology-supported tools, they are better positioned to manage disruptions and maintain continuity in their tasks. Research on digital capabilities suggests that such competencies support problem-solving and adaptability, which are central to organizational resilience in technology-intensive settings (van Laar et al., 2020). In manufacturing SMEs, this adaptability can be reflected in employees' willingness to engage cognitively with emerging challenges and contribute to incremental process adjustments.

The relationship between digital literacy, work engagement, and resilience can also be understood through a social and emotional lens. Digitally literate employees are more likely to collaborate effectively, share information, and coordinate responses during periods of change, supporting collective sense-making and joint problem-solving. These collaborative practices strengthen social engagement and contribute to resilient work systems by fostering shared responsibility and mutual support. At the same time, employees who feel capable of contributing to organizational adaptation may experience greater satisfaction and emotional attachment to their work, reinforcing affective engagement and commitment during challenging periods (Bakker et al., 2014).

Rather than positioning digital literacy as a guarantee of resilience, this study views it as a supportive resource that enhances the conditions under which resilience can develop. Consistent with Self-Determination Theory, digital literacy contributes to resilience by supporting employees' psychological needs for competence, autonomy, and relatedness, which underpin sustained engagement and adaptive behavior (Ryan & Deci, 2020). In manufacturing SMEs, where resources and formal support structures may be limited, prioritizing digital literacy development can therefore play a meaningful role in strengthening both employee engagement and organizational resilience over time.

Managerial Implications

The findings of this study suggest several practical implications for managers in Malaysian manufacturing SMEs seeking to strengthen employee engagement through digital literacy. Managers play a central role in shaping how digital technologies are introduced and embedded in everyday work practices. Rather than viewing digitalization as a purely technical initiative, managers should approach digital literacy as a workforce capability that supports employees' motivation and engagement. Aligning digital investments with operational needs such as production planning, monitoring, and coordination can help employees recognize the relevance of digital tools to their roles, thereby reducing resistance to adoption. Clear leadership communication regarding the purpose and direction of digital transformation is essential for fostering a learning-oriented climate that encourages gradual skill development and experimentation (OECD, 2021).

In addition, managers should prioritize inclusive and structured digital skills development initiatives that account for differences in employees' existing capabilities.

Practical, work-integrated training is more effective than one-off programs in enhancing employees' sense of competence and confidence when using digital tools (World Economic Forum, 2020). From a motivational perspective, such initiatives support employees' psychological need for competence, which is central to work engagement under Self-Determination Theory (Ryan & Deci, 2020). Managers can also leverage digital technologies to support flexibility and coordination, where operationally feasible, while remaining attentive to workload boundaries to avoid work intensification. Finally, addressing resistance to digital change requires ongoing communication, employee involvement, and visible managerial support, as supportive leadership practices have been shown to sustain engagement by strengthening trust and psychological safety during periods of change (Bakker et al., 2014).

Conclusion

This study emphasizes digital literacy as an enabling capability that supports work engagement in Malaysian manufacturing SMEs. Grounded in Self-Determination Theory, the paper demonstrates that digital literacy enhances employees' experiences of vigor, dedication, and absorption by supporting their psychological needs for autonomy, competence, and relatedness. Rather than acting as a direct performance driver, digital literacy shapes the motivational conditions under which engagement is sustained.

By integrating digital literacy into the work engagement framework, this study contributes to the engagement literature by clarifying the psychological mechanisms through which digital capabilities influence employee experiences in resource-constrained manufacturing environments. The findings further highlight that the effectiveness of digital initiatives depends on how organizations address financial constraints, skill disparities, and resistance to change. Overall, the study offers a theoretically grounded and context-sensitive perspective that informs future research and managerial practice aimed at enhancing employee engagement and productivity through digital literacy.

Future Research Directions

Future research may empirically test the proposed framework using quantitative or mixed-method designs, explore longitudinal effects of digital literacy development, and examine moderating roles of affective commitment and leadership.

References

Bakker, A. B., & Albrecht, S. L. (2018). Work engagement: Current trends. *Career Development International, 23*(1), 4–11. https://doi.org/10.1108/CDI-11-2017-0207

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and work engagement: The JD–R approach. *Annual review of organizational psychology and organizational behavior*, *1*(2014), 389-411.

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behavior*. Plenum Press.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry, 11*(4), 227–268. https://doi.org/10.1207/S15327965PLI1104_01

Department of Statistics Malaysia. (2021). *Micro, small and medium enterprises (MSMEs) performance 2024*. Putrajaya, Malaysia: Department of Statistics Malaysia. https://www.dosm.gov.my

Department of Statistics Malaysia. (2023). *Micro, small and medium enterprises (MSMEs) performance 2024*. Putrajaya, Malaysia: Department of Statistics Malaysia. https://www.dosm.gov.my

Department of Statistics Malaysia. (2024). *Micro, small and medium enterprises (MSMEs) performance 2024*. Putrajaya, Malaysia: Department of Statistics Malaysia. https://www.dosm.gov.my

Ngah, R., & Wong, K. Y. (2020). Linking knowledge management to competitive strategies of knowledge-based SMEs. *The Bottom Line, 33*(1), 42–59. https://doi.org/10.1108/BL-08-2019-0105

Nikou, S., De Reuver, M., & Kanafi, M. M. (2022). Workplace Literacy Skills—how Information and Digital Literacy Affect Adoption of Digital Technology. *Journal of Documentation*, *78*(7), 371–391. https://doi.org/10.1108/JD-12-2021-0241

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology, 61*, 101860. https://doi.org/10.1016/j.cedpsych.2020.101860

Schaufeli, W. B. (2021). Engaging leadership: How to promote work engagement? *Frontiers in Psychology, 12*, 754556. https://doi.org/10.3389/fpsyg.2021.754556

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement with a short questionnaire: A cross-national study. *Educational and Psychological Measurement, 66*(4), 701–716. https://doi.org/10.1177/0013164405282471

van Laar, E., van Deursen, A. J. A. M., van Dijk, J. A. G. M., & de Haan, J. (2020). Determinants of 21st-Century Skills and 21st-Century Digital Skills for Workers: A Systematic Literature Review. *SAGE Open*, *10*(1), 215824401990017. sagepub. https://doi.org/10.1177/2158244019900176