Journal of Management Studies and Development
Vol. 5, No. 01, pp. 181-199
journal.iistr.org/index.php/JMSD
DOI: 10.56741/IISTR.jmsd.002050

Factors Influencing Digital Proficiency in Middle Managers within the Malaysian Public Sector

[1]Yusfaidzira binti Ahmad Yusof, [1]Hemaloshinee Vasudevan*
Corresponding Author: * hemaloshinee@unirazak.edu.my
[1] Tun Razak Graduate School, Universiti Tun Abdul Razak, Malaysia

ARTICLE INFO

Article history
Received 31 January 2026
Revised 11 March 2026
Accepted 30 March 2026

ABSTRACT

The Malaysian public sector is experiencing rapid digitalization, necessitating the development of high digital proficiency among middle managers. Digital proficiency refers to the ability of an individual to consume, utilize, manage, and create digital content using digital technology. In the context of rapid digital transformation within the MPS, the primary challenge is to identify the factors that enhance digital proficiency and their effects on middle managers. The study aims to examine the relationship between digital proficiency and factors like self-efficacy, digital organizational culture, digital infrastructure, and digital training among middle managers in the Malaysian Public Service. The study utilized a non-probability convenience sampling method, involving 287 middle managers from the public sector who participated in the survey through Google Form. Data is analyzed using SPSS software for descriptive statistics, reliability, variable correlation, multiple regression, ANOVA, and multicollinearity assessment. Self-efficacy (H1: $\beta = 0.763$, $t = 20.27$, $p < 0.001$), organizational culture (H2: $\beta = 0.089$, $t = 2.13$, $p = 0.034$), digital infrastructure (H3: $\beta = 0.082$, $t = 2.06$, $p = 0.040$) is a supported factor in digital proficiency. and digital training and development (H4: $\beta = 0.016$, $t = 0.40$, $p = 0.692$) is not supported factor in digital proficiency. The MyDigital Blueprint policy is a framework that outlines the strategies for digital transformation in the Malaysian public sector.

Keywords
Digital Infrastructure
Digital Proficiency
Organizational Culture
Self-Efficacy

This is an open-access article under the CC–BY-SA license.

Introduction

The Malaysian Prime Minister's Department highlighted the significance of digital proficiency for the Malaysian Public Service (MPS) following the transformative changes in service delivery post-COVID-19, affecting both public and private sectors [1]. In response to the notion, the Economic Planning Unit (EPU) developed the MyDigital national digital economy blueprint to complement the 12th Malaysian Plan (RMK12) and Wawasan Kemakmuran Bersama (WKB) 2030, identifying the digital economy as a key area for economic growth towards achieving WKB 2030. In Malaysia, the government is focusing on digital transformation through initiatives like the Public Sector Digitalization Strategic Plan. However, there are concerns about the varying levels of digital proficiency among middle managers, many of whom lack confidence in using emerging technologies or leading digital initiatives, despite available training and resources [2]. Digital proficiency refers to an individual's ability to consume, utilize, manage, and create digital content using digital technology [3]. Digital proficiency encompasses four key aspects: understanding various digital technologies and content creation, managing associated risks and opportunities, finding relevant technologies for content consumption, and critically engaging with digital content creation and sharing. Digital proficiency is crucial in the modern workplace as it boosts productivity, aids decision-making, improves communication and collaboration, fosters innovation and adaptability, facilitates career advancement, and enhances customer experiences. Digital proficiency is crucial for middle managers, as it allows for effective implementation of digital strategies, data-driven decision-making, efficient communication and collaboration, enhanced team productivity, talent management, adaptability to industry changes, and career advancement [4]. Without these skills, they may face challenges in meeting modern business demands, negatively impacting their performance and that of their teams.

Middle managers serve as crucial intermediaries in organizations, essential for implementing digital policies and facilitating successful digital transformation initiatives [5]. Digital transformation effectiveness, despite significant investment in tools and infrastructure, largely relies on individual psychological factors, particularly self-efficacy, or the belief in one's capability to perform tasks successfully [6]. Self-efficacy is a crucial factor influencing technology adoption and digital competence in digital transformation contexts [7],[8]. Employees with higher self-efficacy show more motivation, resilience, and adaptability in learning digital skills, while low self-efficacy can cause resistance, avoidance, or anxiety towards technology use [9]. Despite its significance, the link between self-efficacy and digital proficiency is largely unstudied among middle-level managers in the public sector. Previous research predominantly centers on students or general employees, neglecting the effect of managerial self-efficacy on digital competency and performance. Thus, there is an urgent need

to explore whether increased self-efficacy correlates with enhanced digital proficiency, particularly in organizations undergoing digital transformation.

In the context of digital transformation, the Malaysian public sector is under pressure to improve performance and service delivery through digitalization. However, despite national initiatives like the Public Sector Digitalization Strategic Plan (PSDS) 2021–2025, many agencies experience inconsistent performance, especially regarding the implementation and adoption of digital systems. Existing research typically emphasizes technological adoption at the organizational level or digital leadership among top management, neglecting the vital role of middle management in executing strategy [10]. This persistent gap suggests that technological investment alone is insufficient to drive organizational effectiveness. Despite the introduction of training programs like MyDIGITAL and the Public Sector Digitalisation Strategic Plan 2021–2025, there is a lack of studies evaluating their effectiveness in enhancing the confidence, competence, and digital readiness of middle managers [11]. This gap underscores the necessity for further research into the effectiveness of existing digital training initiatives in cultivating digital proficiency, which is vital for successful digital transformation. It is essential to address this issue to ensure that Malaysia's public service workforce can remain agile and responsive to the demands of a fast-changing digital environment.

Literature Review

In 2021, the Malaysian government launched the MyDigital blueprint through the Economic Planning Unit (EPU) as a key component of the 12th Malaysian Plan (RMK12) and Wawasan Kemakmuran Bersama (WKB) 2030. This initiative emphasizes the digital economy as a crucial area for economic growth, aiming for a digitally-enabled government by 2025 that offers efficient, effective, and transparent online services. The 2025 goals for the civil service sector include: achieving 100% digital literacy among civil servants, 80% of government services provided online, all ministries and agencies to offer cashless payment options by 2022, and 80% cloud storage utilization across the government by 2022.

A. Self-efficacy and digital proficiency

Individuals with strong self-efficacy view complex digital tasks as challenges to master instead of threats to avoid. Managers who are confident in their ability to learn and apply new technologies tend to be more effective in using digital tools and platforms [12]. This belief system promotes traits essential for digital proficiency, including persistence, problem-solving, and adaptability [13]. Low self-efficacy leads to technology avoidance, anxiety, and resistance to digital change [14]. Dong [15] suggests that individuals with higher self-efficacy are more likely to engage in continuous learning and adapt to new digital tools in their work environment.

H1: Self-efficacy is positively related to digital proficiency among middle managers.

B. Digital organizational culture and digital proficiency

Digital organizational culture enhances digital proficiency by promoting practices, behaviors, role modeling, alignment with organizational values, strong identification with the organization, and increased motivation for acquiring and utilizing digital skills [16]. Digital culture encompasses an individual's perspectives on information retention, utilization, and sharing within an organization, impacting employees' digital competency [17]. The digital environment fosters a culture of inclusivity, ensuring that all employees feel valued. Middle managers, equipped with skills in information and communication technologies, serve as a bridge between employees and leaders, facilitating the transformation of management systems [18],[19].

H2: Digital organizational culture is positively related to digital proficiency among middle managers.

C. Digital infrastructure and digital proficiency

Luthra et al. [20] found that insufficient digital infrastructure hinders effective online productivity. This text emphasizes the importance of strong digital infrastructure for effective organizational operations, particularly in supporting remote work, online transactions, and online education. It suggests that to improve organizational efficiency, job roles and required skills should be aligned with advancements in digital infrastructure [21]. Individuals in environments with good accessibility tend to show higher digital proficiency than those in organizations with limited or outdated technology resources.

H3: Digital infrastructure is positively related to digital proficiency among middle managers.

D. Digital training & development and digital proficiency

Middle managers face multiple competing demands and expectations, often exceeding their capabilities, and they frequently lack the necessary skills to succeed. Digital technology growth necessitates ongoing skill development in both technical and soft skills, making the training of middle managers in these areas a top priority [22]. Individuals engaged in regular digital skills training and professional development exhibit greater digital proficiency than those who do not, indicating that such training positively affects digital proficiency among middle managers.

H4: Digital training & development and is positively related to digital proficiency among middle managers.

E. Gaps of Study

Research on middle management, particularly regarding digital proficiency, is scarce. Existing studies have not effectively connected these two aspects within a workplace context. The study focuses on four main factors: self-efficacy, digital organizational culture, digital infrastructure, and digital skills training and development. Previous research on self-efficacy

in digital contexts has predominantly targeted students in educational settings, revealing a strong correlation between digital self-efficacy and digital proficiency among these students [23]-[25]. Steininger et al. [26] note that despite organizational and digital culture being fundamental components shaping the workplace information environment, the direct relationship between these two constructs remains underexplored in prior research. A study by Yan and Li [27] highlights that inadequate digital infrastructure hinders online productivity, emphasizing its importance for organizations to function efficiently and effectively from any location. Widowati et al. [28] emphasized the importance of focusing on digital infrastructure developments, which improve organizational effectiveness and efficiency in the digital workplace. According to Akmaliyah et al. [29], digital infrastructure development should align with the organization's holistic vision and mission to ensure a competitive edge against others. This study aims to address research gaps regarding digital proficiency in the workplace, focusing on middle managers, specifically within the Malaysian Public Service (MPS).

F. Analytical framework

Fig. 1 presents the conceptual framework of this study, which influences the factor of digital proficiency in middle managers within the Malaysian public sector. Underlying theories are crucial in academic and research contexts as they shape hypothesis formation, data interpretation, and the explanation of variable relationships.

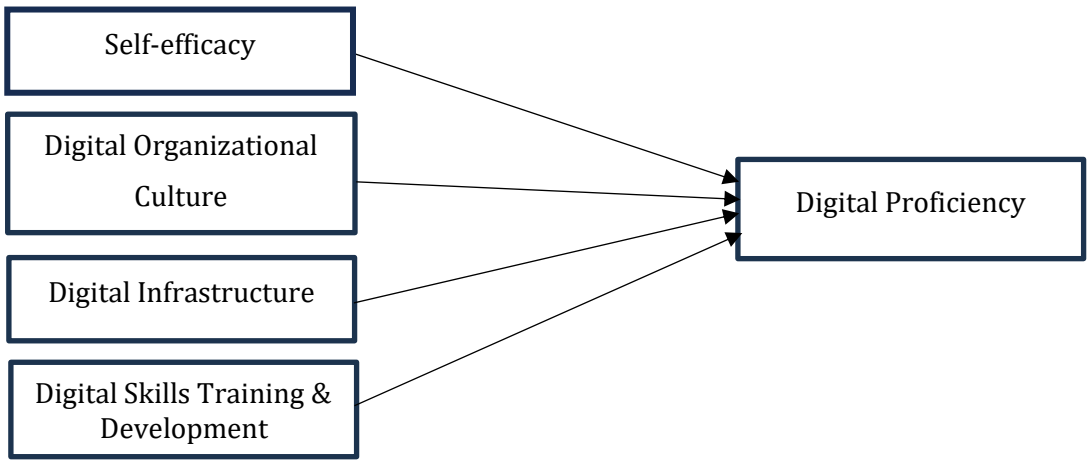


Fig. 1. Conceptual framework of factors influencing digital proficiency

It explains the factors influencing the adoption of digital tools, employee behavior toward technology, and the role of leadership and organizational norms in shaping digital transformation. The self-efficacy domain most relevant to this research is the psycho-behavioural. A middle manager's relaxation and support during the learning process of a new digital tool can enhance their digital proficiency [30]-[32]. Self-efficacy Theory applied to digital proficiency emphasizes that training programs for middle managers should prioritize creating mastery experiences. Self-efficacy, defined as the belief in one's ability to effect change

despite past experiences, significantly impacts digital proficiency, as highlighted by Ulfert-Blank and Schmidt [33] and Wang and Chu [34]. Middle managers' digital proficiency is greatly impacted by their self-efficacy. Those with high digital self-efficacy are more inclined to adopt new technologies and actively pursue digital learning, thereby effectively leading teams in digital transformation. Organizations that foster digital self-efficacy through training, role modeling, and positive reinforcement can enhance the digital skills of their middle management.

On the other hand, Dynamic Capabilities Theory (DCT) posits that an organization's success is largely contingent upon its capability to recognize business opportunities, swiftly diversify its resources and competencies, upgrade existing assets, and effectively design and redesign its organizational structure [35]. Each organization should evaluate predictors according to its specific combination of dynamic capabilities, business strategy, and digital proficiency. [36] highlight that while a relationship exists between dynamic capabilities (DCs) and performance, the specific antecedents that facilitate this relationship remain unclear.

Additionally, they note that contingencies leading to the absence of this relationship may jeopardize an organization's ability to enhance responsiveness and adaptability over time. Notable dynamic capabilities among companies include orientation capacity, improvisation capacity, operational and interpretative flexibility, international management, and cooperative skills [37],[38]. Rohayati [39] emphasized that digital human resource management is essential for improving an organization's digital capabilities. By effectively recruiting, training, and retaining skilled individuals in digital technologies, organizations can secure the talent needed for successful digital transformation efforts. Enhancing digital proficiency across six key areas is crucial for organizations to upgrade their dynamic capabilities and sustain a competitive edge in the digital age. Continuous development in digital proficiencies is necessary to adapt to technological advancements and seize emerging opportunities.

Material and Methods

A quantitative descriptive study is employed to investigate factors influencing digital proficiency among middle managers. The data collection method allows minimal interference, providing respondents with sufficient time to complete the questionnaires, which they are required to answer only once. This study uses a cross-sectional time horizon to gather information through a questionnaire, aiming to measure parameters linked to the dependent and independent variables within a limited timeframe. Cross-sectional designs are non-manipulatory experimental designs that involve data collection at a single point in time. Deductive reasoning, as described by Nandasena et al. [40], involves reasoning from general premises to reach a logically certain conclusion, ensuring that true premises lead to a true conclusion.

The hypothesis test utilized Multiple Regression Analysis, Regression ANOVA, Beta Coefficients, and Multicollinearity Regression. In this study, non-probability convenience sampling will be employed to collect data, as the available population is known, acknowledging that the sample may not represent the entire population. For this study, the target population comprises middle managers from the Diplomatic and Administrative Officers scheme, specifically those in grades 12 and 13, who are employed in various ministries and departments within the government. As reported by the Department of Public Service, there are over 1000 individuals in these positions in public service. Middle manager positions exist across various government sectors, including the economy, finance, social services, information technology, and international relations. This study aims to distribute questionnaires to middle managers in ministries and departments of the Malaysian Public Service, specifically in the Federal Territory of Putrajaya and Kuala Lumpur, under the Diplomatic and Administrative Officers scheme. For this study, Cochran's formula is used to determine the sample size. It represents 1 − α, with α being the error probability; (1 − α) × 100% denotes the confidence coefficient or coverage probability of the confidence interval. Typically, the confidence level for surveys is 0.95 or 95%, with a tolerable margin of error at 5%. Based on Cochran's formula, the required sample size for a population of 1000 individuals can be estimated as follows. The calculation uses common research assumptions: a 95% confidence level (Z = 1.96), population proportion p = 0.5, and a margin of error of 5% (e = 0.05). The first step is to calculate the sample size for a very large (infinite) population using Cochran's formula:

$$n_0 = \frac{Z^2 p(1-p)}{e^2} \quad (1)$$

Where:

n_0= initial sample size for an infinite population
Z= Z-score corresponding to the desired confidence level
p= estimated population proportion
e= margin of error.

Substituting the values into the formula gives:

$$n = \frac{384.16}{1 + \frac{384.16-1}{1000}} \approx 277.74 \quad (2)$$

This result represents the required sample size if the population were extremely large. However, because the actual population in this study is finite (N = 1000), a finite population correction must be applied using the following formula:

$$n = \frac{n_0}{1 + \frac{n_0-1}{N}} \quad (3)$$

Where:

n= adjusted sample size for a finite population
n_0= initial sample size (from Cochran's formula)
N= total population size.

By substituting the values:

$$n = \frac{384.16}{1 + \frac{384.16-1}{1000}} \approx 277.74 \quad (4)$$

Thus, the minimum required sample size is approximately 278 respondents. To anticipate nonresponse or invalid responses, researchers commonly add 10–20% additional respondents as a buffer. Therefore, the recommended sample size for this study is 278 respondents.

SPSS software utilized for data analysis based on responses from the participants. The success of descriptive studies utilizing Likert scaling hinges on the ability to gather consistent and valid data through well-designed instruments. A 5-point Likert scale is used in this study, providing a limited range of responses that enhances participant understanding. the Likert scales are set to 1 (strongly disagree), 2 (disagree), 3 (average), 4 (agree), and 5 (strongly agree). In this study, a questionnaire consists of three sections aimed at assessing respondents' perceptions regarding dependent and independent variables. Section A gathers demographic data (age, years of service, educational background), Section B addresses the dependent variable of digital proficiency, and Section C focuses on independent variables, including self-efficacy, organizational digital culture, digital infrastructure, and digital training and development. The study utilizes a questionnaire adapted from previous research as a general guide due to the lack of direct or extensive research on the topic, with the questions detailed in Table 2.

Table 2. Measurement items

Variables	Items	Likert Scale
Digital Proficiency	1. I am confident in using digital tools to complete my daily work tasks effectively. 2. I can independently troubleshoot common digital or IT-related issues at work. 3. I adapt quickly when new digital platforms or systems are introduced in my organization. 4. I can integrate multiple digital tools to enhance my work productivity. 5. I feel that my current level of digital proficiency supports my role as a middle manager.	5 Likert Scale
Self-efficacy	1. I believe in my ability to learn and master new digital skills when required. 2. I am motivated to explore digital tools that could improve my work performance. 3. I trust my capability to solve digital-related problems without external help. 4. I view challenges in learning digital tools as opportunities to improve myself.	5 Likert Scale
Organization Digital Culture	1. My organization encourages employees to adopt and use digital technologies. 2. Digital collaboration is actively promoted within my organization. 3. My organization rewards or recognizes employees who improve digital practices. 4. The overall workplace environment supports innovation through digitalization.	5 Likert Scale

Variables	Items	Likert Scale
Digital Infrastructure	1. My organization provides reliable internet connectivity for digital work. 2. The digital systems and platforms provided are user-friendly and efficient. 3. The IT support provided in my organization is adequate and responsive. 4. I have access to the necessary devices and software to perform my job digitally.	5 Likert Scale
Digital Training and Development	1. My organization provides sufficient training to improve employees' digital skills. 2. The digital training programs I attended were practical and useful for my work. 3. I receive continuous learning opportunities to keep up with digital changes. 4. Training programs are tailored to meet the needs of employees at my level.	5 Likert Scale

** Compiled by authors*

Results and Discussions

A. Demographic Profile

According to the Malaysian Public Service Department (MPSD), there are over 1,000 middle manager positions in the public service, and a sample size of 278 is deemed acceptable based on the Cochran sampling formula for this study. A total of 420 invitations were distributed to Grade 12 and Grade 13 respondents through official emails and WhatsApp for participation in the survey questionnaire. Out of 420 respondents invited to the study, 287 completed the questionnaire, leaving 133 non-respondents. This translates to a 68% response rate, which is acceptable for social studies research. All 287 respondents answered every question, resulting in no missing responses.

The survey shows that male middle managers constitute 47% (135 respondents), whereas female middle managers make up 53% (152 respondents). The majority of respondents are aged below 50, comprising 73.5% (211 individuals). Respondents in the survey are primarily middle managers, with 20.2% (58) over 50 years old, 6.3% (18) under 40 years old, and none below 30 years old. The educational background of middle managers shows that 47% hold a master's degree, 41.1% have a bachelor's degree, and 11.7% possess a PhD or DBA. Almost half of the respondents have a master's degree. The majority (65.2%, 187) have less than 20 years of public service experience, followed by 19.9% (57) with less than 25 years, 6.6% (19) with less than 30 years, 8.0% (23) with less than 15 years, and 0.3% (1) with less than 10 years. Table 3 presents demographic data of respondents, including gender, age group, educational background, work experience, and workplace location. These findings indicate that the respondent pool is relatively balanced in gender and dominated by mid-career professionals with strong academic qualifications. This demographic profile suggests a workforce that is potentially adaptive to organizational change while maintaining substantial institutional experience.

Table 3. Respondent's profile

Demographic	Categories	Frequency (n=287)	Percentage (%)
Gender	Male	135	47.0
	Female	152	53.0
Age Group	Below 30 years old	0	0
	Below 40 years old	18	6.3
	Below 50 years old	211	73.5
	Above 50 years old	58	20.2
Educational Background	Bachelor	118	41.1
	Master	135	47.0
	PhD/DBA	34	11.8
Work Experience	Less than 10 years	1	0.3
	Less than 15 years	23	8.0
	Less than 20 years	187	65.2
	Less than 25 years	57	19.9
	Less than 30 years	19	6.6
Workplace Location	WP Putrajaya	189	65.9
	WP Kuala Lumpur	36	12.5
	Others	62	21.6

* *Compiled by authors.*

B. Reflective measurement model results

1. Reliability analysis

Cochran Alpha values from 0.7 to 0.95 are suitable for deception research; values over 0.95 may indicate redundancy (Bujang, 2018). Constructs with a value of 0.9 or more are excellent; values between 0.8 and 0.89 are good; and those between 0.7 and 0.79 are acceptable for a study. All construct values below 0.7 are questionable, with values under 0.5 deemed unacceptable. In this study, the Cronbach's Alpha values for all variables range from 0.821 to 0.908, indicating good to excellent reliability. Table 4 summarizes the reliability analysis conducted on the constructed items.

Table 4. Result of the reliability analysis

Constructs	Cronbach's Alpha	Cronbach's Alpha based on Standardized Items	No. of Items	Strength of Association
Digital Proficiency	0.906	0.908	5	Excellent
Self-efficacy	0.882	0.889	4	Good
Digital Culture	0.865	0.874	4	Good
Digital Infrastructure	0.821	0.825	4	Good
Training and Development	0.905	0.905	4	Excellent

2. Correlation Analysis

In this study, Pearson's correlation coefficient (r) was used to assess the relationship between independent variables, including self-efficacy (SE), digital organizational culture (DC), digital infrastructure (DI), training and development (TD), and the dependent variable, digital proficiency (DP). The correlation matrix analysis in Table 5 indicates

significant interactions between the dependent variable and all independent variables, with p<0.001 in a 2-tailed test. Self-efficacy exhibited a strong correlation with digital proficiency, indicated by a coefficient value of r= 0.846. This means that there is a strong correlation between the two variables. Self-efficacy significantly influences digital proficiency, while other independent variables show a moderate correlation, specifically with values of r=0.569 for digital competence (DC) and r=0.569 for digital literacy (DI). The weak correlation between training and development (TD) and digital proficiency among middle managers is indicated by a coefficient of r=0.281, suggesting a small relationship.

Table 5. Correlation Matrix

Constructs		Digital Proficiency	SE	DC	DI	TD
Digital Proficiency	Pearson Correlation	1				
	Sig. (2-tailed)					
SE	Pearson Correlation	.846**	1			
	Sig. (2-tailed)	<.001				
DC	Pearson Correlation	.569**	.566**	1		
	Sig. (2-tailed)	<.001	<.001			
DI	Pearson Correlation	.407**	.356**	.491**	1	
	Sig. (2-tailed)	<.001	<.001	<.001		
TD	Pearson Correlation	.281**	.240**	.471**	.583**	1
	Sig. (2-tailed)	**<.001**	**<.001**	**<.001**	**<.001**	

**. Correlation is significant at the 0.01 level (2-tailed).

3. Hypothesis Analysis

Hypothesis analysis is the process of evaluating explanations for a phenomenon by constructing measurable variables, articulating their expected interactions, and establishing a methodology for analysis. This study utilized multiple regression and multicollinearity analysis to verify the validity of the proposed hypotheses.

C. Multiple Regression

In this study, a multiple regression analysis was performed to investigate how self-efficacy, digital culture, digital infrastructure, and training and development affect digital proficiency. Detailed calculations are presented in Table 6. The model achieved statistical significance, accounting for 73.1% of the variance in digital proficiency, with R^2 = 0.734 and Adjusted R^2 = 0.731. The model showed a strong positive correlation between the predictors and the dependent variable (R = 0.857). The Durbin-Watson statistic of 1.751 indicates that the

assumption of independent errors is fulfilled, demonstrating that the predictors (SE, DC, DI, TD) significantly influence the digital proficiency hypothesis prediction.

Table 6. Multiple Regression Model Summary

Model Summary [b]					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	0.857[a]	0.734	0.731	0.38126	1.751
a. Predictors: (Constant), SE, DC, DI, TD					
b. Dependent Variable: Digital Proficiency					

D. Multicollinearity Analysis

A high multicollinearity value signals a reliability issue, with problematic multicollinearity indicated by individual coefficient values above 10 or tolerance values below 0.1. Table 7 presents the coefficient values obtained from the multicollinearity analysis. Based on Table 6, hypothesis 1 (HI) was supported because self-efficacy (SE) emerged as the strongest and most significant predictor among the variables studied (β = 0.763, t = 20.27, p < .001\ beta = 0.763, t = 20.27, p < .001 β = 0.763, t = 20.27, p < .001).

Table 7. Coefficient Values

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	0.345	0.169		2.044	0.042		
	SE	0.240	0.041	0.238	5.829	0.000	0.769	1.300
	DC	0.187	0.043	0.192	4.357	0.000	0.659	1.517
	DI	0.330	0.047	0.330	7.081	0.000	0.590	1.694
	TD	**0.180**	**0.044**	**0.179**	**4.117**	**0.000**	**0.677**	1.477

a. Dependent Variable: Digital Proficiency

This result indicates that confidence in using digital tools effectively is the key factor influencing digital proficiency. Digital culture has a statistically significant positive effect on digital proficiency, as indicated by a β value of 0.089 and a t-value of 2.13 (p = .034), highlighting the role of supportive organizational and social norms in enhancing digital practices. Digital infrastructure significantly enhances digital proficiency, as indicated by the relationship (β= 0.082, t = 2.06, p = .040). Training and development did not significantly predict digital proficiency (β = 0.016, t = 0.40, p = .692\ beta = 0.016, t = 0.40, p = .692 β = 0.016, t = 0.40, p = .692), suggesting that structured training interventions alone may not influence digital proficiency when considering self-efficacy, digital culture, and digital infrastructure.

The collinearity statistics show that tolerance values ranged from 0.540 to 0.665 and VIF values ranged from 1.503 to 1.853, indicating no multicollinearity issues among the predictors. Self-efficacy is identified as the primary predictor of digital proficiency, with digital culture and

infrastructure also contributing significantly, whereas training and development show no distinct impact in the model.

E. Hypotheses Testing

The findings highlight the interplay of multiple factors in shaping digital readiness in the public sector and underscore the need to verify the study's success in meeting its research objectives, questions, and hypotheses. The summary of testing has been presented in Table 8.

Table 8. Summary of Testing

Items	Hypothesis	T-statistics (|O/STDEV|)	P-Values	Decision
H1	A positive relationship exists between self-efficacy (SE) and digital proficiency among middle managers.	20.27	<0.001	Supported
H2	A positive relationship exists between digital organizational culture (DC) and digital proficiency among middle managers.	2.13	<0.034	Supported
H3	A positive relationship exists between digital infrastructure (DI) and digital proficiency among middle managers.	2.06	<0.040	Supported
H4	A positive relationship exists between digital training and development (TD) and the digital proficiency of middle managers.	0.40	0.692	Rejected

H1 is supported, confirming that self-efficacy significantly enhances digital proficiency among middle managers in the Malaysian Public Service. Self-efficacy demonstrated the strongest positive correlation with digital proficiency ($r = 0.846$, $p < 0.001$) and was identified as the most significant predictor in the regression analysis ($\beta = 0.763$, $t = 20.27$, $p < 0.001$). This indicates that middle managers with higher self-belief in their abilities tend to use digital tools more proficiently in digital tasks, aligning with Bandura's Self-Efficacy Theory, which suggests that individual belief in their capabilities influences motivation, effort, and persistence in mastering new skills. This result highlights that self-efficacy significantly influences digital transformation readiness in public organizations [41],[42]. It suggests that middle managers' confidence and willingness to engage with digital systems are crucial for the effective implementation of digital policies and initiatives.

H2 emphasizes that a strong digital organizational culture enhances the digital proficiency of middle managers. The findings indicated a moderate positive relationship ($r = 0.569$, $p < 0.001$) between digital organizational culture and digital proficiency, with regression analysis showing a significant effect ($\beta = 0.089$, $t = 2.13$, $p = 0.034$). This indicates that an organizational environment promoting openness, collaboration, and innovation enhances the adaptability and performance of middle managers in digital settings. This aligns with the Dynamic Capabilities Theory, highlighting the necessity for organizations to develop adaptive, learning-

oriented cultures. Such a supportive digital culture fosters managerial experimentation and continuous improvement, facilitating effective digital transformation. In the Malaysian Public Service, a digital culture is vital for fostering shared understanding of transformation goals, promoting knowledge exchange, and minimizing resistance to change, which are essential for building digital maturity.

Digital infrastructure plays a significant but secondary role in enhancing digital proficiency among public sector middle managers. Therefore, H3 is supported, the study identified a moderate positive correlation ($r = 0.569$, $p < 0.001$) between digital infrastructure and digital proficiency, with regression results showing a significant but smaller effect ($\beta = 0.082$, $t = 2.06$, $p = 0.040$) in comparison to self-efficacy and culture. This indicates that reliable digital systems and tools contribute to proficiency in skill development, but are not the only driving factor. Under the Dynamic Capabilities Theory, digital infrastructure is crucial for organizational sensing, allowing employees to recognize opportunities and implement digital strategies. Yet, without supportive culture and capability-building, infrastructure alone may fail to achieve full digital competence. This finding supports previous research indicating that although access to technology is essential, its effectiveness relies on user confidence and organizational support [43].

H4 is unsupported, signaling the necessity to revise training methods toward experiential, continuous, and problem-based learning to attain significant digital proficiency. Digital training and development showed a weak correlation ($r = 0.281$) and was not statistically significant in regression analysis ($\beta = 0.016$, $t = 0.40$, $p = 0.692$), indicating that their impact on digital proficiency is minimal. This finding suggests that conventional training programs for middle managers often fail to adapt to the changing digital landscape, focusing more on compliance rather than enhancing capabilities, resulting in minimal behavioral change or skill transfer. From the perspective of Self-Efficacy Theory, training alone does not enhance self-belief without mastery experiences, feedback, and contextual relevance. Likewise, the Dynamic Capabilities Theory suggests that simply being exposed to training does not automatically develop adaptive capabilities without a supportive learning culture and structure.

Contribution of Study

In this study, theoretical contribution identifies self-efficacy, digital organizational culture, and digital infrastructure as key predictors of digital proficiency, with self-efficacy being the most influential. It also highlights that training and development do not significantly affect digital proficiency, suggesting a need to reevaluate conventional training methods in light of digital transformation. Grounded in Self-Efficacy Theory and Dynamic Capabilities Theory, the findings emphasize that digital proficiency is influenced by individual belief, supportive organizational systems, and adaptability, beyond mere training. For the Malaysian

Public Service, essential strategies for sustaining digital transformation include equipping middle managers with digital confidence, enhancing digital culture, and ensuring robust infrastructure. Ultimately, the study indicates that digital proficiency in Malaysia is shaped by both individual self-belief and organizational adaptability. It suggests that a capable, confident public service workforce is essential for achieving digital transformation goals. While infrastructure and culture are important, they alone cannot ensure success without fostering individual confidence in capabilities. Future strategies should focus on holistic interventions that enhance self-efficacy, integrate digital culture, and provide impactful learning experiences.

Practical and Policy Implication

Digital proficiency standards should be incorporated into promotion and performance evaluations for middle managers. Encouraging collaboration across ministries will facilitate resource sharing, effective training, and best practices. Additionally, middle managers' digital development initiatives must align with the Digital Economy Blueprint (MyDIGITAL) for strategic coherence in the long term.

Practical implications of the study highlight the importance of middle managers, who bridge the gap between top management and lower-level employees. It emphasizes the need for these managers to prioritize building digital confidence alongside technical skills. Programs enhancing digital self-efficacy through experiential learning, mentoring, and peer knowledge sharing are essential. Encouraging growth mindsets in adapting to digital changes is crucial, along with providing the necessary support for these adaptations. Organizations must foster a digital-friendly culture and invest in infrastructure to enhance digital proficiency. Leadership should exemplify digital adoption, support digital champions, and establish norms promoting experimentation while minimizing the fear of failure. Continuous investment in reliable digital platforms and equitable technological resource distribution, particularly for rural managers, is essential.

This document emphasizes the need for alignment within an organization towards its digital vision. It advocates for the modeling of digital behaviors and the creation of training programs that incorporate micro-learning, gamified challenges, and role-specific problem-based tasks. Additionally, it highlights the importance of aligning national digital transformation strategies with public service capacity-building to ensure coherence between technological investments and workforce readiness.

Limitations and Recommendations of Future Study

This study highlights limitations in developing dynamic capabilities within the Public Service that require attention. It is advised that the Malaysian Public Service Department regularly monitor digital trends and identify skill gaps among managers, while also

establishing quick response mechanisms for middle managers to obtain training or resources for digital challenges. Additionally, it is essential to enhance flexibility in organizational routines to adapt processes, roles, and responsibilities to new technologies.

Secondly, the limitation is lack of training and development approaches. Current study indicated that traditional training programs do not significantly enhance digital proficiency. For improvement, training should shift to more tailored approaches for middle managers in public service, integrating formal training with practical application and reflective feedback. Introducing certifications like micro-credentials can motivate and validate the progress of middle managers.

Potential future research avenues include: (a) examining the moderating effect of leadership style on the link between self-efficacy and digital proficiency, (b) conducting longitudinal studies to evaluate the persistence of self-efficacy in maintaining digital proficiency, (c) comparing public and private sector managers to analyze how contextual pressures influence training and culture, and (d) applying qualitative methods such as interviews and focus groups to investigate reasons for the ineffectiveness of training interventions in enhancing digital proficiency, among others.

Conclusion

The research emphasizes the importance of hypothesis development for establishing relationships between variables, which enables testable predictions and guides research objectives. Digital culture and infrastructure are crucial at the organizational level, aligning with Dynamic Capabilities Theory. Organizations need to continuously reconfigure resources and practices to stay competitive in changing environments. A robust digital culture and infrastructure empower middle managers to utilize their capabilities effectively and adapt to technological changes. Training and development alone may be ineffective in achieving real proficiency without self-efficacy and systemic support. This underscores the need to integrate training within broader organizational strategies instead of viewing it as a standalone initiative. Middle managers with increased digital self-efficacy exhibit greater confidence, motivation, and persistence in using digital technologies, resulting in higher proficiency. This highlights that digital proficiency involves not only tool exposure but also confidence in effective usage.

Conflict of Interest

The authors declare no conflict of interest.

References

[1] N. Mohd Ariffin and N. Mohd Daud, "Adoption of Customer Centered Service in Public University: A Case Study in Malaysia," in *International Conference on User Science and Engineering*, Singapore: Springer, Jul. 2018, pp. 175–182. https://link.springer.com/chapter/10.1007/978-981-13-1628-9_16

[2] N. Hashim, T. S. Taleb, and M. S. M. Faudzi, "Entrepreneurial bricolage and micro-business performance: A moderated mediation of innovation capability and digital marketing capabilities," *Journal of Strategic Marketing*, vol. 32, no. 8, pp. 1274–1289, 2024. https://doi.org/10.1080/0965254X.2023.2216203
[3] S. Byrne et al., "Professionals' digital competences and user profiles in social agencies and their impact on professional practice, family autonomy and wellbeing," *Frontiers in Psychology*, vol. 15, p. 1363444, 2024. https://doi.org/10.3389/fpsyg.2024.1363444
[4] A. Bandura, "Self-efficacy: Toward a unifying theory of behavioral change," *Psychological Review*, vol. 84, no. 2, pp. 191–215, 1977. https://doi.org/10.1037/0033-295X.84.2.191
[5] N. Al-Kahtani et al., "Digital health transformation in Saudi Arabia: A cross-sectional analysis using Healthcare Information and Management Systems Society digital health indicators," *Digital Health*, vol. 8, 2022. https://doi.org/10.1177/20552076221117742
[6] A.M. MADINA, and D. MARA, "Evolving Trends in Teacher Self-Efficacy Research: A Bibliometric Review (2020-2025). Journal of Educational Sciences/Revista de Ştiinţe ale Educaţiei, vol. 51, no. 1, pp. 58 – 84, 2025, https://doi.org/10.35923/jes.2025.1.04
[7] D. R. Compeau and C. A. Higgins, "Computer self-efficacy: Development of a measure and initial test," *MIS Quarterly*, pp. 189–211, 1995. https://doi.org/10.2307/249688
[8] Y. Yang, J. Chen, and X. Zhuang, "Self-determination theory and the influence of social support, self-regulated learning, and flow experience on student learning engagement in self-directed e-learning". Frontiers in Psychology, 16, 1545980, 2025, https://doi.org/10.3389/fpsyg.2025.1545980
[9] V. Venkatesh and H. Bala, "Technology acceptance model 3 and a research agenda on interventions," *Decision Sciences*, vol. 39, no. 2, pp. 273–315, 2008. https://doi.org/10.1111/j.1540-5915.2008.00192.x
[10] A. Türk, "Digital leadership role in developing business strategy suitable for digital transformation," *Frontiers in Psychology*, vol. 13, p. 1066180, 2023. https://doi.org/10.3389/fpsyg.2022.1066180
[11] Malaysian Administrative Modernisation and Management Planning Unit (MAMPU), "Pelan Strategik Pendigitalan Sektor Awam 2021–2025," 2021. https://www.jupem.gov.my/storage/upload/contents/PELAN-STRATEGIK-PENDIGITALAN-JUPEM-2021-2025.pdf
[12] M. Ghobakhloo, "Industry 4.0, digitization, and opportunities for sustainability," *Journal of Cleaner Production*, vol. 252, p. 119869, 2020. https://doi.org/10.1016/j.jclepro.2019.119869
[13] A. Bandura, "Social cognitive theory: An agentic perspective," *Annual Review of Psychology*, vol. 52, no. 1, pp. 1–26, 2001. https://doi.org/10.1111/1467-839X.00024
[14] G. George and M. R. Camarata, "Managing instructor cyberanxiety: The role of self-efficacy in decreasing resistance to change," *Educational Technology*, vol. 36, no. 4, pp. 49–54, 1996. https://www.jstor.org/stable/44428349
[15] D. Dong, "Self-determination theory perspectives on the influence of digital learning engagement on motivation in extracurricular learning activities: Considering the mediating role of digital self-efficacy," *Learning and Motivation*, vol. 90, p. 102135, 2025. https://doi.org/10.1016/j.lmot.2025.102135
[16] N. Trushkina, R. Abazov, N. Rynkevych, and G. Bakhautdinova, "Digital transformation of organizational culture under conditions of the information economy," *Virtual Economics*, vol. 3, no. 1, pp. 7–38, 2020. https://www.ceeol.com/search/article-detail?id=895371
[17] E. V. Mariscal et al., "The impact of digital infrastructure on the consequences of COVID-19 and on the mitigation of future effects," *IDB Discussion Paper* No. IDB-DP-827, 2020. http://dx.doi.org/10.2139/ssrn.3910862
[18] G. Schiuma, E. Schettini, F. Santarsiero, and D. Carlucci, "The transformative leadership compass: Six competencies for digital transformation entrepreneurship," *International Journal of Entrepreneurial Behavior & Research*, vol. 28, no. 5, pp. 1273–1291, 2022. https://doi.org/10.1108/IJEBR-01-2021-0087
[19] M. Pihlajamaa, N. Malmelin, and A. Wallin, "Competence combination for digital transformation: A study of manufacturing companies in Finland," *Technology Analysis & Strategic Management*, vol. 35, no. 10, pp. 1355–1368, 2023. https://doi.org/10.1080/09537325.2021.2004111
[20] A. Luthra et al., "Cultivating digital culture: Exploring the impact of digital knowledge management on employee performance in higher educational institutions," *International Journal*

of System Assurance Engineering and Management, pp. 1–17, 2025. https://link.springer.com/article/10.1007/s13198-024-02648-6

[21] S. Kraus, A. Ferraris, and A. Bertello, "The future of work: How innovation and digitalization re-shape the workplace". Journal of Innovation & Knowledge, vol. 8, no. 4, 100438, 2023, https://doi.org/10.1016/j.jik.2023.100438

[22] D. Proksch, A. F. Rosin, S. Stubner, and A. Pinkwart, "The influence of a digital strategy on the digitalization of new ventures: The mediating effect of digital capabilities and a digital culture," *Journal of Small Business Management*, vol. 62, no. 1, pp. 1–29, 2024. https://doi.org/10.1080/00472778.2021.1883036

[23] S. Getenet, R. Cantle, P. Redmond, and P. Albion, "Students' digital technology attitude, literacy and self-efficacy and their effect on online learning engagement," *International Journal of Educational Technology in Higher Education*, vol. 21, no. 1, p. 3, 2024. https://link.springer.com/article/10.1186/s41239-023-00437-y

[24] H. Schaffers, M. Vartiainen, and J. Bus, Eds., *Digital Innovation and the Future of Work*. Boca Raton: CRC Press, 2022. https://books.google.com.my/books?id=o_mGEAAAQBAJ

[25] P. Ifinedo, "Understanding information systems security policy compliance: An integration of the theory of planned behavior and the protection motivation theory," *Computers & Security*, vol. 31, no. 1, pp. 83–95, 2012. https://doi.org/10.1016/j.cose.2011.10.007

[26] D. Steininger, P. Mikalef, A. Pateli, and A. Ortiz de Guinea, "Dynamic capabilities in information systems research: A critical review, synthesis of current knowledge, and recommendations for future research," *Journal of the Association for Information Systems*, 2022. https://doi.org/10.17705/1jais.00736

[27] X. Yan, and T. Li, "Construction and application of urban digital infrastructure—practice of "Urban Brain" in facing COVID-19 in Hangzhou, China". Engineering, Construction and Architectural Management, vol. 30, no. 8, pp. 3123-3141, 2023, https://doi.org/10.1108/ECAM-10-2021-0935

[28] A. Widowati, I. Siswanto, and M. Wakid, "Factors affecting students' academic performance: Self-efficacy, digital literacy, and academic engagement effects," *International Journal of Instruction*, vol. 16, no. 4, pp. 885–898, 2023. https://e-iji.net/ats/index.php/pub/article/view/50

[29] A. Akmaliyah et al., "Online-based teaching of Arabic translation in the era of Covid-19 pandemic restrictions," *IOSR Journal of Humanities and Social Science*, vol. 25, no. 5, pp. 13–22, 2020. https://www.iosrjournals.org/iosrjhss/papers/Vol.%2025%20Issue5/Series9/D2505091322.pdf

[30] S. Al Mandhari et al., "Navigating digital transformation: The role of competency identification in talent management strategies," in *SPE Gas & Oil Technology Showcase and Conference*, 2025. https://doi.org/10.2118/224680-MS

[31] D. Compeau, J. Gravill, N. Haggerty, and H. Kelley, "Computer self-efficacy: A review". Human-computer interaction and management information systems: Foundations, pp. 239-275, 2015, https://www.taylorfrancis.com/chapters/edit/10.4324/9781315703619-21/computer-self-efficacy-review-deborah-compeau-jane-gravill-nicole-haggerty-helen-kelley

[32] B. J. Zimmerman, "Self-efficacy: An essential motive to learn," *Contemporary Educational Psychology*, vol. 25, no. 1, pp. 82–91, 2000. https://doi.org/10.1006/ceps.1999.1016

[33] A. S. Ulfert-Blank and I. Schmidt, "Assessing digital self-efficacy: Review and scale development," *Computers & Education*, vol. 191, p. 104626, 2022. https://doi.org/10.1016/j.compedu.2022.104626

[34] Z. Wang and Z. Chu, "Examination of higher education teachers' self-perception of digital competence, self-efficacy, and facilitating conditions: An empirical study in the context of China," *Sustainability*, vol. 15, no. 14, p. 10945, 2023. https://doi.org/10.3390/su151410945

[35] J. Ferreira, A. Coelho, and L. Moutinho, "Dynamic capabilities, creativity and innovation capability and their impact on competitive advantage and firm performance," *Technovation*, vol. 92, p. 102061, 2020. https://doi.org/10.1016/j.technovation.2018.11.004

[36] S. Jooss, A. McDonnell, and A. Skuza, "Middle managers as key talent management stakeholders: Navigating paradoxes," *European Management Review*, vol. 21, no. 2, pp. 459–476, 2024. https://doi.org/10.1111/emre.12587

[37] F. Yazdanpanahi, M. Shahi, M. Vossoughi, and N. Davaridolatabadi, "Investigating the effective factors on the acceptance of teleorthodontic technology based on the technology acceptance

model 3 (TAM3)". Journal of Dentistry, vol. 25, no.1, pp. 68, 2024, https://doi:10.30476/dentjods.2023.96932.1977

[38] J. Zhang et al., "A review of dynamic capabilities evolution—Based on organisational routines, entrepreneurship and improvisational capabilities perspectives," *Journal of Business Research*, vol. 168, p. 114214, 2023. https://doi.org/10.1016/j.jbusres.2023.114214

[39] T. Rohayati, "Integrating Human Resources Management and Digital Competencies: A Strategic Approach in Higher Education," *Al-Ishlah: Jurnal Pendidikan*, vol. 16, no. 2, pp. 1118–1127, 2024. https://journal.staihubbulwathan.id/index.php/alishlah/article/view/5286/2294

[40] G. Nandasena, L. N. K. de Silva, and A. S. Kumara, "Methods of Reasoning in Scientific Discovery," *American Scientific Research Journal for Engineering, Technology, and Sciences*, vol. 39, no. 1, pp. 1–9, 2018. https://files01.core.ac.uk/download/pdf/235050432.pdf

[41] P.V. Mirazchiyski, "Students' Self-Efficacy in General ICT Use as a Mediator Between Computer Experience, Learning ICT at School, ICT Use in Class, and Computer and Information Literacy". Education Sciences, vol. 15, no. 8, pp. 1081, 2025, https://doi.org/10.3390/educsci15081081

[42] M.A. Rahmadi, N,. Sihombing, H. Nasution, L. Mawar, M. Sari, and W.I. Haq, "The Conceptual Model of Etika Digital Ulul Albab in Reducing Cyber-Anxiety Among Generation Z: A CFA-Based Study of Data from Indonesia and Lebanon". Termometer: Jurnal Ilmiah Ilmu Kesehatan dan Kedokteran, vol. 3, no. 3, pp. 191-215, 2025, https://doi.org/10.55606/termometer.v3i3.5427

[43] F. Zhao and A. Collier, "Digital entrepreneurship: Research and practice," in *9th Annual Conference of the EuroMed Academy of Business*, Apr. 2020, pp. 2173–2182. https://eprints.staffs.ac.uk/6274/1/DigitalEntrepreneurship-ResearchandPractice.pdf

Authors



Yusfaidzira binti Ahmad Yusof is currently serving as a Senior Assistant Secretary in the Malaysian public service, and a researcher affiliated with the Tun Razak Graduate School, Universiti Tun Abdul Razak. Her research interests include digital talent development, strategic management, leadership, and digital transformation policies. (email: yusfaidzira.yusof@gmail.com).



Dr. Hemaloshinee Vasudevan received her PhD in General and a major in Organizational Behaviour from the University of Technology Malaysia (UTM). She is currently a faculty member at UNIRAZAK. She had 16 years' experience in the education line and 2 ½ years in the industrial field. She had published in various journals in the business and management field. However, she also has experience in reviewing journals and has been an associate editor at an international journal for more than 5 years. She has published many articles, including research papers, review papers, and narrative case studies on platforms like International, National journals, Scopus, and Web of Science. She is therefore interested in performing research in various areas. Her areas of interest include marketing, artificial intelligence, training, organizational behaviour, sociology, criminology, and business management. (email: hemaloshinee25@gmail.com).