From Digital Adoption to Competitive Capability: SME Digitalisation Policy in Singapore and Implications for Vietnam

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ABSTRACT

Digitalisation among small and medium-sized enterprises (SMEs) has become an increasingly important component of productivity and competitiveness policy. Yet widespread technology adoption does not necessarily translate into sustained improvements in firm performance, particularly where smaller firms lack the managerial, financial and organisational capabilities required to integrate digital technologies into business processes. This article examines Singapore's SME digitalisation policy to identify how public interventions can support the transition from technology adoption to competitive capability and considers the implications for Vietnam. The study employs an explanatory qualitative case-study design based on policy-document analysis, official enterprise statistics, OECD and World Bank assessments, and peer-reviewed research on SME digital transformation. Drawing on the resource-based view and dynamic-capabilities perspective, the analysis focuses on the interaction between firm-level constraints and policy instruments rather than on individual programmes in isolation. The findings indicate that Singapore has progressively assembled a set of complementary policy instruments in which sector-specific digital roadmaps, technology verification, financial co-funding, advisory services and capability-building programmes address different barriers to digital transformation. SME digital adoption reached 95.1% in 2024, while average adoption intensity increased from 2.0 to 2.3 digital areas. Nevertheless, AI adoption remained markedly uneven, at 14.5% among SMEs compared with 62.5% among larger enterprises, suggesting that near-universal basic adoption has not eliminated differences in digital capability. The article argues that the competitiveness significance of SME digitalisation lies less in expanding the number of firms using digital tools than in strengthening their capacity to combine technology with organisational knowledge, skills and market opportunities. For Vietnam, particularly following the adoption of the SME Digital Transformation Scheme for 2026–2030, the analysis identifies policy functions that could support a move beyond participation-oriented assistance towards sector- and maturity-specific pathways, stronger technology-market intermediation, better coordination between advisory and financing mechanisms, and closer links between digital transformation and domestic supplier upgrading.

Keywords: SME, digital, competitiveness; Singapore; Vietnam

INTRODUCTION

Digital technologies have become deeply embedded in the organisation of production, services and exchange. Cloud computing, enterprise software, digital platforms, data analytics, artificial intelligence (AI) and automation can reduce coordination costs, improve the use of information, expand market reach and support new products and business models. Their economic significance therefore extends well beyond the information and communications technology sector. For governments seeking to improve productivity and national competitiveness, the diffusion of digital capabilities across the broader enterprise population has consequently become an important policy concern.

The challenge is particularly pronounced among small and medium-sized enterprises (SMEs). Smaller firms generally operate with fewer financial resources, more limited managerial specialisation and weaker access to digital expertise than large enterprises. These characteristics affect not only the initial decision to adopt technology but also firms' ability to select appropriate solutions, reorganise workflows, train employees and

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sustain technological use over time. Recent OECD evidence confirms that cost, time for training and internal capability remain important impediments to SME digitalisation, while only a minority of surveyed SMEs have reached transformative levels of digital integration (Bianchini & Lasheras Sancho, 2025). The digital divide therefore increasingly concerns the depth and quality of technological use rather than simple access to digital tools.

This distinction is central to contemporary research on digital transformation. Digital transformation involves changes in organisational structures, capabilities and value-creation processes rather than the mere acquisition of technology (Vial, 2019; Verhoef et al., 2021). In SMEs, digital outcomes depend on interactions among technological resources, employee skills, managerial commitment, strategic alignment and organisational learning (Eller et al., 2020; Ben Slimane et al., 2022; Sagala & Őri, 2024). Recent work on SME competitiveness further argues that digital transformation can be both an enabler and an outcome of competitive advantage, depending on how technical, organisational and cultural elements are aligned (Meier et al., 2025). This literature suggests that policy should be concerned not only with whether firms adopt technology, but with whether they acquire the capability to use and reconfigure it productively.

Singapore provides an analytically useful case through which to examine this transition. SMEs employ around two-thirds of Singapore's workforce and contribute nearly half of gross domestic product (IMDA, n.d.). Since the launch of SMEs Go Digital in 2017, the government has progressively assembled a dedicated enterprise-digitalisation framework combining Industry Digital Plans, pre-approved solutions, the Productivity Solutions Grant, CTO-as-a-Service, the Digital Leaders Programme and, more recently, the Digital Enterprise Blueprint. By 2024, 95.1% of SMEs had adopted at least one of six measured digital areas and 97% used at least one sector-specific digital solution. Yet AI adoption was 14.5% among SMEs compared with 62.5% among non-SMEs, indicating that widespread basic adoption can coexist with a substantial gap in technological sophistication (IMDA, 2025a).

The case is particularly relevant to Vietnam. Digital transformation has been embedded in national development policy through Decision No. 749/QĐ-TTg and Decision No. 411/QĐ-TTg, while Decision No. 433/QĐ-TTg of 16 March 2026 introduced a dedicated SME Digital Transformation Scheme for 2026–2030. The Scheme aims to support at least 500,000 SMEs, including at least 300,000 enterprises receiving support in applying digital technologies, platforms or AI. It also explicitly links digital transformation with productivity, adaptability and deeper participation in regional and global value chains (Government of Vietnam, 2026). Vietnam has therefore moved beyond the stage of defining digitalisation as a policy aspiration; the more difficult question concerns how implementation can translate technology support into durable enterprise capability.

Against this background, the article asks three questions: how does Singapore's policy architecture address the constraints that shape SME digital transformation; what does its evolution reveal about the relationship between digital adoption and competitive capability; and which policy functions are relevant to Vietnam's 2026–2030 implementation agenda? Rather than treating Singapore as a model to be replicated, the study analyses the mechanisms through which different instruments reduce information, financing and implementation barriers. It argues that the principal policy transition is from facilitating access to enabling capability accumulation, and that this transition is central to understanding how SME digitalisation can contribute to national competitiveness.

LITERATURE REVIEW AND ANALYTICAL FRAMEWORK

From Digital Adoption to Digital Capability

The literature on enterprise digitalisation has progressively moved beyond a narrow emphasis on technology adoption. Earlier indicators commonly measured whether firms possessed websites, broadband connections, cloud services or enterprise software. Such measures remain useful for tracking diffusion, but they provide limited information about whether technology changes organisational routines, decision-making or the way firms create value. Vial (2019), following a review of 282 studies, conceptualises digital transformation as a process in which digital technologies trigger strategic responses and structural change. Verhoef et al. (2021)

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similarly distinguish digitisation, digitalisation and digital transformation as increasingly deep forms of technological change. The shared implication is that technology acquisition alone is insufficient to produce transformation.

This distinction is particularly relevant to SMEs because smaller firms typically digitalise selectively and incrementally. Eller et al. (2020) show that IT resources, employee skills and digital strategy are important antecedents of SME digitalisation and that digitalisation is positively associated with financial performance; however, individual resources do not automatically translate into performance without being combined through digital use. Ben Slimane et al. (2022) likewise emphasise the interaction of technological infrastructure, management and organisational change. A systematic review by Sagala and Őri (2024) reaches a similar conclusion: successful SME transformation is generally path-dependent, should begin from the firm's baseline and constraints, and requires continued investment in learning. Digital transformation is therefore better understood as a cumulative process than as a binary transition from a non-digital to a digital state.

The difference between adoption and effective use is also visible in empirical interventions. In Vietnam, a World Bank-supported programme provided SMEs with training and free access to a cloud-based enterprise resource planning platform. Initial take-up approached 80%, but usage declined markedly and was approximately 35% after 18 months (Bruhn et al., 2025). The result is important because it isolates a basic limitation of technology-first policy: reducing the purchase price, even to zero, does not remove the organisational costs of data migration, learning, process redesign and managerial attention. Where these complementary changes are not made, initial adoption may not become a durable business capability.

The relevant policy outcome is consequently not the number of technologies purchased but the development of a capacity to select, integrate and upgrade technologies over time. This capability perspective is also consistent with evidence on more advanced forms of digitalisation. Estensoro et al. (2022), analysing 354 SMEs, identify distinct stages of Industry 4.0 development with different resource requirements, while Müller et al. (2021) show that absorptive capacity influences firms' ability to translate external knowledge into innovation and business-model change. The implication is that the resources required for initial adoption differ from those required for progression to more sophisticated stages.

SME Constraints as A Cumulative Transformation Problem

Financial constraints remain an important part of the SME digitalisation problem, but the literature increasingly identifies a broader combination of market and organisational frictions. One is information asymmetry. Digital technologies are complex, change rapidly and are supplied by vendors that typically possess greater technical knowledge than SME purchasers. Smaller firms may therefore struggle to compare solutions, estimate implementation costs or determine whether a technology is appropriate for their business process. Uncertainty about technological fit can discourage investment even when funding is available.

A second constraint is managerial scarcity. Large enterprises can distribute technological transformation across specialised IT, data, cybersecurity and process-management functions, whereas smaller firms often depend heavily on owner-managers whose time is already absorbed by daily operations. The opportunity cost of evaluating technologies, redesigning processes and supervising implementation can therefore be substantial. The 2025 OECD D4SME survey reflects this overlap of constraints: SMEs reported not only hardware and maintenance costs but also a lack of time for training as significant barriers to deeper digitalisation (Bianchini & Lasheras Sancho, 2025).

A third constraint concerns complementary organisational resources. Advanced applications such as AI, integrated data systems and automation generally require data quality, compatible infrastructure, digital skills and managerial understanding. These resources are cumulative: firms that have not established reliable core systems are less able to benefit from more sophisticated technologies. Research on SMEs' progression towards Industry 4.0 consequently stresses staged implementation and different resource combinations at different levels of maturity (Estensoro et al., 2022). Evidence from Vietnam reinforces this capability argument. Hoang et al. (2025), using data from 314 manufacturing SMEs, find that digital capabilities are

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positively associated with sustainable competitive advantage and that digital absorptive capacity mediates this relationship, while digital leadership plays an important enabling role.

These constraints are mutually reinforcing. Limited expertise increases uncertainty about returns; uncertainty reduces investment; limited investment restricts experimentation and learning; and weak learning capacity subsequently makes advanced adoption more difficult. This cumulative character provides the rationale for analysing bundles of policy instruments rather than treating grants, training or advisory support as substitutes. A subsidy can reduce cost but cannot resolve poor technology selection; advice can improve selection but is of limited value if firms cannot finance implementation; and training will not generate transformation where organisational processes remain unchanged.

Digital Capability and Competitiveness

The resource-based view provides a theoretical explanation for why similar technologies generate different outcomes across firms. Competitive advantage depends not simply on resource possession but on how resources are combined and deployed (Barney, 1991). Most commercial digital technologies can be purchased by competitors and are therefore unlikely to constitute durable strategic assets in isolation. Their value depends on complementary knowledge, data, skills, managerial practices and organisational routines.

The dynamic-capabilities perspective extends this reasoning to environments characterised by rapid technological change. Teece et al. (1997) emphasise firms' capacity to integrate, build and reconfigure competencies as conditions change. This is especially relevant to digital transformation because technological adoption is recurrent rather than one-off: firms must continuously assess new solutions, learn from prior implementation and reorganise existing capabilities. Matarazzo et al. (2021) show how sensing and learning capabilities support digital transformation and customer-value creation in SMEs, while Meier et al. (2025) argue that SME competitiveness depends on the alignment of technical, organisational and cultural elements rather than digitalisation alone.

This perspective also clarifies the connection between SME digitalisation and national competitiveness. The relationship is not direct. National competitiveness is shaped by infrastructure, skills, institutions, macroeconomic conditions, innovation systems and international integration, among other factors. SME digitalisation contributes more plausibly through intermediate mechanisms. Digital systems can increase productivity by reducing administrative and transaction costs; more advanced capabilities can support product, process and business-model innovation (Bresciani et al., 2021); digital platforms and integrated systems can improve market access and supply-chain participation; and digital infrastructure can strengthen organisational resilience while simultaneously creating new cybersecurity requirements.

The analytical proposition used in this study is therefore mediated: policy instruments can lower constraints on SME transformation; lower constraints can facilitate the formation of digital capabilities; and broader capability diffusion can contribute to productivity, innovation, scaling and resilience. Singapore is examined through this sequence. The central question is not how many programmes the government has created, but whether the architecture of those programmes corresponds to the constraints and capability stages identified in the literature.

This mediated view also guards against an overly deterministic treatment of technology. Digitalisation can generate uneven outcomes because firms differ in sector, size, strategic orientation and access to complementary resources. The same technology can reduce costs in one firm, remain underused in another and support business-model innovation in a third. For this reason, recent work increasingly treats digital competitiveness as an alignment problem rather than a simple function of technological intensity (Meier et al., 2025). At the national level, the implication is equally important: a high average rate of technology adoption may coexist with substantial differences in productive capability across the enterprise population. A policy framework concerned with competitiveness should therefore pay attention to the distribution and depth of capabilities, not only aggregate uptake. This perspective is especially relevant to economies seeking stronger domestic linkages with multinational firms, because participation in more sophisticated value chains often requires integrated operational, data and security capabilities rather than isolated digital tools.

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From Market Failure to Capability-Building Policy

The case for public intervention in SME digitalisation can be understood through a combination of market-failure and capability arguments. From a conventional market-failure perspective, information asymmetry may lead SMEs to underinvest because they cannot accurately assess the quality of technology suppliers or expected returns. Financing constraints can further restrict investments whose benefits are uncertain or realised only after complementary organisational changes. Digital investments may also generate positive spillovers when better-connected suppliers improve coordination within production networks or when the diffusion of digital standards raises the efficiency of entire sectors. These conditions create a rationale for policy instruments such as information provision, certification, co-financing and common digital infrastructure.

A market-failure framework, however, is insufficient to explain why adoption may remain ineffective after information and financing constraints are reduced. The capability literature suggests that firms do not simply choose from a menu of known technologies; they learn what technologies mean for their own operations through experimentation, implementation and organisational adaptation. This process is especially difficult for SMEs because the knowledge required for transformation is often tacit and context-specific. A firm may know that an ERP system is potentially useful yet still lack the ability to redesign procurement, inventory and accounting routines around it. In such cases, the relevant policy problem is not only underinvestment but weak absorptive and implementation capacity.

This distinction changes the expected role of government. Instead of limiting intervention to lowering prices, policy can reduce the fixed costs of learning by pooling information, organising sector-specific knowledge and making specialised advisory capabilities accessible to firms that cannot efficiently internalise them. Sector roadmaps, diagnostic tools and shared technology expertise can therefore be interpreted as capability-building institutions. They do not substitute for firm-level learning, but they can reduce the cost of entering that learning process and improve the probability that technology is aligned with an economically meaningful business problem.

The argument also implies that policy additionality should vary by maturity. For firms at very low levels of digitalisation, relatively standardised support may have high additionality because basic technologies can address clear administrative inefficiencies and the main barriers are often awareness, information and cost. For firms at more advanced stages, blanket subsidies become less defensible because commercially viable businesses may invest without public assistance. The relevant market failure increasingly concerns uncertainty, coordination and specialised knowledge. Advisory support, experimentation facilities, interoperability standards or co-investment in capability development may therefore be more appropriate than repeated subsidies for commercially available tools.

A further implication concerns the sequencing of instruments. If a subsidy is offered before a firm has identified a business problem, the intervention risks encouraging technology-led adoption. If training is provided without a concrete implementation project, knowledge may remain detached from organisational change. If advisory support identifies a valuable investment but financing is unavailable, the project may not proceed. Policy effectiveness consequently depends not only on the design of individual instruments but on their temporal and functional coordination. This provides the conceptual basis for examining Singapore as an architecture of intervention rather than a catalogue of programmes.

The analytical framework used below therefore combines two perspectives. The first concerns the constraint addressed by policy: information, finance, implementation, skills or security. The second concerns the maturity of the firm and the capability expected to emerge from intervention. This dual perspective makes it possible to distinguish between policies that facilitate initial adoption and those that support deeper integration. It also provides a basis for assessing transferability to Vietnam, where the challenge is not simply to expand the reach of digital support but to ensure that different forms of assistance correspond to firms' actual transformation needs.

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METHODOLOGY

The study adopts an explanatory qualitative case-study design combined with structured policy analysis. Singapore is selected as the principal case because it has developed a relatively mature and explicitly articulated system of SME digitalisation support over an extended period. Vietnam is treated as the policy-transfer context rather than as a symmetrical comparative case because its dedicated 2026–2030 SME Digital Transformation Scheme is too recent for meaningful outcome evaluation. The design therefore focuses on policy mechanisms, implementation logic and transferability rather than causal estimates of programme impact.

The evidence base combines three groups of sources. First, peer-reviewed research is used to establish theoretical and empirical findings concerning digital transformation, SME constraints, absorptive capacity, dynamic capabilities and competitive performance. Recent work published primarily from 2019 onward is combined with foundational contributions to the resource-based and dynamic-capabilities perspectives. Second, the Singapore case is reconstructed from primary policy, programme and statistical materials issued by the Infocomm Media Development Authority (IMDA), Enterprise Singapore and the Ministry of Digital Development and Information. Third, the Vietnam analysis draws on national policy documents, OECD assessments and World Bank research, with particular attention to Decision No. 433/QĐ-TTg and the OECD's 2026 FDI Qualities Review of Viet Nam. The core documentary corpus comprises 15 policy, programme, statistical and institutional analytical sources; peer-reviewed studies are used as contextual and theoretical evidence rather than coded as programme documents. The documentary corpus and its analytical role are listed in Supplementary Appendix A. Documents were included when they provided direct evidence on SME digitalisation instruments, programme design or delivery, enterprise adoption, implementation constraints, or capability-related outcomes in Singapore or Vietnam. General promotional materials without substantive programme, statistical or implementation information were excluded.

The documents were analysed using a structured thematic coding framework. Evidence was coded along four dimensions: (1) the dominant constraint addressed—technological search and information asymmetry, financing and investment risk, implementation capability, workforce capability, or cybersecurity; (2) the policy function performed; (3) the stage of digital maturity at which the instrument is intended to operate; and (4) the capability or outcome that the intervention is expected to support. Coding was applied to substantive passages describing programme objectives, eligibility, delivery mechanisms, implementation support, adoption indicators and reported outcomes. This procedure permits the analysis to identify functional complementarities among instruments while distinguishing intended policy design from evidence of actual implementation or firm-level outcomes.

To improve auditability, Supplementary Appendix A records each coded documentary source, publication date, re-verification date, inclusion rationale, relevant section or source location, and analytical role, and provides worked coding examples. Institutional sources were re-verified on 6 October 2026; where the original retrieval date had not been retained in the research notes, the re-verification date is reported transparently rather than reconstructed retrospectively. Contradictory evidence was not reconciled into a single account: for example, high aggregate adoption rates were coded as evidence of diffusion, whereas persistent AI gaps and declining post-adoption ERP use were coded separately as evidence concerning depth and persistence. Official programme descriptions are therefore treated as evidence of policy intent and reported reach, not as independent proof of implementation quality or causal impact.

For Vietnam, transferability is assessed by policy function rather than institutional form. This distinction is necessary because Singapore is a city-state with a smaller and more concentrated enterprise population, higher income, dense digital infrastructure and strong administrative capacity. Direct institutional replication would therefore be inappropriate. The analysis instead asks whether the underlying functions: reducing search costs, structuring technology markets, sharing adoption risk, supplying advisory capacity and linking digitalisation to upgrading, address problems that are also observable in Vietnam. Transferability is treated as a design question rather than evidence that Singaporean delivery arrangements would perform similarly under Vietnamese institutional conditions.

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The approach has limitations. It does not isolate the causal effect of individual Singaporean programmes on productivity or national competitiveness; official programme outcomes are therefore interpreted as evidence of reach, diffusion and policy evolution rather than causal impact. Nor does the mapping of instruments demonstrate that firms routinely progress from one programme to another, that agencies systematically coordinate referrals, or that combined assistance produces superior outcomes. Reliance on implementing agencies' publications also creates a risk of reproducing official policy narratives, which is mitigated through triangulation with enterprise statistics, OECD and World Bank assessments, and peer-reviewed research. In addition, the recent adoption of Vietnam's 2026–2030 Scheme means that the discussion concerns implementation design and risk rather than realised programme outcomes. These limitations are addressed by distinguishing policy intentions, implementation evidence, adoption outcomes and demonstrated economic effects throughout the analysis.

RESULTS

Singapore has Developed a Complementary Digitalisation Policy Architecture

The analysis shows that Singapore's SME digitalisation policy contains a progressively layered set of instruments addressing different points of friction in the transformation process. The policy design does not rely on financing alone. Industry Digital Plans (IDPs) address uncertainty about what technologies are relevant by translating digitalisation into sector-specific pathways linked to business challenges and stages of development. In 2024, CTO-as-a-Service provided access to IDPs covering 22 industry sectors (IMDA, 2025b). Their policy significance lies in reducing search costs and in making the business problem, rather than the technology itself, the starting point for intervention. This functional mapping indicates complementarity in policy design; it does not by itself demonstrate that individual firms move sequentially across programmes or that agencies coordinate delivery around a common case-management process.

Pre-approved solutions address a related market failure. SMEs frequently have limited capacity to evaluate vendors, implementation requirements and technical reliability. Singapore's framework partially transfers this due-diligence burden to the support system while retaining private provision and firm choice. More than 400,000 users accessed CTO-as-a-Service in 2024, where they could compare more than 300 pre-approved, market-tested solutions; around 30% of these were AI-enabled, up from 20% in 2023 (IMDA, 2025b). The system therefore operates not only as an information service but also as a form of market intermediation.

The Productivity Solutions Grant (PSG) addresses a different constraint by reducing part of the upfront investment risk. Eligible local SMEs can receive support of up to 50% of qualifying costs, up to S$30,000, for pre-approved sector-specific and generic productivity solutions (Enterprise Singapore, 2026). In design terms, the PSG can complement technology verification because co-financing is applied to a market in which some of the information problem has already been reduced. This differs from an unrestricted technology subsidy. However, the documentary evidence reviewed here does not establish how frequently firms move from verification or diagnosis into PSG-supported adoption, and the relationship is therefore interpreted as functional complementarity rather than demonstrated programme integration.

CTO-as-a-Service extends the framework into implementation capability. A large enterprise can maintain specialised technology functions internally; a small firm often cannot. By offering diagnostics, solution discovery and routes to consultancy, the platform provides access to a form of shared expertise that would otherwise involve a high fixed cost. This is particularly relevant in light of the Vietnamese ERP evidence, where free technology and training generated strong initial use but much weaker persistence (Bruhn et al., 2025). The comparison suggests that the binding constraint can move from affordability to organisational absorption once a purchase decision has been made.

More recent Singaporean initiatives address still later stages of transformation. The Digital Leaders Programme supports enterprises in building internal digital teams, roadmaps and emerging-technology projects, while the Digital Enterprise Blueprint introduced in 2024 organises support around four objectives: becoming smarter through AI, scaling faster through integrated solutions, becoming safer through cyber resilience, and upgrading workers' capabilities (MDDI, 2024). In 2026, the National AI Impact Programme

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added a further layer by targeting 10,000 enterprises over three years for deeper AI adoption (IMDA, 2026). Table 1 summarises how this set of instruments maps onto distinct transformation constraints.

Table 1. Singapore's SME digitalisation instruments and complementary policy functions

Policy instrument	Primary constraint addressed	Policy function / capability supported	Selected evidence
Industry Digital Plans	Search cost; uncertainty over technological fit	Sector-specific sequencing of digital solutions	IDPs accessible for 22 sectors in 2024
Pre-approved digital solutions	Information asymmetry; vendor risk	Market verification and lower due-diligence cost	Over 300 solutions on CTO-as-a-Service in 2024; 30% AI-enabled
Productivity Solutions Grant	Upfront cost and investment risk	Co-financing of productivity-enhancing adoption	Up to 50% of eligible costs; up to S$30,000 for local SMEs
CTO-as-a-Service	Lack of specialised technology expertise	Diagnostics, solution discovery and access to advisory support	More than 400,000 users in 2024
Digital Leaders Programme	Weak internal transformation capability	Roadmaps, internal digital teams and advanced projects	Targets firms seeking deeper transformation
Digital Enterprise Blueprint	Need for integration, AI, skills and cyber resilience	Moves support from basic adoption towards deeper capability	Four focus areas: Be Smarter, Scale Faster, Be Safer, Upskill Workers
National AI Impact Programme	Gap in advanced AI capability	Supports deeper enterprise AI adoption	Target: 10,000 enterprises over three years from 2026

Note. Compiled by the author from IMDA (2025b, 2026), MDDI (2024) and Enterprise Singapore (2026).

Broad Diffusion Has Not Eliminated Differences in Digital Depth

Singapore's enterprise statistics reveal a clear distinction between breadth and depth of digitalisation. By 2024, basic adoption was close to saturation: 95.1% of SMEs had adopted at least one of six measured digital areas, compared with 94.5% in 2023. The more revealing changes occurred in intensity and sector-specific use. SMEs adopted an average of 2.3 digital areas in 2024, up from 2.0, while 97% adopted at least one sector-specific digital solution, compared with 85% a year earlier (IMDA, 2025a). Table 2 presents the principal indicators on a consistent 2023–2024 basis.

The AI figures expose a deeper firm-size divide. SME AI adoption more than tripled from 4.2% to 14.5% in one year, but non-SME adoption rose from an already much higher base of 44.0% to 62.5% (IMDA, 2025a). The gap in 2024 was therefore 48 percentage points. This adoption gap should not be interpreted as a direct measure of dynamic capability or competitive performance. Differences may also reflect sector composition, firm size, business needs, expected returns and the relevance of AI to particular activities. Nevertheless, the

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pattern is consistent with the proposition that more advanced applications tend to require complementary organisational and technical resources. Moreover, AI-using SMEs applied AI across an average of three business functions, compared with five among non-SMEs, indicating a difference in the breadth of use as well as the adoption rate. Figure 1 visualises this divergence. The growth of SME AI use is substantial and indicates rapid diffusion, yet the distance from larger firms remains large. The figure should therefore be read as descriptive evidence of uneven adoption depth rather than as a direct indicator of firm capability. IMDA's own survey evidence is revealing in this respect: AI-using firms identified workforce upskilling, job redesign and stronger IT and data infrastructure as among the main actions required to deepen adoption over the following one to two years (IMDA, 2025a). This evidence supports the interpretation that, even among adopters, deeper use requires complementary organisational and technical changes.

Historical evidence also supports the interpretation that the policy problem has changed over time. SME technology adoption rose from approximately 74% in 2018 to 94% in 2022, while adoption intensity increased from 1.7 to 2.1 technologies over the same period (IMDA, 2023). The subsequent move towards integrated solutions, AI, cybersecurity and workforce capability can therefore be understood as a response to the success of earlier diffusion policy. Once the majority of firms have crossed a minimum threshold, further competitiveness gains depend increasingly on how technologies are combined and used rather than on whether firms possess any digital technology at all.

Table 2. Selected indicators of enterprise digitalisation in Singapore, 2023–2024

Indicator	2023	2024	Change
SMEs adopting at least one measured digital area	94.5%	95.1%	+0.6 percentage points
Average digital areas adopted per SME (out of six)	2.0	2.3	+0.3
SMEs using at least one sector-specific digital solution	85%	97%	+12 percentage points
SME AI adoption	4.2%	14.5%	+10.3 percentage points
Non-SME AI adoption	44.0%	62.5%	+18.5 percentage points

Source: IMDA (2025a). The table uses the 2023–2024 measures reported on a consistent basis in the Singapore Digital Economy Report 2025.

Table 3. Selected chronology of Singapore's SME digitalisation policy evolution

Year	Policy development / evidence	Analytical significance
2017	Launch of SMEs Go Digital	Establishes a dedicated framework for broad SME digital adoption.
2018–2022	SME technology adoption rises from about 74% to 94%; average adoption intensity from 1.7 to 2.1	Shows broad diffusion and provides context for a later focus on depth rather than initial access.
2024	Digital Enterprise Blueprint launched	Places greater emphasis on AI, integrated solutions, cyber resilience and workforce capability.

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2025	CTO-as-a-Service and SME support strengthened; 95.1% of SMEs adopt at least one measured digital area	Policy emphasis increasingly includes solution matching, implementation support and safer digital use.
2026	National AI Impact Programme launched	Adds a targeted layer for deeper AI adoption among enterprises.

Note. The chronology summarises policy evolution and adoption context; it does not establish firm-level transitions between programmes or causal programme effects.

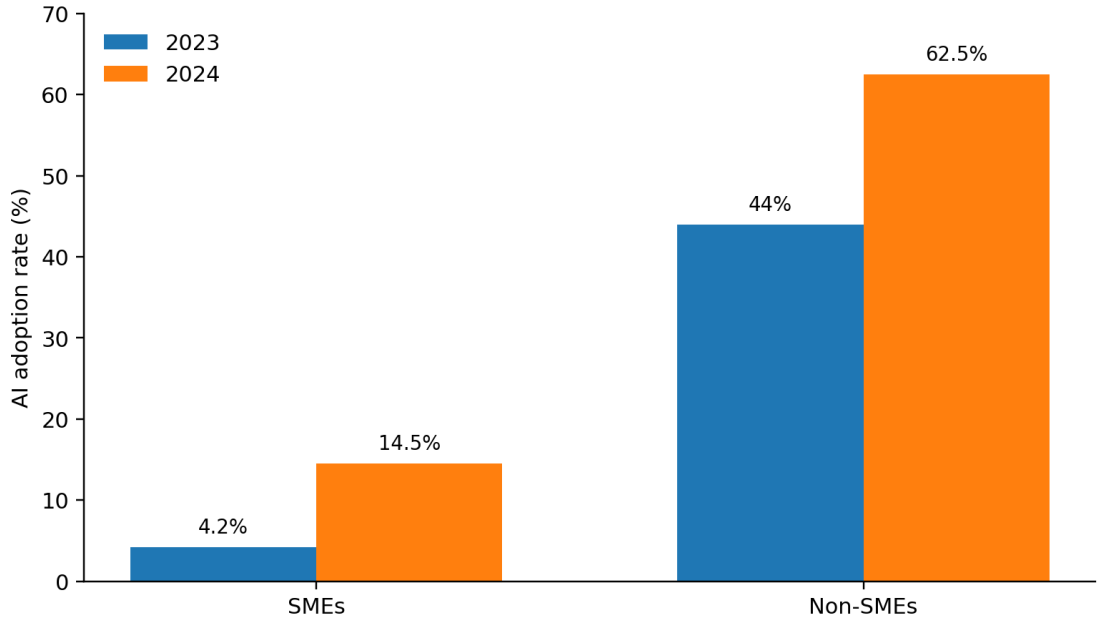


Figure 1. AI adoption among SMEs and non-SMEs in Singapore, 2023-2024

Source: Author's visualisation based on IMDA (2025a).

Policy design has shifted from access towards absorption

Taken together, the programme architecture and adoption data are consistent with a policy-design shift from access towards absorption. SMEs Go Digital initially addressed the difficulties SMEs faced in beginning digitalisation; newer instruments increasingly target the capacity to integrate technologies into business systems and to respond to a changing technological frontier. This is visible in the movement from sector roadmaps and pre-approved solutions towards integrated solutions, AI, cyber resilience and internal digital leadership. The chronology summarised in Table 3 supports this interpretation at the level of policy design. It does not demonstrate that individual firms progress sequentially between programmes, that agencies operate shared assessments or referral systems, or that combined assistance causes improved capabilities. The shift is economically significant because Singapore's digital economy is increasingly generated outside the core technology sector. In 2024, the digital economy reached S$128.1 billion, equivalent to 18.6% of GDP, up from 14.9% in 2019. More than two-thirds of digital-economy value added came from digitalisation in non-information and communications sectors, with finance and insurance, wholesale trade and manufacturing among the major contributors (IMDA, 2025a). This does not demonstrate that SME programmes caused aggregate digital-economy growth. It does, however, establish the context in which enterprise-level diffusion matters: digital value creation is no longer confined to technology producers.

The relevance of SME policy therefore lies partly in technological diffusion across conventional sectors. SMEs account for around two-thirds of Singapore's workforce and nearly half of GDP (IMDA, n.d.). Their ability to absorb technology affects the extent to which the productivity and organisational benefits of

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digitalisation spread beyond large firms and multinational enterprises. The policy architecture can thus be interpreted as an attempt to reduce the distance between technological possibilities at the frontier and the absorptive capacity of a broad domestic business base. This interpretation also places cybersecurity within the competitiveness argument. Greater digital integration may improve efficiency and adaptability but also increases dependence on connected systems. Singapore's 2025 SME initiatives consequently combined digitalisation support with measures to strengthen cyber protection for tens of thousands of SMEs (IMDA, 2025b). The objective is not merely more technology but more reliable use of technology. In capability terms, resilience is part of productive digitalisation rather than a separate regulatory concern.

DISCUSSION AND IMPLICATIONS FOR VIETNAM

The Singapore case suggests that SME digitalisation policy can be understood as a set of complementary responses to a cumulative transformation problem. The principal insight is not that one particular grant, roadmap or platform is superior, nor that the programmes have been demonstrated to operate as a seamless delivery system, but that different interventions correspond to different constraints. Search and information problems dominate some initial decisions; financing may become binding once an appropriate investment is identified; implementation capability becomes critical when technology must be incorporated into daily operations; and complementary skills, data and organisational routines become increasingly important as firms move towards integrated systems and AI. The competitiveness value of this policy design therefore lies in its potential to support progression rather than simply maximise entry into digital adoption.

This interpretation is relevant to Vietnam because Decision No. 433/QĐ-TTg already recognises many of the same policy functions. The Scheme calls for support to reflect firms' needs, size, digital readiness and sectoral characteristics; it envisages digital-transformation roadmaps, a consultant network and mechanisms for selecting and publicising digital and AI solutions; and it links transformation with productivity and value-chain participation (Government of Vietnam, 2026). The main implementation risk may therefore lie less in the stated objectives of the Scheme than in whether these functions can be coordinated effectively in practice. Evidence on actual delivery arrangements remains limited because the Scheme is recent, and the present study does not establish the extent of provincial variation, advisory capacity, financing bottlenecks or vendor-market quality. Implementation coherence is therefore treated here as a testable policy proposition rather than an established empirical gap.

Table 4. Transferability matrix for SME digitalisation policy functions in Vietnam

Policy function	**Existing arrangement / basis**	**Implementation gap or uncertainty**	**Potential responsible actor**	**Resource requirement**	**Principal risk**
Readiness assessment	Decision No. 433 provides for readiness-sensitive support and roadmaps.	Consistency of diagnostic tools and follow-through is not yet established.	Lead implementing ministry/agency and provincial delivery bodies.	Diagnostic tools; trained assessors; common data standards.	Administrative burden; uneven provincial capacity.
Technology verification	Decision No. 433 provides a basis for selecting and publicising digital and AI solutions.	Quality assurance, interoperability and vendor-support criteria require operational detail.	Lead implementing agency with technical experts and independent assessors.	Technical evaluation capacity; transparent criteria; periodic review.	Vendor capture; lock-in; weak competition.
Co-financing	Existing SME	How finance	Relevant SME-	Budget; risk-	Subsidy

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	support instruments provide a basis for financial assistance.	will connect to diagnosis and implementation support is not yet clear.	finance agencies and participating financial institutions.	sharing rules; simple application procedures.	dependence; deadweight support.
Advisory / implementation support	Decision No. 433 envisages a national consultant network.	Depth, sector expertise and geographic coverage of advisory capacity remain uncertain.	National consultant network and provincial implementation partners.	Consultant accreditation; sector expertise; follow-up capacity.	Variable service quality; exclusion of microenterprises.
Management and workforce capability	Training and capability support are included in the Scheme.	Training may remain detached from live implementation projects.	Training providers, consultants and enterprise-support bodies.	Practice-based curricula; manager time; sector-specific modules.	Low participation; weak transfer into organisational change.
Supplier upgrading and evaluation	The Scheme links digital transformation to productivity and value-chain participation.	Baseline, follow-up and buyer-linked metrics are not yet demonstrated.	Implementing agencies working with industry associations and anchor firms.	Baseline data; 12/24-month follow-up; buyer requirements.	Reporting burden; focus on reach rather than outcomes.

Note. The matrix distinguishes existing policy intent from implementation arrangements that remain to be demonstrated. “Potential responsible actor” identifies a functional locus rather than asserting a final administrative assignment where implementation details are still evolving.

The first implication is therefore organisational: where feasible, support could be structured so that firms experience it as a pathway rather than as a menu of disconnected programmes. A readiness assessment could identify a concrete business problem and a plausible next stage of digital development. Firms could then be connected to verified solutions, appropriate financing and, where transformation is complex, implementation support and follow-up. This does not require Vietnam to reproduce CTO-as-a-Service institutionally, nor does the Singapore evidence prove that such referrals currently occur systematically. The transferable element is the policy function of reducing the coordination costs that SMEs face when navigating technology markets and public support.

The second implication concerns differentiation. Vietnam’s SME sector is substantially larger and more heterogeneous than Singapore’s. A micro-enterprise moving from manual bookkeeping to electronic accounting faces a different transformation problem from a medium-sized manufacturing supplier seeking to integrate production data with a multinational customer. A uniform subsidy structure risks over-supporting basic adoption among firms that would invest anyway while under-supporting the organisational changes required by more advanced firms. Sector-specific and maturity-sensitive pathways would allow the type of intervention to change as the firm progresses.

For foundational firms, the policy priority may be standardised, low-complexity solutions that reduce administrative costs and establish reliable digital records. At intermediate stages, the challenge becomes integration across functions such as inventory, customer management, human resources and production. At

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more advanced stages, grants for individual software products are likely to have lower additionality than specialised advisory support, talent development, data infrastructure or co-investment in experimentation. This staged logic is supported by research showing that the resources required to progress through Industry 4.0 differ by maturity level (Estensoro et al., 2022), and by Vietnamese evidence demonstrating the importance of absorptive capacity and digital leadership for competitive outcomes (Hoang et al., 2025).

The third implication is to treat technology verification as a market-shaping mechanism. Decision No. 433 already provides a basis for selecting and publishing digital products and platforms. The Singapore case suggests that the value of such a mechanism lies not merely in determining grant eligibility but in reducing information asymmetry. A credible verification system should therefore assess characteristics that matter to implementation: technical reliability, interoperability, cybersecurity, data portability, pricing transparency and provider support capacity. The purpose is not to select technological winners but to create a trusted market in which SMEs can make choices with lower due-diligence costs.

This becomes particularly important when public subsidies expand. Where grants increase firms' purchasing power but quality control is weak, incentives can shift towards supplier-driven adoption. Firms may acquire software that satisfies programme requirements but is poorly aligned with business processes. The Vietnamese ERP experiment offers a warning: strong initial take-up did not translate into sustained use even when the technology was free (Bruhn et al., 2025). Financial support should therefore be embedded in diagnosis and implementation rather than treated as proof that transformation has occurred.

The fourth implication concerns management capability. Digital-skills programmes often focus on employees' technical proficiency, but in SMEs owner-managers determine the allocation of investment, the redesign of workflows and whether employees are given the time and resources required for learning. The literature consistently identifies leadership, strategic alignment and organisational learning as central to successful transformation (Eller et al., 2020; Ben Slimane et al., 2022; Sagala & Őri, 2024). The findings of Hoang et al. (2025) are especially relevant in the Vietnamese context: digital absorptive capacity mediates the relationship between digital capabilities and sustainable competitive advantage, while digital leadership has an enabling role. Management training should therefore move beyond general awareness to include technology-investment assessment, process redesign, vendor management, data governance and cybersecurity.

The fifth implication is to connect SME digitalisation more directly to Vietnam's industrial and FDI upgrading agenda. This connection is critical if digitalisation is to be justified as national competitiveness policy rather than only as enterprise modernisation. The OECD's 2026 FDI Qualities Review shows that digital greenfield FDI accounted for 45% of Vietnam's total greenfield FDI inflows in 2023, compared with 24% over the preceding decade. The same review identifies the continuing weakness of digital capabilities and linkages among domestic firms as constraints on the wider benefits of foreign investment (OECD, 2026). Vietnam therefore faces a structural asymmetry: highly digital foreign investment can expand rapidly while domestic supplier capabilities remain uneven.

Targeted SME digitalisation can help narrow this gap if it is linked to concrete value-chain requirements. In selected manufacturing and service sectors, support could prioritise technologies and organisational standards demanded by larger buyers, including electronic procurement, production traceability, digital quality management, ERP integration, cybersecurity compliance and data exchange. The policy logic would then be market-facing: firms digitalise not to satisfy an abstract transformation target but to qualify for more sophisticated customers and production networks. Such an approach is consistent with Decision No. 433's explicit objective of strengthening SME participation in regional and global value chains.

Transferability also involves implementation risks that are more pronounced in Vietnam's larger and more heterogeneous enterprise environment. Technology-verification and subsidy mechanisms can create vendor capture if providers influence solution selection; repeated grants can generate subsidy dependence where commercially viable investments would otherwise occur; complex application and reporting requirements can exclude microenterprises with limited administrative capacity; and uneven provincial capability can

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produce substantial variation in programme quality. These risks reinforce the need to pilot and evaluate a small number of functions before assuming that a nationally coherent pathway can be delivered at scale.

The final implication concerns evaluation. Numerical targets such as the 500,000 SMEs to be supported under Decision No. 433 are necessary for programme accountability, but they measure reach rather than transformation. Singapore's own experience illustrates the limitation of binary indicators. A 95.1% adoption rate can coexist with a 48-percentage-point SME/non-SME gap in AI adoption, although that gap should not itself be treated as a direct measure of capability. For Vietnam, firms receiving training, firms purchasing technology, firms still using that technology after two years and firms achieving measurable productivity improvements should therefore not be treated as equivalent outcomes.

A more informative evaluation architecture would distinguish programme reach, implementation, persistence and economic effect. A pre-intervention baseline should record the firm's digital maturity, relevant business process, employment and selected performance indicators at the point of assessment. Immediate indicators could then record diagnosis, participation and adoption; follow-up at 12 and 24 months could examine continued use, integration across business functions and progression in digital maturity. Where data quality permits, economic outcomes could include reductions in processing time or operating cost, productivity changes, export activity, digital revenue or qualification for supplier relationships. The objective is not to impose heavy reporting requirements on small firms, but to prevent programme delivery from being mistaken for capability formation. These implications also highlight the limits of policy transfer. Singapore's administrative concentration, infrastructure and technology-provider market cannot be reproduced directly in Vietnam. Yet the underlying functions may be transferable: reducing search costs, improving trust in technology markets, sharing investment risk, supplying advisory capacity, differentiating support by maturity and tying advanced digitalisation to market opportunities. The lesson is therefore one of policy logic rather than institutional imitation.

CONCLUSION

Singapore's experience shows that SME digitalisation policy changes character as basic technological adoption becomes widespread. Early interventions can lower entry barriers, but deeper competitiveness effects depend increasingly on firms' capacity to integrate, learn from and continuously upgrade digital resources. The case therefore supports a shift from measuring digitalisation primarily through adoption towards analysing capability formation, while the evidence does not establish the causal contribution of individual programmes or seamless progression between them. For Vietnam, Decision No. 433/QĐ-TTg provides a timely foundation for this transition. Its effectiveness will depend on whether sector- and maturity-sensitive support, technology verification, financing and advisory services can be coordinated into a coherent delivery pathway and whether digital upgrading is connected to productivity and value-chain opportunities. Future research should evaluate these mechanisms as implementation data become available, particularly their effects on sustained technology use, productivity and domestic supplier upgrading, and should examine variation across provinces, firm sizes and sectors.

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