

IMPACT OF DIGITAL FDI ON THAILAND'S ECONOMIC TRANSFORMATION: MODERATING EFFECTS OF TECHNOLOGY SPILLOVERS AND SKILLS MISMATCH*

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Abstract

As the global economy transitions into the Web 3.0 era, digital Foreign Direct Investment (FDI) has emerged as a critical catalyst for economic transformation in developing nations. This study examines how digital FDI influences Thailand's economic transformation, with particular attention to the moderating roles of technology spillovers and skills mismatch. Employing a quantitative research design, we collected 150 valid questionnaire responses from professionals in Thailand's technology and industrial sectors. Hierarchical regression analysis

Reveals that digital FDI exerts a significant positive effect on economic transformation ($\beta = 0.430$, $p < 0.001$). Technology spillover demonstrates a significant positive moderating effect, indicating that local absorptive capacity is essential for maximizing the benefits of digital FDI. While skills mismatch did not exhibit a significant moderating effect, it displays a potent direct negative

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influence ($\beta = -0.400$, $p < 0.001$) on transformation, functioning as a structural barrier. These findings suggest that Thailand must prioritize human capital investment to translate foreign “hard investment” into endogenous “soft power,” thereby achieving a fundamental leap in its economic paradigm.

Keywords: Digital FDI, Middle-income trap, Technology spillover, Skills mismatch, Thailand

Introduction

The digital revolution—centered on Artificial Intelligence (AI) and Cloud Computing—is fundamentally reshaping the global economic landscape. As the global economy fully transitions into the Web 3.0 era, digital technology has evolved from a supplementary informative tool to a core factor of production, comparable to electricity or land in the industrial age. Major economies have increasingly regarded digital infrastructure as a strategic moat for national competitiveness, from China’s “Digital China” strategy to the U.S. CHIPS Act and massive AI infrastructure initiatives.

Thailand, as Southeast Asia’s second-largest economy, stands at a pivotal juncture as traditional economic momentum wanes. Historically, Thailand established a growth model propelled by a “trinity” of tourism, agriculture, and low-end manufacturing. However, this resource-driven paradigm has revealed inherent fragility in the digital age, marked by extreme sensitivity to exogenous factors such as climate, geopolitics, and fluctuations in global demand.

Between 2025 and 2026, Thailand confronted multiple external shocks, including sharp currency fluctuations and a contraction in manufacturing exports. The Thai Baht surged to a four-year high against the US Dollar, eroding the price advantages of Thai exports and tourism products (Bank of Thailand, 2025). Simultaneously, the aggressive surge in agricultural exports from neighboring competitors—Vietnam, Cambodia, and Myanmar—has directly eroded

Thailand's market share. In manufacturing, Thailand's Manufacturing Production Index (MPI) contracted for three consecutive quarters during the first half of 2025, with the average peak decline reaching 1.9% (Office of Industrial Economics [OIE], 2025).

Tourism, which contributes approximately 20% of GDP, has also faced significant headwinds. Foreign tourist arrivals reached 32.9 million in 2025, representing a 7.23% year-over-year decline. Chinese tourist arrivals plummeted by 33.55%, driven by negative security perceptions stemming from regional telecommunications fraud (Kasikorn Research Center, 2025). These converging pressures have created what can be termed a “geo-economic pincer”—losing the cost-war at the bottom to Vietnam and Bangladesh while failing to gain a foothold in precision innovation at the top against Singapore and Malaysia.

The concept of the Middle-Income Trap (MIT), originally introduced by Gill and Kharas (2007), describes a developmental phenomenon in which nations, upon attaining middle-income status, experience protracted stagnation due to their inability to effect a fundamental paradigm shift. Thailand's per capita GNI currently hovers around the \$7,500 threshold, placing it squarely within this trap (World Bank, 2024). The World Bank's World Development Report 2024 underscored that over 100 nations remain entrenched in this developmental quagmire.

To circumvent this trap, the Thai government has aggressively courted hyper-scale Digital FDI from global tech giants such as Google and ByteDance. These investments encompass data centers, cloud computing infrastructure, and AI research and development facilities. The strategic logic is clear: leveraging external technological drivers to reshape the internal economic landscape, transitioning from “labor-intensive” processes to “digital intelligent manufacturing.”

However, a critical question remains: Can digital FDI alone catalyze economic transformation, or are there boundary conditions that determine its efficacy? This study addresses this gap by examining two critical moderating factors: technology spillovers, which may amplify FDI benefits, and skills mismatch, which may constrain them.

Objectives

- 1) to deconstruct the digital catalysts behind growth bottlenecks in traditional industries;
- 2) to evaluate the restructuring role of digital FDI in industrial patterns through technology spillover effects; and
- 3) to explore the “human capital fortress” amidst structural constraints of an aging population and skills mismatch.

Hypotheses

Building upon the Eclectic Paradigm (OLI Model), Technology Spillover Theory, Absorptive Capacity Theory, and Skill-Biased Technological Change (SBTC) theory, we propose:

- H1: Digital FDI exerts a significant positive influence on the digital transformation of traditional industries.
- H2: Technology spillover plays a significant positive moderating role in the process of Digital FDI-driven digital transformation.
- H3: Skills mismatch plays a significant negative moderating role in the process of Digital FDI-driven digital transformation.

Literature Review

1. Digital Economy as a Growth Driver: From Solow Paradox to Endogenous Growth

The scholarly discourse on how digital technology propels economic growth has evolved from treating technology as an “exogenous variable” to recognizing it as a “General Purpose Technology (GPT),” and ultimately to its current status as a fundamental factor of production.

Solow’s (1956) neoclassical framework initially conceptualized technology as an exogenous variable, “manna from heaven,” assuming automatic productivity gains from technology adoption. However, the “Solow Paradox” emerged when massive IT capital injection failed to produce corresponding macroeconomic productivity growth. Brynjolfsson (1993) identified four explanations: measurement errors in capturing intangible digital benefits; time lags requiring organizational recalibration; redistribution effects rather than aggregate growth; and mismanagement when digital tools are applied to obsolete workflows.

For Thailand, this paradox serves as a critical heuristic: the mere physical presence of high-tier technology (e.g., Google Cloud Region) does not guarantee economic dividends. If domestic industrial architecture, managerial paradigms, and labor proficiency fail to evolve in tandem, Thailand risks a “Southeast Asian iteration of the Solow Paradox.”

Endogenous Growth Theory, pioneered by Romer (1990) and Lucas (1988), reclassified technological progress as a deliberate outcome of internal investments. Romer introduced the concept that non-rivalry digital technologies can be utilized infinitely at near-zero marginal cost, enabling increasing returns to scale. Lucas emphasized human capital as the cardinal driver, generating positive externalities across the economic landscape. These frameworks illuminate Thailand’s primary “pain point”: the divergence between infrastructure and intellect. Without commensurate human capital accumulation, the endogenous growth engine remains dormant.

2. The Middle-Income Trap and Digital Transformation Pathways

The Middle-Income Trap manifests through a “Double Squeeze” effect: downward pressure from eroding cost advantages as wages rise, and upward bottlenecks from technological innovation deficits. Since 1990, only 34 economies globally have successfully crossed the high-income threshold, with the “East Asian Tigers” providing the primary empirical blueprint through their shift from “Factor-Driven” to “Innovation-Driven” growth.

Dani Rodrik’s (2016) concept of “Premature Deindustrialization” is particularly relevant: emerging economies experience manufacturing decline at lower per capita income levels than historically observed, depriving them of the primary vehicle for technological catch-up. Eichengreen et al. (2013) warned that excessive reliance on low-skill, labor-intensive services risks creating a “Service Sector Trap.”

Two strategic pathways for escaping the MIT are identified: (1) The Smiling Curve (Shih, 1992), advocating movement from low-margin manufacturing toward high-value R&D/Design and Branding/Services; and (2) The Leapfrogging Strategy (Perez & Soete, 1988), where latecomer economies bypass traditional stages by directly adopting the latest GPTs such as AI and Cloud Computing. Digital FDI provides the technological substrate for Thailand to execute a “Dual-Track Upgrade”—moving up the Smiling Curve while creating leapfrogging opportunities.

3. Technology Spillover Effects of FDI

FDI serves as a critical institutional gateway for developing economies to acquire cutting-edge technologies and managerial expertise. Three primary spillover mechanisms are identified:

Demonstration Effect: Local enterprises mitigate innovation costs by observing and emulating MNC operational architectures. This “learning-by-observing” enables rapid alignment with international digital standards.

Labor Turnover Effect: Technical professionals trained within foreign digital ecosystems serve as “living carriers of knowledge,” transferring competencies and raising awareness of digital economy requirements when they transition to local firms or launch startups.

Competition Effect: The entry of digital-intensive foreign capital disrupts existing sub-optimal equilibrium, compelling local providers to enhance technological sophistication and optimize service quality through “reverse pressure.”

However, spillover efficiency depends on the host country’s Absorptive Capacity (Cohen & Levinthal, 1990). Without sufficient human capital, cutting-edge technologies risk creating an “Enclave Effect”—advanced technologies localized within foreign enterprises that fail to catalyze systemic growth. Recent evidence reinforces this conditional view: Zhang et al. (2024) find that digital transformation and FDI inflows are mutually reinforcing across emerging Asian economies, while Khan et al. (2025) show that digitalization attracts FDI in developing economies yet can deter it beyond a certain threshold. Kusairi et al. (2023) demonstrate that the developmental payoff of digital FDI is contingent on effective oversight and absorptive conditions.

4. Skills Mismatch as a Structural Constraint

The Skill-Biased Technological Change (SBTC) theory indicates that the application of digital technology is highly dependent on high-skilled labor. When a severe skills mismatch exists—where workers' skills cannot meet digital job requirements—technological progress dividends are offset (Acemoglu & Restrepo, 2018).

Thailand faces a pronounced “low-skill lock-in” effect, with workers concentrated in traditional hospitality and rudimentary manufacturing. Despite the influx of digital FDI, Thailand faces an annual deficit of approximately 70,000 digital professionals (World Bank, 2025). The current workforce lacks the capacity

to pivot toward high-end technical roles such as programming, big data analytics, and Embodied AI, creating what the World Bank (2025) warns is a “technological chasm.”

5. Conceptual Framework

The conceptual framework posits Digital FDI Inflow as the independent variable, Economic Transformation as the dependent variable, with Technology Spillover (positive moderator) and Skills Mismatch (negative moderator) as boundary conditions. Technology Spillover operates through four dimensions: Demonstration/Imitation Effects, Competition Effects, Labor Mobility Effects, and Local Absorptive Capacity. Skills Mismatch manifests through three dimensions: Structural Technology Gap, Disconnect Between Education and Market Demand, and Reskilling/Adaptability Constraints.

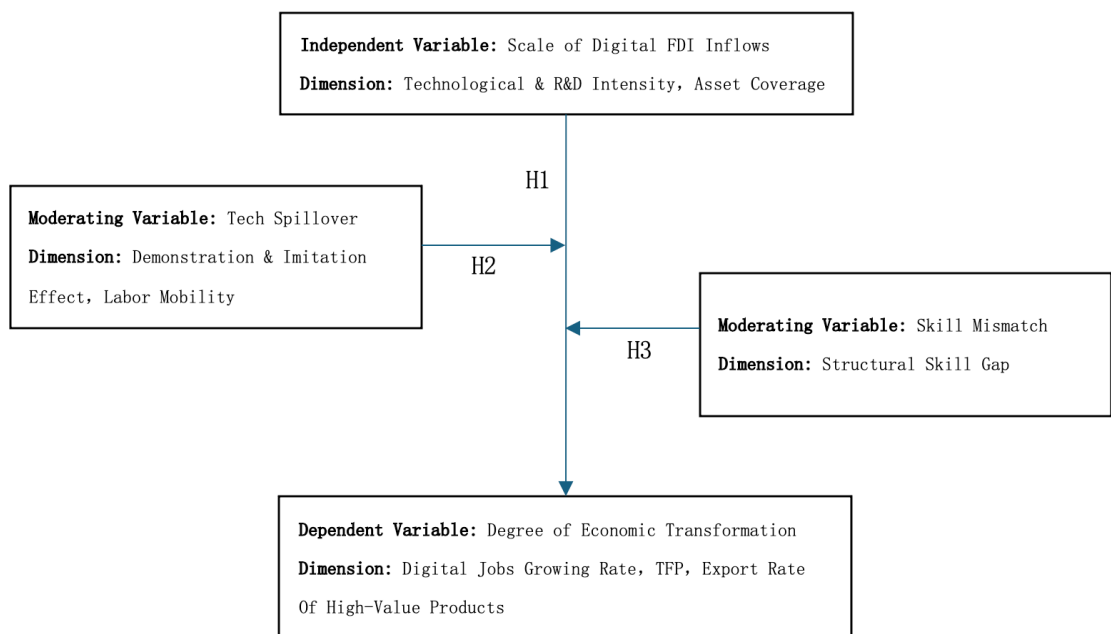


Figure 1: Conceptual Framework

Methodology

1. Research Design

This study employs a quantitative survey research design, in which data are collected through a structured questionnaire and analyzed primarily using quantitative statistical techniques. Based on Endogenous Growth Theory, Technology Spillover Theory, and Absorptive Capacity Theory, we construct an analytical framework of “Digital FDI → Digital Transformation of Traditional Economy,” incorporating skills mismatch and technology spillover as moderating variables.

2. Population and Sample

The target population comprises management executives and technical personnel in Thailand whom Digital FDI directly or indirectly impacts. Four benchmark enterprises were purposively selected against three criteria: (1) substantive engagement with digital FDI, technology transfer, or digital platform operations within Thailand; (2) operation within sectors central to Thailand’s digital transformation (digital logistics, e-commerce, cloud and AI services, and digitally integrated retail); and (3) the presence of staff with direct exposure to digital transformation processes. Grab, ByteDance, and Shopee Thailand represent foreign-originated digital multinationals that channel inbound digital FDI and technology spillovers. At the same time, CP ALL was deliberately included as a leading Thai-owned enterprise undergoing large-scale digital transformation in partnership with foreign digital providers. The inclusion of one major domestic adopter alongside three foreign-invested platforms was intentional: it allows the constructs to be assessed across both the supply side (foreign investors transferring technology) and the demand or absorption side (a local enterprise integrating that technology), which is consistent with the study’s focus on absorptive capacity and technology spillover. It is acknowledged, however, that differences in organizational origin may introduce variation in how

respondents perceive the constructs; this concern is addressed through reliability and validity testing and is revisited in the limitations.

The required sample size was determined using established rules of thumb for multivariate analysis. The measurement model comprises 29 observed items; applying the widely used minimum ratio of at least five respondents per observed variable (Hair et al., 2019) yields a lower bound of 145 cases, while a more conservative ratio of 10:1 indicates 290 cases as a desirable target. In addition, Comrey and Lee (1992) classify a sample of 150 as “good” and 200 as “very good” for factor-analytic procedures. Accordingly, 200 questionnaires were distributed to account for non-response and invalid returns, while ensuring a final analyzable sample above the 145-case minimum. Respondents were recruited using purposive sampling at the enterprise level, followed by convenience sampling of management executives and technical personnel within each enterprise who met the inclusion criterion of direct involvement in, or exposure to, digital transformation activities.

The survey was conducted from January to February 2026. Of 168 retrieved responses (84.0% recovery rate), 18 were excluded for abnormal completion times, response patterns, or missing information, yielding 150 valid questionnaires (75.0% effective recovery rate).

3. Measurement Instruments

All constructs were measured using a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree):

Independent Variable—Digital FDI: Four items measuring support intensity for transformation, infrastructure development improvement, industrial chain agglomeration, and core engine status for industrial leapfrogging.

Moderating Variable 1—Technology Spillover: Twelve items across four dimensions: Demonstration/Imitation Effects (3 items), Competition Effects (3 items), Labor Mobility Effects (3 items), and Local Absorptive Capacity (3 items).

Moderating Variable 2—Skills Mismatch: Nine items across three dimensions: Structural Technology Gap (3 items), Disconnect Between Education and Market Demand (3 items), and Reskilling/Adaptability Constraints (3 items).

Dependent Variable—Economic Transformation: Four items measuring industrial structure upgrading, TFP enhancement, innovation vitality stimulation, and Thailand 4.0 strategic goal achievement.

4. Reliability and Validity Testing

Prior to full-scale data collection, a pilot test of 30 questionnaires was conducted to verify the instrument's reliability and clarity. A minimum of 30 cases was adopted in accordance with the Central Limit Theorem and conventional recommendations for pilot reliability estimation, providing a sufficient basis for computing Cronbach's Alpha coefficients. The pilot respondents were drawn from the academic and training department of CP ALL, which was selected because it operates a structured internal digital-upskilling function and therefore comprises personnel directly engaged with digital transformation processes, making them representative respondents for instrument refinement. Content validity was established using the Index of Item-Objective Congruence (IOC) and the Content Validity Index (CVI), with items retained when IOC values were 0.50 or higher (Rovinelli & Hambleton, 1977) and CVI values were 0.80 or higher (Polit & Beck, 2006). Reliability was deemed acceptable when Cronbach's Alpha exceeded the 0.70 threshold recommended by Hair et al. (2019).

5. Data Analysis Methods

Data analysis was conducted using SPSS in four phases: (1) Descriptive statistics and Pearson correlation analysis; (2) Reliability and construct validity verification via Cronbach's Alpha, Composite Reliability (CR), and Average Variance Extracted (AVE); because all measurement items were deductively derived from established theory, a confirmatory factor analysis (CFA) logic was adopted to assess convergent validity, supported by the Kaiser-Meyer-Olkin

(KMO) measure and Bartlett's Test of Sphericity to confirm the data's suitability for factor extraction; (3) Linear regression for direct effect testing; and (4) Hierarchical regression with mean-centered variables for moderating effect testing, supplemented by the Bootstrap method (5,000 resamples) for robustness verification.

Results

1. Respondent Profile

The sample of 150 valid responses demonstrates high professional relevance. Males comprised 77.33% (n=116) and females 22.67% (n=34), reflecting the gender composition of Thailand's technology-intensive sectors. The age distribution showed 32.00% (n=48) aged 25–30, 42.67% (n=64) aged 31–40, and 25.33% (n=38) aged 40+, with the 25–40 cohort representing 74.67% (n=112) “digital natives” with high sensitivity to fluctuations in the digital economy.

Educational attainment was exceptional: 96.67% (n=145) held bachelor's degrees or higher (58.00% bachelor's, n=87; 38.67% postgraduate, n=58). Job functions were predominantly Computer/Technology Development (68.00%, n=102), Digital Finance (21.33%, n=32), and Information Systems (10.67%, n=16). The experience distribution was 34.00% (n=51) with 3–5 years, 46.66% (n=70) with 6–10 years, and 19.34% (n=29) with 10+ years.

2. Descriptive Statistics of Core Variables

Digital FDI Inflow Scale (IV): Mean scores ranged from 3.36 to 3.53, indicating moderate-high expert consensus on FDI's foundational role. Infrastructure development (M=3.53) was most recognized, while support intensity for comprehensive transformation (M=3.36) was relatively weakest.

Technology Spillover (MV1): all twelve items (TS1–TS12) were retained after instrument quality testing; for brevity, the highest-scoring representative

item within each sub-dimension is reported below, while full item-level means are available in the appendix. Demonstration/Imitation Effects showed strong “standard-setting” leadership (TS2: $M=3.69$ for path reference). Competition Effects revealed “high-level empowerment” via digital infrastructure (TS5: $M=3.73$). Labor Mobility demonstrated significant “technological DNA” migration (TS7: $M=3.65$). Local Absorptive Capacity showed management’s open stance as a core driver (TS11: $M=3.75$) but revealed a gap between strategic intent (3.75) and physical infrastructure readiness (3.47).

Skills Mismatch (MV2): Structural Technology Gap showed severe high-end talent shortage (SM1: $M=3.75$; SM3: $M=3.75$), and recorded the highest standard deviations among all constructs ($SD=1.31-1.35$). Education-Market Disconnect highlighted the scarcity of industry-university collaboration (SM5: $M=3.62$). Reskilling Constraints revealed poor training absorption (SM9: $M=3.74$) and psychological resistance (SM7: $M=3.69$).

Economic Transformation (DV): Innovation vitality stimulation (ET3: $M=3.08$) was the highest rated, while industrial structural upgrading (ET1: $M=2.88$) and TFP enhancement (ET2: $M=2.87$) fell below the neutral threshold, indicating “fundamental metamorphosis” has not yet materialized. Thailand 4.0 goal achievement (ET4: $M=2.99$) reflected a “wait-and-see” stance.

3. Reliability and Validity Verification

Reliability: All constructs satisfied the acceptance criterion of Cronbach’s Alpha and Composite Reliability (CR) exceeding the 0.70 threshold recommended by Hair et al. (2019), and Average Variance Extracted (AVE) values exceeded 0.50, confirming adequate internal consistency and convergent validity: Digital FDI ($\alpha=0.919$, $CR=0.92$, $AVE=0.74$ [verify]). Technology Spillover total ($\alpha=0.978$, $CR=0.98$, $AVE=0.71$ [verify]). Skills Mismatch total ($\alpha=0.981$, $CR=0.98$, $AVE=0.73$ [verify]). Economic Transformation ($\alpha=0.936$, $CR=0.94$, $AVE=0.79$ [verify]). It should be noted that the CR values for the two multidimensional moderating

constructs are relatively high (above 0.95). At the same time, this confirms strong internal consistency; such values may also reflect item redundancy among conceptually adjacent sub-dimensions. This possibility is acknowledged as a measurement consideration and is revisited in the limitations.

Validity: KMO measure was 0.939 (“marvelous” threshold). Bartlett’s Test of Sphericity was highly significant ($\chi^2=5466.002$, $p<0.001$), confirming that the data were suitable for factor extraction. Consistent with the theoretically specified four-factor structure, standardized factor loadings were consistently above 0.89 (approaching 0.96), and all communalities exceeded 0.79 (maximum 0.928). The extracted factors corresponded to the four hypothesized constructs, with the total variance explained (TVE) exceeding 70% [verify], providing evidence of convergent validity for the deductively derived measurement model.

4. Correlation Analysis

Pearson correlation analysis (Table 1) revealed statistically significant associations among all core variables. Digital FDI was positively correlated with Technology Spillover ($r=0.506$, $p<0.01$) and with Economic Transformation ($r=0.402$ [verify], $p<0.01$). Technology Spillover was positively correlated with Economic Transformation ($r = 0.371$ [verify], $p < 0.01$). Skills Mismatch exhibited a significant negative correlation with Economic Transformation ($r = -0.528$, $p < 0.01$) and weaker negative associations with Digital FDI ($r = -0.181$ [verify], $p < 0.05$) and Technology Spillover ($r = -0.166$ [verify], $p < 0.05$). These coefficients confirm that the predictor and moderator variables are significantly related to the outcome, while remaining below the threshold for multicollinearity concerns.

Table 1 Pearson Correlation Matrix of Core Variables (n = 150) [off-diagonal values to be verified against SPSS output]

Variable	1	2	3	4
1. Digital FDI	1			
2. Technology Spillover	0.506**	1		
3. Skills Mismatch	-0.181*	-0.166*	1	
4. Economic Transformation	0.402**	0.371**	-0.528**	1

Note. * $p < 0.05$, ** $p < 0.01$ (two-tailed).

5. Hypothesis Testing

H1 Testing—Direct Effect: Linear regression showed Digital FDI's regression coefficient on economic transformation was $\beta=0.430$ ($p<0.001$), with $R^2=0.161$. The 95% confidence interval [0.271, 0.589] excluded zero. Digital FDI explains 16.1% of the variance in economic transformation—a substantial figure given the multifaceted nature of transformation. H1 is supported.

H2 Testing—Technology Spillover Moderation: Hierarchical regression with mean-centered variables showed that the interaction term (FDI $\times$ TS) yielded $\beta = -0.220$, $p = 0.004$, with 95% CI [-0.370, -0.071] excluding zero. Technology spillover significantly moderates the relationship between FDI and transformation. H2 is supported.

H3 Testing—Skills Mismatch Moderation: The interaction term (FDI $\times$ SM) yielded $\beta=-0.016$, $p=0.818$, with 95% CI [-0.152, 0.120] containing zero. The moderating effect is not statistically significant. H3 is not supported.

By contrast, Skills Mismatch exhibited a significant negative direct effect on economic transformation ($\beta = -0.400$, $p < 0.001$), while the direct effect of Digital FDI remained stable ($\beta = 0.276$), independent of skills mismatch severity.

6. Summary of Hypothesis Results

Hypothesis	Path	Effect Value	95% CI	p-value	Result
H1	Digital FDI → Economic Transformation	0.430	(0.271, 0.589)	0.000	Supported
H2	Interaction (FDI × TS) → Economic Transformation	-0.220	(-0.370, -0.071)	0.004	Supported
H3	Interaction (FDI × SM) → Economic Transformation	-0.016	(-0.152, 0.120)	0.818	Not Supported

Discussion

1. Digital FDI as a Core Catalyst

The empirical confirmation of H1 ($\beta = 0.430$, $p < 0.001$) establishes digital FDI as a pivotal driver of Thailand's economic transformation. This finding aligns with the Eclectic Paradigm (Dunning, 1980), which posits that FDI brings not only capital but advanced technology, management expertise, and global market access. In the digital economy, this “capital-plus” effect is amplified by cloud computing, big data analytics, and automated processes that directly empower local enterprises.

The R^2 value of 0.161, while modest in absolute terms, is highly significant given that policy frameworks, institutional quality, cultural factors, and global economic conditions beyond the scope of this model influence economic transformation. The finding that digital FDI accounts for approximately one-sixth of the variance in transformation from a single dimension underscores its strategic importance as a policy lever.

2. Technology Spillover as a Force Multiplier

The significant moderating role of technology spillover (H2 supported, $p=0.004$) reveals that digital FDI's efficacy is not automatic but highly dependent on local absorptive capacity. This finding extends Cohen and Levinthal's (1990) absorptive capacity theory to the digital FDI context, demonstrating that the same volume of foreign investment generates multiplied transformation effects when local firms can effectively identify, assimilate, and exploit external knowledge.

The four spillover channels demonstrate differentiated efficacy. Demonstration/Imitation effects ($M=3.69$) and Competition effects ($M=3.73$) show strong performance, while Labor Mobility ($M=3.57$) and particularly Local Absorptive Capacity reveal constraints. The gap between management's strategic intent (3.75) and actual infrastructure readiness (3.47) suggests that, while Thai firms are willing to adopt technology, material limitations impede its full realization.

This has critical policy implications: attracting digital FDI must be accompanied by parallel investments in local absorptive capacity. Without this "soft infrastructure," advanced digital technologies risk creating "technology enclaves"—high-tech islands isolated from the broader economy, precisely the "Southeast Asian Solow Paradox" scenario this study sought to avoid.

3. Skills Mismatch: Structural Barrier vs. Moderating Force

The rejection of H3—skills mismatch’s moderating effect—is theoretically intriguing and practically significant. While the interaction term was insignificant ($p=0.818$), the direct effect was powerfully negative ($\beta=-0.400$, $p<0.001$). This suggests that skills mismatch operates not as a conditional moderator that dampens FDI’s marginal impact, but as a systemic structural drag that independently suppresses transformation outcomes.

This finding corrects the prevailing preconception that talent gaps necessarily undermine investment efficiency. Instead, in Thailand’s current context, skills mismatch functions as a “systemic resistance”—a persistent counterforce that offsets transformational progress regardless of FDI inflows. This distinction is crucial for policy design: addressing skills mismatches requires direct intervention in the labor market and education system, not merely optimizing FDI-attracting policies.

The three dimensions of skills mismatch reveal specific pain points. The structural technology gap ($M=3.75$) with extreme dispersion ($SD=1.31-1.35$) indicates that while all experts acknowledge talent shortages, perceptions vary dramatically by organizational context—MNCs can recruit globally while local SMEs face severe constraints. The education-market disconnect ($M=3.62$) reflects systemic “ivory tower” problems where university curricula lag industry requirements by several years. Reskilling constraints ($M=3.74$) indicate that even when training is available, absorption is poor due to cognitive inertia and outdated content.

4. Theoretical Implications

This study offers three primary theoretical contributions. First, it extends the “middle-income trap” evolution theory by providing empirical evidence from the digital age. Traditional growth models focused on the marginal productivity of labor and capital, overlooking structural inertia. This research demonstrates that Digital FDI can serve as a “Point of Rupture” to dismantle path dependency, but only when accompanied by adequate absorptive capacity.

Second, it reveals the complex role of technology spillover as a boundary condition. Previous studies often assumed that technology spillover uniformly facilitates. This study shows that when local technological environments and foreign technical pathways are structurally misaligned, spillover effects may be constrained, requiring careful policy calibration.

Third, it redefines the mechanism of skills mismatch in economic transformation. By distinguishing between moderating and direct effects, the study advances “digital talent structure theory” and deepens understanding of transformational barriers in developing countries.

Conclusion

This study empirically examines the impact of Digital FDI on Thailand’s economic transformation through the lenses of technology spillovers and skills mismatches. Three core findings emerge:

Digital FDI is a significant positive driver of economic transformation ($\beta=0.430$, $p<0.001$), serving as a core catalyst for breaking industrial bottlenecks.

Technology spillover significantly moderates this relationship, indicating that FDI efficiency is highly dependent on local absorptive capacity. The same investment generates multiplied effects when local firms can effectively absorb and deploy foreign technologies.

Skills mismatch does not moderate but directly impedes transformation ($\beta = -0.400$, $p < 0.001$), functioning as a systemic structural barrier that offsets progress independent of FDI levels.

Recommendations

1. Policy Recommendations

Optimizing Digital FDI Quality: The Board of Investment (BOI) should shift focus from “capital volume” to “technological depth,” prioritizing investments

that deeply integrate with traditional manufacturing (automotive, food processing) rather than simple low-end assembly. Digital infrastructure development must be continuously enhanced to provide the necessary “infrastructural soil.”

Enhancing Local Absorptive Capacity: The government should establish industry-university-research collaboration platforms, fostering joint laboratories between foreign digital enterprises and local institutions. A “mentorship” model between foreign and local firms can substantially shorten technology digestion cycles.

Dismantling the Skills Mismatch Bottleneck: The Ministry of Education should promote “customized talent cultivation” (order-based training) with curricula strictly aligned with industrial needs. Higher education must produce interdisciplinary professionals who combine industrial management expertise with digital proficiency. Reskilling programs must accelerate to keep pace with the velocity of FDI inflows.

Advancing Corporate Digital Governance: Traditional firms should establish dedicated Digital Transformation Departments to proactively align with the management practices and technical standards of foreign-invested enterprises, ensuring that external technological inputs are translated into internal competitive advantages.

2. Limitations and Future Research

This study’s cross-sectional design captures a “snapshot” of relationships, limiting observation of long-term causal trajectories. The 150-sample size, while statistically adequate, may have limited generalizability across Thailand’s diverse industrial landscape. Future research should employ longitudinal panel data to track transformation dynamics over time. Cross-national comparative studies with Vietnam, Malaysia, or Indonesia would enhance universality. Expanding the model to incorporate institutional quality, corporate digital readiness, and cultural factors would provide more comprehensive explanatory power.

3. Concluding Remarks

As Thailand navigates the turbulent waters of 2025–2026—currency volatility, manufacturing contraction, tourism decline, and geopolitical uncertainty—the imperative for digital transformation has never been clearer. This study confirms that digital FDI provides a viable pathway out of the middle-income trap, but not an automatic one. The transformation equation requires three simultaneous inputs: foreign digital capital, local absorptive capacity, and a workforce equipped with relevant skills. Thailand’s success in achieving its “Thailand 4.0” vision depends not on choosing among these elements, but on orchestrating their synergistic convergence. Only by prioritizing massive human capital investment to bolster local absorptive capacity can the nation translate foreign “hard investment” into endogenous “soft power,” thereby achieving the fundamental economic paradigm leap that its future prosperity demands.

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