

Policy-Driven Workforce Development and Integrated Skills as Predictors of Workforce Readiness in Thailand's Digital Economy

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Abstract

Aim/Purpose: This study aimed to examine how perceived policy-driven workforce development initiatives enacted under the Thailand 4.0 national framework influence university students' employability-related skill development and their subsequent readiness to enter the labor market. Specifically, the research investigated the extent to which Policy and Workforce Development Initiatives (PWDI) contribute to students' English Proficiency (EP), Digital and Technical Skills (DTS), and Soft Skills and Higher-Order Thinking Skills (SHS), along with how these three skill domains shape overall Labor-Market Readiness (LMR). Grounded in human capital and employability theories, workforce readiness is conceptualized as the result of integrated skills. By developing and validating a structural model grounded in current regional skill demands, this study provided empirical evidence on how policy initiatives translate into integrated skill outcomes among undergraduate learners.

Introduction/Background: Across Southeast Asia, economies are undergoing rapid transformation driven by Industry 4.0 and 5.0 technologies, automation, and global connectivity. Thailand's response to these shifts is captured in the Thailand 4.0 strategy, which emphasizes human capital development, digital transformation, and innovation capacity. Despite these policy efforts, labor-market reports consistently highlight persistent skills gaps, particularly in English communication, digital literacy, and higher-order cognitive abilities. Employers increasingly seek graduates who can operate in multilingual, technology-mediated environments and who possess the adaptability, communication competence, and problem-solving abilities required for dynamic workplaces. However, universities face ongoing challenges in aligning their curricula with rapidly changing workforce needs. Within this context, understanding the mechanisms through which policy initiatives influence skill development is essential. This research contributes to that understanding by modeling the direct pathways through which PWDI affect three core skill domains and, in turn, labor-market readiness among undergraduate students.

Methodology: A quantitative, cross-sectional design was employed using data from 390 undergraduate students enrolled in seven academic programs at Bangkok University, Thailand. Data were collected through a structured questionnaire distributed via QR codes during class sessions. Each construct—PWDI, EP, DTS, SHS, and LMR—was measured using four validated items rated on a five-point Likert scale. Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) were conducted to evaluate the measurement and structural models. The CFA indicated excellent fit across all indicators (CMIN/DF = 1.283, GFI = .950, RMSEA = .027, CFI = .996), demonstrating strong construct validity. The structural model also exhibited robust fit (CMIN/DF = 1.280, GFI = .949, RMSEA = .027, CFI = .996). All six hypothesized paths were tested using standardized regression weights, critical ratios, and significance levels.

Findings: The findings confirmed that PWDI significantly and positively influenced each of the three skill domains. The strongest effect was observed on Digital and Technical Skills ($\beta = .696$), followed by

Soft Skills and Higher-Order Thinking Skills ($\beta = .680$), and English Proficiency ($\beta = .656$). These results highlighted the importance of policy mechanisms, such as work-integrated learning, micro-credentials, curriculum modernization, and teacher upskilling, in shaping student competencies across multiple domains. In turn, each skill domain demonstrated a significant positive effect on Labor-Market Readiness. While all three skills contributed meaningfully, SHS displayed the strongest influence on LMR ($\beta = .369$), followed by EP ($\beta = .333$) and DTS ($\beta = .299$). This suggests that soft skills and higher-order thinking skills help translate competencies into perceived workforce readiness. The model showed substantial explanatory power, with PWDI explaining 43.1% of the variance in EP, 48.4% in DTS, and 46.3% in SHS. Overall, the findings indicated that policy initiatives improve workplace-relevant skills, which in turn enhance students' perceived readiness for the labor market.

Contribution/Impact on Society: This study advances regional understanding of how educational policy, institutional initiatives, and curriculum reforms shape graduate employability in the context of digital transformation. The findings provide evidence that policy efforts under Thailand 4.0 can substantially enhance students' skill development when effectively implemented at the university level. From a societal perspective, the findings reinforce the need for coordinated systems that align education with dynamic labor-market needs. The study also highlights the importance of integrated skill development in preparing graduates for the digital economy. It shows that skill development is not only a pedagogical concern, but also a policy priority with implications for economic competitiveness, social mobility, and workforce equity.

Recommendations: The findings underscore the importance of embedding authentic, workplace-aligned learning opportunities across disciplines. Universities should prioritize the integration of English-medium communication tasks, digital-tool proficiency, and problem-based learning within regular coursework. Policymakers should continue strengthening industry partnerships, investing in teacher training, and designing scalable micro-credential pathways that address emerging skill demands. Employers may also benefit from closer collaboration with universities to co-develop experiential learning opportunities and performance-based assessments that mirror real-world expectations.

Research Limitations: This study was limited by its reliance on a single institutional context, which may constrain generalizability. The use of self-report measures introduces potential perceptual bias, and the cross-sectional design restricts the ability to infer long-term skill development trajectories or causal pathways. Perceptual measures of policy exposure and readiness may inflate observed relationships among variables. Future studies should incorporate multi-institutional samples, longitudinal tracking, and triangulated data sources, including employer evaluations and performance-based assessments.

Future Research: Future investigations may explore moderating variables such as program type, digital access, socioeconomic background, or prior work experience to understand variation in skill development outcomes. Comparative studies across ASEAN countries would also provide insight into differences in regional policy implementation. Additionally, mixed-method approaches, combining surveys with interviews, classroom observations, or learning analytics, could offer deeper insights into how policy initiatives are enacted at the instructional level and how students experience skill development over time.

Keywords: *English proficiency, workforce development, digital literacy*

Introduction

Rapid technological advancement, globalization, and digital transformation are fundamentally reshaping labor-market structures across economies. In response to these changes, governments increasingly emphasize workforce development strategies that prioritize advanced skills, adaptability, and innovation. In Thailand, these transformations are institutionalized through the Thailand 4.0

agenda, which seeks to reposition the country from a labor-intensive economy toward an innovation-driven and knowledge-based system. Under this policy framework, growth is expected in advanced manufacturing, automation, and data-intensive services, placing new and increasingly complex demands on the future workforce (NXPO & IRIS Consulting, 2025).

Within this evolving labor-market context, graduate employability is a central concern for higher-education institutions, policymakers, and employers. Contemporary workplaces increasingly require graduates to operate in digitally mediated environments, collaborate across national and cultural boundaries, and adapt to rapid technological change. Thus, employers no longer evaluate job readiness based on isolated competencies. Instead, employability is increasingly conceptualized as the ability to integrate multiple skill domains and apply them effectively in complex and dynamic real-world contexts, consistent with employability frameworks (Knight & Yorke, 2004; Yorke, 2006).

Among these domains, English proficiency has emerged as a foundational employability skill. English functions as the dominant language of international business, technology, and professional communication, particularly in digitally connected workplaces. Employers expect graduates to participate in English-medium discussions, interpret technical documentation, and communicate effectively with diverse stakeholders. Empirical evidence consistently identifies English proficiency as one of the most frequently cited qualifications for new graduates, especially in internationally oriented and technology-intensive sectors (It-ngam et al., 2023; Sureeyatanapas et al., 2016). Nevertheless, English proficiency alone is insufficient to ensure successful labor-market entry. This suggests that linguistic competence must be complemented by other capabilities to support comprehensive workforce readiness.

Alongside linguistic competence, digital and technical skills have become indispensable for workforce participation. Digital technologies underpin most contemporary work processes, ranging from data management and automation to virtual collaboration and analytics-driven decision-making. Labor-market assessments repeatedly highlight shortages in IT-related competencies among new graduates, particularly in contexts characterized by rapid digitalization (The Nation, 2023). At the same time, employers increasingly emphasize the importance of soft skills and higher-order thinking skills, including communication, teamwork, problem-solving, initiative, and self-regulation. These skills enable individuals to apply technical knowledge effectively, navigate complex tasks, and respond flexibly to organizational change. Collectively, these competencies reflect the multidimensional nature of employability, which extends beyond technical expertise to include cognitive and interpersonal capabilities. Recent evidence indicates that technology-mediated English language learning can strengthen critical thinking skills while enhancing graduates' preparedness for labor market participation (Algouzi et al., 2023).

Despite substantial investments in education and training, persistent mismatches remain between the skills developed in formal education systems and those demanded by employers. Studies in professional sectors, such as healthcare and services, demonstrate that graduates often struggle with essential English communication tasks, thereby constraining service quality and limiting international coordination (Khamwong et al., 2020). Broader labor-market analyses further identify gaps in digital competencies and transferable soft skills, highlighting the continuing mismatch between graduates' skills and the integrated demands of contemporary workplaces (Puriwat & Tripopsakul, 2020; Weerasombat & Pumipatyothin, 2025). This mismatch highlights the need for integrated skill development models that align educational outcomes with labor-market expectations.

In response to these challenges, governments and higher-education institutions have implemented a range of Policy and Workforce Development Initiatives (PWDI) under Thailand 4.0. These initiatives include work-integrated learning, micro-credentials, curriculum–industry alignment, teacher upskilling, and university–industry partnerships. While such initiatives are intended to enhance workforce readiness, empirical evidence remains limited regarding how effectively these policies translate into concrete skill development, and whether they ultimately improve graduates' readiness for labor-market entry. Moreover, existing research tends to examine individual skill

domains in isolation, with limited attention to how policy-driven initiatives influence the development of integrated competencies.

This study addresses this gap by proposing and empirically testing a theory-driven structural model that explains labor-market readiness as the outcome of integrated skill development supported by policy initiatives. Grounded in Human Capital Theory, which emphasizes the role of education and skill development in enhancing productivity and employability (Becker, 1964; Schultz, 1961), this study extends prior research by adopting an integrative perspective. Rather than examining English proficiency, digital skills, or soft skills in isolation, the study conceptualizes these competencies as interrelated dimensions that together form an Integrated Skill Portfolio (ISP). The ISP framework highlights the complementary and synergistic relationships among skill domains, providing a more holistic understanding of how graduates develop employability in a digital economy.

Using Structural Equation Modeling (SEM), this research examined the relationships among Policy and Workforce Development Initiatives, English Proficiency, Digital and Technical Skills, Soft Skills and Higher-Order Thinking Skills, and Labor-Market Readiness within the context of Thai higher education.

Research Objectives

The primary objective of this study was to empirically examine how policy-driven workforce development initiatives are associated with labor-market readiness through integrated skill development among university students. Specifically, the study sought to investigate whether Policy and Workforce Development Initiatives positively contribute to the development of English Proficiency, Digital and Technical Skills, as well as Soft Skills and Higher-Order Thinking Skills. In line with the integrated skill perspective, the study further aimed to examine how these skill domains function collectively rather than independently in shaping workforce readiness. In addition, the study aimed to validate the conceptualization of these three skill domains as components of an Integrated Skill Portfolio, and to assess the extent to which individual skill domains and the integrated portfolio contribute to Labor-Market Readiness. Finally, the research evaluated the overall structural model to determine whether policy initiatives exert indirect and mediated effects on labor-market readiness through integrated skill development.

Research Scope

This study was defined by its conceptual, methodological, population, and contextual boundaries. Conceptually, the research focused on four employability-related skill constructs: English Proficiency, Digital and Technical Skills, Soft Skills and Higher-Order Thinking Skills, along with Policy and Workforce Development Initiatives as the principal predictor and Labor-Market Readiness as the outcome variable. These constructs were conceptualized as interrelated components within an integrated skill development framework rather than isolated variables.

Methodologically, the study employed a quantitative research design and used Structural Equation Modeling to examine the relationships among these latent variables. SEM was appropriate for this purpose because it allows simultaneous assessment of measurement quality and structural pathways. This approach also enabled the examination of complex relationships, including indirect effects among constructs. Data were collected through a structured Likert-scale questionnaire administered to university students.

The population consisted of Generation Z undergraduate students enrolled in various academic programs at a private university in Thailand. This group was suitable for the study because these students are approaching labor-market entry and are directly affected by current educational reforms and workforce development policies.

Contextually, the study was situated within the national transition toward Thailand 4.0, focusing on how higher-education initiatives support the development of skills required in an innovation-driven economy. It emphasized students' perceived skill development and readiness, rather than objective performance or employer-based measures, which was important for interpreting the findings.

Research Significance

This study contributes to theory, methodology, and practice. Theoretically, it extends employability and workforce-development literature by adopting a portfolio-based perspective, demonstrating that English Proficiency, Digital and Technical Skills, and Soft Skills and Higher-Order Thinking Skills function collectively as an Integrated Skill Portfolio rather than as isolated predictors of labor-market readiness. By integrating Human Capital Theory and employability frameworks, it advances understanding of how multiple competencies interact to shape workforce readiness in a digital economy.

Methodologically, the study illustrates the effective application of Structural Equation Modeling and higher-order construct modeling in employability research, allowing for rigorous examination of both direct and indirect relationships, and strengthening the analytical framework's robustness. The validated measurement and structural models provide a rigorous framework that future studies can adapt to examine integrated skill development and policy impacts across different contexts.

Practically, the findings offer evidence-based insights for universities seeking to redesign curricula around integrated skill development, for policymakers evaluating Thailand 4.0 workforce initiatives, and for students aiming to understand the combinations of competencies that support successful labor-market entry. Importantly, the study highlights that focusing on isolated skill development may be insufficient, and that coordinated, integrative approaches are necessary to enhance workforce readiness. By clarifying how policy interventions translate into integrated skills and readiness outcomes, this study supports more informed decision-making in education and workforce planning.

Literature Review and Hypothesis Development

Regional Context and Workforce Transformation

Southeast Asia is advancing toward knowledge-intensive and innovation-driven economies, with Thailand, Indonesia, and Vietnam investing heavily in Industry 4.0 and emerging Industry 5.0 capabilities. These transformations place increasing emphasis on digital integration, automation, and human-centric innovation, reshaping labor-market expectations and elevating demand for workers who possess technical skills, problem-solving ability, and strong English communication for global collaboration (World Economic Forum, 2023). However, educational systems across the region have struggled to keep pace. Conventional, content-driven curricula often fail to address automation, AI-mediated workflows, and rapidly evolving occupational requirements, resulting in persistent misalignment between graduate competencies and employer needs (Dondi et al., 2021). The literature consistently identifies three skill domains as central to workforce readiness: English proficiency, digital and technical skills, and soft skills combined with higher-order thinking skills. These domains operate interdependently, reflecting the integrated nature of communication, technology use, and cognitive flexibility required in modern workplaces. This interdependence aligns with employability frameworks, which emphasize that workforce readiness depends on integrating multiple competencies rather than isolated skill acquisition (Knight & Yorke, 2004; Yorke, 2006).

Within this environment, policy-driven workforce development initiatives are critical for shaping skill formation. Many ASEAN governments have introduced reforms aimed at strengthening education-to-employment pathways through curriculum modernization, work-integrated learning, micro-credentials, and stronger industry partnerships. However, despite these efforts, empirical evidence remains limited on how such policy initiatives translate into integrated student-level skill development outcomes.

Policy and Workforce Development Initiatives and Skill Formation

Policy and Workforce Development Initiatives (PWDI) represent coordinated efforts to enhance employability through structured educational and training reform. In Thailand, the Thailand 4.0 agenda emphasizes digital transformation, innovation, and human capital development. These priorities are expressed through work-integrated learning programs, teacher upskilling, industry-aligned curricula, and collaborative partnerships between universities and employers (Puriwat & Tripopsakul, 2020). Evidence from neighboring ASEAN countries reinforces the value of such initiatives. Singapore's Skills Future and School-in-Factory models highlight how sustained policy

support and lifelong learning systems can improve skill relevance and employability (Lim et al., 2024; Yulianti & Fitriansyah, 2024). Complementing these reforms, AI-enabled labor-market analytics increasingly help policymakers identify emerging skill needs in real time and adjust curricula accordingly (Thida, 2023; Chumwatana & Hpone, 2025).

Despite these developments, implementation in Thailand remains uneven, particularly regarding teacher readiness and curriculum modernization. This raises the need for empirical examination of whether PWDI effectively influences the development of core workforce skills. From a human capital perspective, such initiatives can be viewed as institutional mechanisms that enhance individuals' skills and productivity, thereby improving employability outcomes (Becker, 1964; Schultz, 1961).

Policy and Workforce Development Initiatives and English Proficiency

English proficiency is a central predictor of employability across ASEAN labor markets, especially in internationally oriented roles. However, Thai graduates often display only moderate proficiency, with notable gaps in interactive communication, information mediation, and professional writing skills essential for workplace performance (It-ngam et al., 2023; Kailuenam & Piamsawas, 2025). While university English courses improve confidence, they often fail to produce authentic workplace-aligned proficiency due to limited exposure to real-world communication, form-focused assessment, and culturally embedded instructional norms (Boonmoh & Chanchay, 2024). Regional research similarly has indicated that graduates frequently fall short of CEFR-aligned benchmarks (Kirkpatrick, 2012).

PWDIs that incorporate English-medium instruction, work-integrated learning, and industry participation are expected to improve students' workplace-relevant language skills. Such mechanisms provide authentic contexts for language use, thereby strengthening functional communication skills that align with labor-market expectations.

H₁: Policy and Workforce Development Initiatives positively influence English Proficiency.

Policy and Workforce Development Initiatives and Digital and Technical Skills

Digital and technical competence has become foundational across occupational sectors. Yet studies show that Thai graduates, particularly non-STEM students, often lack essential digital and information literacy skills (Puriwat & Tripopsakul, 2020). Labor-market analyses report rising demand for programming, data analytics, cloud computing, workflow platforms, and hybrid digital-interpersonal capabilities (Thida, 2023; Chumwatana & Hpone, 2025). These trends underscore the need to embed digital literacy across disciplines rather than confining it to specialized programs.

PWDI under Thailand 4.0, such as digital-skills training, industry partnerships, and updated curricula are designed to narrow these gaps. By aligning curricula with industry needs, such initiatives facilitate the development of applied digital competencies relevant to evolving workplace demands.

H₂: Policy and Workforce Development Initiatives positively influence Digital and Technical Skills.

Policy and Workforce Development Initiatives and Soft Skills and Higher-Order Thinking Skills

Soft skills and higher-order thinking skills, such as communication, teamwork, problem-solving, and socio-emotional regulation, are consistently emphasized by employers as essential for job performance and adaptability (Weerasombat & Pumipatyothin, 2025). However, research has frequently reported misalignment between student self-perception and employer evaluations, especially regarding analytical reasoning and workplace communication. Although digital learning environments may support soft-skill development, sustained improvement typically requires problem-based learning, collaborative tasks, and authentic assessments (Abrami et al., 2015; Lai, 2011). Cultural dynamics in Thai education often limit student autonomy and initiative, further constraining skill development (Boonmoh & Chanchay, 2024).

Experiential learning and industry engagement promoted through PWDI are expected to strengthen students' soft and cognitive skills. These competencies are critical because they enable individuals to integrate technical and linguistic knowledge into effective workplace performance.

H₃: Policy and Workforce Development Initiatives positively influence Soft Skills and Higher-Order Thinking Skills.

English Proficiency and Labor-Market Readiness

Labor-market readiness reflects students' perceived ability to meet employer expectations and perform job tasks effectively. English proficiency enhances these outcomes by enabling communication, access to information, and participation in multilingual and digital work environments. Research consistently identifies English proficiency as a key determinant of employability in ASEAN contexts (It-ngam et al., 2023; Kirkpatrick, 2012).

H₄: English Proficiency positively influences Labor-Market Readiness.

Digital and Technical Skills and Labor-Market Readiness

Digital and technical skills enable graduates to carry out technology-mediated tasks, adapt to organizational systems, and contribute to digital workflows. As technologies are integrated into routine work processes, a lack of digital competence constrains employability and advancement (World Economic Forum, 2023).

H₅: Digital and Technical Skills positively influence Labor-Market Readiness.

Soft Skills, Higher-Order Thinking Skills, and Labor-Market Readiness

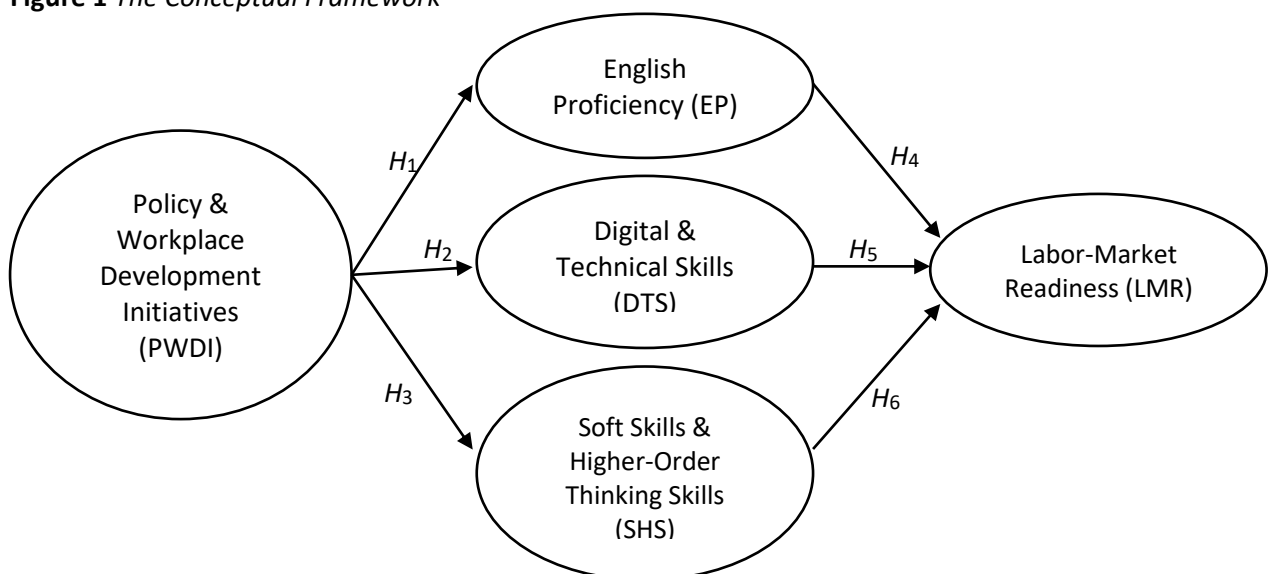
Soft and cognitive skills translate technical and linguistic competencies into effective workplace performance. Employers consistently highlight teamwork, communication, adaptability, and problem-solving as critical abilities for work-ready graduates. Deficiencies in these areas undermine employability, even among technically proficient individuals (Weerasombat & Pumipatyothin, 2025). In particular, higher-order thinking skills serve as integrative capabilities that enable individuals to apply knowledge flexibly in complex and dynamic work environments.

H₆: Soft Skills and Higher-Order Thinking Skills positively influence Labor-Market Readiness.

Conceptual Framework

Drawing from the reviewed literature, a conceptual model was developed in this study linking policy initiatives, skill development, and labor-market readiness. The model proposes that PWDI directly influences English Proficiency, Digital and Technical Skills, Soft Skills, and Higher-Order Thinking Skills, which subsequently shape Labor-Market Readiness. This framework reflects an integrated skill perspective in which multiple competencies interact to influence employability outcomes rather than operating independently. These relationships, shown in Figure 1, correspond to Hypotheses *H₁–H₆* and provide a theoretically grounded structure for examining how workforce development policies translate into employability outcomes.

Figure 1 *The Conceptual Framework*



Research Methodology

Research Design

In this study, a quantitative, cross-sectional research design was employed to investigate the relationships among Policy and Workforce Development Initiatives (PWDI), English Proficiency (EP), Digital and Technical Skills (DTS), Soft Skills and Higher-Order Thinking Skills (SHS), and Labor-Market Readiness (LMR). A survey approach was used to capture students' self-perceived skill development and employability. Structural Equation Modeling (SEM) served as the primary analytical technique because it enables simultaneous evaluation of measurement validity and the structural paths linking latent constructs. SEM was particularly appropriate for this study because it allowed for examination of complex relationships, including both direct and indirect effects among latent variables.

Respondents and Data Collection

Data were collected from 390 undergraduate students enrolled in various academic programs at Bangkok University, Thailand. The sample included students from accounting, business administration, communication arts, engineering, fine arts, humanities, and science. Respondents were drawn from courses taught by the researchers and from other courses within the university to reduce instructor-related bias and increase sample diversity.

An online questionnaire was administered using QR codes distributed during classes and academic activities. Participation was voluntary, and students were informed about the study's purpose, confidentiality measures, and their right to withdraw. No identifying data were collected. All 390 responses were complete and valid, exceeding the minimum sample size recommended for SEM. However, as the sample was drawn from a single institution, caution should be exercised when generalizing the findings to broader populations.

Measurement Instruments

Each construct was measured using four items developed and adapted based on prior research on employability, digital competence, English proficiency, and workforce development. Items were rated on a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree) and were modified to suit the Thai higher education context. Specifically, the Policy and Workforce Development Initiatives (PWDI) items were informed by research on workforce skills and workforce development in Thailand (Puriwat & Tripopsakul, 2020; Yulianti & Fitrianyah, 2024). These initiatives were measured through four items assessing exposure to work-integrated learning, curriculum–industry alignment, micro-credential offerings, and institutional support for workforce preparation.

English Proficiency (EP) items were informed by research examining English competency requirements in the Thai workplace (It-ngam et al., 2023; Kailuenam & Piamsawas, 2025; Sureeyatanapas et al., 2016). English Proficiency included four items reflecting students' perceived ability to participate in English-medium discussions, convey information clearly, interpret professional documents, and produce written work for academic or workplace purposes. Digital and Technical Skills (DTS) items were informed by research on university students' digital competence (Wang et al., 2021). Digital and Technical Skills were measured through four items addressing digital information evaluation, use of common digital tools, application of field-specific technologies, and adaptability to emerging technologies.

Soft Skills and Higher-Order Thinking Skills (SHS) items were informed by research on critical thinking and employability skills (Abrami et al., 2015; Weerasombat & Pumipatyothin, 2025). Soft Skills and Higher-Order Thinking Skills were assessed using four items capturing communication, teamwork, problem-solving, and autonomous decision-making. Labor-Market Readiness (LMR) items were informed by established research on university students' self-perceived employability (Rothwell et al., 2008; Knight & Yorke, 2004). All constructs were measured using self-reported perceptions, which are appropriate for assessing subjective readiness but may introduce response bias. Labor-Market Readiness consisted of four items measuring perceived preparedness for job tasks, alignment with employer expectations, competitiveness in the labor market, and confidence in transitioning into

employment. Because all variables were collected using a single survey instrument at one point in time, there is a potential risk of common method bias; therefore, the results should be interpreted with appropriate caution.

Reliability Analysis

Internal consistency was evaluated using Cronbach's alpha. As shown in Table 1, all constructs surpassed the recommended threshold of .70, indicating excellent reliability for all measurement scales.

Table 1 *Constructs, Measurement Items, and Reliability (n = 390)*

Construct / Variable	Number of Items	Cronbach's Alpha
Policy and Workforce Development Initiatives (PWDI)	4	.969
English Proficiency (EP)	4	.951
Digital and Technical Skills (DTS)	4	.970
Soft Skills and Higher-Order Thinking Skills (SHS)	4	.968
Labor-Market Readiness (LMR)	4	.968

Data Analysis Procedure

Data were analyzed using Structural Equation Modeling following a two-step process. First, Confirmatory Factor Analysis (CFA) was conducted to assess whether the observed indicators adequately represented each latent construct. Model fit was evaluated using common indices following accepted SEM thresholds. These indices were selected based on widely accepted SEM guidelines to ensure both absolute and incremental model fit.

After confirming an acceptable measurement model, the structural model was estimated to test the hypothesized relationships among PWDI, EP, DTS, SHS, and LMR. Path coefficients, critical ratios, and significance levels were examined to evaluate the strength and direction of each relationship. In addition, the analysis considered indirect effects to better understand the mediating role of skill development in linking PWDI to labor-market readiness. This two-stage strategy ensured that measurement quality was firmly established before interpreting structural effects. Given the cross-sectional nature of the data, the analysis focused on associations rather than causal relationships.

Ethical Considerations

The study followed ethical standards for research involving human participants. Participation was voluntary, informed consent was obtained electronically, and confidentiality was assured. The research posed minimal risk, and data were used solely for academic purposes. No personally identifiable information was collected, and all responses were anonymized before analysis.

Demographic Profile of Respondents

The demographic characteristics of the respondents provided context for interpreting the study's findings. The sample consisted of 390 undergraduate students enrolled in a range of academic programs at Bangkok University, representing diverse disciplinary backgrounds.

In terms of program distribution, the largest group of respondents was from Business Administration (200 students). The remaining students were from Fine Arts (43), Humanities (34), Communication Arts (33), Science (32), Engineering (25), and Accounting (23). This distribution indicated broad representation across social sciences, arts, and STEM-related fields. Such diversity enhanced the representativeness of the sample within the institutional context, although it did not eliminate limitations related to single-institution sampling.

Participants were in the later stages of their studies, with 143 students in their third year and 247 in their fourth year. This suggests that the majority were nearing graduation and were therefore well placed to evaluate their own readiness for entering the labor market. This characteristic strengthens the relevance of responses related to perceived workforce readiness, as participants were approaching labor-market entry.

The sample included 151 male and 239 female respondents. Their high-school backgrounds were also diverse: 183 students reported an arts-based background, 147 had a science–math background, 55 had completed vocational programs, and 5 indicated other educational pathways. This variety reflected multiple academic trajectories through which students access higher education in Thailand.

Overall, the demographic composition reflected a broad cross-section of undergraduate students in terms of academic disciplines, year of study, and prior educational experience. This diversity supported the relevance of the findings to the broader context of undergraduate education in Thailand. Table 2 summarizes these characteristics.

Table 2 *Demographic Characteristics of Respondents (n = 390)*

Variable	Category	Frequency
Program of Study	Accounting	23
	Business Administration	200
	Communication Arts	33
	Engineering	25
	Fine Arts	43
	Humanities	34
	Science	32
Year of Study	Year 3	143
	Year 4	247
Gender	Male	151
	Female	239
High-School Background	Arts	183
	Science–Math	147
	Vocational	55
	Other	5

Results

This section presents the findings from the confirmatory factor analysis and structural equation modeling conducted to test the proposed research model. The results are organized into four parts: evaluation of the measurement model, assessment of the structural model, hypothesis testing, and explained variance. Summary statistics are provided in Tables 3 and 4. This structured approach ensures a clear distinction between measurement validation and structural relationship testing.

Measurement Model Assessment

Confirmatory Factor Analysis (CFA) was performed to examine whether the observed indicators adequately represented their corresponding latent constructs. As shown in Table 3, the measurement model demonstrated an excellent fit to the data. The Chi-square to degrees of freedom ratio (CMIN/DF) was 1.283, indicating strong model parsimony. The Goodness-of-Fit Index (GFI) reached .950, while the Root Mean Square Error of Approximation (RMSEA) was .027, suggesting a close fit between the model and the observed data.

Table 3 *Goodness-of-Fit Indices for the Measurement and Structural Models*

Model	CMIN/DF	GFI	RMSEA	NFI	RFI	IFI	TLI	CFI
Measurement Model (CFA)	1.283	.950	.027	.981	.978	.996	.995	.996
Structural Model	1.280	.949	.027	.981	.978	.996	.995	.996

Incremental fit indices further supported model adequacy. The Normed Fit Index (NFI) and Relative Fit Index (RFI) were .981 and .978, respectively. The Incremental Fit Index (IFI), Tucker–Lewis Index (TLI), and Comparative Fit Index (CFI) all exceeded .90. All model fit indices met or exceeded commonly accepted threshold values, indicating that the measurement model demonstrated strong

construct validity and reliability. Together, these indicators confirmed that the measurement model was both reliable and appropriate for testing the hypothesized structural relationships.

Structural Model Evaluation

After establishing the measurement model's adequacy, the structural model was tested to evaluate the hypothesized relationships among Policy and Workforce Development Initiatives, English Proficiency, Digital and Technical Skills, Soft Skills and Higher-Order Thinking Skills, and Labor-Market Readiness. The structural model reflected an excellent level of fit; results closely mirrored the CFA.

As presented in Table 3, the structural model yielded a CMIN/DF ratio of 1.280, a GFI of .949, and an RMSEA of .027. The incremental fit indices remained consistently high, with NFI = .981, RFI = .978, IFI = .996, TLI = .995, and CFI = .996. The consistency between measurement and structural model fit indices indicated strong model stability and supports the robustness of the proposed framework.

Hypothesis Testing

The hypothesized relationships were assessed using standardized and unstandardized regression weights. Table 4 reports the path coefficients, standard errors, critical ratios, and significance levels. All six hypothesized paths were positive and statistically significant at $p < .001$, providing full empirical support for the proposed model. These results indicated that the relationships among PWDI, skill development, and labor-market readiness were statistically robust within the sample.

Table 4 Structural Path Estimates and Hypothesis Testing Results

Hypothesis	Path	Estimate	Standardized β	SE	CR	p -value	Result
H1	EP $\leftarrow$ PWDI	.558	.656	.038	14.729	***	Supported
H2	DTS $\leftarrow$ PWDI	.793	.696	.047	17.021	***	Supported
H3	SHS $\leftarrow$ PWDI	.682	.680	.042	16.102	***	Supported
H4	LMR $\leftarrow$ EP	.390	.333	.048	8.201	***	Supported
H5	LMR $\leftarrow$ DTS	.261	.299	.035	7.433	***	Supported
H6	LMR $\leftarrow$ SHS	.366	.369	.040	9.107	***	Supported

Note. *** $p < .001$

Policy and Workforce Development Initiatives had a significant positive effect on English Proficiency (estimate = .558, β = .656, CR = 14.729), supporting H_1 . The impact of PWDI on Digital and Technical Skills was similarly strong (estimate = .793, β = .696, CR = 17.021), supporting H_2 . PWDI also positively influenced Soft Skills and Higher-Order Thinking Skills (estimate = .682, β = .680, CR = 16.102), supporting H_3 .

With respect to labor-market outcomes, English Proficiency significantly influenced Labor-Market Readiness (estimate = .390, β = .333, CR = 8.201), supporting H_4 . Digital and Technical Skills also contributed positively to Labor-Market Readiness (estimate = .261, β = .299, CR = 7.433), supporting H_5 . Among the three skill domains, Soft Skills and Higher-Order Thinking Skills demonstrated the strongest predictive effect on Labor-Market Readiness (estimate = .366, β = .369, CR = 9.107), providing support for H_6 . This pattern suggested that higher-order cognitive and interpersonal competencies may play a comparatively stronger role in shaping perceived workforce readiness within the studied context.

Explained Variance

The model's explanatory power was assessed using squared multiple correlations (R^2). Policy and Workforce Development Initiatives accounted for 43.1% of the variance in English Proficiency, 48.4% in Digital and Technical Skills, and 46.3% in Soft Skills and Higher-Order Thinking Skills. These values indicated moderate to substantial explanatory power, suggesting that PWDI are important predictors of skill development outcomes, and that PWDI substantially contributed to the development of critical employability skills.

Overall, the findings presented in Tables 3 and 4 demonstrated that the proposed model offers strong explanatory power and provides clear empirical support for the relationships linking policy initiatives, skill development, and labor-market readiness. However, consistent with the study design, these findings should be interpreted as associative relationships rather than causal effects.

Discussion

This study examined how policy-driven workforce development initiatives shape university students' employability-related skills and, in turn, their readiness to enter the labor market. The structural model demonstrated excellent fit across all indices, and all hypothesized paths (*H1–H6*) were positive and statistically significant, confirming the theoretical soundness and empirical robustness of the proposed framework. These findings provide strong empirical support for the proposed relationships, although they should be interpreted as associative rather than causal due to the cross-sectional design.

Policy and Workforce Development Initiatives (PWDI) showed strong positive effects on all three skill domains—English proficiency (EP), digital and technical skills (DTS), and soft skills and higher-order thinking skills (SHS). The particularly strong effects on DTS and SHS suggested that initiatives such as work-integrated learning, micro-credentials, curriculum–industry alignment, and teacher upskilling are effective mechanisms for promoting digital literacy and transferable skills. From a human capital perspective, these findings indicate that policy-aligned educational practices can enhance students' competencies by facilitating the accumulation of relevant knowledge and skills. These findings were aligned with regional shifts toward Industry 4.0 and 5.0, where graduates must not only operate digital tools, but also collaborate across disciplines and solve complex problems.

Although the influence of PWDI on EP was slightly weaker than for DTS and SHS, the path remained statistically significant. This pattern reflects long-recognized challenges in developing authentic workplace-oriented English ability, which often requires immersive communication environments, pedagogical reform, and extended practice rather than policy-level emphasis alone. This suggests that language proficiency development may depend more heavily on sustained practice and contextual exposure compared to other skill domains. Nonetheless, the positive association indicates that structured English-medium instruction, language-across-curriculum strategies, and employer-linked learning opportunities are beginning to contribute to measurable improvements in English-related competencies.

All three skill domains significantly predicted Labor-Market Readiness (LMR). SHS demonstrated the strongest predictive effect, underscoring the importance of communication, teamwork, problem-solving, and self-directed reasoning in shaping graduates' confidence and perceived preparedness for employment. This finding was consistent with employability frameworks, which emphasize that higher-order cognitive and interpersonal skills serve as integrative capabilities that enable individuals to apply technical and linguistic competencies effectively (Yorke, 2006). Employers consistently identify these competencies as highly valued yet often insufficiently developed in new graduates, and the present results reinforce their central role in employability. EP and DTS also contributed meaningfully to LMR, highlighting the interconnected nature of linguistic competence, technological fluency, and workforce readiness in a globally connected and digitally mediated environment. These results further support the conceptualization of employability as a multidimensional construct requiring the integration of multiple skill domains rather than reliance on a single competency.

The explained variance values demonstrated that PWDI accounted for a substantial proportion of skill development, and that EP, DTS, and SHS collectively offer strong explanatory power for LMR. These findings emphasize the importance of policy-level and institutional mechanisms in cultivating integrated skill profiles aligned with labor-market expectations. They also provide empirical evidence that Thailand's workforce development efforts are moving in a productive direction. However, because PWDI were measured through students' perceptions rather than objective indicators of policy implementation, the findings reflect perceived effectiveness rather than actual policy impact.

Conclusion

This study investigated the relationships among policy-driven workforce development initiatives, three core employability skill domains, and students' labor-market readiness. Based on SEM analysis of 390 undergraduate respondents, the findings confirmed that Policy and Workforce Development Initiatives significantly enhance English Proficiency, Digital and Technical Skills, and Soft Skills and Higher-Order Thinking Skills components. These skill domains, in turn, significantly contributed to students' perceived readiness for employment. Importantly, the findings suggest that workforce readiness emerges from the interaction of multiple competencies rather than from any single skill domain.

The results provide clear empirical support for the premise that labor-market readiness emerges from multi-dimensional skill development, and that policy frameworks and institutional practices play a central role in shaping these competencies. Nevertheless, these conclusions should be interpreted cautiously due to the cross-sectional and perception-based nature of the data, which limits causal inference. As Thailand advances its 4.0 strategy, strengthening the intersection between policy, curriculum, and student skill development remains essential.

Implications

Theoretical Implications

This study extends the employability literature by demonstrating that workforce development policies can simultaneously influence multiple skill domains. Its findings reinforce the conceptualization of employability as a multi-component construct, and highlight the interplay among linguistic, technical, and cognitive-interpersonal competencies. By integrating Human Capital Theory and employability frameworks, the study contributes to a more comprehensive understanding of how policy-driven initiatives influence integrated skill development.

Implications for Higher Education

For universities, the results highlight the value of embedding policy-aligned learning experiences—internships, industry-partnered projects, English-medium instruction, and digital literacy modules—directly into curricula. The findings suggest that curricula should be designed to develop integrated competencies rather than treating skill domains as separate learning outcomes. Integrating communication, technological, and problem-solving tasks within coursework may better prepare students for dynamic labor-market environments.

Policy Implications

At the policy level, the findings support continued investment in initiatives under Thailand 4.0 aimed at curriculum modernization, teacher capacity building, and public-private partnerships. The results suggest that policy effectiveness is closely linked to how initiatives are implemented at the institutional level, particularly in terms of creating authentic learning environments. Strengthening work-integrated learning and credentialing systems can further enhance students' readiness for technologically evolving industries.

Implications for Students

The results emphasize that labor-market readiness requires more than technical proficiency. Strong communication abilities, digital fluency, and higher-order thinking skills significantly enhance students' confidence and competitiveness. Students should therefore focus on developing a balanced and integrated skill set to improve their employability in complex work environments. Awareness of these multidimensional skill requirements can help guide students' academic and professional development choices.

Limitations

Some limitations should be acknowledged. The sample was drawn from a single private university, which may restrict the generalizability of the findings to other institutional contexts. All data were

self-reported, introducing potential biases despite the strong measurement properties observed. Additionally, the use of a single data source raises the possibility of common method bias, which may have influenced the observed relationships among variables. The cross-sectional design prevents firm causal claims, and the focus on perceived readiness excludes objective performance metrics or employer evaluations. Future studies should consider triangulated data sources and longitudinal designs to address these limitations.

Recommendations for Future Research

Future research should include samples from multiple universities, both public and private, to improve generalizability and enable comparative institutional analyses. Longitudinal studies could track skill development across academic years and into early employment. Future research may also explore moderating variables such as program type, socioeconomic background, or digital access to better understand variation in skill development outcomes. Qualitative approaches, such as interviews, focus groups, or classroom observations, would provide deeper insights into how policy initiatives are implemented and experienced. Incorporating employer perspectives or performance-based assessments would strengthen the validation of student-reported readiness. In addition, comparative cross-country studies within other ASEAN countries could provide further insights into differences in policy implementation and effectiveness. Additionally, examining moderating variables such as program type, prior work experience, and access to digital resources could help clarify how and for whom PWDI exerts the strongest effects.

Author Contributions

Kanasin Tunsakul: Conceptualization, investigation, writing – original draft; **Khomson Tunsakul:** Conceptualization, methodology, formal analysis, writing – review & editing.

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