

WORK READINESS AMONG TVET TRAINEES IN TIMOR-LESTE: THE ROLE OF CURRICULUM, INSTRUCTOR COMPETENCE, TRAINING FACILITIES AND INDUSTRY ENGAGEMENT UNDER GOVERNMENT SUPPORT

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ABSTRACT

This study investigates how training quality dimensions and government support shape trainee work-readiness in Timor-Leste's Technical and Vocational Education and Training (TVET) system, a context marked by high youth unemployment and uneven institutional capacity. Drawing on Human Capital Theory, Constructivist Learning Theory, and Skills Ecosystem Theory, the study tests an integrated structural model linking curriculum relevance, instructor competence, training facilities, and industry engagement to work-readiness, with government support as a moderator. Using data from 151 final-term trainees across two accredited Don Bosco institutions, Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted via SmartPLS 4.0. Results show that instructor competence is the only significant direct predictor of work-readiness ($\beta = 0.306$, $p = 0.006$), while other structural inputs were non-significant. Government support showed no significant moderating effects except in enhancing the relationship between industry engagement and work-readiness ($\beta = 0.282$, $p = 0.006$). The model demonstrated moderate explanatory power ($R^2 = 0.507$), predictive relevance ($Q^2_{\text{predict}} > 0$), and acceptable validity, though global model fit (SRMR = 0.095) was marginally suboptimal. The findings highlight that in fragile systems, employability is driven more by human and systemic factors than by formal inputs, underscoring the need to professionalise TVET trainers and foster structured government-industry coordination.

KEYWORDS: TVET; work-readiness; instructor competence; industry engagement; government support; curriculum relevance; training facilities; employability; PLS-SEM; Timor-Leste; human capital development.

I. INTRODUCTION

Rapid technological change, automation, and the Fourth Industrial Revolution have intensified demand for adaptable, digitally literate, and industry-ready workers (World Economic Forum, 2020). In this context, Technical and Vocational Education and Training (TVET) is increasingly viewed as a central pillar of human capital development, particularly in developing and post-conflict settings where youth unemployment and skills mismatches are persistent (UNESCO-UNEVOC, 2013; ADB, 2021). A key outcome of effective TVET systems is work-readiness, understood as the capability to apply technical knowledge, generic skills, and professional attitudes to perform successfully in the workplace (Yorke, 2006; Caballero et al., 2011).

In Timor-Leste, the government has prioritised human capital development through the National Strategic Development Plan 2011-2030, the National Employment Strategy 2017-2030, and the National TVET Plan 2011-2030. The establishment of the Timor-Leste National Qualifications Framework (TLNQF) in 2011 and efforts to align with the both regional and international qualifications reference framework signal an intention to improve quality assurance, regional mobility, and competitiveness (INDMO, 2022). These reforms are informed by international standards from UNESCO, ILO, and the Sustainable Development Goals.

Despite this ambitious policy architecture, the performance of Timor-Leste's TVET sector remains constrained by structural and institutional weaknesses. The labour market in Timor-Leste is characterised by high youth unemployment, limited formal sector opportunities, and a predominance of informal and hybrid livelihoods. Empirical assessments highlight outdated or inconsistent curricula, limited industry participation, inadequate facilities, weak governance, and fragmented accreditation systems (ADB, 2021; SEFOPE, INDMO & APTC, 2022; INDMO, 2024). Trainer quality remains a major bottleneck: INDMO (2024) reports that over half of trainers lack relevant industry experience, and nearly 65% (out of 89 trainers) hold qualifications below an advanced diploma in TVET, most of whom possess only certificates equivalent to secondary education. Only 36.1% of training centres are accredited, and just 44% of curricula meet national standards (INDMO, 2025). Tracer studies show that only 17% of 8,423 graduates secured employment (SEFOPE, INDMO & APTC, 2022), and participation in on-the-job training (OJT) remains low, with just 30% of 178 trainees having been placed in industry settings (INDMO, 2024).

The secondary technical-vocational (ESTV) sub-system reflects similar challenges. While the government has expanded provision to 51 schools with nearly 4,000 graduates annually (INETL, 2024), many institutions lack laboratories, workshops, and qualified teachers, particularly in rural areas (CSEP, 2022; Government of Timor-Leste, 2024). Even stronger performers such as Dom Bosco Fatumaca (ESTV) and Dom Bosco Comoro (CFP) face gaps in facilities, instructor development, and industry engagement (CESP, 2022; INDMO, 2024). Employers continue to report shortages in Information and Communication Technology (ICT), hospitality, construction, mechanical trades, and service occupations, alongside deficits in transversal skills (SEFOPE, 2022).

International literature links employability to four key institutional determinants: curriculum relevance, instructor competence, training facilities, and industry engagement, with government support acting as an enabling condition (e.g., Rasul et al., 2015; Odondi et al., 2022; Abd Wahab et al., 2024). However, little is known about how these factors interact in post-conflict, low-capacity contexts such as Timor-Leste. Existing studies in fragile settings often highlight fragmented governance, weak school-industry linkages, and limited career guidance, but rarely use structural modelling to test multi-factor relationships or to incorporate policy support as a moderating variable.

To address this gap, the present study examines trainees' perceived work-readiness in two accredited TVET institutions in Timor-Leste, analyses how curriculum relevance, instructor competence, training facilities, and industry engagement influence work-readiness, and evaluates whether government support moderates the strength of these relationships.

The study is grounded in Human Capital Theory (HCT), Constructivist Learning Theory (CLT), and Skills Ecosystem Theory (SET), and employs partial least squares structural equation modelling (PLS-SEM) to test a structural model incorporating both direct and moderating effects. By focusing on accredited institutions in a post-conflict environment, the research contributes contextually grounded evidence to global debates on TVET effectiveness, employability, and skills system reform.

II. LITERATURE REVIEW

1) Theoretical Perspectives on TVET and Work-Readiness

a) Human Capital Theory

Human Capital Theory (Schultz, 1961; Becker, 1964, 1993) conceptualises education, training, health, and related attributes as forms of capital which enhance productivity and earnings. In a TVET context, HCT underscores the economic rationale for investment in relevant curricula, qualified instructors, adequate facilities, and quality assurance systems, with the expectation that such investment yields improved employability and national competitiveness.

In Timor-Leste, substantial resources have been invested in accredited training centres and ESTV schools; between 2019 and 2024, 22 centres produced over 10,800 graduates with competency certifications across administration, construction, hospitality, agriculture, auto mechanic, and ICT (INDMO, 2024), and 51 ESTV schools produced around 3,964 graduates in 2023 (INETL, 2024; TATOLI, 2023). Yet employers report continued recruitment difficulties and skill gaps in technical and soft skills (SEFOPE, 2022), indicating that training outputs have not translated into expected human capital returns (SEFOPE, INDMO, APTC 2022).

HCT, however, has recognised limitations. It often assumes efficient labour markets, strong governance, and linear links between training and employment, with limited attention to learning processes, implementation quality, and structural constraints (Oketch, 2007). In fragile contexts where informality, institutional weakness, and uneven policy enforcement are prevalent, these assumptions may not hold, necessitating complementary theoretical lenses.

b) Constructivist Learning Theory

Constructivist Learning Theory (Piaget, 1972; Vygotsky, 1978; Bruner, 1996) views learning as an active process in which learners construct knowledge through engagement with real-world tasks, reflection, and social interaction. In TVET, constructivist principles underpin project-based learning, simulated workplaces, competency-based training, and reflective assessment (Biggs & Tang, 2011; Chand,

2023). These approaches align with Outcome-Based Education (OBE), which emphasises demonstrable competence rather than time-based inputs.

Constructivism complements HCT by explaining how investment in TVET translates (or fails to translate) into employability. If pedagogy is predominantly didactic, practical exposure is limited, or On-the-Job-Training (OJT) is weak, the potential of training to build work-readiness is undermined, even when infrastructure and curricula exist on paper.

In Timor-Leste, evidence of lecture-dominated teaching, limited access to modern equipment, and uneven OJT opportunities suggests that constructivist principles are only partially operationalised. The fact that majority of trainers lack industry experience and holds below advanced diploma level (INDMO, 2024) and many schools and training centers lack functional workshops and laboratories (CSEP, 2022; INDMO, 2024) directly constrains experiential learning.

c) Skills Ecosystem Theory

Skills Ecosystem Theory (Finegold, 1999; Buchanan et al., 2001) frames skills formation as a systemic process shaped by interactions among TVET institutions, employers, government agencies, industry bodies, unions, and communities. High-performing “skills ecosystems” exhibit coherent strategies, strong feedback loops between training and labour markets, and well-functioning quality assurance.

In Timor-Leste, instruments such as the National TVET Plan, TLNQF, and the National Employment Strategy aim to build a more coherent ecosystem. However, only 36.1% of providers are accredited (INDMO, 2025) and 44% of curricula aligned to national standards (INDMO, 2025), and employers continue to report skills shortages and weak engagement (SEFOPE, 2022). These patterns point to an incomplete or fragmented skills ecosystem.

2) Work-Readiness, Employability, and TVET

Work-readiness, often used interchangeably with employability, refers to preparedness to secure and sustain meaningful employment through the combination of technical skills, workplace behaviours, and personal attributes (Yorke, 2006; Nurjanah & Ana, 2022). Contemporary frameworks include cognitive, socio-emotional, and adaptive capacities, such as problem-solving, communication, teamwork, digital literacy, and readiness for lifelong learning (Jackson, 2016).

International studies show that TVET can improve employment outcomes when programmes are industry-responsive and supported by strong school-industry partnerships. However, results are context-dependent. In the Philippines, Mariano and Tantoco (2023) reported high employment rates among TVET graduates but noted persistent employer concerns about communication and soft skills. In Nepal, Chakravarty et al. (2019) found that short-term skills programmes increased non-agricultural employment but had limited impact in rural economies.

Institutional constraints such as fragmented governance, outdated curricula, weak career guidance, and limited industry collaboration are frequently associated with poor school-to-work transitions (Ramadan et al., 2019; Popova & Panzica, 2020; Owusu-Agyeman & Aryeh-Adjei, 2024;). Studies in the context of Industry 4.0 highlight gaps in digital readiness and underscore the need for dual training models and industry-defined learning projects (Nurjanah & Ana, 2022; Sudarsono et al., 2024).

Across this literature, instructors consistently emerge as key intermediaries. Evidence from Malaysia, Africa and other regions shows that trainers who combine technical mastery, industry exposure, and strong pedagogy significantly enhance learners' confidence and job preparedness (Abdullah et al., 2022; Abd Wahab et al., 2024). Where Continuous Professional Development (CPD) opportunities are limited and many trainers lack industry experience—as in Timor-Leste—the capacity of TVET institutions to deliver work-readiness-oriented training is seriously constrained (SEFOPE, INDMO and APTC, 2024).

3) TVET Quality Dimensions and Government Support

Empirical studies highlight four core institutional determinants of TVET quality: curriculum relevance, instructor competence, training infrastructure, and industry engagement. Each of these dimensions is crucial for improving outcomes in technical and vocational programs:

- a) **Curriculum Relevance** - This refers to aligning program content with current occupational standards and emerging labor market needs. Strong links between vocational training curricula and industry requirements are essential to ensure skills taught are up-to-date and valued in real-world settings (Owusu-Agyeman & Aryeh-Adjei, 2024). Conversely, outdated or generic curricula often lead to skills mismatches, contributing to graduate underemployment or unemployment, and reinforcing negative perceptions of TVET as a "second-tier" option (Ramadan et al., 2019).
- b) **Instructor Competence** - This encompasses educators' professional qualifications, industry experience, and pedagogical expertise. Effective TVET instructors typically possess deep technical knowledge along with practical experience in their trade, ensuring training is grounded in current industry practices (Paryono, 2015). They also require strong teaching skills to impart both technical and soft (socio-emotional) skills. Critically, instructors serve as role models and mentors, instilling workplace-oriented behaviors and values in students. For example, high-performing TVET teachers provide guidance and mentorship that help students develop a strong work ethic and positive attitudes toward their future careers (World Bank, 2023).
- c) **Training Infrastructure** - This dimension refers to the adequacy and quality of facilities, workshops, tools, machinery, and digital technologies used for training. Sufficient investment in modern training infrastructure is vital. If equipment and materials are outdated or insufficient, the educational experience is compromised and students cannot acquire relevant practical skills (UNESCO-UNEVOC, 2021; Odondi et al., 2022). Employers consistently note that training facilities

and equipment are critical for the overall quality and relevance of skills programs (Hằng, 2021). Indeed, studies have found that TVET schools with less-modern equipment produce graduates with skills that do not meet current industry standards (SEFOPE, INDMO, and APTC, 2022).

- d) **Industry Engagement** – This entails structured participation of employers in various aspects of TVET delivery, including curriculum design and review, training delivery, assessment, internships (industrial attachments), and job placements. Research from Uganda identified five key forms of employer involvement in quality TVET: contributing to curriculum development, offering industrial attachments, partnering with institutions, supporting community-based training, and engaging in outreach initiatives (ADB, 2014). Such collaboration ensures that training content remains aligned with industry needs and that students gain authentic work experience during their studies. Development agencies emphasize that structured cooperation with the private sector in TVET planning and delivery, particularly via work-based learning, is essential to produce demand-driven skills (SEFOPE, INDMO, and APTC, 2022). These partnerships enhance authentic learning and ease students' transition into employment.

Government support is a crucial, though often indirect, enabler of quality in Technical and Vocational Education and Training (TVET), covering policies, regulatory frameworks, funding mechanisms, and coordination arrangements (Bussi et Al., 2025). Addressing quality gaps in TVET's dimensions—such as curricula, instructor training, and facilities—is critical and necessitates strong governmental backing through policy, funding, and institutional frameworks (Veung Naron and Ven Seyhah, 2021). Governments play a pivotal role in updating curricula, training instructors, modernizing facilities, and fostering public-private partnerships for apprenticeships and employment. Studies across countries like Malaysia, the Philippines, Ghana, and Nigeria highlight that policy coherence and sustained investment are vital for aligning these elements (curricula, trainer development, infrastructure, and industry collaboration) with evolving labor market needs (Rasul et al., 2015; Ismail et al., 2017; Popova & Panzica (2020); Owusu-Agyeman et al., 2024). Ultimately, while government support is foundational to systemic reforms and quality improvement, it typically acts by enabling other factors, making it an indirect determinant rather than a direct operator of graduate employability (SEFOPE, INDMO, and APTC, 2022).

4) Research Gap

Although curriculum relevance, trainer competence, infrastructure, and industry engagement are widely recognised as critical components of effective TVET systems, several gaps remain. Few studies analyse these dimensions simultaneously within a structural modelling framework, and while the moderating role of government support is often discussed conceptually, it is seldom tested empirically. Moreover, evidence from post-conflict and low-capacity contexts—where labour markets, institutional capability, and governance conditions differ markedly from more developed settings—remains limited.

In Timor-Leste, this gap is particularly acute. TVET policies and frameworks exist, but empirical evidence on how institutional factors and policy support jointly shape trainee work-readiness is scarce. This study responds by modelling work-readiness as a function of four training quality dimensions, with government support as a contextual moderator, using PLS-SEM in a post-conflict TVET system.

III. METHODOLOGY

A. Integrated Conceptual Framework

Drawing from Human Capital Theory (HCT), Constructivist Learning Theory (CLT), and Skills Ecosystem Theory (SET), this study proposes an integrated framework that explains how training quality and contextual support jointly shape trainee work-readiness within the TVET system of Timor-Leste. Three core propositions guide the framework.

First, key training quality dimensions—Curriculum Quality (CQ), Instructor Competence (IC), Training Infrastructure (TI), and Industry Engagement (IE)—are expected to influence trainees' work-readiness (WR). These dimensions represent the pedagogical, material, and experiential components of competency-based education and align with the human capital perspective that investment in structured, quality training enhances skill acquisition and productivity (Becker, 1993; Psacharopoulos and Patrinos, 2018).

Second, Government Support (GS) is conceptualised as a moderating factor that can strengthen or weaken the effects of these training quality dimensions. Government involvement—including policy clarity, funding mechanisms, partnership facilitation, and quality assurance—is recognised as an enabling institutional condition within skills ecosystems (Buchanan et al., 2001; Wheelahan, 2016). When effectively operationalised, government support enhances coordination between training institutions and employers, amplifying the impact of training inputs.

Third, Work-Readiness (WR) is treated as a multidimensional construct encompassing technical skills, soft skills, behavioural attributes, and confidence to perform workplace tasks. This broad conceptualisation is consistent with contemporary employability frameworks emphasising both cognitive and non-cognitive competencies (Yorke, 2006; Clarke, 2018).

HCT provides the economic justification for linking training inputs to employability outcomes. CLT highlights the critical mediating role of instructors and practice-oriented learning environments, emphasising that learning is socially constructed and facilitated through active engagement (Vygotsky, 1978; Bruner, 1996). SET underscores the systemic interdependence among training providers, employers, and government agencies, supporting the inclusion of industry engagement and policy support as central elements of the framework (Buchanan et al., 2001; Finegold, 1999).

As illustrated in Figure 1, the conceptual model positions CQ, IC, TI, and IE as direct predictors of WR, while GS moderates each of these relationships through interaction effects.

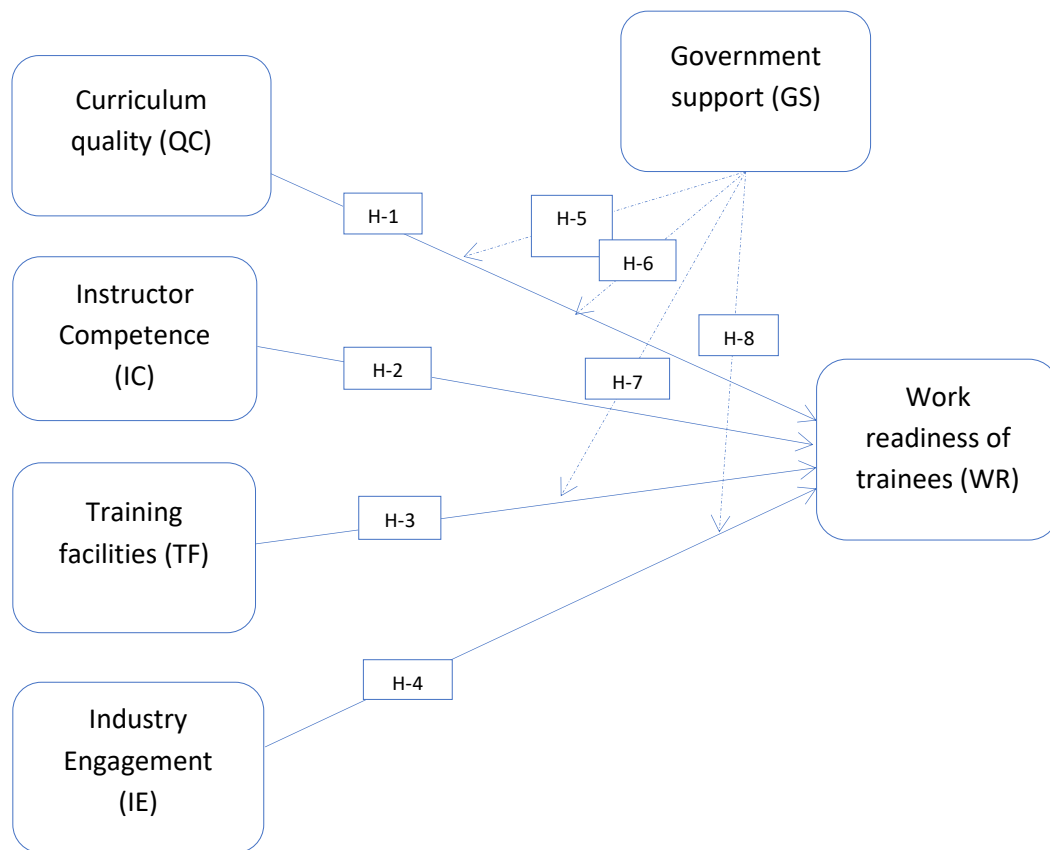


Figure 1. Research Framework

B. Hypotheses Development

a) Direct Effects

Grounded in Human Capital Theory (HCT), Constructivist Learning Theory (CLT), and Skills Ecosystem Theory (SET), the study proposes that core dimensions of TVET quality shape trainee work-readiness. HCT emphasises the economic returns of investing in relevant curricula, competent instructors, and functional training facilities. CLT highlights the central role of instructors and hands-on learning environments in enabling skill acquisition. SET underscores the importance of effective interaction between training institutions, employers, and government agencies. On this basis, the following direct-effect hypotheses are formulated:

- a) **H1:** Curriculum Quality has a significant positive effect on Work-Readiness (Owusu-Agyeman & Aryeh-Adjei, 2024; Ramadan et al., 2019).
- b) **H2:** Instructor Competence has a significant positive effect on Work-Readiness (Paryono, 2015; World Bank, 2023; Abdullah et al., 2022; Abd Wahab et al., 2024; Vygotsky, 1978).

- c) **H3:** Training Infrastructure has a significant positive effect on Work-Readiness (UNESCO-UNEVOC, 2021; Odondi et al., 2022; Hång, 2021; Becker, 1964).
- d) **H4:** Industry Engagement has a significant positive effect on Work-Readiness (ADB, 2014; Finegold, 1999).

b) Moderating Effects of Government Support

Although empirical studies directly testing government moderation in TVET contexts are limited—particularly in post-conflict and low-capacity settings—there is strong theoretical justification for expecting government involvement to shape the strength of relationships between training quality and work-readiness.

From an HCT perspective, coordinated policies, funding, and quality assurance systems create enabling conditions for training inputs to yield employability outcomes. CLT suggests that supportive institutional environments enhance pedagogical quality and experiential learning. SET conceptualises government as a key system coordinator whose interventions strengthen linkages between TVET institutions, employers, and labour markets.

Accordingly, Government Support is hypothesised to enhance the influence of each training quality dimension on work-readiness:

- H5:** Government Support positively moderates the relationship between Curriculum Quality and Work-Readiness.
- H6:** Government Support positively moderates the relationship between Instructor Competence and Work-Readiness.
- H7:** Government Support positively moderates the relationship between Training Infrastructure and Work-Readiness.
- H8:** Government Support positively moderates the relationship between Industry Engagement and Work-Readiness.

This study employed a quantitative, explanatory, cross-sectional design to examine the relationships among training quality dimensions, government support, and trainee work-readiness in Timor-Leste. Partial Least Squares Structural Equation Modeling (PLS-SEM) was conducted using SmartPLS 4.0, following methodological recommendations for prediction-oriented research, complex models with interaction terms, and datasets with moderate sample sizes or non-normal distributions (Hair et al., 2019; Hair et al., 2021; Hair et al., 2024).

The study targeted all 160 final-term trainees enrolled in two accredited Dom Bosco TVET institutions—Comoro and Fatumaca—across priority technical fields including electrical installation, construction, mechanics, welding, and carpentry. A census approach was used to maximise representativeness, enabling the inclusion of the entire population of final-term trainees from the selected institutions.

Regarding sample adequacy, the final sample met the methodological requirements for PLS-SEM, as it exceeded the minimum threshold recommended by the “10-times rule,” which was based on the maximum number of structural paths directed toward the endogenous construct, thereby confirming the suitability of the dataset for the analytical procedures applied (Hair et al., 2019).

Data were collected using a structured questionnaire consisting of demographic variables and seven reflective constructs: curriculum quality, instructor competence, training facilities, industry engagement, government support, and work-readiness. All items were adapted from validated instruments and contextualised to the Timor-Leste TVET environment. Instrument development followed established procedures including expert review, forward-backward translation, and pilot testing, with final items assessed on a 5-point Likert scale.

Ethical approval was obtained from the Institute of Business Research Ethics Committee, and institutional permissions were secured. Participation was voluntary, informed consent was collected, and confidentiality assured. Data collection took place in classrooms between September and October 2025 using paper-based questionnaires administered in Tetum. No identifying information was collected, and both paper and digital data were stored securely in accordance with institutional ethical guidelines.

Data analysis was conducted using SmartPLS 4.0, following the two-stage approach recommended for Partial Least Squares Structural Equation Modeling (PLS-SEM) (Hair et al., 2021; Hair et al., 2024). In the first stage—the measurement model assessment—the reliability and validity of the reflective constructs were examined using standard criteria. Internal consistency reliability was assessed through Cronbach’s alpha and Composite Reliability ($CR \geq 0.70$), convergent validity through the Average Variance Extracted ($AVE \geq 0.50$), and discriminant validity using both the Fornell-Larcker criterion and the Heterotrait-Monotrait ratio (HTMT), applying conservative thresholds between 0.85 and 0.90. This ensured that each construct demonstrated adequate internal consistency and empirical distinctiveness prior to testing the structural relationships.

In the second stage—the structural model assessment—the hypothesised relationships among the constructs were evaluated using path coefficients (β), statistical significance via bootstrapping with 5,000 resamples, and the coefficient of determination (R^2) to determine explanatory power (Hair et al., 2021). Effect sizes (f^2) were calculated to assess the practical contribution of each predictor, and predictive relevance (Q^2) was examined using the blindfolding procedure. Approximate model fit indices, including the Standardized Root Mean Square Residual (SRMR), were reported in line with recent PLS-SEM guidelines (Hair et al., 2024). Moderation analysis was conducted by generating interaction terms for all hypothesised moderating effects ($GS \times CQ$, $GS \times IC$, $GS \times TF$, $GS \times IE$), following established procedures for testing interaction effects within the PLS-SEM framework.

IV. RESULTS

C. Sample Characteristics

This study employed a census-based approach targeting all 160 final-term trainees from two accredited TVET institutions under INDMO, I.P. A total of 151 valid responses were obtained (94% response rate), ensuring strong representativeness and a low margin of error ($\pm 2.6\%$ at 95% confidence), consistent with recommendations for small-population studies (Kothari, 2004; Creswell, 2014). Descriptive statistics were used to summarise key demographic characteristics—gender, age group, field of training, and institutional affiliation—which provide an important contextual foundation for interpreting trainees’ perceptions of curriculum quality, instructor competence, training facilities, industry engagement, government support, and overall work-readiness. The detailed demographic distribution is shown in Table 1.

Table 1. Demographic Distributions

1. Variable	2. Category	3. Frequency (n)	4. Percentage (%)
5. Gender	6. Male	7. 147	8. 97%
	9. Female	10. 4	11. 3%
12. Age Group	13. 15-20 years	14. 96	15. 64%
	16. 21 - 25 years	17. 51	18. 34%
	19. 26 - 30 years	20. 3	21. 2%
	22. 30 + years	23. 1	24. 1%
25. Institution	26. ESTV DB Fatumaca	27. 72	28. 48%
	29. CFPP DB Comoro	30. 79	31. 52%
32. Programme/Trade	33. Automotive Mechanic	34. 45	35. 30%
	36. Bricklaying	37. 4	38. 3%
	39. Carpentry	40. 22	41. 15%
	42. Electrical	43. 21	44. 14%
	45. Electronic	46. 19	47. 13%
	48. Metal Fabrication/Mechanic	49. 15	50. 10%
	51. Plumbing	52. 6	53. 4%

	54. Refrigeration and Air Conditioning	55. 12	56. 8%
	57. Welding	58. 7	59. 5%
60. Certificate Level	61. Level II	62. 79	63. 52%
	64. Level III or equivalent	65. 72	66. 48%
67. Municipality of Origin	68. Aileu	69. 2	70. 1%
	71. Ainaro	72. 0	73. 0%
	74. Atauro	75. 0	76. 0%
	77. Baucau	78. 60	79. 40%
	80. Bobonaro	81. 7	82. 5%
	83. Covalima	84. 2	85. 1%
	86. Dili	87. 35	88. 23%
	89. Ermera	90. 4	91. 3%
	92. Lautem	93. 16	94. 11%
	95. Liquiça	96. 4	97. 3%
	98. Manatuto	99. 3	100. 2%
101. Manufahi	102. 4	103. 3%	
104. Oecusse	105. 12	106. 8%	
107. Viqueque	108. 2	109. 1%	

Of the 151 respondents, 147 were male and only four were female, reflecting a strong gender imbalance in technical TVET participation. ESTV Dom Bosco Fatumaca contributed 72 respondents (69 male, 3 female), while CFP Dom Bosco Comoro contributed 79 (78 male, 1 female). Learners in Fatumaca were predominantly aged 15-20, whereas Comoro displayed a more diverse age profile, with concentrations in the 21-25 group and smaller cohorts aged 26-30 and above 30, indicating the presence of older or second-chance learners. Trainees were enrolled in Certificate II and III programmes across automotive mechanics, bricklaying, carpentry, electrical, electronics, metal fabrication, plumbing, refrigeration and air-conditioning, and welding. Participants originated from several municipalities, with strong representation from Baucau, Dili, Lautém, and Oecusse, and more limited representation from other regions.

D. Descriptive Statistics of Key Constructs

A descriptive analysis was conducted to examine trainees’ perceptions of six core constructs: curriculum relevance, instructor competence, training facilities, industry engagement, government support, and work-readiness. All items were measured on a five-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). Overall, the results demonstrate **consistently positive evaluations**, with mean values ranging from *Agree* to *Strongly Agree* and low-to-moderate variability across indicators. Table 2 presents a summary of respondents’ mean scores and standard deviations across all constructs.

Table 2. Summary of Respondents’ Perceptions across Study Constructs

110. Const ructs	111. Indicator	112. S D	113. D	114. N	115. A	116. S A	117. M ean	118. Stan dard Deviation	119. Interpr etation
120. Curric ulum relevance (CR)	121. X1.1 The skills I learn in my curriculum are relevant to the needs of the job market in Timor-Leste.	122. 3	123. 4	124. 2	125. 8	126. 3	127. 3.9	128. 0.82	129. Agree
	130. X1.2 -The curriculum includes a balance of technical and soft skills (e.g., work-ethics, communication , teamwork).	131. 1	132. 0	133. 8	134. 4	135. 9	136. 4.5	137. 0.66	138. Strongly Agree
	139. X1.3 - The learning outcomes of my program are clear and easy to understand.	140. 1	141. 1	142. 1	143. 8	144. 5	145. 4.2	146. 0.69	147. Strongly Agree

	148. X1.4 - The curriculum emphasizes practical, hands-on and project-based learning rather than only theory.	149. 1	150. 8	151. 1 8	152. 8 4	153. 4 0	154. 4.0 2	155. 0.81	156. Agree
	157. X1.5 - My curriculum helps me adapt to new and emerging skills needed in the workplace.	158. 1	159. 1	160. 1 4	161. 6 6	162. 6 9	163. 4.3 3	164. 0.73	165. Strongly Agree
166. Instructor Competence (IC)	167. X2.1 - My instructors have strong practical experience from working in the industry.	168. 2	169. 0	170. 2 2	171. 7 8	172. 4 9	173. 4.1 4	174. 0.76	175. Agree
	176. X2.2 - My instructors are effective at explaining complex topics and demonstrating skills.	177. 0	178. 4	179. 1 1	180. 8 2	181. 5 4	182. 4.2 3	183. 0.70	184. Strongly Agree
	185. X2.3 - My instructors encourage an active, hands-	186. 0	187. 2	188. 7 3	189. 5 9	190. 8 2	191. 4.5	192. 0.65	193. Strongly Agree

	on learning environment.								
	194. X2.4 - My instructors are well-qualified and continuously update their professional knowledge.	195. 3	196. 1	197. 1	198. 7	199. 6	200. 4.2	201. 0.80	202. Strongly Agree
				3	4	0	4		
	203. X2.5 - My instructors foster critical thinking and problem-solving in class.	204. 3	205. 3	206. 207. 8	208. 7	209. 6	210. 4.2	211. 0.81	212. Strongly Agree
					3	4	7		
213. Training Facilities (TF)	214. X3.1 - The institution has adequate tools and equipment for practical skills training.	215. 3	216. 3	217. 1	218. 6	219. 6	220. 4.2	221. 0.84	222. Strongly Agree
				2	9	4	5		
	223. X3.2 - The facilities are modern and comparable to those used in the workplace.	224. 2	225. 1	226. 2	227. 8	228. 3	229. 4.0	230. 0.73	231. Agree
				1	9	8	6		
	232. X3.3 - The training environment (workshops/classrooms) is safe, clean, and	233. 0	234. 2	235. 9	236. 4	237. 9	238. 4.5	239. 0.67	240. Strongly Agree
					8	2	2		

	well-maintained.									
	241. X3.4 - I	242. 1	243. 4	244. 1	245. 7	246. 5	247. 4.2	248. 0.77	249. Strongly Agree	
	have access to relevant digital and environmental ly sustainable ("green") facilities that support my learning.			4	4	8	2			
250. Industry engagement (IE)	251. X4.1 - Employers are actively involved in the design or review of our curriculum.	252. 1	253. 2	254. 2	255. 8	256. 4	257. 4.0	258. 0.722	259. Agree	
				1	5	2	93			
	260. X4.2 - My training program includes internships or workplace-based learning opportunities.	261. 1	262. 1	263. 1	264. 7	265. 4	266. 4.0	267. 0.872	268. Agree	
			0	9	4	7	33			
	269. X4.3 - My institution regularly collects feedback from employers to improve training.	270. 3	271. 5	272. 1	273. 8	274. 4	275. 4.0	276. 0.829	277. Agree	
				7	6	0	26			

	278. X4.4 - I	279. 9	280. 1	281. 3	282. 7	283. 2	284. 3.6	285. 1.022	286. Agree (lower)
	participate in industry visits, immersion, or guest lectures.		0	5	3	4	16		
	287. X4.5 - My	288. 2	289. 3	290. 2	291. 7	292. 5	293. 4.1	294. 0.831	295. Agree
	institution helps me connect with employers for networking and job opportunities.			4	0	2	06		
296. Govern ment support (GS)	297. Z1 - The government provides adequate funding and resources to improve TVET institutions.	298. 3	299. 2	300. 3	301. 5	302. 5	303. 4.0	304. 0.722	305. Agree
				4	8	4	93		
	306. Z2 - Government policies encourage partnerships between TVET institutions and private companies.	307. 3	308. 6	309. 3	310. 8	311. 3	312. 4.0	313. 0.872	314. Agree
				0	0	2	33		
	315. Z3 - Government accreditation and quality assurance strengthen my	316. 0	317. 6	318. 2	319. 8	320. 4	321. 4.0	322. 0.829	323. Agree
				0	3	2	26		

	program's credibility.								
324. Z4	-	325. 1	326. 6	327. 2	328. 7	329. 4	330. 3.6	331. 1.022	332. Agree (lower)
Government			2	4	8	16			
	reviews and updates TVET policies to meet economic and labour market needs.								
333. Z5	-	334. 1	335. 2	336. 1	337. 7	338. 6	339. 4.1	340. 0.831	341. Strongly Agree
Government			5	1	2	06			
	support helps align TVET qualifications with international frameworks (e.g., ASEAN, CPLP).								
342. Trainees Work readiness (TWR)	343. Y1.1 - I am confident in my technical skills to perform my job effectively after graduation.	344. 1	345. 1	346. 2	347. 4	348. 9	349. 4.6	350. 0.619	351. Strongly Agree
				8	9	09			
	352. Y1.2 - My training has prepared me with soft skills (e.g., communication, teamwork, problem-	353. 0	354. 2	355. 1	356. 5	357. 9	358. 4.5	359. 0.644	360. Strongly Agree
				2	6	89			

<p>solving, work ethics, and discipline).</p>									
361. Y1.3 - I believe I can adapt quickly to new tasks and challenges in the workplace.	362. 0	363. 2	364. 6	365. 7 4	366. 6 9	367. 4.3 91	368. 0.630	369. Strongly Agree	
370. Y1.4 - I am confident that I can successfully find employment in my chosen field after graduation.	371. 1	372. 1	373. 2	374. 5 2	375. 9 5	376. 4.5 83	377. 0.624	378. Strongly Agree	
379. Y1.5 My training has motivated me to pursue lifelong learning and continuous skill development.	380. 3	381. 0	382. 3	383. 6 3	384. 8 2	385. 4.4 64	386. 0.726	387. Strongly Agree	
388. Y1.6 - Employers who interacted with me during training gave positive feedback on my skills.	389. 2	390. 1	391. 4	392. 8 2	393. 6 2	394. 4.3 31	395. 0.688	396. Strongly Agree	

Trainees reported strong positive perceptions across all constructs. Curriculum quality received high mean scores (3.97–4.55), reflecting confidence in relevance, clarity, and integration of employability skills, though hands-on learning components showed slightly greater variability. Instructor competence was a major institutional strength (4.14–4.52), particularly regarding instructors' ability to facilitate active, practice-oriented learning, communicate complex concepts, and maintain updated knowledge. Training facilities were also rated favourably (4.06–4.52), especially in terms of safety, cleanliness, and adequacy of tools, though the modernity of equipment relative to industry standards was identified as an improvement area.

Industry engagement displayed the widest variability (3.62–4.11), with trainees acknowledging curriculum consultation and workplace-based learning opportunities but noting inconsistencies in industry visits, guest lectures, and immersion activities. Perceptions of government support were generally positive (3.62–4.11), particularly regarding qualification alignment with regional frameworks and accreditation processes, although responsiveness of policy updates to labour market needs was rated lower. Work-readiness emerged as the strongest construct (4.33–4.61), with trainees expressing high confidence in their technical skills, soft skills, employability, and adaptability.

E. Measurement Model

Inferential analysis was conducted using SmartPLS 4.0 to implement a Partial Least Squares Structural Equation Model (PLS-SEM). This two-stage analytical approach involved (i) evaluating the measurement model and (ii) assessing the structural model (Hair et al., 2021). PLS-SEM uses an iterative algorithm that alternates between estimating the measurement and structural components until optimal explained variance and predictive accuracy are achieved. This aligns with the predictive-oriented philosophy of PLS-SEM, making it suitable for exploratory and theory-building research.

Stage 1: Evaluation of the Measurement Model

The first stage of PLS-SEM involved assessing the reliability and validity of the reflective constructs before testing the hypothesised relationships.

a) Convergent Validity

Convergent validity was assessed using factor loadings and the Average Variance Extracted (AVE) following established PLS-SEM criteria (Hair et al., 2021). As reported in **Table 3**, most indicators exceeded the recommended loading threshold of 0.50; however, two Curriculum Relevance items—X1.1 (0.351) and X1.4 (0.365)—fell below this criterion. These items were removed, and the model was re-estimated. The revised outer model, with all remaining indicators loading above 0.50 and AVE values ≥ 0.50 , is presented in **Figure 3**, confirming satisfactory convergent validity across constructs.

Table 3. Loading factor

397. Construct	398. Indicator	399. Loading factor	
400. X1. Curriculum relevance	401. X1.1	402. 0.351	
	403. X1.2	404. 0.750	
	405. X1.3	406. 0.741	
	407. X1.4	408. 0.365	
	409. X1.5	410. 0.808	
411. X2. Instructor competence	412. X2.1	413. 0.826	
	414. X2.2	415. 0.861	
	416. X2.3	417. 0.576	
	418. X2.4	419. 0.733	
	420. X2.5	421. 0.737	
422. X3. Training Facility	423. X3.1	424. 0.697	
	425. X3.2	426. 0.819	
	427. X3.3	428. 0.667	
	429. X3.4	430. 0.860	
431. X4. Industry engagement	432. X4.1	433. 0.722	
	434. X4.2	435. 0.769	
	436. X4.3	437. 0.878	
	438. X4.4	439. 0.541	
	440. X4.5	441. 0.719	
442. Y1. Trainee Work-readiness	444. Y1.1	445. 0.827	
	446. Y1.2	447. 0.850	
	448. Y1.3	449. 0.823	
	443.	450. Y1.4	451. 0.874
	452. Y1.5	453. 0.898	
	454. Y1.6	455. 0.792	
456. Z1. Government Support	457. Z1.1	458. 0.788	

	459. Z1.2	460. 0.692
	461. Z1.3	462. 0.697
	463. Z1.4	464. 0.662
	465. Z1.5	466. 0.753

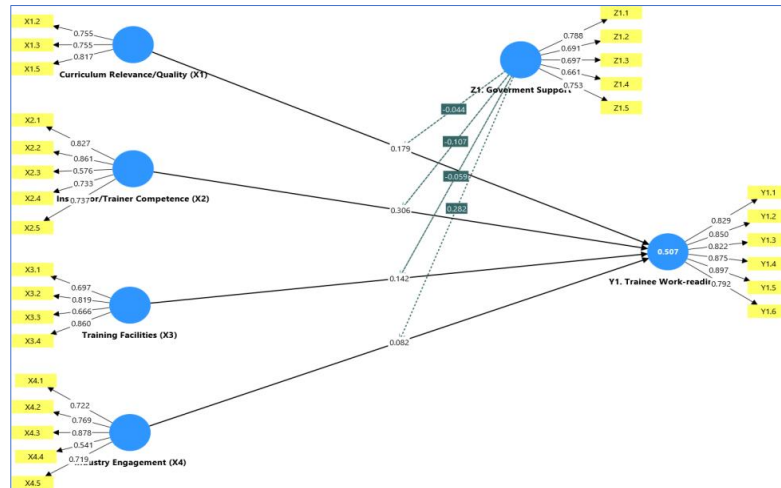


Figure 2. Graphical output of the initial outer model after refinement

b)Discriminant Validity

Discriminant validity was assessed using both the Fornell-Larcker criterion and the Heterotrait-Monotrait Ratio (HTMT). The Fornell-Larcker results in Table 4 indicate that the square root of each construct’s AVE was greater than its correlations with other constructs, confirming clear construct distinctiveness. HTMT values, also shown in Table 4, remained below the conservative 0.85 threshold for most construct pairs, with one exception: Curriculum Relevance and Instructor Competence exhibited an HTMT value of 0.867. This slight exceedance is acceptable given their conceptual proximity within TVET instructional processes and remains below the liberal 0.90 threshold widely used for theoretically related constructs. Overall, results confirm that the measurement model demonstrates strong convergent and discriminant validity, supporting its suitability for structural model analysis.

Table 4. Combined Discriminant Validity: Fornell-Larcker Criterion (below diagonal) and HTMT (above diagonal)

467. Construct	468. X1: Curriculum	469. X2: Instructor	470. X3: Facilities	471. X4: Industry	472. Y1: Work- Readiness	473. Z1: Gov't Support
474. X1: Curriculum Relevance/Quality	475. 0.775	476. 0.867	477. 0.704	478. 0.621	479. 0.679	480. 0.370
481. X2: Instructor/Trainer Competence	482. 0.636	483. 0.753	484. 0.770	485. 0.659	486. 0.694	487. 0.534
488. X3: Training Facilities	489. 0.501	490. 0.594	491. 0.766	492. 0.618	493. 0.571	494. 0.570
495. X4: Industry Engagement	496. 0.468	497. 0.659	498. 0.618	499. 0.742	500. 0.530	501. 0.709
502. Y1: Trainee Work-Readiness	503. 0.541	504. 0.623	505. 0.511	506. 0.530	507. 0.845	508. 0.406
509. Z1: Government Support	510. 0.281	511. 0.436	512. 0.478	513. 0.570	514. 0.379	515. 0.737

F. Reliability Test

Reliability was examined using Cronbach’s Alpha, Composite Reliability (rho_a and rho_c), and AVE, with results also summarised in Table 5. All constructs met the minimum reliability thresholds. Although Curriculum Relevance recorded a slightly lower Cronbach’s Alpha (0.670), its Composite Reliability (0.819) exceeded the recommended level—acceptable within PLS-SEM, where Composite Reliability is considered a more robust indicator of internal consistency. Trainee Work-Readiness displayed the strongest reliability across all latent constructs.

Table 5. Reliability Test

516. Construct	517. Cronbach's Alpha	518. Composite Reliability (rho_a)	519. Composite Reliability (rho_c)	520. Average Variance Extracted (AVE)
521. X1. Curriculum relevance	522. 0.670	523. 0.673	524. 0.819	525. 0.602
526. X2. Instructor competence	527. 0.807	528. 0.837	529. 0.866	530. 0.567
531. X3. Training Facility	532. 0.768	533. 0.826	534. 0.848	535. 0.585
536. X4. Industry engagement	537. 0.793	538. 0.814	539. 0.851	540. 0.539
541. Y1. Trainee Work-readiness	542. 0.920	543. 0.925	544. 0.937	545. 0.714
546. Z1. Government Support	547. 0.792	548. 0.850	549. 0.842	550. 0.518

Stage 2: Structural Model Assessment

The structural model was assessed to examine the hypothesised relationships among the latent constructs. Bootstrapping with **5,000 resamples** was employed to generate robust estimates of the path coefficients, standard errors, and significance levels, consistent with PLS-SEM's non-parametric foundations and its independence from normality assumptions (Hair et al., 2021). **Figure 5** presents the inner model results, including the magnitude and direction of the structural paths, while subsequent tables provide detailed statistical outputs for hypothesis testing.

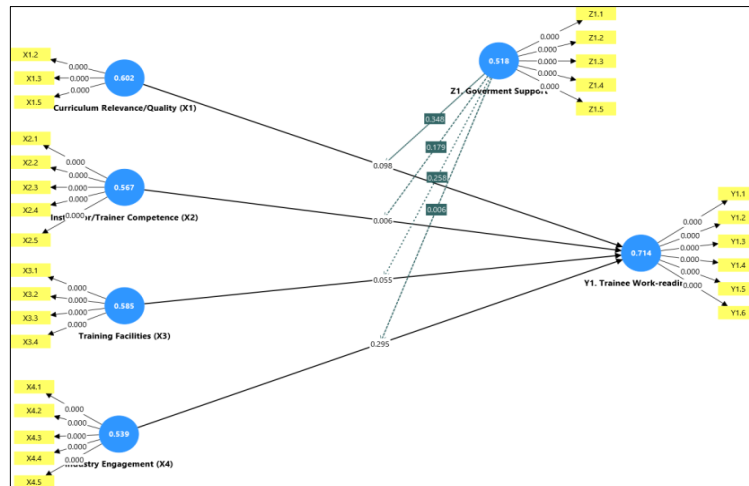


Figure 3. Graphical Output of the Inner Model Results

G. Coefficient of Determination (R²)

The coefficient of determination (R²) assesses the explanatory power of the model by indicating how much variance in the endogenous construct is explained by its predictors. In PLS-SEM, R² values of 0.25, 0.50, and 0.75 are typically interpreted as weak, moderate, and substantial respectively (Hair et al., 2021). As shown in Table 6, the model yielded an R² of 0.507 (adjusted R² = 0.475) for trainee work-readiness, indicating that curriculum relevance, instructor competence, training facilities, industry engagement, and the moderating effects of government support collectively explain 50.7% of its variance. This represents a moderate level of explanatory power and suggests that institutional and instructional factors play a meaningful role in shaping trainees’ perceived work-readiness.

Table 6. R-Squared Coefficient

551. Construct	552. R-square	553. R-square adjusted
554. Y1. Trainee Work-readiness	555. 0.507	556. 0.475

H. Effect Size (f²)

Effect size (f²) analysis was used to assess the practical contribution of each predictor to trainee work-readiness. Based on Cohen’s (1988) thresholds (0.02 = small, 0.15 = medium, 0.35 = large), the results (Table 7) indicate that Curriculum Relevance (f² = 0.032), Instructor Competence (f² = 0.073), and Government Support (f² = 0.037) exert small but meaningful effects, while Training Facilities (f² = 0.019) and Industry Engagement (f² = 0.005) have negligible influence. Moderation effects were similarly modest, with only Government Support × Industry Engagement reaching a

small effect ($f^2 = 0.058$). Overall, the predictors demonstrate limited substantive impact, reinforcing the comparatively stronger role of instructor competence and targeted policy-industry coordination in shaping work-readiness.

Table 7. Effect Size (f^2) Values

557. Construct	558. f^2
559. X1. Curriculum relevance	560. 0.032
561. X2. Instructor competence	562. 0.073
563. X3. Training Facility	564. 0.019
565. X4. Industry engagement	566. 0.005
567. Z1. Government Support	568. 0.037
569. Z1 × X2. Instructor competence	570. 0.010
571. Z1 × X1. Curriculum relevance	572. 0.002
573. Z1 × X3. Training Facility	574. 0.005
575. Z1 × X4. Industry engagement	576. 0.058

To assess the significance and strength of the hypothesized relationships, a bootstrapping procedure with 5,000 resamples was conducted. This analysis generated the path coefficients (β), along with their corresponding t-values, p-values, and effect sizes (f^2) for each structural path. These results provide the basis for evaluating the statistical support for each hypothesis and determining the substantive impact of the predictor variables within the structural model.

Regarding the direct effects (H1-H4), only one hypothesis was statistically supported. The relationship between Instructor Competence and Trainee Work-Readiness (H2) was significant ($\beta = 0.306$, $p = 0.006$), confirming that trainer quality is a key driver of employability outcomes. This finding highlights the critical role of pedagogical capacity in transforming structural inputs into meaningful learning experiences. In contrast, Curriculum Relevance (H1: $\beta = 0.179$, $p = 0.098$), Training Facilities (H3: $\beta = 0.142$, $p = 0.055$), and Industry Engagement (H4: $\beta = 0.082$, $p = 0.295$) all demonstrated positive but statistically non-significant effects on work-readiness. These patterns suggest that, while structural and material resources are present, they are not sufficiently impactful in isolation to enhance trainees' perceived readiness for employment.

In terms of moderation effects (H5-H8), most hypotheses involving Government Support as a moderator were not supported. Specifically, no significant moderating influence was found on the relationships between Government Support and Curriculum Relevance (H5: $\beta = -0.044$, $p = 0.348$), Instructor Competence (H6: $\beta = -0.107$, $p = 0.179$), or Training Facilities (H7: $\beta = -0.059$, $p = 0.258$). However, a statistically significant and positive moderating effect was observed in H8, where Government Support enhanced the effect of Industry Engagement on Work-Readiness ($\beta = 0.282$, $p = 0.006$). This finding underscores the importance of targeted policy support in activating and amplifying the role of employer engagement in TVET systems.

Overall, these results demonstrate that in the context of Timor-Leste’s TVET sector, instructional quality and system-level coordination with industry actors are more influential than structural provisions or broad policy presence. The path model provides empirical support for prioritising trainer professionalisation and structured government-industry collaboration as strategic levers for improving trainee work-readiness.

I. Predictive Relevance (Q²)

Predictive relevance was assessed using PLSpredict, consistent with recent methodological recommendations (Hair et al., 2024). Q²_predict values > 0 indicate predictive relevance. As shown in Table 9, all indicators yielded Q²_predict > 0, confirming predictive capability. Y1.6 showed the strongest predictive relevance (0.301).

Table 8. Predictive Relevance (Q²_predict)

577. Indicators	578. Q ² predict	579. PL S-SEM_R MSE	580. P LS-SEM_ MAE	581. LM_R MSE	582. LM_ MAE	583. IA_R MSE	584. IA_ MAE
585. Y1.1	586. 0.119	587. 0.586	588. 0.450	589. 0.557	590. 0.422	591. 0.625	592. 0.516
593. Y1.2	594. 0.120	595. 0.609	596. 0.442	597. 0.706	598. 0.453	599. 0.649	600. 0.527
601. Y1.3	602. 0.170	603. 0.579	604. 0.457	605. 0.675	606. 0.474	607. 0.635	608. 0.561
609. Y1.4	610. 0.088	611. 0.600	612. 0.468	613. 0.588	614. 0.424	615. 0.629	616. 0.529

617. Y1.5	618. 0.184	619. 0.6 61	620. 0. 481	621. 0.677	622. 0.467	623. 0.732	624. 0.58 7
625. Y1.6	626. 0.301	627. 0.5 79	628. 0. 415	629. 0.596	630. 0.419	631. 0.692	632. 0.55 3

J. Model Fit and Goodness of Fit

To evaluate the overall model fit, the Standardised Root Mean Square Residual (SRMR) was examined. SRMR assesses the difference between the observed and predicted correlations, with values below 0.08 generally indicating good fit. As shown in Table 10, the SRMR for both the saturated and estimated models was 0.095—slightly above the conventional threshold. While this suggests a sub-optimal global fit, it is not uncommon in Partial Least Squares Structural Equation Modeling (PLS-SEM), which emphasises predictive accuracy over model fit. Importantly, the model demonstrated predictive relevance across all indicators ($Q^2_{predict} > 0$), thereby supporting its validity for interpretation despite the elevated SRMR value.

In addition, the model's Goodness of Fit (GOF) index was calculated to provide supplementary insight. Although GOF is no longer recommended for model validation in contemporary PLS-SEM practice (Hair et al., 2021; 2024), it is included here for completeness. The GOF value was calculated as $GOF = \sqrt{0.587 \times 0.507} = \sqrt{0.297} = 0.545$, indicating a large global effect size. This is reported as supplementary descriptive information only.

Table 9. Model Fit Indices

633.	634. Saturated model	635. Estimated model
636. SRMR	637. 0.095	638. 0.095
639. d_ULS	640. 3.693	641. 3.683
642. d_G	643. 1.359	644. 1.362
645. Chi-square	646. 1084.863	647. 1081.204
648. NFI	649. 0.612	650. 0.613

v. DISCUSSIONS

The structural model provides important empirical insights into how TVET quality factors shape trainee work-readiness in Timor-Leste. Among the eight hypotheses tested, only H2 (Instructor Competence → Work-Readiness) and H8 (Government Support × Industry Engagement) were statistically supported. These results reveal a pattern in which human factors and governance-mediated

coordination exert more influence on employability outcomes than structural inputs such as curriculum, facilities, or unmoderated industry exposure. The following sections present a detailed discussion of these findings, integrating numerical evidence with existing international literature.

K. Instructor Competence as the Most Influential Driver of Work-Readiness (H2 Supported)

The path coefficient for Instructor Competence → Work-Readiness was the strongest among all predictors ($\beta = 0.306$, $p = 0.006$), with a small but meaningful effect size ($f^2 = 0.073$). This confirms H2 and aligns with international evidence that identifies instructor competence as a decisive determinant of TVET outcomes. Studies from Malaysia, Indonesia, Africa, and the Pacific consistently show that trainers who demonstrate a combination of technical mastery, industry exposure, and strong pedagogical ability significantly enhance learners' confidence, workplace readiness, and soft skills (Paryono, 2015; Abdullah et al., 2022; Abd Wahab et al., 2024; World Bank, 2023).

From the perspective of Constructivist Learning Theory, learning is shaped through guided interaction, coaching, and iterative practice. In resource-constrained environments such as Timor-Leste—where facilities may be outdated and curricula inconsistently implemented—instructors frequently compensate for weak structural conditions. They become the primary agents shaping work-readiness by providing contextualised teaching, supporting workplace habit formation, and modelling professional behaviour. Accordingly, the data empirically confirms that instructor competence represents the most reliable pathway for strengthening trainee work-readiness within the Timor-Leste TVET system.

L. Structural Inputs Show No Significant Direct Effects (H1, H3, H4 Not Supported)

Three hypotheses grounded in Human Capital Theory—Curriculum Relevance (H1), Training Facilities (H3), and Industry Engagement (H4)—were not supported by the empirical results. For H1 (Curriculum Relevance → Work-Readiness), the model produced a path coefficient of $\beta = 0.179$ with a p-value of 0.098 and a small effect size ($f^2 = 0.032$), indicating no statistically significant direct effect on work-readiness. Likewise, H3 (Training Facilities → Work-Readiness) yielded a path coefficient of $\beta = 0.142$, a p-value of 0.055, and a negligible effect size ($f^2 = 0.019$), suggesting that facilities did not significantly influence work-readiness. For H4 (Industry Engagement → Work-Readiness), the coefficient was $\beta = 0.082$ with a non-significant p-value of 0.295 and a trivial effect size ($f^2 = 0.005$), confirming that industry engagement, in its current form, has no meaningful direct effect. Although all coefficients were positive, their non-significant p-values and very small effect sizes collectively indicate that these structural inputs are not sufficiently strong or consistently applied to shape employability outcomes.

International evidence generally identifies curriculum relevance, modern facilities, and industry exposure as strong predictors of employability (UNESCO-UNEVOC, 2021; Odondi et al., 2022). However, the findings from Timor-Leste point to a clear discrepancy between “formal quality” and

“experienced quality.” In other words, while structural inputs may exist in institutional plans or policy frameworks, they may not be implemented with the depth or functionality required to influence learning outcomes. Curricula may be available but outdated or delivered didactically; facilities may be present but insufficient, obsolete, or non-functional; and industry engagement may be sporadic or symbolic, lacking meaningful work-based learning mechanisms such as apprenticeships, employer-led assessments, or co-designed learning tasks.

This pattern mirrors findings from Nepal (Chakravarty et al., 2019), Ghana (Owusu-Agyeman & Aryeh-Adjei, 2024), and the Philippines (Mariano & Tantoco, 2023), where institutional and governance constraints dilute the potential impact of structural factors on trainee outcomes. Thus, the results from Timor-Leste do not contradict global TVET theory; rather, they highlight how weak implementation conditions can neutralise otherwise powerful determinants of employability, demonstrating that structural quality must be functional, coherent, and well-integrated to produce meaningful effects on work-readiness.

M. Government Support Works as a Selective, Not General, Moderator (H5-H7 Not Supported, H8 Supported)

Government support was conceptualised as a systemic enabler based on Skills Ecosystem Theory, but the findings show a highly selective influence.

Government Support Does Not Strengthen Most Relationships (H5, H6, H7 Not Supported)

For H5 (Government Support × Curriculum → Work-Readiness), the moderating effect was negative but very weak ($\beta = -0.044$, $p = 0.348$, $f^2 = 0.010$), indicating that government support does not significantly strengthen the influence of curriculum relevance on work-readiness. A similar pattern was observed for H6 (Government Support × Instructor Competence → Work-Readiness), where the coefficient ($\beta = -0.107$, $p = 0.179$, $f^2 = 0.002$) showed that government support does not meaningfully moderate the relationship between instructor competence and trainee outcomes. Likewise, H7 (Government Support × Training Facilities → Work-Readiness) produced a non-significant and trivial moderating effect ($\beta = -0.059$, $p = 0.258$, $f^2 = 0.005$), confirming that government support does not enhance the impact of training facilities on work-readiness. Taken together, these results demonstrate that government support does not function as a broad institutional amplifier across the core training quality dimensions examined in this study.

The fact that all three moderating effects were negative, albeit statistically insignificant, suggests several underlying systemic challenges. Policy support does not appear to directly strengthen the effects of curriculum quality, teacher competence, or training facilities, pointing to possible fragmentation in governance, inconsistent policy implementation, or inadequate monitoring mechanisms—all of which can dilute intended system-level impacts. These findings align with international evidence indicating that in resource-constrained or low-capacity TVET systems,

government influence tends to be indirect, uneven, and contingent on implementation quality (Rasul et al., 2015; Popova & Panzica, 2020); Bussi et Al., 2025).

N. Government Support Significantly Strengthens Industry Engagement (H8 Supported)

The only significant moderating effect observed in the model is H8 (Government Support × Industry Engagement → Work-Readiness), with results indicating a positive and meaningful interaction ($\beta = 0.282$, $p = 0.006$, $f^2 = 0.058$). This demonstrates that government support enhances the effectiveness of industry engagement, even though industry engagement on its own ($\beta = 0.082$, $p = 0.295$) is not strong enough to produce a direct impact on work-readiness. In practical terms, government involvement appears to unlock the value of institutional-industry collaboration, enabling pathways through which trainees gain more authentic exposure to workplace expectations, standards, and practices.

This finding aligns with Skills Ecosystem Theory and reflects the role of government as a “system architect” (Finegold, 1999). Through targeted policies, the state reduces transaction costs for employers, facilitates institutional and industry matching processes, and clarifies roles and expectations through regulation, funding, and partnership frameworks. Accordingly, government support does not function as a broad, uniform amplifier across all training dimensions; rather, it acts as a targeted catalyst, becoming effective primarily when strengthening the coordination and collaboration between TVET institutions and employers.

The results collectively demonstrate that human inputs outweigh structural inputs in shaping trainee work-readiness. Instructor competence emerged as the only significant direct determinant of work-readiness, underscoring its central role in environments where equipment, curricula, and industry partnerships remain uneven or inconsistently implemented. This reinforces evidence from international research showing that trainers often act as the primary mechanism through which learning quality is transmitted in resource-limited systems.

At the same time, the findings indicate that structural components must be fully functional to have an impact. Although curricula, training infrastructure, and industry engagement exist within the institutional framework, their current implementation appears insufficiently robust to generate measurable improvements in employability outcomes. This suggests a gap between policy intentions and operational reality, where the presence of structural inputs does not automatically translate into effective learning experiences.

The analysis further shows that government support contributes meaningfully only when it is targeted. Specifically, it strengthens the relationship between industry engagement and work-readiness, implying that policy and institutional support are most effective when directed toward facilitating coordination between training providers and employers. However, government support does not yet

amplify the effects of curriculum quality, facilities, or instructor competence, highlighting the need for more coherent and operationalised governance mechanisms within the TVET system.

Overall, the findings confirm that work-readiness is shaped by the interaction of people and systems rather than by isolated inputs. This aligns with contemporary employability frameworks (Yorke, 2006; Clarke, 2018), which emphasize the importance of experiential learning, mentorship, and institutional coordination. In fragile or low-capacity contexts such as Timor-Leste, the formation of work-readiness relies most heavily on strong human engagement and well-supported partnerships across the skills ecosystem.

O. CONTRIBUTION AND IMPLICATIONS

a) Empirical Contributions

Three core empirical patterns emerge from the analysis, each offering valuable insights into how training quality dimensions and contextual factors shape work-readiness in Timor-Leste's TVET system.

First, instructor competence is the most decisive predictor of work-readiness.

Instructor competence ($\beta = 0.306$, $p = 0.006$, $f^2 = 0.073$) is the only training quality dimension with a statistically significant direct effect on work-readiness, confirming H2. This reinforces international evidence showing that trainers are the primary agents who translate curricula, infrastructure, and institutional policies into meaningful learning experiences. In environments where curriculum quality, facilities, and industry linkages remain inconsistent, instructors frequently compensate through pedagogical expertise, contextualisation of training, and ongoing coaching. This finding underscores the centrality of human inputs in shaping trainee outcomes in low-capacity settings.

Second, structural inputs alone are insufficient to produce measurable improvements in work-readiness.

Curriculum relevance (H1: $\beta = 0.179$, $p = 0.098$, $f^2 = 0.032$), training facilities (H3: $\beta = 0.142$, $p = 0.055$, $f^2 = 0.019$), and industry engagement (H4: $\beta = 0.082$, $p = 0.295$, $f^2 = 0.005$) showed *positive but statistically insignificant* direct effects on work-readiness. These patterns indicate that structural and material inputs—while present—are not implemented with sufficient depth, functionality, or consistency to translate into employability gains. The distinction between *formal quality* (inputs that exist on paper) and *experienced quality* (how these inputs function in practice) is critical here. The findings suggest that structural reforms remain underutilised unless accompanied by strong pedagogy, institutional capability, and operational mechanisms.

Third, government support is weakly operationalised and functions as a selective rather than broad enabler.

Government support does not significantly moderate the effects of curriculum (H5: $\beta = -0.044$, $p = 0.348$, $f^2 = 0.010$), instructor competence (H6: $\beta = -0.107$, $p = 0.179$, $f^2 = 0.002$), or training facilities (H7: $\beta = -0.059$, $p = 0.258$, $f^2 = 0.005$). These results show that policy support and funding do not yet enhance institutional quality or instructional effectiveness. However—critically—government support significantly moderates the effect of industry engagement on work-readiness (H8: $\beta = 0.282$, $p = 0.006$, $f^2 = 0.058$). This implies that policy support becomes meaningful only when it strengthens coordination between institutions and employers. Where government focuses on brokering partnerships, clarifying roles, and incentivising employer participation, positive outcomes begin to emerge. Without such targeted interventions, its influence remains largely symbolic.

Collectively, these empirical insights show that TVET effectiveness depends on delivery quality, institutional capability, and systemic coordination, rather than the mere existence of policies, infrastructure, or curriculum documents.

b) Theoretical Implications

The study offers nuanced insights into the applicability and limitations of the three guiding theoretical frameworks. Human Capital Theory (HCT) receives partial support. While the significant influence of instructor competence affirms the theory's core premise—that investment in human capital yields productivity gains—the non-significance of curriculum quality, training infrastructure, and direct government support challenges the assumption that inputs inherently translate into outcomes. In low-capacity or post-conflict contexts such as Timor-Leste, the implementation environment, institutional capability, and labour market structure mediate the relationship between investment and employability. These findings echo critiques of HCT that call for a more context-sensitive interpretation, where governance conditions and system readiness shape returns on educational investment.

Constructivist Learning Theory (CLT) is strongly supported by the results. The centrality of instructors in predicting work-readiness aligns with CLT's emphasis on the importance of experiential, contextualised, and socially facilitated learning. The lack of direct effects from curriculum, facilities, and industry engagement suggests that these elements, while necessary, are insufficient in the absence of pedagogical capacity. Trainers play a pivotal role in operationalising curriculum content, activating learning environments, and mediating workplace-based experiences. In systems constrained by limited instructional quality or institutional coherence, constructivist practices remain largely aspirational, even when material resources are available.

The application of Skills Ecosystem Theory (SET) is only partially realised in this study. The limited influence of government support and industry engagement—both in their direct effects and moderation—points to an underdeveloped skills ecosystem in which key actors are present but weakly interconnected. However, the significant moderation effect between government support and industry engagement suggests that ecosystem-level benefits emerge when state actors actively

structure and support employer participation. This underscores the importance of governance capability, coordination density, and institutional alignment—factors that are often lacking in fragile or transitional systems.

Collectively, the findings advance an integrated theoretical perspective: TVET effectiveness depends not only on resource investment (HCT), but also on instructional practice (CLT) and systemic coordination (SET). In contexts where these elements are misaligned, as observed in Timor-Leste, the conversion of training inputs into employability outcomes is likely to remain limited.

c) Practical and Policy Implications

The findings offer several important implications for technical and vocational education and training (TVET) reform in Timor-Leste and comparable low-capacity or post-conflict settings. First, given that instructor competence emerged as the strongest predictor of work-readiness, the professionalisation of the trainer workforce presents the most immediate opportunity for system-wide improvement. This includes establishing a national qualification and certification framework for trainers, mandating and funding continuous professional development (CPD), facilitating industry attachments, and promoting dual roles as both technicians and educators. Embedding constructivist, competency-based pedagogy within training programs is critical to realising these reforms.

Second, industry engagement must evolve from symbolic consultation to structured collaboration. Establishing Sector Skills Councils, co-developing curricula and occupational standards, mandating high-quality on-the-job training (OJT) or apprenticeships, and involving employers in assessment and feedback loops are essential. When paired with targeted incentives, such mechanisms ensure that government support becomes catalytic—enabling long-term, system-wide partnerships rather than fragmented, ad hoc interactions.

Third, training infrastructure must be better aligned with labour market needs. This involves prioritising investments in equipment that support competency-based learning, training instructors in the use of digital and simulation technologies, and implementing maintenance and utilisation protocols that ensure facilities serve as dynamic instructional assets rather than static capital holdings.

Fourth, government must reorient its role from administrative oversight to system integration. Strengthening inter-ministerial coordination, adopting performance-based funding models, enhancing monitoring systems focused on learning and employment outcomes, and promoting digital transformation and pedagogical innovation can help translate policy efforts into effective system reform.

Fifth, TVET institutions require enhanced internal capacity and coherence. This can be achieved through the development of robust quality assurance systems focused on teaching and learning, the establishment of dedicated units for labour market intelligence and employer engagement, and the formation of cross-institutional networks such as Centres of Excellence in strategic sectors.

Finally, transition support for graduates should be strengthened by offering career guidance, labour market information, and entrepreneurship training. Embedding mentoring and peer support systems can also improve adaptability and resilience across both formal and informal labour markets. Collectively, these strategies can help ensure that high levels of perceived work-readiness more consistently translate into sustainable employment outcomes.

P. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

This study is subject to several limitations that should be considered when interpreting its findings. First, the cross-sectional research design limits causal inference and does not allow for the examination of how trainee work-readiness may evolve over time or following exposure to actual employment contexts. Second, work-readiness was assessed through self-reported measures, which may not fully capture actual workplace performance, employer evaluations, or longer-term labour market outcomes.

Third, the sample was confined to two accredited institutions within the Don Bosco network. While these institutions represent some of the more established TVET providers in Timor-Leste, the findings may not be generalisable to other training centres, vocational sectors, or regional contexts with differing capacities or challenges. Fourth, the structural model excluded important labour market indicators such as job placement rates, income levels, job retention, or underemployment—factors that would enhance the external validity of the work-readiness construct. Additionally, the model did not include potentially influential variables such as learner motivation, digital literacy, leadership quality, accreditation rigour, or institutional culture, all of which warrant further exploration. Finally, data collection was conducted during an ongoing period of TVET reform, meaning the findings reflect a system in transition rather than one operating under stable policy and institutional conditions.

To build on this study, future research could adopt longitudinal designs, such as tracer studies, to assess the relationship between perceived work-readiness and actual employment outcomes, including income, job quality, and career progression. Further studies should also incorporate the perspectives of employers, trainers, and policymakers to triangulate institutional data and assess alignment between training provision and labour market demands. Expanding the conceptual model to include organisational and individual-level factors—such as institutional leadership, learner characteristics, soft skill development, and digital infrastructure—could provide a more holistic view of employability dynamics.

Moreover, given Timor-Leste's unique labour market context, future research should explore how informal and hybrid employment systems influence work-readiness and skill utilisation, including kinship-based hiring and multiple livelihood strategies. Mixed-methods approaches and systems-level analyses could help unpack the role of governance, financing, accountability, and institutional incentives in shaping TVET performance. Finally, sector-specific investigations—particularly in priority

fields such as hospitality, ICT, petroleum, mining, and agriculture—may reveal differentiated patterns in how TVET inputs translate into employment outcomes.

Such future studies will not only strengthen theoretical understanding of TVET systems in post-conflict contexts but also inform more context-responsive policy and programmatic interventions aimed at improving workforce readiness in Timor-Leste and similar developing economies.

Q. CONCLUSION

This study examined how four core training quality dimensions—curriculum relevance, instructor competence, training facilities, and industry engagement—shape trainee work-readiness in Timor-Leste’s TVET system, with government support modelled as a contextual moderating factor. Using PLS-SEM and a census-based sample of 151 final-term trainees, the study reveals several important empirical patterns.

First, trainees reported high levels of self-perceived work-readiness, indicating strong confidence in their transition to the labour market. However, the relationships underlying this readiness are highly uneven. Among all training quality dimensions, instructor competence is the only significant direct predictor of work-readiness, underscoring the critical role of trainers as the primary agents who convert curriculum intentions, infrastructure, and institutional support into meaningful learning outcomes.

Second, curriculum relevance, training facilities, and industry engagement—despite being positively perceived—did not show significant direct effects on work-readiness. Curriculum relevance, training facilities, and industry engagement exhibited only small or negligible effect sizes. These findings highlight a persistent gap between *formal quality* (availability of inputs) and *experienced quality* (how these inputs function in real learning environments). Structural inputs appear insufficiently functional or consistently implemented to drive employability outcomes.

Third, government support does not significantly moderate the effects of curriculum, instructor competence, or training facilities. Its only meaningful influence is a significant, positive moderation of the relationship between Industry Engagement and Work-Readiness. This demonstrates that policy support yields tangible benefits only when directed toward strengthening institutional-industry coordination. In the absence of such targeted support, government influence remains largely symbolic.

Overall, the findings show that in a post-conflict, low-capacity context such as Timor-Leste, work-readiness is driven primarily by human factors (instructors) and targeted system coordination (government-industry partnerships) rather than by the mere existence of curricula, infrastructure, or broad policy frameworks. Strengthening trainer professionalisation and building structured,

government-enabled employer participation emerge as the most strategic levers for improving employability outcomes.

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