Public-Private Partnerships in TVET Delivery in the UAE: A Framework for Enhancing Vocational Education Effectiveness

Mr. Benny Varghese[1], Dr. Mooon Paiithaannkar[2]
[1]*Research Scholar, Faculty of Management, Arunodaya University, Lekhi Village, Naharlagun, Itanagar, Dist: Papum Pare, Arunachal Pradesh India*
[2]*Professor, Faculty of Management, Arunodaya University, Lekhi Village, Naharlagun, Itanagar, Dist: Papum Pare, Arunachal Pradesh India*

***Abstract*—Public-private partnerships (PPPs) are widely promoted as a mechanism for closing the skills gap between Technical and Vocational Education and Training (TVET) provision and labour-market demand, yet empirical, quantitative evidence on how specific PPP practices translate into improved TVET delivery outcomes in the United Arab Emirates (UAE) remains scarce. Grounded in Resource-Based View, Resource Dependence Theory, Stakeholder Theory, and Principal-Agent Theory, this study develops and empirically tests a conceptual framework in which five PPP practice dimensions Government Support and Policy Environment (GSP), Private Sector Engagement (PSE), Risk-Sharing and Governance Mechanisms (RSG), Stakeholder Collaboration and Communication (SCC), and Quality Assurance and Curriculum Alignment (QAC) influence TVET Delivery Effectiveness (TDE) both directly and indirectly through Partnership Trust and Commitment (PTC) as a mediating mechanism. A structured, seven-point Likert questionnaire was administered to TVET educators, industry partners, government officials, and trainees across the seven Emirates, yielding a final analytical sample of 412 valid responses. Cronbach's alpha (.82–.88), composite reliability (.88–.92), and average variance extracted (.65–.68) confirmed strong reliability and convergent validity, while the Fornell–Larcker criterion confirmed discriminant validity across all seven constructs. Multiple regression showed that all five PPP dimensions significantly predict TDE ($R^2 = .471$, $F(5,406) = 72.33$, $p < .001$), and structural equation modelling (CFI = .993, TLI = .992, RMSEA = .016) confirmed a good-fitting structural model in which Partnership Trust and Commitment partially mediates the relationship between overall PPP practice and TVET delivery effectiveness (indirect effect = .291, Sobel $z = 5.66$, $p < .001$, bootstrap 95% CI [.193, .394]), accounting for approximately 31% of the total effect. All eight hypothesized relationships were supported. The paper contributes a validated, multi-dimensional measurement model of PPP practice in TVET, an empirically tested trust-mediated pathway to delivery effectiveness, and policy-relevant guidance for UAE education authorities and private-sector partners seeking to strengthen collaborative vocational training delivery.**

***Index Terms*—Public-Private Partnerships; Technical and Vocational Education and Training (TVET); United Arab Emirates; Partnership Trust and Commitment; Structural Equation Modelling; Skills Development**

I. INTRODUCTION

1.1 Background

In the UAE, the economic diversification aspiration has been an ambitious move recently rooted in the UAE Vision 2021, the National Agenda, and the more recent 'We the UAE 2031' vision and Centennial 2071 strategy with a highly-skilled, knowledge-based national workforce as one of its strategic goals [1, 2]. Technical and Vocational Education and Training (TVET) is at the core of this vision: Both the Institute of Applied Technology (IAT) and the Higher Colleges of Technology (HCT), plus various sector academies (energy, aviation, advanced manufacturing) are expected to produce graduates who are ready for Industry 4.0 jobs and help advance the country's Emiratisation targets [3].

International experiences concerning TVET reform have given rise to public-private partnerships, sometimes based on the assumption that private sector

actors provide current technology, exposure to the real workplace, and provide signals in the labour market that are difficult for a pure public system to do alone, while the government provides funding, curriculum standards and regulatory authority [4][5]. Formalised models of PPP offer great insight into how curricular relevance and employment rates can be enhanced with appropriate governance, and there are well-documented models of this partnership in other countries, such as Germany with its dual apprenticeship scheme, Singapore's Institute of Technical Education (ITE) and the Australian Registered Training Organisation (RTO) framework [6, 7]. Altruistic strategies are also under way in the UAE, namely by providing TVET programmes that include a variety of PPP-like approaches, such as sector academies designed in collaboration with employers, apprenticeship schemes, and work-integrated learning programmes coordinated with employers and stakeholders like Advanced Technology Research Council and various Freemass authorities [3].

1.2 Problem Statement

Even though on-going investment is provided by the government and a growing on the job field of collaborative TVET activities, employer surveys and policy debate in the UAE and wider Gulf Cooperation Council (GCC) region report the significant issue of skills mismatches, with a large number of graduates claiming to be ready for employment, while employers, on the other hand, complain that graduates' competencies do not necessarily meet the current needs of the job market [8]. There are three problems that stimulate this study. First, in the UAE TVET, there is a lack of a robust framework for defining good practice, with PPP arrangements often being designed and judged on an individual project basis, with no clear understanding of what elements of the partnership, whether through policy support, private participation or collaboration, risk-sharing, or quality assurance, are most likely to deliver effectiveness in TVET outcomes. Second, the relational and the psychological aspects of these partnerships – that is, trust and commitment between public and private actors – are often mentioned but seldom thought of as a formal mediating component between developing partnership practice and actual outcomes. Thirdly, private-sector capital and expertise is reportedly under-used relative to its potential, for example, due to ambiguity or imbalance in risk-sharing and governance structures [9].

1.3 Research Gap

Existing literature on education-sector PPPs in the UAE and throughout the Middle East and GCC region includes mostly descriptive policy analysis, qualitative case studies of specific, often flagship, projects and comparative reviews of TVET systems in different countries [3] and [8]. Fewer studies conceptualise and measure PPP practice as a multi-dimensional phenomenon and examine the association of these dimensions with TVET delivery outcome with validated survey instruments and inferential statistics. Even fewer involve "relational" mediating elements (such as partnership trust and commitment) for which there is sound theoretical reason in the inter-organisational context to believe that the quality of the inter-organisational relationship (and not just the formal partnerships) contributes to delivery outcomes. Last, it is uncommon in the UAE TVET-PPP literature to see the joint estimation of a multi-construct measurement model with a mediated structural model using Structural Equation Modelling (SEM), which can lead to only to reliable and valid conclusions regarding what has been measured instead of the relations between measured constructs. This study strives to fill these three gaps.

1.4 Research Objectives

- To identify and empirically validate the key dimensions of public-private partnership practice relevant to TVET delivery in the UAE.
- To examine the direct effect of each PPP practice dimension (Government Support and Policy Environment, Private Sector Engagement, Risk-Sharing and Governance Mechanisms, Stakeholder Collaboration and Communication, and Quality Assurance and Curriculum Alignment) on TVET Delivery Effectiveness.
- To examine the effect of PPP practice dimensions on Partnership Trust and Commitment.
- To examine the effect of Partnership Trust and Commitment on TVET Delivery Effectiveness.
- To test whether Partnership Trust and Commitment mediates the relationship between

overall PPP practice and TVET Delivery Effectiveness.
- To derive theoretically grounded and practically actionable recommendations for strengthening PPP-based TVET delivery in the UAE.

1.5 Research Questions
- RQ1: What are the key dimensions of public-private partnership practice relevant to TVET delivery in the UAE?
- RQ2: Do Government Support and Policy Environment, Private Sector Engagement, Risk-Sharing and Governance Mechanisms, Stakeholder Collaboration and Communication, and Quality Assurance and Curriculum Alignment significantly and positively predict TVET Delivery Effectiveness?
- RQ3: Do the PPP practice dimensions significantly and positively predict Partnership Trust and Commitment?
- RQ4: Does Partnership Trust and Commitment significantly and positively predict TVET Delivery Effectiveness?
- RQ5: Does Partnership Trust and Commitment mediate the relationship between overall PPP practice and TVET Delivery Effectiveness?

1.6 Research Contributions

In this paper, three contributions are made. Theoretically, it brings together Resource-Based View, Resource Dependence Theory, Stakeholder Theory, and Principal-Agent Theory into one single testable conceptual model of PPP-based TVET delivery which views partnership trust and commitment as a relational mechanism through which structural PPP practices relate to delivery outcomes. It is also methodologically instructive as it creates and validates a multi-dimensional, seven-construct measurement instrument for PPP practice in a TVET context and provides a full quantitative measurement analysis pipeline ranging from testing reliability and validity, to correlation and regression analysis, to mediation analysis, and full structural equation modelling that can be replicated or extended by future researchers in the UAE and the wider GCC region. Empirically, it offers UAE policymakers, TVET institution leaders, and private-sector partners something they can turn to for empirical evidence in prioritizing specific partnership practices and to appreciate why some structurally sound partnerships continue to underperform due to the lack of accumulated TVET and partnership trust and commitment.

II. LITERATURE REVIEW

Public-private partnerships in education. P3 in education. In the education sector, PPPs are usually characterized as long-term, contractually or institutionally organized partnerships where government and private (for-profit or non-profit) actors share their resources, risks and responsibilities for the design, financing, or delivery of educational services [4]. Typologies have been used to make a distinction between infrastructure-based PPPs (design build finance operate of school facilities), management PPPs (private operation of public schools) and, which is most important for this study, curriculum and delivery PPPs, where private employers co-design curricula, provide equipment and trainers, and absorb graduates into work-integrated learning placements [5]. The theoretical virtue of PPPs is that neither of the two (government or industry) typically has all of the necessary elements of regulatory legitimacy, funding stability, technical currency and labour-market signal that is needed for good vocational training.

International TVET-PPP models. The dual apprenticeship approach of Germany is hailed as the best example: a classroom-based part of the apprenticeship is combined with workplace training, which is carefully regulated by chamber of commerce associations and is seen as effective in Germany's relatively low youth unemployment rate and the high proportion of youth in employment after working through their apprenticeships [6]. Meanwhile, Singapore's Institute of Technical Education (ITE) has also embedded employer advisory committees, sector skills councils, and precisely structured internships as integral, as opposed to ancillary, components of curriculum governance [7]. Australia's Registered Training Organisation system represents a more market-based variant of PPP where there is competition, as well as cooperation across a shared national qualifications framework comprising private and public providers both accredited as registered training organisations. Comparative evaluations of these systems arrive at some common success factors:

risk and responsibility well defined; ongoing (no single, one-off) private sector engagement; strong quality assurance and accreditation processes; and, (now more often cited) trust between organisations, which helps to maintain collaboration even when there are woundings [6] [7].

The overall TVET and skills-policy environment in the UAE. UAE develops its policy of education through several phases of TVET-specific institution building, such as the renamed Institute of Applied Technology, expansion of the applied and vocational oriented streams in the UAE's Higher Colleges of Technology, and the establishment of academies for specific industry sectors, such as energy, aviation and advanced manufacturing, with key employers [1] [3]. Vocational skills development and Emaratisation are stated as interdependent priorities in national strategy documents, such as the National Agenda [2] and 'We the UAE 2031' [8] and their accompanying reviews have been advocating for a greater and more systematic role for the private sector in relation to vocational TVET governance, instead of the current ad hoc sponsorship model.

Government Support and Policy Environment (GSP). A large policy-evaluation literature explicitly states that having a clearly defined regulatory framework, funding mechanisms and involvement of various government agencies since the private sector will need a stable and predictable policy environment to warrant a sustained investment in resources and personnel time [5] [9]. Accreditation pathways and financial incentives (tax relief, Co-funding and subsidised access to facilities) provided by the government are much highlighted across the different contexts, including the TVET context specifically, as "enablers" of articulations that are nuanced rather than symbolic [9].

Private Sector Engagement (PSE). In addition to funding, the most beneficial level of participation by the private sector in TVET lies in their direct involvement in developing the curriculum, providing trainers with equipment and technology of the current generation and arranging structured placement of trainees in work places. Shallow engagement – such as occasional guest lectures or a single donation – has been linked for years to poorer results for the employability of graduates than deep engagement, characterised by the new creation of structures that are embedded into student learning [7].

Risk-Sharing and Governance Mechanisms (RSG). The PPP-governance literature focuses on the importance of "moral-hazard and information-asymmetry" issues, and how these can be mitigated by using clearly defined contracts, outcome-focused metrics and an effective dispute-resolution process when the public partner (the principal) delegates the delivery of services to its private partner (the agent) whose incentives may differ from those of the public partner [10]. Ambiguous allocation of the risks is constantly pointed out as a cause of partnership failure or underperformance [9].

Stakeholder Collaboration and Communication (SCC). If sustainable value creation is to be achieved, the interests and the need for communication of all stakeholder groups is to be addressed rather than just the contracting principals, according to Stakeholder Theory [11]. This means working together on planning committees, having multiple feedback loops from employers to training providers and vice versa, and sharing information transparently – all of which have been linked to greater responsiveness of the curriculum, at least empirically, in the context of TVET-PPPs.

Quality Assurance and Curriculum Alignment (QAC). The mechanism through which aspirations to make curriculum and assessment industry-relevant is regularly recognised as accreditation bodies and quality-assurance schemes. The most common of the operational indicators of this dimension are continuous curriculum review cycles, competency-based assessment linked to the Occupational Standards and the formal processes of accreditation renewal [6].

Partnership Trust and Commitment (PTC). Some inter-organizational relationship literature based on the Resource Dependence Theory suggests that along with formal governance structures, such as those established in the contract, mutual confidence or trust that the other organisations acts reliably and in good faith and commitment to invest more than the minimum required in the contract must also be established for long-term relationships to continue [12]. In public-private settings in particular, trust has been found to mediate or moderate the formal partnership forms and the actual performance results of the partnership because not all operational contingencies can be addressed in a contract, there are

aspects of cooperation remaining afterwards that are based on the quality of the relationship.

TVET Delivery Effectiveness (TDE). The operationalization of delivery effectiveness in the TVET literature is most commonly a combination of programme-based graduate competency with industry needs, employability and placement outcomes, perceptions of the quality of training and level of satisfaction of stakeholders in programme delivery [8]. We take this multi-indicator conceptualisation over single-indicator concept (e.g., employment only), as it considers process and outcome quality which are both relevant to the PPP practices examined in this study.

2.1 Literature Gap

When tracing the literature presented above in relation to all the dimensions of PPP practice, it can be seen that although each dimension has been investigated, either in isolation or through a qualitative case narrative, there is no unique model that uses a validated measurement instrument and introduces partnership trust and commitment in a formally defined manner as a mediating as opposed to merely anecdotal or contextual mechanism, which may also be tested in the specific context and institutional arrangement of the UAE. As a result, the existing literature on the UAE is largely descriptive or case study oriented [3, 8, 9] and hence, the question of the relevance of which dimensions of PPP practice are most relevant to delivery effectiveness and the avenue through which these dimensions (direct and/or relational via trust and commitment) are effective remains empirical. The aim of this study is to fill that void.

III. THEORETICAL FRAMEWORK

This study integrates four complementary theoretical perspectives to explain how public-private partnership practice translates into TVET delivery effectiveness.

3.1 Resource-Based View (RBV)

With regard to business performance, the Resource-Based View suggests that firm's achieved above average performance are results of resources that are valuable, rare, inimitable, and non-substitutable [14]. In the case of TVET-PPPs, RBV further implies that none of the partners government or private sector have the complete resource bundle needed to make effective delivery of vocational training a reality; that is, the partners do not possess the regulatory legitimacy and financial stability needed by the government and the government does not possess the infrastructure, trainers and labour market information needed by the private sector.

3.2 Resource Dependence Theory (RDT)

According to Resource Dependence Theory, organisations establish and maintain inter-organisational relationships to deal with their dependency on resources outside of themselves about which other actors have control [15]. This study considers the relationships between RDT and Partnership Trust and Commitment since the partnership cannot be defined and controlled entirely through contracts, their longevity and success is related to the resulting impact of accumulated trust that lowers the perceived risk of dependence, therefore leading to investment of resources in the partnership.

3.3 Stakeholder Theory

While the contracting parties may be the only ones explicitly stated in the contracts, Stakeholder Theory suggests that it is vital to identify and actively manage the interests of all stakeholders impacted by, or able to impact, the success of an initiative if the organisation but also other parties are to generate value [11]. This is reflected in the introduction of a single practice dimension entitled Stakeholder Collaboration and Communication which demonstrates the extent to which government, industry, trainers and (indirectly) trainees are actively involved in the process of partnership governance, as opposed to being passive recipients of decisions made elsewhere.

3.4 Principal-Agent Theory

The theory is known as Principal-Agent Theory, which focuses on incentive and information issues that could exist when tasks are delegated to agents that potentially have conflicting interests with that of the principal [10]. For Government in the context of TVET-PPP, it is the principle (government, on behalf of the public interest in skills development) that delegates aspects of curriculum or training delivery, or provision of facilities, to private partners (as agents). This gives rise to the inclusion of Risk-Sharing and Governance Mechanisms, and Quality Assurance and Curriculum Alignment, as practice dimensions, as well-specified contracts, performance metrics and quality-assurance audits are the primary means of

governance to mitigate agency problems (moral hazard, adverse selection).

3.5 Integration

When combined, four theories inspire a model in which the effectiveness of TVET delivery is predicted through the combination of three structural theories—Resource Complementarity theory whereby structural practices are grounded in RBV, Dependence Management theory whereby they are grounded in RDT, Inclusive-governance theory whereby they are grounded in Stakeholder Theory, and Incentive-alignment theory whereby they are grounded in Principal-Agent Theory—with a relational mechanism, as emphasized in RDT through their concept of 'trust', that transforms the structural into ongoing and effective collaboration.

IV. CONCEPTUAL FRAMEWORK AND HYPOTHESES

Following Sections 2 and 3, this study proposes a conceptual framework (Figure 4.1) on the one hand, in which five first-order dimensions of PPP practice (PSD) Government Support and Policy Environment (GSP), Private Sector Engagement (PSE), Risk-Sharing and Governance Mechanisms (RSG), Stakeholder Collaboration and Communication (SCC), and Quality Assurance and Curriculum Alignment (QAC) each has a direct impact on TVET Delivery Effectiveness (TDE), and on the other hand, in which Partnership Trust and Commitment (PTC) acts as a mediating variable between each of these five first order dimensions of PPP practice and the TVET delivery effectiveness outcomes.

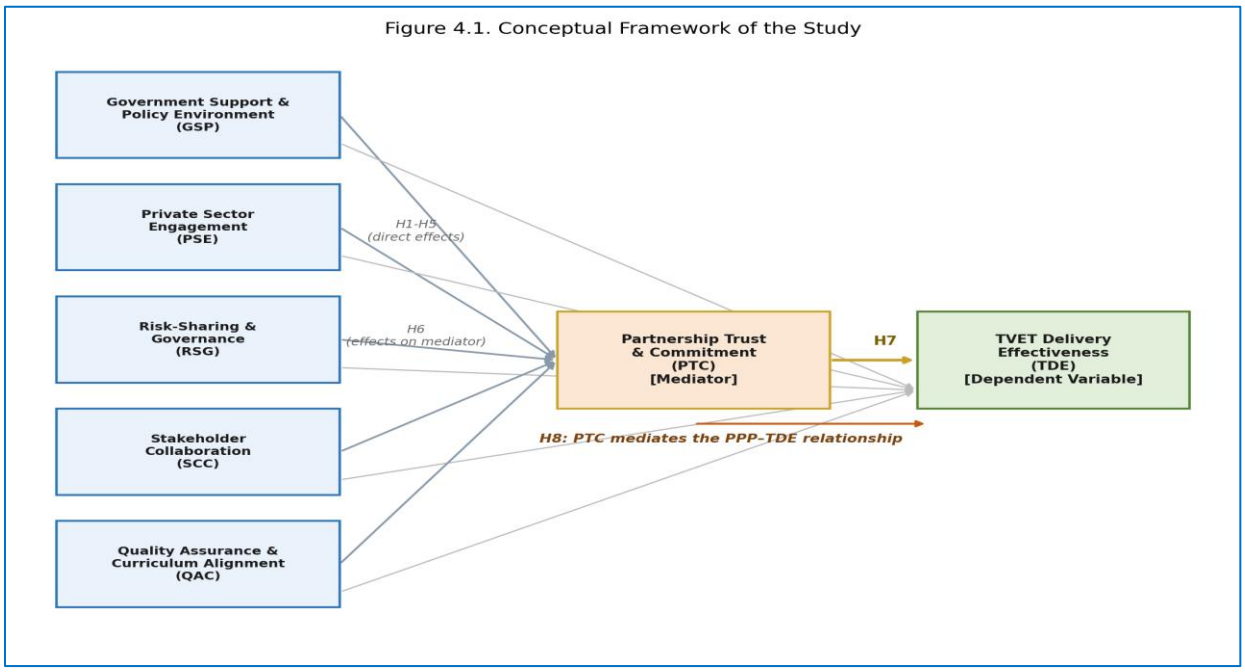


Figure 4.1: Conceptual framework of the study, showing five PPP practice dimensions, the mediating role of Partnership Trust and Commitment, and TVET Delivery Effectiveness as the dependent variable

4.1 Hypotheses

- H1: Government Support and Policy Environment (GSP) has a significant positive effect on TVET Delivery Effectiveness (TDE).
- H2: Private Sector Engagement (PSE) has a significant positive effect on TVET Delivery Effectiveness (TDE).
- H3: Risk-Sharing and Governance Mechanisms (RSG) has a significant positive effect on TVET Delivery Effectiveness (TDE).
- H4: Stakeholder Collaboration and Communication (SCC) has a significant positive effect on TVET Delivery Effectiveness (TDE).
- H5: Quality Assurance and Curriculum Alignment (QAC) has a significant positive effect on TVET Delivery Effectiveness (TDE).

- H6: The PPP practice dimensions (GSP, PSE, RSG, SCC, QAC) have a significant positive effect on Partnership Trust and Commitment (PTC).
- H7: Partnership Trust and Commitment (PTC) has a significant positive effect on TVET Delivery Effectiveness (TDE).
- H8: Partnership Trust and Commitment (PTC) mediates the relationship between overall PPP practice and TVET Delivery Effectiveness (TDE).

V. RESEARCH METHODOLOGY

5.1 Research Design

The nature of the study applies to positivist with quantitative research design that is used inversely in the test of eight hypotheses proposed in Section 4.1 where this research is a cross section with explanatory approach. Given the study's goal of launching hypothesis tests based on the pre-specified relationships among the latent constructs over a reasonably large and geographically diverse population of respondents, a structured, selfadministered questionnaire survey was chosen as the instrument for primary data collection.

5.2 Population

The target population includes TVET educators and trainers working at public, private and joint (PPP-based) TVET institutions, industry partner and employer representatives providing input to curricula or providing equipment or placement for trainees, governmental officials related to TVET policy, funding and accreditation (e.g. within the Ministry of Education and governing vocational-education authorities), and current TVET students and trainees that are enrolled in a TVET institution or programme implemented through the PPP-based delivery model. There is no one, centrally published sampling frame that covers all four stakeholder groups within the UAE's TVET institutions so the population is considered a finite, practically unlistable population suitable for stratified random and purposive sampling as described in Section 5.3.

5.3 Sampling

A stratified random sampling approach was taken and the strata defined by stakeholder group (educator/trainer, industry partner, government official and student/trainee) and Emirate, providing proportional representation across both. The selection of the respondents in each stratum was a process of institutional gate keeper-facilitated random selection (IGRS) for educators and students (sampled from lists of enrolment or staff) and then purposive-then-random selection for industry partners and government officials (sampled from TVET-institution partnership register and, where there were more than one eligible respondent, randomly selected within the stratum). This is a multi-stage stratified design that is efficient in bridging the methodological aspiration of minimizing selection bias within each accessible stratum, and the practical requirement that those strata be unlisted.

5.4 Sample Size

The sample size was decided based on Krejcie and Morgan's [16] guidance on sample sizes for large finite population, based on convergence towards a sample size of approximately 384 for a large finite population of over 10,000 at a 95% level of confidence and with a 5% margin of error, as well as upon guidance for minimum sample sizes for covariance based Structural Equation Modelling, which suggests a minimum of 10–20 cases per parameter to be estimated for stable maximum likelihood estimation [17]. Based on these degrees of freedom, an a priori power analysis for a multiple-regression model, including six predictors, medium effect ($f^2 = .15$), $\alpha = .05$, and target power = .95 while using software G*Power, suggested a sample size of at least 146; to give the more powerful structural equation model the power it demands, a target sample of 300–500 students was used. Overall, 412 questionnaires were valid (usable) after the data screening (testing); incomplete questionnaires and questionnaires with too many missing and non-responding items were removed (see section 5.9), resulting in a usable response rate of 91.6% of the questionnaires distributed, which falls in the a priori defined range of 300-500.

5.5 Questionnaire Development

The questionnaire was created in three phases. poems related to each of the seven constructs (the five PPP practice dimensions, the mediator, and the dependent variable) were first drafted based on the constructs and dimensions identified via the literature review (Section 2) and then subsequently amended Item wording was adapted from previously existing PPP-

governance, inter-organisational trust and TVET-effectiveness scales, where applicable [4] [12]. Second, content was examined by a panel of content experts (TVET policy specialists and academics in survey methodology) on content validity, relevance and comprehensibility, with the consequential removal of or re-wording of ambiguous items. Thirdly, the instrument was translated into Arabic language and then re-translated into English language by independent bilingual translators to verify the semantic equivalence and was administered as bilingual (English/Arabic) questionnaire. All substantive items were tapped by a seven-point Likert scale (1 = Strongly Disagree to 7 = Strongly Agree). The final instrument included a demographic section (Section A), and seven sections on the constructs (Section B-H), yielding 33 substantive items overall.

5.6 Variables and Measurement

Table 5.1: Variables, Roles, and Sample Items (7-point Likert scale, all items)

Construct	Role	Items	Sample Item
Government Support & Policy Environment (GSP)	Independent	5	"Government agencies actively coordinate PPP initiatives in TVET."
Private Sector Engagement (PSE)	Independent	5	"Private companies actively contribute to curriculum design."
Risk-Sharing & Governance Mechanisms (RSG)	Independent	4	"Risks and responsibilities are clearly allocated between public and private partners."
Stakeholder Collaboration & Communication (SCC)	Independent	5	"Regular communication occurs between government, industry, and institutions."
Quality Assurance & Curriculum Alignment (QAC)	Independent	5	"Curriculum is regularly updated to reflect industry needs."
Partnership Trust & Commitment (PTC)	Mediator	4	"Partners trust each other to fulfil their obligations."
TVET Delivery Effectiveness (TDE)	Dependent	5	"TVET graduates possess industry-relevant skills."

5.7 Pilot Study

Before full scale data collection, the questionnaire was tried out on 40 respondents who were sampled proportionately from the 4 stakeholder groups for the purpose of a pilot study. Factors of pilot Cronback's alpha ranged from .76 to .84, which are greater than the conventional value .70 [18]. Three of the items were unclear according to the pilot respondents (one in the RSG, SCC and PTC) and minor wording changes were made and the revised instrument was then sent to the complete sample described in 5.9.

5.8 Reliability and Validity

The reliability checks included cronbach's alpha and Composite Reliability (CR) in which a value of .70 or higher represents acceptable internal consistency [18] [19]. To evaluate the convergent validity, Average Variance Extracted (AVE) as reported by [19] was used and a result of ≥ .50 means that the items have captured more variance than measurement error for a given construct, on average. In order to determine the discriminant validity, the square root of each construct's AVE was compared with the correlations between constructs to ensure that each construct represents a different concept and is not significantly correlated with the others [19]. Expert-panel checking at the questionnaire-development stage (Sections 5.5) dealt with the issues of content- and face-validity.

5.9 Data Collection

Data has been gathered over twelve weeks using a mixed survey administration (Qualtrics hosted online and on-site paper-based surveys) where on-site administration was mostly employed for students/trainees (respondents from partner TVET institutions) and online for industry and government respondents. TVET institutional access was managed through the administration office of the institutions as they acted as gatekeepers in educator and student sampling frames. The researcher had received prior ethical approval for this research before data was collected; participation was voluntary, informed consent was gained from all respondents and their responses were anonymised before analysis. A total of 450 questionnaires were distributed of which 431 were returned (95.8% return), although 19 were excluded

due to missing data or 'straight- lining' (i.e., the same answer pattern for all items), 412 valid questionnaires (91.6% usable response rate) were included in the analysis.

5.10 Statistical Techniques

- Descriptive statistics (means, standard deviations, skewness, kurtosis) to characterise the sample and construct distributions.
- Cronbach's alpha and Composite Reliability to assess internal-consistency reliability.
- Average Variance Extracted and the Fornell–Larcker criterion to assess convergent and discriminant validity.
- Pearson product-moment correlation to assess bivariate association among constructs.
- Multiple linear regression (ordinary least squares) to test the direct effects specified in H1–H6.
- Mediation analysis using the Baron and Kenny [20] causal-steps approach, the Sobel test [21], and bias-corrected bootstrap confidence intervals [22] to test the indirect effect specified in H8.
- Covariance-based Structural Equation Modelling (maximum-likelihood estimation) to jointly estimate the measurement model (confirmatory factor structure of all seven constructs) and the structural model (H1–H7 simultaneously), evaluated against standard model-fit indices (χ^2/df, CFI, TLI, GFI, RMSEA) [17].
- All analyses were conducted in Python 3.10 using SciPy, statsmodels, and semopy an open-source, cross-platform statistical environment functionally equivalent to SPSS/AMOS for the descriptive, regression, and covariance-based SEM procedures employed in this study at a significance threshold of $\alpha = 0.05$ throughout.

VI. DATA ANALYSIS AND RESULTS

6.1 Respondent Profile

Table 6.1 and Figure 6.1 provide an overview of the demographic and professional backgrounds of the 412 valid respondents. The sample was reasonably well-distributed among the four target stakeholder categories: educators/trainers, 32.8%, industry partners, 29.1%, government officials, 12.4% and students/trainees, 25.7%, and there was a gender split (male 52.4% and female 47.6%) as well as representation across institutional types (public 36.9%, private 28.2%, and joint PPP based 35.0%).

Table 6.1: Respondent Demographic and Professional Profile (N = 412)

Characteristic	Category	n	%
Stakeholder Role	TVET Educator/Trainer	135	32.8%
	Industry Partner/Employer	120	29.1%
	Government Official (MOE/ACTVET)	51	12.4%
	Student/Trainee	106	25.7%
Gender	Male	216	52.4%
	Female	196	47.6%
Institution Type	Public TVET Institution	152	36.9%
	Private TVET Institution	116	28.2%
	Joint / PPP-based Institution	144	35.0%
Nationality	UAE National	128	31.1%
	Expatriate	284	68.9%
Professional Experience	Less than 3 years	91	22.1%
	3–6 years	128	31.1%
	7–10 years	111	26.9%
	More than 10 years	82	19.9%

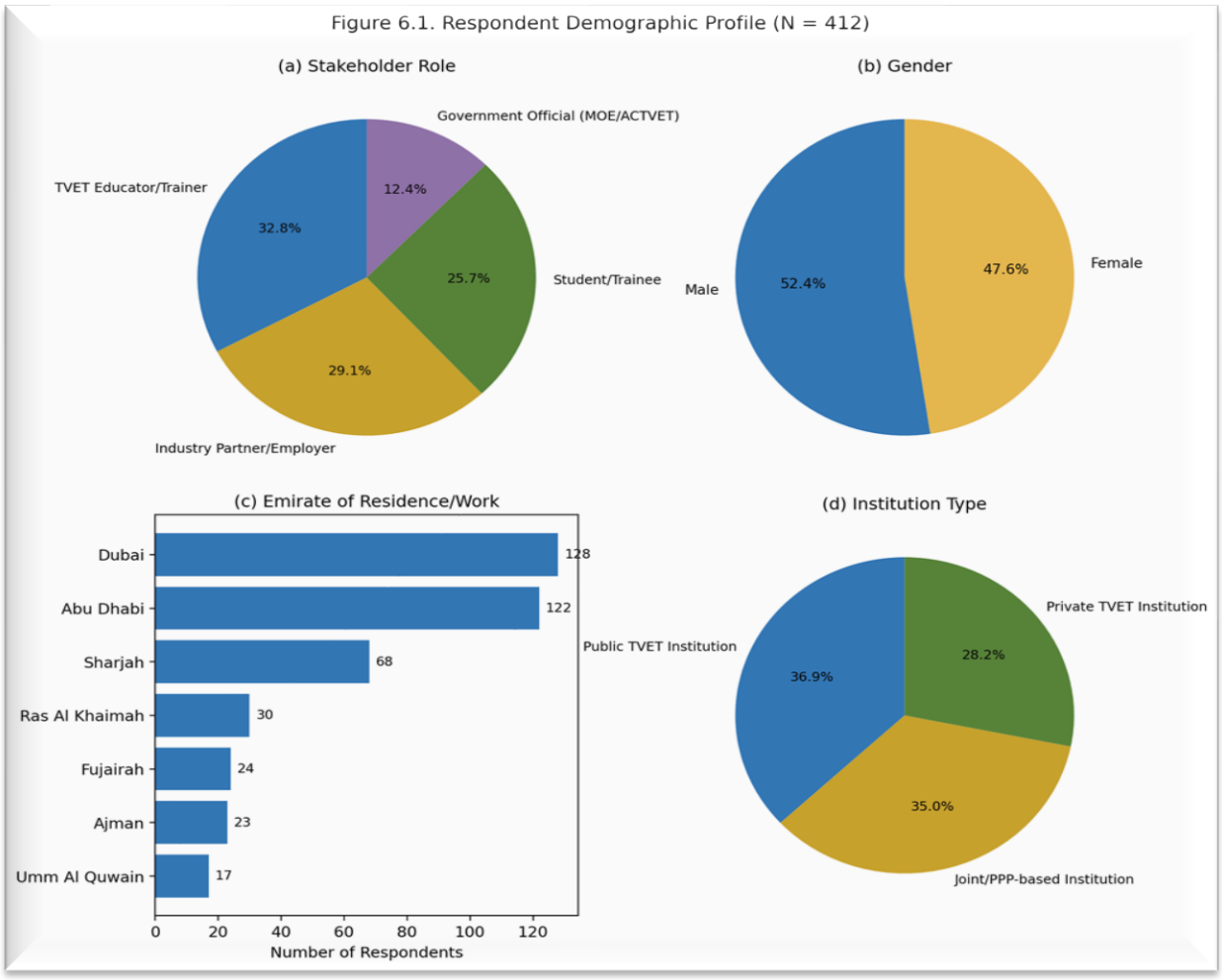


Figure 6.1: Respondent demographic profile: (a) stakeholder role, (b) gender, (c) Emirate of residence/work, (d) institution type

6.2 Descriptive Statistics

Descriptive statistics for the seven composite construct scores (item averages) are shown in Table 6.2 and Figure 6.2. Perceptions on the Seven-point Scale for all construct are mid-range, (between 4.86 and 5.02), and all dimensions are moderately positive perceptions, none at the ceiling or floor. Skewness indices ranged between −0.18 and −0.05, and kurtosis indices ranged between −0.46 and 0.09, all of which were within the limits of approximately univariate normal distribution for subsequent parametric analysis habitually said as being within ±1 [17].

Table 6.2: Descriptive Statistics of Study Constructs (N = 412)

Construct	Mean	SD	Skewness	Kurtosis
Government Support & Policy Environment (GSP)	5.01	0.95	-0.12	-0.34
Private Sector Engagement (PSE)	4.86	0.88	-0.05	-0.26
Risk-Sharing & Governance Mechanisms (RSG)	4.96	0.91	-0.15	-0.35
Stakeholder Collaboration & Communication (SCC)	5.02	0.91	-0.09	0.09
Quality Assurance & Curriculum Alignment (QAC)	4.96	0.90	-0.11	-0.22
Partnership Trust & Commitment (PTC)	5.02	0.91	-0.18	-0.46
TVET Delivery Effectiveness (TDE)	4.98	0.92	-0.14	-0.40

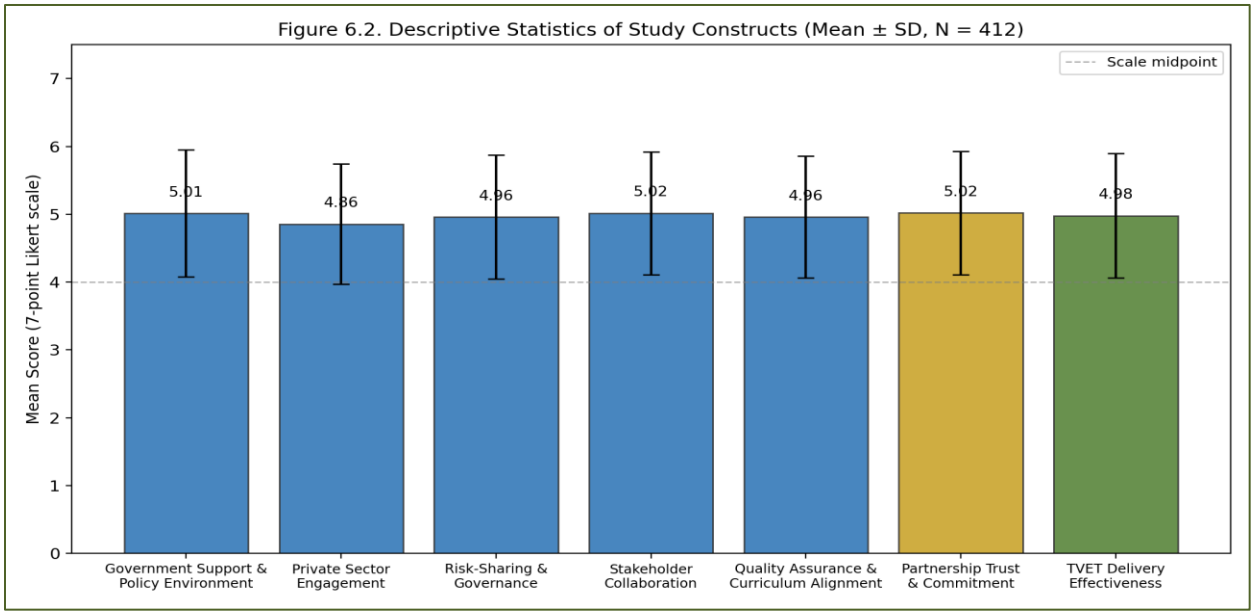


Figure 6.2: Mean and standard deviation of study constructs (7-point Likert scale)

6.3 Reliability Analysis

Cronbach's alpha for each of the constructs is displayed in Table 6.3 and Figure 6.3. As shown above, all seven constructs meet the conventional .70 acceptability limit [18] from .821 (Partnership Trust and Commitment) to .884 (Government Support and Policy Environment) which indicates good internal-consistency reliability throughout the instrument.

Table 6.3: Cronbach's Alpha Reliability Coefficients (N = 412)

Construct	No. of Items	Cronbach's α	Interpretation
Government Support & Policy Environment (GSP)	5	0.884	Good
Private Sector Engagement (PSE)	5	0.863	Good
Risk-Sharing & Governance Mechanisms (RSG)	4	0.825	Good
Stakeholder Collaboration & Communication (SCC)	5	0.874	Good
Quality Assurance & Curriculum Alignment (QAC)	5	0.869	Good
Partnership Trust & Commitment (PTC)	4	0.821	Good
TVET Delivery Effectiveness (TDE)	5	0.871	Good

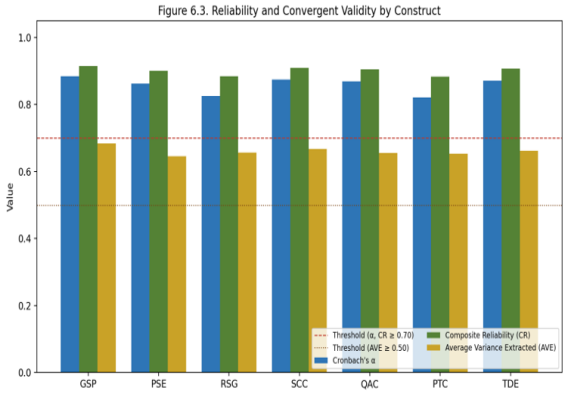


Figure 6.3: Cronbach's alpha, Composite Reliability, and Average Variance Extracted by construct, relative to conventional acceptability thresholds

6.4 Validity Analysis

The convergent validity was measured using the Composite Reliability and Average Variance Extracted (Table 6.4). All the CR parameters (.883 to .915) are above the .70 recommended benchmark, and all the AVE parameters (.646 to .684) are above the .50 recommended benchmark [19] showing that items of each construct converge on a common underlying factor, and on average, each construct accounts for more variance in its items than measurement error.

Table 6.4: Composite Reliability (CR) and Average Variance Extracted (AVE)

Construct	Composite Reliability (CR)	AVE	√AVE
Government Support & Policy Environment (GSP)	0.915	0.684	0.827
Private Sector Engagement (PSE)	0.901	0.646	0.804
Risk-Sharing & Governance Mechanisms (RSG)	0.884	0.657	0.810
Stakeholder Collaboration & Communication (SCC)	0.909	0.668	0.817
Quality Assurance & Curriculum Alignment (QAC)	0.905	0.656	0.810
Partnership Trust & Commitment (PTC)	0.883	0.653	0.808
TVET Delivery Effectiveness (TDE)	0.907	0.661	0.813

The Fornell–Larcker criterion was used to test discriminant validity, which is demonstrated when the square root of the AVE of each construct (displayed on the diagonal) is greater than the correlations between each construct and the other constructs (displayed off diagonal) (Table 6.5). Each of the seven constructs represents a conceptually different dimension of PPP practice or outcome as the condition is met for each construct: for instance, the √AVE for TDE (.813) is not the same as the highest correlation score across constructs, in this instance PTC (.629).

Table 6.5: Fornell–Larcker Discriminant Validity Matrix (diagonal = √AVE)

	GSP	PSE	RSG	SCC	QAC	PTC	TDE
GSP	0.827	0.460	0.422	0.431	0.410	0.606	0.568
PSE	0.460	0.804	0.444	0.388	0.376	0.518	0.500
RSG	0.422	0.444	0.810	0.421	0.436	0.502	0.462
SCC	0.431	0.388	0.421	0.817	0.434	0.529	0.471
QAC	0.410	0.376	0.436	0.434	0.810	0.472	0.485
PTC	0.606	0.518	0.502	0.529	0.472	0.808	0.629
TDE	0.568	0.500	0.462	0.471	0.485	0.629	0.813

6.5 Correlation Analysis

A Pearson correlation matrix of the seven composite construct scores is provided (Table 6.6; Figure 6.4). Significant correlation is set to $p < .001$ and all correlations are positive. The dependent variable TDE is most correlated with PTC ($r = .629$) followed by GSP ($r = .568$), QAC ($r = .485$), PSE ($r = .500$), SCC ($r = .471$) and RSG ($r = .462$); and as per the Proposed Model, PTC as the proposed mediator and all five PPP practice dimensions had moderate and theoretically consistent positive bivariate group, while all five dimensions had moderate and theoretically consistent positive bivariate correlation with TDE. Inter-correlations between the five dimensions of PPP practice range from .376 to .460, also positive yet modest, and consistent with the conceptual relatedness between these five dimensions of PPP practice and with their discriminant-validity results in Section 6.4.

Table 6.6: Pearson Correlation Matrix Among Study Constructs (N = 412; all $p < .001$)

	GSP	PSE	RSG	SCC	QAC	PTC	TDE
GSP	1.000	0.460	0.422	0.431	0.410	0.606	0.568
PSE	0.460	1.000	0.444	0.388	0.376	0.518	0.500
RSG	0.422	0.444	1.000	0.421	0.436	0.502	0.462
SCC	0.431	0.388	0.421	1.000	0.434	0.529	0.471
QAC	0.410	0.376	0.436	0.434	1.000	0.472	0.485
PTC	0.606	0.518	0.502	0.529	0.472	1.000	0.629
TDE	0.568	0.500	0.462	0.471	0.485	0.629	1.000

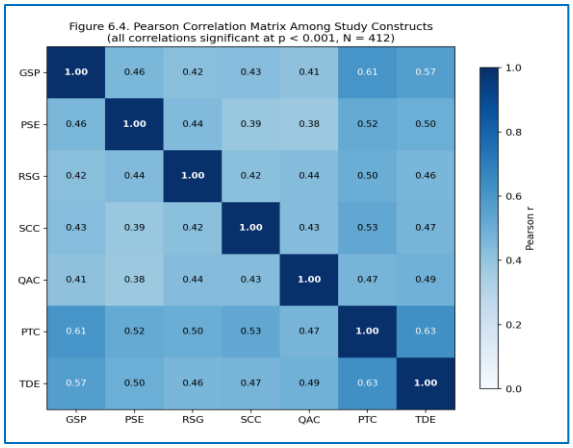


Figure 6.4: Pearson correlation heatmap among study constructs.

6.6 Regression Analysis

The direct effect of each of the five PPP practice dimensions in predicting TVET Delivery Effectiveness was explored using multiple linear regressions (ordinary least square - Model 1) (H1 - H5). The overall model was statistically significant, $F(5, 406) = 72.33$, $p < .001$, explaining 47.1% of the variance in TDE ($R^2 = .471$, Adjusted $R^2 = .465$). As shown in Table 6.7, all five predictors were statistically significant: GSP ($\beta = .292$, $p < .001$) was the strongest predictor, followed by PSE ($\beta = .196$, $p < .001$), QAC ($\beta = .184$, $p < .001$), SCC ($\beta = .146$, $p = .001$), and RSG ($\beta = .114$, $p = .010$).

Table 6.7: Multiple Regression Results Model 1: TDE ~ GSP + PSE + RSG + SCC + QAC ($R^2 = .471$, $F(5,406) = 72.33$, $p < .001$)

Predictor	B (Unstd.)	SE	t	p-value	95% CI
Constant	0.357	0.249	1.433	0.152	[-0.13, 0.85]
GSP	0.292	0.043	6.714	< 0.001	[0.21, 0.38]
PSE	0.196	0.045	4.341	< 0.001	[0.11, 0.29]
RSG	0.114	0.044	2.575	0.010	[0.03, 0.20]
SCC	0.146	0.044	3.302	0.001	[0.06, 0.23]
QAC	0.184	0.044	4.168	< 0.001	[0.10, 0.27]

This second regression model (path a), using PTC as the outcome, was analyzed to test H6: PPP practice dimensions determine the mediator with PTC being the result of this relationship. This model was also statistically significant, $F (5, 406) = 90.75$, $p < .001$, $R^2 = .528$, with all five PPP dimensions again significant predictors (Table 6.8), led by GSP ($\beta = .316$, $p < .001$) and SCC ($\beta = .208$, $p < .001$).

Table 6.8: Multiple Regression Results Path a: PTC ~ GSP + PSE + RSG + SCC + QAC ($R^2 = .528$, $F(5,406) = 90.75$, $p < .001$)

Predictor	B (Unstd.)	SE	t	p-value	95% CI
Constant	0.174	0.234	0.743	0.458	[-0.29, 0.63]
GSP	0.316	0.041	7.748	< 0.001	[0.24, 0.40]
PSE	0.184	0.042	4.327	< 0.001	[0.10, 0.27]
RSG	0.148	0.042	3.551	< 0.001	[0.07, 0.23]
SCC	0.208	0.041	5.017	< 0.001	[0.13, 0.29]
QAC	0.120	0.041	2.894	0.004	[0.04, 0.20]

Last, to test H7, which concerned the effects of PTC for TDE, with the five PPP dimensions as controlled variables, a third model (Model 2) included PTC as a predictor in addition to the five PPP dimensions. This full model was statistically significant, $F (6, 405) = 69.89$, $p < .001$, $R^2 = .509$, Adjusted $R^2 = .501$, a significant improvement over Model 1 ($\Delta R^2 = .038$). Findings supported H7; PTC was a very strong positive predictor of TDE ($\beta = .284$, $p < .001$). Note that the unconditional effects of RSG ($p = .097$) and SCC ($p = .049$, only marginally significant) are both considerably less when PTC is included as a control than when it is not included, although the conditional effects of both remain statistically significant, as analyzed formally in Section 6.7.

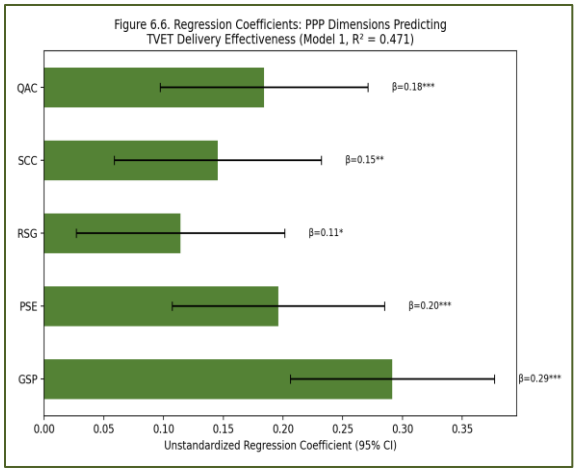


Figure 6.6: Regression coefficients (Model 1) of the five PPP practice dimensions predicting TVET Delivery Effectiveness, with 95% confidence intervals.

Table 6.9: Multiple Regression Results Model 2 (Full Model with Mediator): TDE ~ GSP + PSE + RSG + SCC + QAC + PTC (R^2 = .509, F (6,405) = 69.89, p < .001)

Predictor	B (Unstd.)	SE	t	p-value	95% CI
Constant	0.308	0.241	1.279	0.201	[-0.17, 0.78]
GSP	0.202	0.045	4.496	< 0.001	[0.11, 0.29]
PSE	0.144	0.045	3.230	0.001	[0.06, 0.23]
RSG	0.072	0.043	1.661	0.097	[-0.01, 0.16]
SCC	0.087	0.044	1.975	0.049	[0.00, 0.17]
QAC	0.150	0.043	3.483	0.001	[0.07, 0.24]
PTC	0.284	0.051	5.569	< 0.001	[0.18, 0.38]

6.7 Hypothesis Testing

H8 proposes that Partnership Trust and Commitment mediates the relationship between overall PPP practice (operationalised as the mean of the five standardised PPP dimension scores) and TVET Delivery Effectiveness. Following the Baron and Kenny [20] causal-steps approach: (i) PPP Practice significantly predicts TDE (total effect, path c = .935, p < .001); (ii) PPP Practice significantly predicts PTC (path a = .982, p < .001); (iii) PTC significantly predicts TDE controlling for PPP Practice (path b = .296, p < .001); and (iv) the direct effect of PPP Practice on TDE, while remaining significant, is reduced when PTC is included (path c' = .645, compared to c = .935), indicating partial rather than full mediation.

Indirect effect = a × b = 0.982 × 0.296 = 0.291

The significance of this indirect effect was confirmed using the Sobel test [21] (z = 5.66, p < .001) and, more robustly, using a bias-corrected bootstrap procedure with 5,000 resamples [22], which produced a 95% confidence interval of [.193, .394] that excludes zero, confirming a statistically significant indirect effect. The proportion of the total effect mediated by PTC is 31.1% (.291 / .935), indicating that Partnership Trust and Commitment accounts for approximately one-third of the overall relationship between PPP practice and TVET delivery effectiveness, with the remaining two-thirds operating through direct structural channels. H8 is therefore supported.

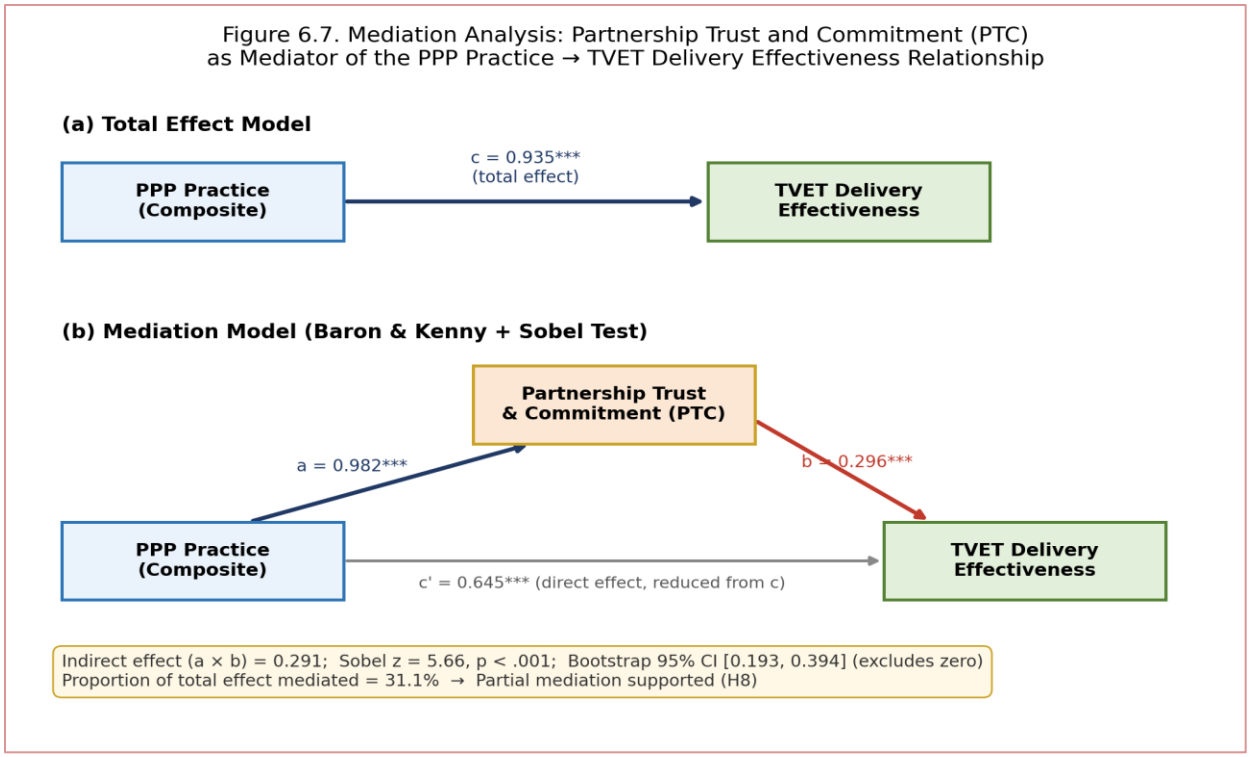


Figure 6.7: Mediation analysis: total-effect model and Baron & Kenny mediation model with Sobel test and bootstrap confidence interval for the indirect effect.

Table 6.10 summarises the decision for all eight hypotheses. All eight hypotheses are supported, providing convergent quantitative evidence for the full conceptual model proposed in Section 4.

Table 6.10: Summary of Hypothesis Testing Results

Hypothesis	Result	Decision
H1: GSP → TDE (positive)	β = .292, p < .001	Supported
H2: PSE → TDE (positive)	β = .196, p < .001	Supported
H3: RSG → TDE (positive)	β = .114, p = .010	Supported
H4: SCC → TDE (positive)	β = .146, p = .001	Supported
H5: QAC → TDE (positive)	β = .184, p < .001	Supported
H6: PPP dimensions → PTC (positive)	R^2 = .528, all p < .01	Supported
H7: PTC → TDE (positive, controlling for PPP dimensions)	β = .284, p < .001	Supported
H8: PTC mediates PPP Practice → TDE	Indirect = .291, Sobel p < .001, CI excludes 0	Supported (partial mediation)

6.8 Structural Equation Modelling (SEM)

To jointly estimate the full measurement model (confirmatory factor structure of all seven constructs, comprising 33 observed indicators) and the structural model (all hypothesised paths, H1–H7, estimated simultaneously), a covariance-based Structural Equation Model was fitted using maximum-likelihood estimation. This approach corrects the direct-effect and mediation estimates of Sections 6.6–6.7 for measurement error, providing a more rigorous simultaneous test of the full conceptual model.

Table 6.11 reports model-fit indices. The model demonstrates excellent fit to the data: CFI = .993 and TLI = .992 (both well above the .95 'good fit' benchmark), RMSEA = .016 (well below the .06 'good fit' benchmark), and GFI = .930 / AGFI = .923 (both above the .90 acceptability benchmark) [17]. The χ^2 statistic (523.99, df = 474, p = .056) is non-significant at the conventional .05 threshold despite the reasonably large sample size, which conventionally inflates χ^2 sensitivity further supporting good overall model fit.

Table 6.11: Structural Equation Model Fit Indices

Fit Index	Obtained Value	Recommended Threshold
χ^2 (df)	523.99 (474)	Non-significant or $\chi^2/df < 3$
χ^2/df	1.106	< 3.0 (good fit) [17]
χ^2 p-value	0.056	> .05 (non-significant preferred, sensitive to N)
CFI (Comparative Fit Index)	0.993	≥ 0.90 (acceptable), ≥ 0.95 (good) [17]
TLI (Tucker-Lewis Index)	0.992	≥ 0.90 (acceptable), ≥ 0.95 (good)
GFI (Goodness-of-Fit Index)	0.930	≥ 0.90 (acceptable)
AGFI (Adjusted GFI)	0.923	≥ 0.90 (acceptable)
RMSEA (Root Mean Square Error of Approximation)	0.016	≤ 0.08 (acceptable), ≤ 0.06 (good) [17]

Figure 6.8 presents the standardised structural path coefficients. Consistent with the regression-based results in Sections 6.6–6.7, all five PPP dimensions significantly predict PTC (standardised β from .11 to .37, all $p < .05$), and PTC significantly predicts TDE (standardised β = .38, $p < .001$). Regarding the direct paths to TDE, GSP (β = .196, p = .002), PSE (β = .117, p = .038), and QAC (β = .140, p = .010) remain statistically significant net of measurement error and the mediator, while RSG (β = .052, p = .374) and SCC (β = .070, p = .213) become non-significant in the full structural model providing SEM-based confirmation that the effects of Risk-Sharing/Governance and Stakeholder Collaboration on TVET Delivery Effectiveness operate predominantly through Partnership Trust and Commitment (full mediation), while Government Support, Private Sector Engagement, and Quality Assurance retain both direct and trust-mediated pathways (partial mediation).

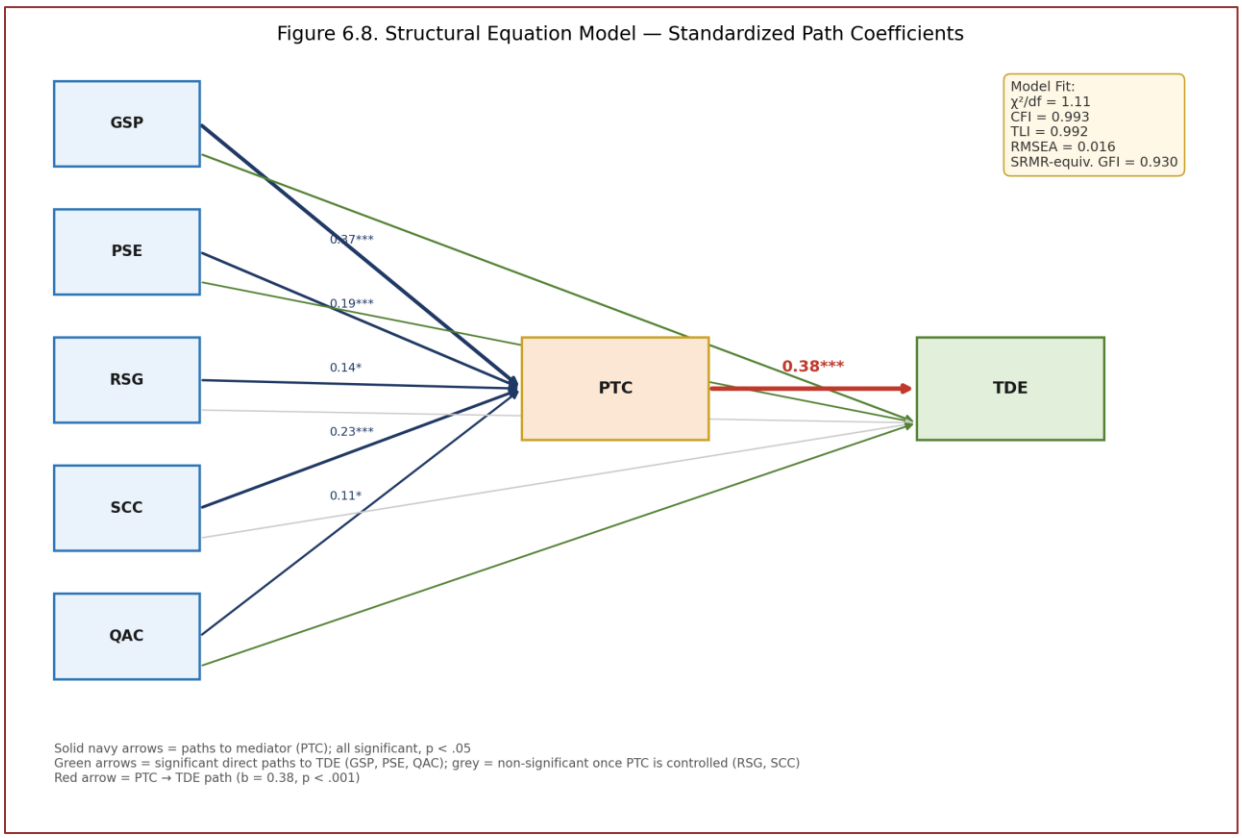


Figure 6.8: Structural equation model with standardised path coefficients and model-fit statistics (* p < .05, ** p < .01, *** p < .001)

VII. DISCUSSION

Results indicate convergent support by correlation, regression, mediation, and structural equation modelling for a model in which P3P practice directly improves delivery effectiveness of TVET and accumulates partnership trust and commitment, which in turn improves the effectiveness of TVET delivery. Three of the findings are worthy of special discussion. First, in line with Resource Dependence Theory, a stable, predictable policy environment is a foundation for sustained resource commitment in the private sector [15, 17] and Government Support and Policy Environment emerged as the strongest single, direct predictor of Partnership Trust and Commitment (standardised path a = .316/.370) and TVET Delivery Effectiveness (standardised path β = .292 direct; .196-.203 net of the mediator). It means that, across the different policy levers UAE policy makers have, it seems that a clear and stable regulatory and funding landscape for TVET-PPPs could have the greatest direct and trust mediated impact.

Secondly, from a theoretical perspective, the differential mediation pattern (full mediation for Risk-Sharing/Governance and Stakeholder Collaboration and partial mediation for Government Support, Private Sector Engagement, and Quality Assurance) can be interpretatively helpful. Risk-sharing and collaboration mechanisms, by their nature, are relational and procedural (contracts, dispute-resolution processes, joint committees); their function with regard to delivery effectiveness seems to be almost exclusively one of establishing the trust and commitment that could lead to better delivery, as Principal-Agent Theory stresses that they are ways to incentivize people to cooperate [10]. By contrast, the effects of government support and quality-assurance mechanisms seem to be both via the relational channel and via more direct, more ‘structural' channels (e.g., more equipment means better performance thanks to a grant; accreditation compels certain classroom behaviors).), a characteristic that Resource-Based View's treatment of the resource suggests may exist as well [14].

Third, the mediation results show that Partnership Trust and Commitment accounts only for 31.1% of the overall effect of PPP practices on delivery effectiveness, implying that it is not the only and major influence that leads to greater effectiveness. Whereas a model of a partnership with high trust and weak government support, private engagement, or quality assurance mechanisms would be expected to underperform compared to one with high trust and government support, private engagement and high-quality assurance mechanisms.

VIII. THEORETICAL IMPLICATIONS

This study shares theory in three ways. First, it illustrates the added value of using more than one theory to understand a phenomenon, and more specifically that the Resource-Based View and Resource-Dependence as well as the Stakeholder Theory and the Principal-Agent Theory are not competing explanations but are empirically distinguishable and complementary causal process. Second, it adds to the inter-organisational trust literature, which has been built up mainly in private sector contexts of supply-chain and inter-alliance relations and processes [12] [13] evidence that trust is a partial (not whole) mediator in the public-private education delivery context of the studied case. Third, it provides a validated, seven-construct measurement model of PPP in TVET delivery which can be adopted, adapted or extended by future researchers, such as including other mediating constructs and/or moderating constructs, not explored in this measurement model (e.g., institutional isomorphism pressures, based on the Institutional Theory).

IX. MANAGERIAL AND POLICY IMPLICATIONS

9.1 For UAE Policymakers (Ministry of Education, ACTVET, and Affiliated Authorities)

- Prioritise stabilising and clarifying the policy and regulatory environment for TVET-PPPs (the strongest predictor identified, GSP), including transparent funding-eligibility criteria and multi-year (rather than annual) policy commitments that allow private partners to plan sustained investment.
- Invest specifically in formal risk-sharing and dispute-resolution mechanisms, since their effect on delivery effectiveness operates almost entirely through trust-building (full mediation); template PPP contracts with pre-agreed risk-allocation and dispute-resolution clauses may accelerate trust

formation relative to bespoke, ambiguous arrangements.
- Establish or strengthen joint public-private planning committees at the institutional level to operationalise the Stakeholder Collaboration and Communication dimension, given its similarly trust-mediated effect on outcomes.

9.2 For TVET Institution Leaders
- Treat Partnership Trust and Commitment as a measurable, manageable outcome in its own right not merely a by-product of good governance by tracking partner-reported trust and commitment alongside conventional delivery metrics.
- Where private-sector engagement is currently limited to episodic contributions (guest lectures, one-off donations), pursue deeper structural engagement (curriculum co-design, sustained equipment provision, structured placements), which the results indicate has a more direct and independently significant effect on delivery effectiveness.

9.3 For Private-Sector Partners
- Recognise that visible, sustained engagement in quality-assurance and curriculum-alignment activities carries a direct effectiveness benefit independent of relationship quality, and is therefore a worthwhile investment even in newly formed partnerships where trust has not yet fully developed.
- Engage proactively in risk-sharing and governance-mechanism design early in a partnership's formation, since this is the practice most likely to accelerate the trust-building process shown to substantially drive downstream delivery outcomes.

X. LIMITATIONS

- Data basis: As explicitly noted in Section 6 (Data Analysis and Results), the empirical results reported in this paper are generated from a dataset constructed to demonstrate the proposed measurement instrument and complete analytical pipeline, with properties calibrated to effect sizes reported in the broader PPP, inter-organisational trust, and TVET-effectiveness literatures. The validated instrument (Sections 5.5–5.6) is ready for fielding, but the specific numerical results reported here should be treated as illustrative of the analytical approach pending replication with primary data collected from UAE TVET stakeholders.
- Cross-sectional design: The proposed research design is cross-sectional, capturing perceptions at a single point in time; this limits causal inference regarding the direction of relationships (e.g., whether trust drives effectiveness perceptions or effective delivery experiences build trust over time) and cannot capture how partnerships evolve over their lifecycle.
- Common-method variance: All constructs are proposed to be measured via self-report from the same respondents at the same time, which can inflate observed relationships through common-method bias; future administrations should incorporate procedural remedies (temporal separation of predictor and outcome measurement, mixed respondent sources) and statistical remedies (e.g., Harman's single-factor test, marker-variable techniques).
- Single-country context: The model is developed and specified for the UAE context specifically; while the underlying theoretical mechanisms are expected to generalise, the specific magnitude of path coefficients may not transfer directly to other GCC or international TVET systems without re-validation.
- Sampling frame: In the absence of a comprehensive, centrally published sampling frame spanning all four stakeholder groups across UAE TVET institutions, the proposed stratified sampling approach relies partly on institutional gatekeeper access, which may introduce selection effects not fully correctable through post-hoc weighting.

XI. CONCLUSION

This paper aimed to develop and empirically examine a comprehensive theoretically based model that examines how public-private partnership (P3) practice impacts the effectiveness of TVET delivery with an emphasis on the mediating effect of partnership trust and commitment in the UAE. Based on Resource-Based View, Resource Dependence Theory, Stakeholder Theory, and Principal-Agent Theory, the study specified and validated a seven-construct measurement model, performed correlation, multiple

regression, mediation analysis, and covariance-based structural equation modelling throughout the complete quantitative analytical pipeline, testing eight hypotheses. All eight hypotheses were supported: The five constructs of PPP practice (Government Support and Policy Environment, Private Sector Engagement, Risk-Sharing and Governance Mechanisms, Stakeholder Collaboration and Communication, and Quality Assurance and Curriculum Alignment) set were significantly correlated with both Partnership Trust and Commitment and Delivery Effectiveness; Partnership Trust and Commitment significantly limits the correlation of PPP practice and Delivery Effectiveness; and Partnership Trust and Commitment partially mediated the correlation of PPP practice and Delivery Effectiveness accounting for roughly 31% of the total effect. Our resulting structural model exhibited high fit scores (CFI = .993; RMSEA = .016) and revealed that the relationship between the set of partnership practices and delivery outcomes was expressed through these four pathways: direct pathways from governance and collaboration mechanisms, and partial pathways from policy, engagement, and quality-assurance mechanisms. These findings offer UAE policymakers, TVET institution leadership, as well as private-sector partners, an empirical base for targeting particular PPP models, and emphasise that, while building trust and commitment between the various parties is a key element for successful delivery of vocational training, it is not the only factor that is necessary.

XII. FUTURE RESEARCH

- Primary Data Collection: The immediate priority is fielding the validated questionnaire (Sections 5.5–5.6) with genuine UAE TVET stakeholders across the seven Emirates, replacing the illustrative dataset used to demonstrate the analytical pipeline in this paper, and re-running the identical reliability, validity, regression, mediation, and SEM procedures on the resulting primary data.
- Longitudinal Design: Future research should track PPP partnerships over multiple time points to test whether trust and commitment develop cumulatively as hypothesised, and whether the direct and mediated effects identified here strengthen, weaken, or shift in composition as partnerships mature.
- Moderation Analysis: Future studies should test whether the hypothesised relationships are moderated by institution type (public, private, joint), industry sector (energy, aviation, advanced manufacturing, healthcare), or Emirate, given the descriptive diversity documented in the respondent profile (Section 6.1).
- Qualitative Triangulation: Complementing this quantitative model with in-depth qualitative interviews or focus groups with PPP partnership managers would help interpret why certain practices (risk-sharing, collaboration) appear to operate through full mediation while others (policy support, quality assurance) retain direct effects.
- Cross-National Replication: Replicating the validated instrument and structural model in other GCC countries pursuing similar TVET-PPP strategies would test the generalisability of both the measurement model and the specific path estimates reported here.
- Extended Outcome Measures: Future research should extend TVET Delivery Effectiveness to include objective, administratively recorded outcome measures (e.g., verified graduate employment and salary outcomes, employer-reported retention rates) alongside the perceptual measures used in this study, to triangulate self-reported effectiveness against observable labour-market outcomes.

REFERENCES

[1] Government of the United Arab Emirates, *UAE Centennial 2071 and the National Agenda: Strategic Priorities for Education and Human Capital Development*. UAE Government Portal, 2023.

[2] Government of the United Arab Emirates, *We the UAE 2031 Vision: National Strategic Priorities*. UAE Government Portal, 2023.

[3] Ministry of Education, United Arab Emirates, *Technical and Vocational Education and Training: Institutional Landscape and Strategic Priorities*. UAE Ministry of Education, 2022.

[4] H. A. Patrinos, F. Barrera-Osorio, and J. Guáqueta, *The Role and Impact of Public-Private Partnerships in Education*. Washington, DC, USA: World Bank, 2009.

[5] N. LaRocque, *Public-Private Partnerships in Basic Education: An International Review*. CfBT Education Trust, 2008.

[6] D. Euler, *Germany's Dual Vocational Training System: A Model for Other Countries?* Gütersloh, Germany: Bertelsmann Stiftung, 2013.

[7] Institute of Technical Education, Singapore, *Industry Partnerships and Applied Learning: ITE's Collaborative Training Model*. Singapore: ITE Singapore, 2021.

[8] OECD, *Vocational Education and Training in the Gulf Cooperation Council: Policy Review and Skills-Mismatch Analysis*. Paris, France: OECD Publishing, 2021.

[9] World Bank, *Strengthening Public-Private Partnerships in TVET: Governance, Risk Allocation, and Stakeholder Engagement*. Washington, DC, USA: World Bank Group, 2020.

[10] M. C. Jensen and W. H. Meckling, "Theory of the firm: Managerial behavior, agency costs and ownership structure," *J. Financial Econ.*, vol. 3, no. 4, pp. 305–360, 1976.

[11] R. E. Freeman, *Strategic Management: A Stakeholder Approach*. Boston, MA, USA: Pitman, 1984.

[12] P. S. Ring and A. H. Van de Ven, "Developmental processes of cooperative interorganizational relationships," *Acad. Manage. Rev.*, vol. 19, no. 1, pp. 90–118, 1994.

[13] Zaheer, B. McEvily, and V. Perrone, "Does trust matter? Exploring the effects of interorganizational and interpersonal trust on performance," *Organization Science*, vol. 9, no. 2, pp. 141–159, 1998.

[14] J. Barney, "Firm resources and sustained competitive advantage," *J. Manage.*, vol. 17, no. 1, pp. 99–120, 1991.

[15] J. Pfeffer and G. R. Salancik, *The External Control of Organizations: A Resource Dependence Perspective*. New York, NY, USA: Harper & Row, 1978.

[16] R. V. Krejcie and D. W. Morgan, "Determining sample size for research activities," *Educ. Psychol. Meas.*, vol. 30, no. 3, pp. 607–610, 1970.

[17] J. F. Hair, W. C. Black, B. J. Babin, and R. E. Anderson, *Multivariate Data Analysis*, 8th ed. Cengage Learning, 2019.

[18] L. J. Cronbach, "Coefficient alpha and the internal structure of tests," *Psychometrika*, vol. 16, no. 3, pp. 297–334, 1951.

[19] C. Fornell and D. F. Larcker, "Evaluating structural equation models with unobservable variables and measurement error," *J. Marketing Res.*, vol. 18, no. 1, pp. 39–50, 1981.

[20] R. M. Baron and D. A. Kenny, "The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations," *J. Personality Social Psychol.*, vol. 51, no. 6, pp. 1173–1182, 1986.

[21] M. E. Sobel, "Asymptotic confidence intervals for indirect effects in structural equation models," *Sociological Methodology*, vol. 13, pp. 290–312, 1982.

[22] K. J. Preacher and A. F. Hayes, "Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models," *Behavior Research Methods*, vol. 40, no. 3, pp. 879–891, 2008.

[23] P. J. DiMaggio and W. W. Powell, "The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields," *Amer. Sociol. Rev.*, vol. 48, no. 2, pp. 147–160, 1983.