

Entrepreneurial Competence of Faculty in State Universities and Colleges: A Structural Equation Model

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Abstract: This study develops and tests a structural equation model to examine the entrepreneurial competence of faculty in state universities and colleges in Northern Mindanao, Philippines. Recognizing the importance of entrepreneurial skills in higher education for institutional effectiveness and student preparedness, the research identifies instructional delivery, e-literacy, and total quality management (TQM) as key variables influencing faculty entrepreneurial competence. Using a causal research design and Structural Equation Modeling (SEM), data collected from 439 faculty members reveal that instructional delivery has a significant positive impact on entrepreneurial competence, while e-literacy exhibits an adverse direct effect, and TQM contributes positively but to a lesser extent. The most robust model, Model 5, demonstrates excellent fit indices, confirming the relationships among variables. Findings inform the development of the Triadic Entrepreneurial Competence (TEC) Model, emphasizing the integration of competency-based instructional delivery, contextual e-literacy, and institutional quality systems. The TEC model advocates for continuous improvement and a holistic approach to enhancing faculty entrepreneurial skills, which ultimately foster innovative teaching strategies and promote entrepreneurial mindsets among students. This research contributes to understanding the systemic factors shaping faculty competencies and provides a framework for higher education institutions in cultivating entrepreneurial faculties to prepare students effectively for a rapidly evolving economy. The insights support policymakers and educators in designing targeted interventions to strengthen entrepreneurial education within Philippine higher education.

Keywords: Entrepreneurial competence, structural equation modeling, instructional delivery, e-literacy, total quality management

1. INTRODUCTION

Entrepreneurial competence among faculty in higher education has emerged as a critical determinant of institutional effectiveness and student preparedness in an increasingly dynamic and knowledge-driven economy. Faculty members who possess entrepreneurial competencies are better equipped to design innovative learning experiences, respond to shifting educational demands, and cultivate an entrepreneurial mindset among their students (Kaplan, 2024; Ingersoll, 2021). However, despite its recognized importance, entrepreneurial competence remains an underdeveloped dimension of faculty professional identity in many higher education systems, particularly in developing countries (Education Sciences, 2024).

Globally, teachers often lack the entrepreneurial knowledge and skills necessary to effectively prepare students for real-world challenges. Limited access to professional development resources, absence of entrepreneurial training programs, and the lack of a supportive institutional ecosystem continue to impede the development of entrepreneurial competence among educators (Chojak, 2024; Gibb, 2018). These deficiencies are not merely individual shortcomings but reflect systemic gaps in how higher education institutions conceptualize and support faculty development.

In the Philippine context, the concern is equally pressing. Despite the growing emphasis on entrepreneurship education in the national curriculum, many faculty members remain unprepared to teach entrepreneurial subjects effectively. Capote et al. (2015) found that inadequate training and limited institutional support hinder educators from developing the competencies needed for entrepreneurship instruction. Similarly, Villanueva and Lim (2019) observed



that teachers often lack the resources and training necessary to foster an entrepreneurial mind-set among students, resulting in a persistent disconnect between theoretical instruction and practical application. More recently, Saranza et al. (2022) confirmed that many educators lack formal business training or experience, negatively affecting their capacity to impart entrepreneurial knowledge effectively. These challenges are further reflected in Northern Mindanao, where Dela Cruz et al. (2021) revealed that while faculty acknowledge the importance of entrepreneurship education, their actual competencies fall significantly short of what is required.

In response to these challenges, the Commission on Higher Education (CHED) has actively pursued initiatives to embed entrepreneurial competencies into higher education curricula and faculty development frameworks (CHED, 2024). Parallel to policy efforts, scholarly attention has turned to identifying the institutional and pedagogical factors that drive faculty entrepreneurial competence. Three variables have emerged as particularly relevant in this regard: instructional delivery, e-literacy, and total quality management (TQM).

Instructional delivery — encompassing teaching strategy, mastery of subject matter, classroom management, and instructional assessment — is widely recognized as a foundational driver of faculty competence development. Effective instructional delivery empowers educators to embed entrepreneurial thinking into their pedagogy, improving both their own and their students' entrepreneurial capacity (Gede, 2023; Johnson & Martinez, 2018). E-literacy, defined as the ability to effectively find, use, and create information using digital technologies, has become indispensable in contemporary educational environments. Faculty with strong e-literacy skills are better positioned to access entrepreneurial resources, leverage digital platforms for innovative teaching, and model the kind of adaptive, technology-mediated problem-solving that entrepreneurship demands (Hasanah et al., 2024; Botohan & Jajalla, 2025). Total quality management, meanwhile, provides institutions with a structured framework for continuous improvement through leadership engagement, student-centered focus, faculty support mechanisms, and systematic program evaluation — all of which create the conditions under which entrepreneurial competence can flourish (Blegur et al., 2020; Al-Dhaafri & Alosani, 2020).

Despite growing literature on each of these factors individually, there is a notable lack of studies examining their combine influence on faculty entrepreneurial competence, particularly in the Philippine higher education context. This study address that gap be developing and testing a structural model that captures the interrelationships among instructional delivery, e-literacy, TQM and the entrepreneurial competence of faculty in State Universities and Colleges in Northern Mindanao.

2. OBJECTIVES

This study aimed to develop a structural equation model of entrepreneurial competence among faculty in State Universities and Colleges in Northern Mindanao, Region X, Philippines. The study tested five hypothesized structural models to identify the one that best fits the data.

3. METHODS

This study employed a causal research design with Structural Equation Modeling (SEM). The respondents were 439 faculty members from six State Universities and Colleges in Northern Mindanao, Region X, Philippines.

Data were gathered using validated and reliability-tested survey instruments adapted from established sources. The instrument underwent rigorous validation through expert review followed by pre-testing, and obtained a strong reliability coefficients (Cronbach's alpha) of 0.945. All instruments used a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Qualitative interpretations were assigned to ranges: 4.51–5.00 (Strongly Agree/Highest level), 3.51–4.50 (Agree), 2.51–3.50 (Moderately Agree), 1.51–2.50 (Disagree), 1.00–1.50 (Strongly Disagree/Lowest level).

Structural Equation Modeling (SEM) using Maximum Likelihood estimation tested five hypothesized structural models. Model fit was evaluated using the following indices: $CMIN/DF < 2.00$, $p\text{-value} > .05$, $GFI > .95$, $NFI > .95$, $TLI > .95$, $CFI > .95$, and $RMSEA < .05$.

4. RESULTS AND DISCUSSIONS

Using the Structural Equation Model (SEM), five structural models were developed through sequential analyses to estimate causal relationships and assumptions. The study examined three latent predictor traits across three measured and one outcome variable. Comparative analyses of these five models are displayed in Table 1. As shown, only Model 5 achieved the required fit indices, demonstrating an acceptable chi-square/df ratio, a non-significant p-value, and strong comparative fit indices (GFI, NFI, TLI, CFI) alongside a low RMSEA value, suggesting an optimal

fit to the data. The remaining models exhibited poor model fit, as indicated by high chi-square/df values, significant p-values, and suboptimal fit indices.

Table 1. Summary of goodness-of-fit measures of the five structural models

Model	CMIN/DF	P-value	NFI	TLI	CFI	GFI	RMSEA
1	5.073	0.000	0.876	0.875	0.898	0.876	0.096
2	6.676	0.000	0.878	0.862	0.893	0.888	0.114
3	5.603	0.000	0.892	0.882	0.909	0.905	0.103
4	4.922	0.000	0.911	0.906	0.927	0.915	0.095
5	1.369	0.080	0.983	0.992	0.995	0.982	0.029
Standard Value	<2.00	>.05	>.95	>.95	>.95	>.95	<.05

Legend:

CMIN/DF- Chi-square/Degree of Freedom

CFI- Comparative Fit Index

TLI- Tucker-Lewis Index

GFI- Goodness of Fit Index

RMSEA- Root Mean Square Error of Approximation

NFI- Normed Fit Index

Model 1 displayed poor model fit, with a chi-square/df ratio of 5.073, a significant p-value of 0.000, and GFI (0.876), NFI (0.876), TLI (0.875), and CFI (0.898) values all below the acceptable threshold of 0.95. The RMSEA value of 0.096 exceeded the 0.05 limit, indicating a poor approximation of the data structure.

Model 2 performed even worse, with the highest chi-square/df ratio of 6.676, an RMSEA of 0.114, and slightly improved GFI (0.888), but still insufficient fit indices for NFI (0.878), TLI (0.862), and CFI (0.893), all falling below the required 0.95 threshold.

Model 3 showed similar results to previous models, with a chi-square/df ratio of 5.603 and an RMSEA of 0.103, indicating that its structure failed to effectively capture the relationships between variables. While GFI (0.905) approached the threshold, other indices, including NFI (0.892), TLI (0.882), and CFI (0.909), remained below standards.

Model 4 showed marginal improvement over previous models, with a chi-square/df ratio of 4.922 and slightly better fit indices for NFI (0.911), TLI (0.906), CFI (0.927), and GFI (0.915). However, it still failed to meet the required thresholds for CMIN/DF and RMSEA (0.095), demonstrating a poor overall fit.

Model 5, in contrast, achieved an excellent fit with a chi-square/df ratio of 1.369, a non-significant p-value (0.080), and all fit indices exceeding the standard values: NFI (0.983), TLI (0.992), CFI (0.995), and GFI (0.982). Its RMSEA value of 0.029 falls well below the 0.05 threshold, indicating a minimal error of approximation and signifying that this model accurately represents the dataset's underlying structure. The substantial improvement in fit suggests that Model 5 appropriately captures the relationships among variables, making it the most valid and reliable among the tested models for measuring entrepreneurial competence of faculty.

Table 2 presents the standardized direct, indirect, and total effect estimates of the latent variables on the entrepreneurial competence of faculty in Structural Model 5. The results show that instructional delivery directly affects $\beta=0.62$, whereas e-literacy reveals an adverse direct effect of $\beta=-0.12$. Total quality management has a direct effect of $\beta=0.07$. As with the previous models, no indirect effects were observed, emphasizing a direct influence on entrepreneurial competence.

Table 2. Standardized direct, indirect, and total effects of the latent variables on the entrepreneurial competence of faculty in the structural model 5

LATENT VARIABLES	DIRECT EFFECT	INDIRECT EFFECT	TOTAL EFFECT
INSTRUCTIONAL DELIVERY (INDEL)	0.62	0.00	0.62
E-LITERACY (ELITE)	-0.12	0.00	-0.12

TOTAL QUALITY MANAGEMENT (TQUM)	0.07	0.00	0.07
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The Best-Fit Structural Model and the TEC Framework

Model 5's superior goodness-of-fit demonstrates that entrepreneurial competence is best explained by a trimmed structural configuration that retains the most theoretically meaningful indicators of each latent variable. The strong direct effect of instructional delivery ($\beta = .620$) confirms its primacy as a driver of faculty entrepreneurial competence, while TQM's smaller but positive contribution ($\beta = .070$) reinforces the value of institutional quality systems. The negative direct effect of e-literacy ($\beta = -.117$) in the structural model, despite its positive bivariate correlation, likely reflects multicollinearity or suppression effects — a phenomenon where one predictor's statistical effect reverses when controlling for correlated predictors (Darlington & Hayes, 2017). This suggests that e-literacy's positive influence on entrepreneurial competence may be largely mediated through instructional delivery.

These findings grounded the development of the Triadic Entrepreneurial Competence (TEC) Model, anchored on Timmons' (1994) Entrepreneurial Mindset Theory. The TEC Model posits that faculty entrepreneurial competence is cultivated through the integration of three interdependent components: (1) competency-based instructional delivery, (2) contextually appropriate e-literacy, and (3) fully implemented total quality management. This model provides a holistic, institution-level framework for enhancing faculty entrepreneurial competence in higher education settings.

The Triadic Entrepreneurial Competence (TEC) Model, as shown in Figure 1, emerged from an extensive exploration of the interconnectedness between instructional delivery, e-literacy, total quality management, and the entrepreneurial competence of educators. This model is designed to enhance teaching effectiveness in higher education by integrating key components that help improve the entrepreneurial mindset and practical teaching strategies.

Moreover, TEC Model represents a transformative educational approach uniquely positioned to elevate teaching effectiveness and enrich student learning experiences. Integrating the key elements such as robust instructional delivery, enhanced e-literacy, and a commitment to total quality management, this model empowers educators to engage students like never before. It replaces traditional methods with dynamic, interactive strategies that capture students' attention and nurture critical thinking and problem-solving skills necessary for success in a rapidly changing world.

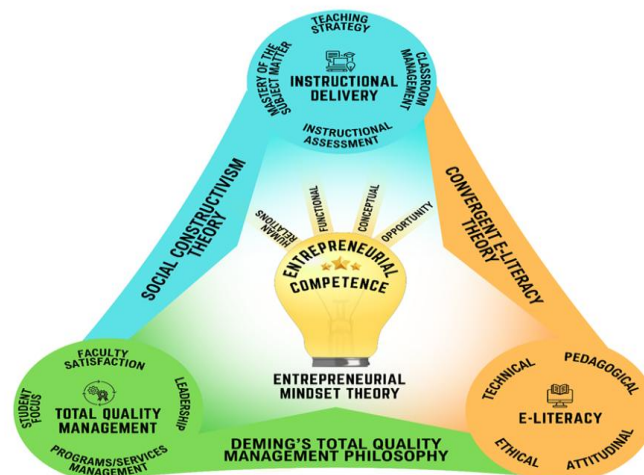


Figure 1. Triadic Entrepreneurial Competence (TEC) Model

Lastly, The Triadic Entrepreneurial Competence (TEC) Model promotes a continuous improvement culture, where educators and students thrive through a collaborative and supportive environment, ensuring that educational outcomes are met and exceeded. With a strong foundation in entrepreneurial thinking, this model prepares students to succeed academically and in their future careers, promoting a generation of innovative and adaptable leaders. Embracing the TEC Model means committing to a new standard of educational excellence that prioritizes creativity, flexibility, and real-world relevance in learning, ultimately shaping a brighter future for all.

5. CONCLUSIONS

The Triadic Entrepreneurial Competence (TEC) Model, developed from the generated structural equation model, presents a holistic framework for strengthening faculty entrepreneurial competence by integrating three essential components: instructional delivery, e-literacy, and total quality management. The model highlights that entrepreneurial competence is enhanced when these components work together to improve teaching practices, promote the effective use of digital technologies, and foster a culture of quality and continuous improvement. The framework also promotes a shift from traditional teaching approaches to more interactive, innovative, and learner-centered instructional practices that enhance student engagement while developing critical thinking, problem-solving, and entrepreneurial skills needed to thrive in an increasingly dynamic and competitive environment.

6. RECOMMENDATIONS

Policy makers may prioritize faculty development initiatives that integrate instructional delivery, e-literacy, and total quality management as complementary components of entrepreneurial competence through sustained investment in professional development, digital infrastructure, and quality assurance systems. School administrators may reinforce the implementation of the Triadic Entrepreneurial Competence (TEC) Model by providing continuous faculty training, access to appropriate digital technologies, and institutional quality management initiatives that promote innovative and learner-centered teaching practices. Likewise, faculty members may continuously strengthen their instructional delivery, digital competence, and quality management capabilities through professional development and the integration of innovative, technology-enhanced, and learner-centered instructional approaches.

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