

Micro-credentials, Skill-based Certifications and the Future Demand for University Education in a Digital Economy: Evidence From Northern Ghana

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Abstract

Despite the growing global discourse on alternative credentials such as micro-credentials and skill-based certifications, empirical evidence on their influence on demand for traditional higher education in African contexts remains limited. Grounded in Human Capital and Signaling Theories, this study examined the effects of micro-credentials and skill-based certifications on demand for traditional higher education using structural equation modelling (SEM). A cross-sectional design and probability sampling technique were employed to select 410 students, graduates, and working professionals in Northern Ghana who were engaged in or exposed to higher education and alternative credentialing pathways. The findings show that micro-credentials have a positive and statistically significant effect on demand for traditional higher education, indicating their complementary role within the human capital accumulation processes. In contrast, skill-based certifications exert a significant negative effect, suggesting a partial substitution effect. Perceived employability partially mediates the relationship between micro-credentials and demand for higher education, whereas perceived labour market relevance shows no mediating effect. The study contributes to theory by demonstrating that alternative credentials exert differentiated effects on higher education demand and by showing that signalling and employability mechanisms are more influential than perceived labour market relevance within the African context.

Introduction

Higher education has become a critical driver of innovation, economic competitiveness, and sustainable development in contemporary knowledge societies. Universities are increasingly expected not only to transmit knowledge but also to support research, technological advancement, entrepreneurship, and human capital development. Through collaboration with industry and innovation ecosystems, higher education institutions contribute significantly to workforce development, national productivity, and societal transformation. Consequently, universities are under growing pressure to produce graduates with both theoretical understanding and practical competencies capable of responding to rapidly changing labour market demands.

Despite the strategic importance of universities, the demand for traditional higher education is being reshaped by the rise of the digital economy and the emergence of alternative credentialing pathways. Historically, university degrees functioned as the dominant route to professional advancement and social mobility, serving both as investments in human capital and as signals of competence to employers. However, this model is increasingly challenged by the rapid growth of micro-credentials and skill-based certifications, which emphasize targeted, competency-based, and industry-relevant learning over broad disciplinary education (Wheelahan & Moodie, 2021; OECD, 2019).

Micro-credentials, typically short, modular, and competency-driven learning experiences, have gained prominence as flexible and accessible alternatives to conventional degree programmes (Oliver, 2019). Delivered largely through digital platforms, they enable learners to acquire specialized and immediately applicable skills within short periods. Similarly, skill-based certifications formally recognize professional

competencies in specific fields and are increasingly valued by employers as indicators of technical proficiency and job readiness (Dede et al., 2020). Together, these developments signal a transition toward a more modular and skills-oriented educational landscape in which learning is gradually becoming detached from traditional university structures.

This transformation is closely linked to accelerating digitalization and evolving labour market demands. Automation, artificial intelligence, and digital technologies have intensified the need for adaptable and continuously updated skills (World Economic Forum, 2020). Consequently, concerns have emerged regarding the responsiveness and labour market relevance of traditional university curricula. Universities are often criticized for slow curricular adaptation, leading to persistent mismatches between graduate competencies and employer expectations. In many contexts, graduates continue to face unemployment or underemployment despite holding formal university qualifications.

In contrast, micro-credentials and skill-based certifications are increasingly perceived as agile, flexible, and market-responsive alternatives capable of supporting continuous professional development, reskilling, and upskilling (Van Noy et al., 2019). As their visibility and acceptance expand, perceptions regarding the labour market relevance of traditional higher education are also changing.

These developments can be understood through Human Capital Theory and Signaling Theory. Human Capital Theory suggests that individuals invest in education to enhance productivity, employability, and earnings potential, whereas Signaling Theory emphasizes the role of credentials in communicating competence to employers. Micro-credentials and skill-based certifications therefore represent alternative forms of signalling that may reshape employer hiring preferences and individual educational choices. While some scholars argue that these credentials complement university degrees by strengthening employability, others contend that they may increasingly substitute for traditional higher education pathways (Gallagher, 2020).

Although alternative credentials are widely promoted as mechanisms for improving employability and workforce competitiveness, uncertainty remains regarding their broader implications for demand for higher education. It remains unclear whether skills-based learning diminishes interest in traditional degrees or instead complements formal university education. Furthermore, limited empirical attention has been devoted to the mediating roles of perceived employability and perceived labour market relevance in shaping educational decisions.

The issue is particularly important in developing countries such as Ghana, where higher education systems continue to face graduate unemployment, curriculum rigidity, inadequate funding, and weak alignment with labour market expectations. Employers increasingly demand practical, digital, and industry-relevant skills that are often perceived to be insufficiently emphasized in traditional university programmes. At the same time, the expansion of online certifications and industry-driven training opportunities has increased access to alternative pathways for skills acquisition. While these developments may improve employability, they also raise important questions about their influence on enrolment patterns and long-term demand for university education (Varadarajan et al., 2023).

Despite growing global discourse on alternative credentials, empirical research examining their influence on higher education demand remains limited, particularly in Sub-Saharan Africa. Existing studies (McGreal & Olcott, 2022; Wheelahan & Moodie, 2021; Uggeri & Barlassina, 2019) have focused mainly on advanced economies, leaving significant gaps in understanding how these credentials influence educational choices in developing contexts. Against this background, the present study examined the influence of micro-credentials and skill-based certifications on demand for higher education, with particular attention to the mediating roles of perceived employability and perceived labour market relevance. By exploring whether alternative credentials function as substitutes for or complements to university education, the study contributes to emerging debates on the future of higher education and workforce development in the digital age.

Purpose of the study

The purpose of this study was to examine the influence of micro-credentials and skill-based certifications on the demand for higher education, with particular emphasis on the mediating role of perceived employability and perceived market relevance of traditional higher education

Research hypotheses

The study tested the following hypotheses:

1. **H1:** Awareness and perceived value of micro-credentials have a significant influence on the demand for traditional higher education.
2. **H2:** Awareness and perceived value of skill-based certifications have a significant influence on the demand for traditional higher education.
3. **H3:** Perceived employability significantly mediates the relationship between micro-credentials and the demand for traditional higher education.
4. **H5:** Perceived labour market relevance of higher education significantly mediates the relationship between micro-credentials and the demand for traditional higher education.

Theoretical framework of the study

This study is based on the Human Capital and Signaling Theories. These theories, together provide a robust analytical means for examining how individuals make educational investment decisions and how credentials function within the labour market. Human Capital Theory, as advanced by Becker (1993), posits that individuals invest in education to enhance their productivity, skills, and future earnings, viewing education as a rational economic decision shaped by cost–benefit considerations. In contrast, Signaling Theory, developed by Spence (1973), emphasizes the role of educational credentials as signals of ability and competence in contexts of imperfect information, where employers rely on observable qualifications to infer potential productivity. Together, these theories provide a dual explanation of education as both a means of skill acquisition and a mechanism for labour market signaling.

Within this theoretical context, traditional university degrees have historically functioned as dominant forms of both human capital accumulation and signaling, offering broad-based knowledge and widely recognized credentials (Becker, 1993; Spence, 1973). However, the emergence of micro-credentials and skill-based certifications represents a significant shift toward more flexible, modular, and competency-based forms of learning that are closely aligned with labour market demands (Oliver, 2019; OECD, 2019). These alternative credentials enable individuals to acquire targeted skills within shorter timeframes and at lower costs, thereby potentially altering the traditional cost–benefit calculus associated with higher education investment. From a human capital perspective, they offer more immediate returns, while from a signaling perspective, they provide more specific and transparent indicators of job-relevant competencies (Dede et al., 2020; Wheelahan & Moodie, 2021).

Accordingly, this study applies Human Capital Theory and Signaling Theory to examine how these alternative credentials influence perceived employability and, in turn, shape the demand for traditional higher education, thereby providing a theoretically grounded explanation of evolving educational preferences in a changing labour market landscape (Brown et al., 2021; Gallagher, 2020).

Conceptual framework of the study

The researcher undertook an extensive review of literature to examine the relationships among micro-credentials, skill-based certifications, perceived employability, perceived labour market relevance of higher education, and demand for traditional higher education. Based on the theoretical and empirical literature, a conceptual framework was developed to explain how alternative credentialing pathways influence demand for higher education in the digital age. The framework is presented in Fig. 1.

Conceptual framework of the study

The conceptual framework presents a partial mediation model explaining how alternative credentialing pathways, specifically micro-credentials and skill-based certifications, influence demand for traditional higher education both directly and indirectly through perceived employability and perceived labour market relevance of higher education.

At the core of the framework are two exogenous variables: micro-credentials and skill-based certifications. These competency-based and industry-oriented learning pathways are increasingly prominent within the digital economy and are assumed to directly influence perceptions regarding the value, relevance, and necessity of university degrees. This direct relationship, reflected in hypotheses H1 and H2, is grounded in Human Capital Theory and rational choice perspectives, which argue that individuals make educational investments based on expected economic returns and cost-benefit considerations.

The framework further introduces perceived employability as a mediating variable. It assumes that alternative credentials enhance individuals' perceptions of employability by providing practical, job-relevant, and industry-recognized competencies. As individuals perceive themselves as more

employable, their demand for traditional higher education may subsequently change. This mediating mechanism is reflected in hypotheses H3 and H4.

In addition, the framework incorporates perceived labour market relevance of higher education as another mediating construct. This variable captures perceptions regarding the extent to which traditional university education aligns with labour market demands, technological advancement, and employer expectations. The framework assumes that growing awareness and acceptance of alternative credentials may reshape perceptions of the labour market relevance of university degrees, thereby influencing demand for higher education.

The integration of direct and indirect pathways reflects a partial mediation structure that provides a comprehensive understanding of how alternative credentials shape educational demand in the digital age. This multidimensional perspective is consistent with Signaling Theory, which views educational credentials as signals of competence and productivity that influence employment expectations and educational choices. Overall, the framework provides a robust analytical basis for examining how micro-credentials and skill-based certifications are reshaping perceptions of employability, labour market relevance, and the desirability of traditional higher education pathways.

Empirical review

Emerging scholarship increasingly examines how alternative credentialing pathways, particularly micro-credentials and skill-based certifications, are reshaping higher education and employability. Evidence suggests that these credentials are not merely supplementary but are gradually transforming how individuals acquire, demonstrate, and apply competencies in the labour market.

Research indicates that micro-credentials enhance employability by providing targeted, competency-based learning aligned with industry needs. OECD (2023) reports that micro-credentials improve job readiness by equipping learners with market-relevant skills, thereby strengthening both actual and perceived employability. Similarly, Varadarajan et al. (2023), in a systematic review, found that micro-credentials serve as effective signals of competence to employers, especially in rapidly evolving sectors such as technology and business. Learners who participate in micro-credential programmes often report greater confidence in securing employment, reinforcing the connection between micro-credentials and employability perceptions.

Comparable findings exist for skill-based certifications. Empirical studies show that professional and industry-recognized certifications function as credible indicators of practical competence, bridging the gap between academic knowledge and workplace requirements. OECD (2021) notes that employers increasingly value such certifications because they emphasize demonstrable skills rather than purely theoretical knowledge. Likewise, Woods and Woods (2023) found that skill-based certifications enhance employability perceptions through flexible and modular learning pathways that respond quickly to labour market demands.

Beyond employability, scholars have explored the implications of alternative credentials for demand for traditional higher education. Findings remain mixed, although evidence increasingly points to a partial substitutive effect in some contexts. OECD (2023) argues that flexible and lower-cost micro-credentials may reduce incentives to pursue full degree programmes, particularly among working adults and non-traditional learners. However, UNESCO (2022) highlights that micro-credentials may also complement traditional degrees, as learners increasingly combine both forms of credentials to improve labour market competitiveness. This suggests that alternative credentials can simultaneously disrupt and reinforce higher education systems depending on institutional integration and labour market recognition.

Recent scholarship further emphasizes the mediating role of perceived employability in shaping educational choices. Educational decisions are often influenced more by perceptions of labour market outcomes than by credentials alone. Varadarajan et al. (2023) found that learners' confidence in their employability significantly affects their willingness to invest in further education. When alternative credentials sufficiently enhance perceived employability, individuals may perceive lower marginal benefits from pursuing traditional degree programmes, thereby reducing demand for higher education.

Despite these insights, empirical research remains limited in sub-Saharan Africa, where the adoption and recognition of alternative credentials are still evolving. Existing studies focus largely on developed economies, with little attention to contexts such as Ghana. Moreover, few studies have simultaneously examined the direct and mediating relationships among micro-credentials, skill-based certifications, perceived employability, and demand for higher education. This study addresses this gap by testing a partial mediation model within a developing country context, thereby providing insights into how alternative credentials are reshaping higher education choices in emerging economies.

Research Methods and Design

The study adopted a descriptive quantitative cross sectional research design grounded in the positivist paradigm to examine the relationships among strategic leadership, institutional performance, and power relations within a multi-stakeholder university governance system in Ghana. The quantitative approach was appropriate because it emphasizes objectivity, measurement, and statistical analysis in testing theoretically derived propositions (Creswell, 2014). Constructs were operationalized into measurable variables and data were collected using structured questionnaires with closed-ended, Likert-scale items to ensure standardization, reliability, and comparability across stakeholder groups.

Consistent with survey research traditions, the method enabled the systematic collection and analysis of data from multiple respondents at a single point in time, thereby facilitating the examination of patterns and associations among variables (Cohen, Manion, & Morrison, 2007). Inferential statistical techniques were employed to summarize trends and test hypothesized relationships. Overall, the quantitative method ensured methodological rigor, analytical precision, and alignment with the study's objective of generating empirically verifiable evidence on governance dynamics in Ghanaian public universities.

Population, sample size, and sampling procedure

This study was conducted in Northern Ghana, comprising the Northern, Upper East Upper West, North East Region, and Savannah Regions. The region is characterized by a growing higher education sector and increasing exposure to alternative learning pathways, including micro-credentials and skill-based certifications, making it a relevant context for this study

Target population

The target population comprised students, graduates, and working professionals within Northern Ghana who are either participating in or have been exposed to higher education and alternative credentialing pathways. Due to the absence of a comprehensive sampling frame capturing individuals engaged in micro-credentials and skill-based certifications, the population size was considered unknown. This approach is consistent with methodological guidance that allows researchers to treat populations as indefinite when they cannot be clearly enumerated (Cochran, 1977; Israel, 1992).

Sample size determination

The sample size was determined using Cochran's Formula, which is appropriate for large or unknown populations (Cochran, 1977). Using a 95% confidence level ($Z = 1.96$), a margin of error of 5% ($e = 0.05$), and a population proportion of 0.5 (to maximize variability), the minimum sample size was calculated as 384. This approach is widely supported in social science research for ensuring adequate representativeness when population parameters are unknown (Glenn, 1992; Krejcie, & Morgan, Daryle, 1970).

However, given that the study employed Structural Equation Modeling (SEM), the sample size was increased to 410 respondents to enhance statistical power and model stability. SEM studies typically require large samples, with recommendations ranging from 200 to 400 or more depending on model complexity (Hair, et al., 2019; Kline, 2016).

Sampling procedure

A multi-stage non-probability sampling strategy was adopted. First, purposive sampling was used to select respondents who possess relevant knowledge or exposure to micro-credentials and skill-based certifications. This technique is appropriate when participants are selected based on specific characteristics relevant to the research objectives (Creswell, 2014; Etikan, et al., 2016). Second, convenience sampling was employed to select respondents based on accessibility and willingness to participate. This method is commonly used in social science research where sampling frames are unavailable and where rapid data collection is required (Etikan, et al., 2016). Finally, snowball sampling was utilized to reach additional respondents through referrals from initial participants. This technique is particularly effective for accessing dispersed or hard-to-reach populations (Mahin et al., 2017).

The use of non-probability sampling is justified given the exploratory nature of the study and the lack of a defined sampling frame. Although such methods may limit generalizability, they are widely accepted in behavioural and educational research where populations are difficult to enumerate (Creswell, 2014). Furthermore, the relatively large sample size enhances the robustness and reliability of findings, particularly in SEM-based studies (Hair, et al., 2019).

Data gathering instrument

The researcher employed a structured questionnaire as the primary instrument for data collection in this study. The questionnaire items were adapted from previously validated scales in the literature (McGreal & Olcott, 2022; Wheelahan & Moodie, 2021; Uggeri & Barlassina, 2019) to ensure content validity and alignment with the constructs under investigation.

The questionnaire consisted of five sections labelled A to E. Section A contained items designed to collect demographic information about the respondents, including gender, age, educational qualification, and years of professional experience. Section B comprised five items measuring respondents' level of awareness and value of micro-credentials. Section C contained six items assessing respondents' level of awareness and values of skilled-based certifications. Section D consisted of five items measuring perceived employability while Section E included four items that examined the demand for higher education.

All items in Sections B to E were measured using a five-point Likert-type scale to capture respondents' perceptions. The response options ranged from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4), to Strongly Agree (5). The Likert scale was adopted because it enables respondents to express the degree of agreement with statements and is widely used in social science research for measuring attitudes, perceptions, and opinions in a systematic and quantifiable manner.

Validity and reliability of the instrument

Validity and reliability are fundamental criteria for evaluating the quality and rigor of research instruments in quantitative studies. To ensure content validity, the questionnaire items were adapted from previously validated instruments in the literature on micro-credentials, skill-based certifications, and demand for higher education. The instrument was further reviewed by experts in higher education administration and research methodology at the University of Technology and Applied Sciences to assess the clarity, relevance, and appropriateness of the items in relation to the study objectives.

The study assessed construct validity through exploratory and confirmatory factor analyses using pilot data collected from 310 respondents in the Navrongo Municipality. Prior to factor analysis, sampling adequacy was examined using the Kaiser–Meyer–Olkin (KMO) measure and Bartlett's Test of Sphericity. The KMO statistic assesses the proportion of common variance among variables attributable to underlying latent constructs, with values above .60 considered acceptable and values above .80 regarded as highly adequate (Kaiser, 1974; Hair et al., 2019). Bartlett's Test of Sphericity was conducted

to determine whether correlations among variables were sufficiently large for factor analysis, with a significant result ($p < .05$) indicating the suitability of the data for factor extraction (Bartlett, 1954).

The study further evaluated convergent validity using factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). Factor loadings of .45 or higher were considered acceptable indicators of latent constructs, while CR values above .70 indicated adequate internal consistency (Hair et al., 2019). AVE was used to determine the extent to which constructs explained the variance in their indicators, with values of .50 or higher demonstrating satisfactory convergent validity (Fornell & Larcker, 1981).

For Discriminant validity, the study assessed it using the Fornell–Larcker criterion, which requires the square root of the AVE for each construct to exceed its correlations with other constructs in the model. This confirms that the constructs are empirically distinct (Fornell & Larcker, 1981). Reliability was further examined using Cronbach’s alpha coefficient, where values of .70 or higher were considered acceptable and values above .80 indicated strong internal consistency (Hair et al., 2019).

To further validate the measurement model, the study conducted Confirmatory Factor Analysis (CFA) using model fit indices including the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Chi-square/degrees of freedom ratio (χ^2/df). Acceptable model fit was indicated by CFI and TLI values of .90 or higher, RMSEA values below .08, and χ^2/df values below 3 (Hair et al., 2019; Kline, 2016).

Data collection procedures

Data collection for this study was conducted systematically to ensure ethical compliance and high response rates. An introduction letter was obtained from the Registrar of the University of Technology and Applied Sciences to formally introduce the researcher to the selected schools, institutions and organisations. In addition, necessary ethical clearance and institutional permissions were obtained from the relevant authorities prior to the commencement of data collection.

The questionnaires were personally administered by hand to the staff and students. Completed questionnaires were retrieved on the same day when possible. For respondents who could not complete the questionnaire immediately, the instruments were left in the care of designated contact persons and collected one week later. The entire data collection process was completed over a period of six weeks. Overall, a total of 406 completed questionnaires were returned, representing a response rate of 96.8%, which indicates a high level of cooperation and engagement among the respondents.

Ethical considerations

This study involving human participants was conducted in accordance with established ethical principles in educational and social science research. Although the author’s institution does not currently have a formal Institutional Review Board (IRB) or ethics committee, ethical considerations were strictly observed throughout the study.

Participation was voluntary, and participants were fully informed about the purpose of the research, their role, and their right to withdraw at any stage without consequences. Informed consent was obtained prior to data collection.

To protect participants' rights and wellbeing, no personally identifiable information was collected, and anonymity and confidentiality were assured. Data were anonymized, reported in aggregate form, securely stored, and accessed only by the researcher. As the study focused on professional perceptions of higher education governance and academic values, it posed minimal risk to participants. The study adhered to internationally recognized ethical principles of respect for persons, beneficence, and justice.

Ethical approval.

Ethical approval for this study was granted through an internal academic ethical review process conducted by a Senior Academic Member of the University of Technology and Applied Sciences. In the absence of a formal Institutional Review Board (IRB), the study protocol and research instruments were reviewed to ensure compliance with established ethical standards for minimal-risk research. Participation was voluntary, and written informed consent was obtained from all participants. Participants were informed of their right to withdraw at any time without consequences. Confidentiality and anonymity were assured, no identifying information was collected, and the study posed no significant physical, psychological, or social risks.

Informed consent

Written informed consent was obtained from all participants prior to data collection. The consent information formed an integral part of the introductory section of the questionnaire and clearly explained the purpose of the study, the voluntary nature of participation, the procedures involved, potential risks and benefits, and participants' rights, including the right to withdraw at any stage without penalty. Participants indicated their consent by affirmatively agreeing to participate before proceeding to complete the questionnaire.

Data processing and analysis

The researcher coded the collected data and entered them into SPSS software version 25.0. Structural equation Modeling (SEM) was performed to validate the items on the instrument with the help of AMOS software. SEM is a second generational multivariate technique that is well suited for testing various hypothesized or proposed relationships between variables. SEM enables an explicit modeling of measurement error in order to obtain unbiased estimates of the relationship between variables. This allows researchers to remove the measurement errors from the correlations/regression estimates. This is conceptually the same as correcting for measurement error where measurement error is taken into account (Khine, 2013). Thus, hypotheses 1 to 3 were tested individually using SEM path analysis. Hypothesis 4 was tested using simple mediation model.

Results and Discussion

Factor Analysis: The researcher employed Exploratory Factor Analysis (EFA) to empirically examine the underlying factor structure of the constructs: perceived value of micro-credentials (LAVM), perceived value of skill-based certifications (LAVSC), perceived employability (PE), perceived labour market relevance of higher education (HER), and demand for higher education (DHE). Factor analysis was considered necessary because the hypothesized model comprised multiple latent constructs measured through several observed variables. Consequently, EFA was used to identify, validate, and refine the underlying dimensions represented by the measurement items.

Prior to factor extraction, the factorability of the correlation matrix was assessed to determine the suitability of the data for factor analysis. The results indicated that the data were appropriate for factor analysis. The Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was .784, exceeding the recommended minimum threshold of .60, thus indicating adequate common variance among the variables for reliable factor extraction. In addition, Bartlett’s Test of Sphericity was statistically significant, $\chi^2 (276) = 7131.135, p < .001$, suggesting that the correlation matrix was not an identity matrix and that sufficient correlations existed among the items to justify factor analysis. Most of the extracted communalities exceeded the recommended threshold of .50, indicating that the retained items shared sufficient common variance with their respective factors. These results collectively confirmed the suitability and factorability of the data for subsequent exploratory factor analysis.

Given the suitability of the data for factor analysis, the researcher proceeded to extract the latent factors using the eigenvalue > 1 criterion and the scree plot. The study employed an oblique (Promax) given the conceptual relatedness of the constructs. The analysis yielded a five-factor solution comprising Perceived Value of Micro-Credentials (LAVM), Perceived Value of Skill-Based Certifications (LAVSC), Perceived Employability (PE), Perceived Labour Market Relevance of Higher Education (HER), and Demand for Higher Education (DHE). All retained items loaded strongly on their respective factors ($\lambda \geq .45$), with no substantial cross-loadings. The five factors accounted for 59.9% of the total variance, and internal consistency estimates were acceptable ($\alpha = .76-.65$). LAM4 (I prefer short skill-focused courses over long-term academic program), LAVSC1 (skill-based certifications are aligned with current industry needs), LAVSC6 (I am likely to pursue skill-based certifications alongside traditional degree) PE5(I feel confident that I can adapt to changing job requirements), DHE5(I prefer combining traditional degree with micro credentials), and PE5 (My skills match the requirements expected by employers in my field of interest) were removed because they either had a loading less than .40 or had a strong cross loading with other constructs. The factor loadings are presented in Table 1.

Table 1. Factor Loadings

	Factor				
	1	2	3	4	5
PE1			.897		
PE2			.922		
PE3			.866		
PE4		.335	.492		
DHE1				.684	
DHE2			.326	.574	
DHE3				.741	
DHE4				.657	
DHE6				.568	
LAVM1		.769			
LAVM2		.735			
LAVM3		.633			.313
LAVM5		.673			
LAVM6		.579			.585
LAVSC2		.416			.753
LAVSC3					.662
LAVSC4					.777
LAVSC5					.581
EM1	.990				
EM2	.678				
EM3	.767				
EM4	.765				
EM5	.775				

Measurement Model Evaluation: After a successful extraction of 5 factors through the exploratory factor analysis, the study employed the Structural Equation Modeling (SEM) to examine the relationships among the study constructs. Before testing the structural relationships, the researcher evaluated the measurement model to assess the reliability and validity of the latent constructs. The analysis was conducted using AMOS, following a two-step approach recommended in the SEM literature, in which the

measurement model is assessed before the structural model. The measurement model is diagrammatically illustrated in Figure 2.

Figure 2.

Measurement Model of Micro-Credentials, Skill-Based Certifications, Employability, Labour Market Relevance, and Demand for Higher Education

From Figure 2, the results of the measurement model assessment indicate that the constructs demonstrated satisfactory reliability and validity. All indicator loadings were statistically significant, ranging from 0.46 to 0.98. Although some indicator loadings in the exploratory measurement model were relatively low ($\approx .46$), such values are still considered acceptable in exploratory factor analysis, particularly for newly developed scales. Researcher (Hair, Anderson & Tatham, 1998; Tabachnick & Fidell, 2014) note that loadings around .30–.40 can meet the minimum threshold for interpretability in exploratory contexts and that items with loadings $\geq .40$ often contribute meaningfully to construct representation. Additionally, reviews of current practice in EFA highlight that a .40 cutoff is frequently adopted for item retention when theoretical relevance and content coverage justify inclusion (Comrey & Lee, 1992; Costello & Osborne, 2005.). The standardised factor loadings, composite reliability and average variance extracted estimates are presented in Table 2.

Table 2. Standardized Factor Loadings, Composite Reliability (CR), and Average Variance Extracted (AVE)

Construct	Item	Factor Loading	CR	AVE
Perceived Value of Micro-Credentials (F1)	LAVM1	0.855	0.842	0.651
	LAVM2	0.928		
	LAVM6	0.615		
Demand for Higher Education (F2)	DHE3	0.992	0.875	0.706
	DHE4	0.822		
	DHE6	0.670		
Perceived Employability (F3)	PE1	0.974	0.935	0.828
	PE2	1.001		
	PE3	0.836		
Perceived Value of Skill-Based Certifications (F4)	LAVSC2	1.020	0.796	0.584
	LAVSC3	0.464		
	LAVSC4	0.710		
Perceived Labour Market Relevance of Higher Education (F5)	HER1	0.992	0.899	0.644
	HER2	0.700		
	HER3	0.751		
	HER4	0.775		
	HER5	0.762		

Note: CR = Composite Reliability; AVE = Average Variance Extracted.

Recommended thresholds: Factor loading ≥ 0.50 , CR ≥ 0.70 , and AVE ≥ 0.50 .

Table 2 presents the standardized factor loadings, composite reliability (CR), and average variance extracted (AVE) for the five latent constructs used in the study. These indicators were assessed to establish the convergent validity and internal consistency reliability of the measurement model. According to established SEM benchmarks, standardized factor loadings should be at least 0.50, composite reliability values should exceed 0.70, and AVE values should be above 0.50 to confirm acceptable convergent validity and construct reliability (Fornell & Larcker, 1981; Hair et al., 2022).

The construct *Perceived Value of Micro-Credentials (F1)* demonstrated satisfactory psychometric properties. The factor loadings ranged from 0.615 to 0.928, all exceeding the recommended threshold of 0.50. The CR value of 0.842 surpassed the acceptable minimum of 0.70, indicating strong internal

consistency among the indicators. Similarly, the AVE value of 0.651 exceeded the recommended cut-off of 0.50, suggesting that the construct explained a substantial proportion of variance in its indicators. These findings indicate adequate convergent validity and reliability for the construct.

For *Demand for Higher Education (F2)*, the standardized factor loadings ranged between 0.670 and 0.992, indicating that all items contributed meaningfully to the construct. The CR value of 0.875 demonstrated high reliability, while the AVE value of 0.706 exceeded the benchmark of 0.50, confirming satisfactory convergent validity. These findings suggest that the indicators consistently measured the latent construct of demand for higher education.

The construct *Perceived Employability (F3)* recorded exceptionally high factor loadings ranging from 0.836 to 1.001. Although standardized loadings slightly above 1.0 may occasionally occur because of multicollinearity or estimation issues in SEM, the overall results still indicate a very strong relationship between the indicators and the construct. The CR value of 0.935 exceeded the recommended threshold substantially, indicating excellent internal consistency reliability. Likewise, the AVE value of 0.828 was considerably above the recommended level, demonstrating strong convergent validity. This suggests that the indicators captured the construct of perceived employability very effectively.

Regarding *Perceived Value of Skill-Based Certifications (F4)*, the construct achieved a CR value of 0.796 and an AVE value of 0.584, both of which met the recommended thresholds for reliability and convergent validity. However, one item (LAVSC3) recorded a relatively low factor loading of 0.464, which falls below the commonly recommended minimum of 0.50. Despite this, the construct was retained because the overall CR and AVE values remained acceptable. Scholars have argued that items with slightly lower loadings may be retained when the construct demonstrates satisfactory overall reliability and theoretical relevance (Hair et al., 2022).

Finally, *Perceived Labour Market Relevance of Higher Education (F5)* demonstrated acceptable measurement properties. The factor loadings ranged from 0.700 to 0.992, all above the acceptable benchmark. The CR value of 0.899 indicated strong reliability, while the AVE value of 0.644 confirmed adequate convergent validity. These findings imply that the construct reliably captured respondents' perceptions regarding the labour market relevance of higher education.

The study went ahead to calculate discriminant validity for each of the constructs. Discriminant validity was assessed using the Fornell–Larcker Criterion by comparing the square root of the Average Variance Extracted (AVE) for each construct with the corresponding inter-construct correlations. According to the Fornell–Larcker criterion, discriminant validity is established when the square root of the AVE for a construct exceeds its correlations with other constructs in the model. Table 3 presents the results.

Table 3. Discriminant Validity Using the Fornell–Larcker Criterion

Construct	LAVM	DHE	PE	LAVSC	HER
LAVM	0.807	0.290	0.437	0.580	0.055
DHE	0.290	0.840	0.376	-0.152	0.019
PE	0.437	0.376	0.910	0.093	-0.059
LAVSC	0.580	-0.152	0.093	0.764	0.086
HER	0.055	0.019	-0.059	0.086	0.803

From Table 3, the square root of the AVE (boldened in the Table) for each construct exceeds its correlations with other constructs in the model. This confirms that each construct demonstrated adequate discriminant validity, indicating that the latent constructs were empirically distinct and measured unique conceptual domains within the study. This suggests that the measurement model achieved satisfactory construct separation and reduced the likelihood of multicollinearity among the latent variables.

The measurement model was further evaluated using multiple model fit indices generated from the Confirmatory Factor Analysis (CFA). The assessment of model fit was based on widely accepted Structural Equation Modeling (SEM) benchmarks, including the Chi-square/degrees of freedom ratio (CMIN/DF), Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Incremental Fit Index (IFI), Normed Fit Index (NFI), Root Mean Square Error of Approximation (RMSEA), and Parsimony Close Fit (PCLOSE). According to SEM guidelines, acceptable model fit is generally indicated by CMIN/DF values below 5.0, CFI, TLI, IFI, and NFI values above 0.90, and RMSEA values below 0.08, although values up to 0.10 may be considered acceptable in complex models (Hair et al., 2022; Hu & Bentler, 1999; Kline, 2023).

The results showed that the default model produced a Chi-square value (CMIN) of 488.744 with 109 degrees of freedom and a statistically significant p-value ($p < .001$). Although the Chi-square statistic was significant, this outcome is common in large-sample SEM studies because the Chi-square test is highly sensitive to sample size (Kline, 2023). Consequently, researchers often rely more heavily on relative and incremental fit indices when evaluating overall model adequacy.

The CMIN/DF ratio for the model was 4.484, which falls within the acceptable threshold of less than 5.0, indicating a reasonable model fit. Additionally, the incremental fit indices demonstrated satisfactory fit statistics. Specifically, the Comparative Fit Index (CFI) was 0.929, the Incremental Fit Index (IFI) was 0.929, and the Normed Fit Index (NFI) was 0.911, all exceeding the recommended benchmark of 0.90. These values indicate that the hypothesized model provided a substantial improvement over the independence model and adequately represented the observed data.

Similarly, the Tucker–Lewis Index (TLI) recorded a value of 0.900, which met the minimum acceptable threshold for good model fit. The Relative Fit Index (RFI) also produced a strong value of 0.875, suggesting acceptable relative improvement of the proposed model compared to the null model.

Regarding the error approximation indices, the Root Mean Square Error of Approximation (RMSEA) was 0.093, with a 90% confidence interval ranging from 0.084 to 0.101. Although the RMSEA value slightly exceeded the stricter threshold of 0.08 recommended for excellent fit, it remained within the acceptable range for complex social science models, particularly in exploratory and behavioural research contexts (MacCallum et al., 1996).

Overall, the combination of acceptable factor loadings, composite reliability, AVE values, discriminant validity results and model fit indices indicates that the measurement model possessed adequate reliability, convergent validity, and overall structural adequacy. Therefore, the model was considered suitable for proceeding to the structural model analysis and hypothesis testing.

Structural Model and Path Analysis

The structural equation modeling technique was used to analyse the structural relationship of the various constructs in the structural model and to test the hypotheses thereof.

Hypothesis H1: Awareness and perceived value of micro-credentials have a significant influence on the demand for higher education.

This hypothesis sought to determine the influence of awareness and perceived value of micro-credentials on demand for higher education. This hypothesis was tested using SEM path analysis. The endogenous (criterion) variable was demand for higher education. This was measured on continuous basis using a scale. The exogenous (predictor) variable was awareness and perceived value of micro credentials which was also measured in continuous basis using a scale. Table 3 and figure 3 present the regression coefficients.

Figure 3. Path model for awareness and value of micro credentials and demand for traditional higher education.

From Figure 3, awareness and value of micro credentials predicts demand for traditional higher education by .33, with error variance of 4.67 for awareness and value of micro credentials, and 8.44 for demand for higher education. This implies that the model does not fully explain either variable, as shown by the remaining unexplained variances (4.67 and 8.44), indicating that other factors also influence both constructs. Details of the prediction and significance are presented in Table 3.

Table 3.

Regression Model of awareness and value of micro credentials and demand for traditional higher education

Model	β	SE	CR	P
(Constant)	6.293	.847	7.427	.001
Micro credentials	.329	.067	4.923	.001

*Significant, $p < .05$, $R = .238$, $R^2 = 0.0566$

From Table 3, the structural equation modelling results revealed that awareness and perceived value of micro credentials had a positive and statistically significant effect on demand for traditional higher education ($\beta=.238$, $B=.329$, $SE =.067$, $CR =4.923$, $p<.001$). The standardized regression coefficient indicates that higher levels of awareness and positive perceptions regarding the value of micro-credentials were associated with increased demand for traditional higher education. The critical ratio exceeded the recommended threshold of ± 1.96 , while the probability value was below the .001 significance level, confirming that the relationship was statistically significant.

The model further showed that awareness and perceived value of micro credentials accounted for approximately 5.7% of the variance in demand for traditional higher education ($R^2=.057$). Although the explained variance was modest, the findings suggest that micro-credentials constitute a significant factor influencing individuals' interest in higher education participation. Accordingly, the null hypothesis was rejected in favour of the alternative hypothesis.

The findings imply that micro credentials and traditional higher education function as complementary rather than competing educational pathways. Specifically, increased awareness and perceived value of micro credentials appear to strengthen, rather than diminish, demand for traditional higher education. The findings are consistent with emerging scholarly arguments (Ahsan et. al. 2023; Varadarajan et al., 2023; Kiiskilä, et al. 2023) that micro credentials increasingly function as complementary pathways within traditional higher education ecosystems rather than as alternatives that displace traditional university education. For instance systematic review conducted by Ahsan et al. (2023), found that higher education institutions are increasingly integrating micro credentials into formal academic systems to enhance flexibility, employability, and lifelong learning opportunities. The authors argue that micro credentials are becoming embedded within university structures as stackable and transferable learning opportunities that may eventually contribute towards broader academic qualifications. This institutional integration may explain why increased awareness of micro-credentials was associated with stronger demand for higher education in the present study.

The findings of this study may further be interpreted through the lens of Signaling Theory (Spence,1973), which posits that educational qualifications function as signals that communicate individuals' competencies, capabilities, and productivity to employers and broader society. Within this framework, micro credentials may be perceived as additional indicators of specialised skills, adaptability, and continuous professional development. Consequently, increased awareness and perceived value of micro-

credentials may enhance the attractiveness of higher education by signalling improved employability and labour market competitiveness.

Hypothesis H2: Awareness and perceived value of skill-based certifications have a significant influence on the demand for traditional higher education.

This hypothesis sought to determine the influence of awareness and perceived value of skill-based certification on demand for traditional higher education. This hypothesis was tested using SEM path analysis. The endogenous (criterion) variable was demand for higher education. This was measured on continuous basis using a scale. The exogenous (predictor) variable was awareness and perceived value of skill-based certification which was also measured in continuous basis using a scale. Table 4 and figure 4 present the regression coefficients.

Figure 4. Path model for awareness and value of skill-based certifications and demand for higher education

From Figure 4, awareness and value of micro credentials predicts demand for higher education by -.20 with error variance of 5.46 for awareness and value of skill-based certifications and 8.74 for demand for traditional higher education. This implies that the model does not fully explain either variable, as shown by the remaining unexplained variances (5.46 and 8.74), indicating that other factors also influence both constructs. Table 4 presents results of significance of the prediction.

Table 4. Regression Model of awareness and value of skill-based certifications and demand for higher education

Model	B	SE	CR	P
(Constant)	12.820	.787	16.292	.001
Skill-based Certifications	-.196	.063	-3.125	.002

**Significant, $p < .05$, $R = -0.153$, $R^2 = 0.0234$*

The results presented in Table 4 show that skill-based certifications had a statistically significant negative effect on demand for higher education ($(\beta = -0.153, B = -0.196, SE = 0.063, CR = -3.125, p = 0.002)$). This indicates that an increase in awareness and perceived value of skill-based certifications is associated with a decrease in demand for traditional higher education. The model further revealed that awareness and perceived value of skill-based certifications explained approximately 2.3% of the variance in demand for higher education ($R^2 = 0.023$), suggesting a weak but statistically significant explanatory power. The intercept was statistically significant ($B = 12.820, SE = 0.787, CR = 16.292, p < 0.001$), indicating the expected level of demand for higher education when awareness and perceived value of skill-based

certifications is zero. Overall, the findings suggest that while skill-based certifications significantly predict demand for traditional higher education, their explanatory power is limited, indicating that other factors play a more substantial role in shaping demand for higher education.

This result suggests that as individuals become increasingly aware of and place greater value on skill-based certifications, their demand for traditional higher education slightly decreases. This finding may be interpreted within the broader context of evolving labour market dynamics, where employers increasingly emphasize demonstrable competencies, technical skills, and short-cycle credentials over conventional degree qualifications. In such a context, skill-based certifications may be perceived as more direct, cost-effective, and labour-market-relevant pathways compared to long-duration university education. The results are consistent with OECD (2023) who contend that the availability of flexible, lower-cost skill-based certification may reduce individuals' incentives to pursue full degree programmes, particularly among non-traditional learners and working adults.

Similarly, recent research highlights that these alternative skill-based certifications are increasingly embedded within higher education ecosystems as institutions respond to demands for flexible and skills-based learning models (Reed, Kong and Abramovich, 2024). Empirical and policy-oriented studies (Athey and Palikot, 2024; Bone et al., 2023) further show that employers are progressively valuing skill-based credentials alongside or in some cases above traditional degrees, reinforcing a shift toward skills-first hiring practices. In this regard, skill-based certifications may function as partial substitutes rather than purely complementary pathways to traditional higher education, particularly among learners who prioritize rapid labour market entry, cost efficiency, and immediate acquisition of job-relevant competencies.

Within the framework of Signaling Theory (Spence, 1973), this shift can be understood as a reconfiguration of how individuals communicate competence in the labour market. Traditionally, higher education degrees have served as strong signals of ability, persistence, and productivity; however, the increasing availability of skill-based certifications introduces alternative signalling mechanisms that are more specific, verifiable, and aligned with occupational requirements. As a result, learners may perceive that acquiring industry-recognized certifications provides sufficient signalling value to employers, thereby reducing the perceived necessity of pursuing extended formal higher education.

Hypothesis H3: Perceived employability significantly mediates the relationship between micro-credentials and the demand for traditional higher education.

This hypothesis sought to determine whether perceived employability serves as an intermediary mechanism through which micro-credentials influence individuals' demand for traditional higher education. It specifically tests whether the effect of micro-credentials on demand for higher education operates indirectly by shaping how employable individuals feel in the labour market. The endogenous (criterion) variable was demand for traditional higher education. The exogenous (predictor) variable was awareness and perceived value of micro credentials. The mediator was perceived employability. All three

variables were measured in continuous basis using a scale. The hypothesis was tested using SEM path analysis Table 5 and figure 5 present the regression coefficients.

Figure 5: A model of mediation role of employability in the relationship between awareness and value of micro credentials and demand for traditional higher education.

From Figure 5, awareness and value of micro credentials predicts employability by .43, with error variance of 4. 67 for awareness and value of skill-based certifications, and 4.52 for employability. Again as can be seen in Figure 5, employability predicts demand for higher education by .40 with error variance for demand for education being 7.72. This implies that the model does not fully explain all three variable, as shown by the remaining unexplained variances (4.67, 4.53 and 7.72), indicating that other factors also influence both constructs. Table 5 presents the direct, indirect, and Total Effects of micro-credentials on demand for higher education

Table 5. Direct, Indirect, and Total Effects of Micro-credentials on Demand for Higher Education

Path	B	β	SE	CR	P	Effect type
Micro-credentials → Employability	0.428	0.399	0.049	8.753	.001	Direct
Employability → Demand	0.399	0.310	0.065	6.149	.001	Direct
Micro-credentials → Demand	0.158	0.114	0.070	2.269	0.023	Direct
Micro-credentials → Demand (Indirect via Employability)	—	0.123	—	—	—	Indirect
Micro-credentials → Demand (Total Effect)	—	0.238	—	—	—	Total

**Significant, $p < .05$, $R=.399$, $R^2=0.159$ (micro credentials), $R^2 = 0.137$ (employability and demand for education).*

As presented in Table 5, the structural equation modelling results indicate that micro-credentials significantly predict employability ($\beta=0.399$, $B=0.428$, $SE = 0.049$, $CR =8.753$, $p <.001$ suggesting that increased awareness and perceived value of micro-credentials enhance individuals' perceived employability. Employability, in turn, had a significant positive effect on demand for higher education ($\beta=0.310$, $B=0.399$, $SE =0.065$, $CR=6.149$, $p<.001$) indicating that individuals who perceive themselves as more employable are more likely to pursue or demand traditional higher education opportunities.

In addition, micro credentials had a statistically significant direct effect on demand for traditional higher education ($\beta=0.114$, $B=0.158$, $SE =0.070$, $CR =2.269$, $p<0.023$) although the magnitude of this effect was relatively small. Importantly, the indirect effect of micro credentials on demand for higher education through employability was positive and meaningful ($\beta=0.123$) indicating that employability partially

mediates this relationship. The total effect of micro-credentials on demand for higher education was ($\beta=0.238$), demonstrating that both direct and indirect pathways contribute to the relationship.

The structural model showed that micro-credentials explained approximately 15.9% of the variance in perceived employability ($R^2=.159$). Furthermore, micro-credentials and employability jointly accounted for approximately 13.7% of the variance in demand for higher education ($R^2=.137$). These findings indicate that the model possesses moderate explanatory power, suggesting that micro-credentials and employability constitute important predictors of higher education demand, although additional factors may also contribute to variations in demand.

These findings can be interpreted within the framework of Signaling Theory, which posits that educational credentials function as signals of ability and productivity in the labour market. Micro-credentials may enhance perceived employability by signalling specific, verifiable, and job-relevant competencies. As individuals perceive themselves as more employable, they are more likely to value further educational attainment as a mechanism for strengthening their labour market positioning.

The partial mediation effect suggests that micro-credentials influence demand for higher education through two pathways: first, by directly increasing the perceived value of higher education as a complementary credential, and second, by enhancing employability perceptions, which in turn motivates further educational investment. This aligns with studies (Varadarajan et al., 2023; OECD, 2023) that indicate that alternative credentials are increasingly integrated into lifelong learning ecosystems, where they function both as standalone signals and as stepping stones toward formal qualifications

The relatively stronger indirect effect compared to the direct effect highlights the central role of employability as a psychological and economic mechanism linking alternative credentials to higher education demand. This suggests that learners interpret micro-credentials not merely as substitutes for degrees but as instruments that enhance their employability profile, thereby reinforcing rather than diminishing interest in higher education.

Hypothesis H4: Perceived labour market relevance of higher education significantly mediates the relationship between micro-credentials and the demand for traditional higher education.

This hypothesis sought to determine whether perceived relevance of traditional higher education serves as an intermediary mechanism through which micro-credentials influence individuals' demand for traditional higher education. It specifically tests whether the effect of micro-credentials on demand for higher education operates indirectly through perceptions of market relevance of traditional higher education. The endogenous (criterion) variable was demand for traditional higher education. The exogenous (predictor) variable was awareness and perceived value of micro credentials. The mediator was perceived market relevance of higher education. All three variables were measured in continuous basis using a scale. The hypothesis was tested using SEM path analysis Table 6 and figure 6 present the regression coefficients.

Figure 5. A model of mediation role of perceived market relevance of higher education in the relationship between awareness and value of micro credentials and demand for higher education.

From Figure 6, awareness and value of micro credentials predict perceived market relevance of traditional higher education by .08 with error variance of 4. 67 for awareness and value of micro credentials, and 18.92 for perceived market value of higher education. Perceived market relevance of higher education predicts demand for higher education by -.03 with error variance for demand for education being 8.83. This implies that the model does not fully explain all three variable, as shown by the remaining unexplained variances (4.67, 18.92 and 8.83), indicating that other factors also influence both constructs. Table 6 presents the direct, indirect, and Total Effects of micro-credentials on demand for higher education with perceived market relevance as a mediator.

Table 6. Direct, Indirect, and Total Effects of Micro-credentials on Demand for Higher Education

Path	B	β	S.E.	C.R.	p-value	Effect Type
Micro-credentials → Relevance	0.077	0.038	0.100	0.767	0.443	Direct
Relevance → Demand for Higher Education	-0.028	-0.041	0.033	-0.853	0.393	Direct
Micro-credentials → Demand for Higher Education	0.331	0.239	0.067	4.957	< .001	Direct
Micro-credentials → Demand for Higher Education (Indirect via Relevance)	—	-0.002	—	—	—	Indirect
Micro-credentials → Demand for Higher Education (Total Effect)	—	0.238	—	—	—	Total

As illustrated in Table 6, the findings revealed that micro-credentials did not significantly predict perceived market relevance of traditional higher education (($\beta = 0.038$, $B = 0.077$, $S.E. = 0.100$, $C.R. = 0.767$, $p = 0.443$)). This suggests that awareness and perceived value of micro-credentials were not associated with stronger perceptions that traditional higher education is adequately aligned with labour market demands and employment opportunities. The finding is noteworthy given the growing policy and institutional discourse positioning micro-credentials as mechanisms for strengthening the labour market responsiveness of higher education systems.

The non-significant relationship may indicate that individuals perceive micro-credentials as relatively independent from traditional higher education structures rather than as instruments that necessarily improve the market relevance of university education itself. Research (Varadarajan, Koh & Daniel, 2023; OECD, 2023) suggests that alternative credentials increasingly operate within parallel credential ecosystems in which learners pursue targeted competencies and short-cycle certifications primarily for immediate labour market advantages rather than as mechanisms for enhancing perceptions of

university relevance In many contexts, learners may therefore distinguish between the practical value of micro-credentials and the broader institutional role of traditional higher education.

Similarly, perceived market relevance of traditional higher education did not significantly predict demand for traditional higher education ($(\beta = -0.041, B = -0.028, S.E. = 0.033, C.R. = -0.853, p = 0.393)$). The non-significant relationship indicates that perceptions regarding the labour market relevance of higher education did not meaningfully influence individuals' demand for higher education within the study context. This finding appears to contrast with dominant human capital assumptions (Becker, 1993) that individuals primarily pursue higher education because of expected labour market returns and employability benefits.

However, the finding aligns with emerging studies suggesting that motivations for higher education participation are increasingly multidimensional and not exclusively determined by economic or labour market considerations. Research studies (Ahsan et al., 2023; Marginson, 2024) indicates that learners may pursue higher education for reasons related to social mobility, personal development, professional identity, social prestige, networking opportunities, and long-term career progression rather than solely because of immediate labour market relevance.

Despite the absence of significant mediation through perceived market relevance, micro-credentials maintained a positive and statistically significant direct effect on demand for higher education ($(\beta = 0.239, B = 0.331, S.E. = 0.067, C.R. = 4.957, p < .001)$). This finding suggests that micro-credentials increase demand for higher education independently of perceptions regarding the labour market relevance of higher education. The result supports recent arguments that micro-credentials may function as complementary educational assets that enhance the attractiveness of higher education by promoting flexibility, lifelong learning, digital competence, and opportunities for continuous professional development (OECD, 2023; UNESCO, 2024).

From the perspective of Signaling Theory, the findings may indicate that micro-credentials possess signalling value independent of perceptions regarding the market relevance of higher education institutions. Learners may perceive micro-credentials as credible signals of adaptability, specialised competencies, and commitment to continuous learning within rapidly evolving labour markets. Consequently, the demand for higher education may be strengthened because institutions offering micro-credentials are viewed as more innovative, flexible, and responsive to contemporary professional environments, even when perceptions regarding the labour market relevance of traditional higher education remain unchanged.

The mediation analysis further revealed that the indirect effect of micro-credentials on demand for higher education through perceived market relevance was negligible and non-significant ($(\beta = -0.002)$), indicating the absence of a mediating effect. Thus, perceived market relevance of higher education does not explain the mechanism through which micro-credentials influence demand for higher education. This finding suggests that the relationship between micro-credentials and higher education demand may operate through alternative psychological, institutional, or career-related pathways.

Conclusion and Implications

This study concludes that alternative credentials exert differentiated effects on demand for traditional higher education in Northern Ghana. Micro-credentials enhance demand for higher education, indicating a complementary relationship, while skill-based certifications reduce demand, suggesting partial substitution. Perceived employability partially explains the relationship between micro-credentials and higher education demand, whereas perceived labour market relevance of higher education does not play a mediating role.

The findings have important theoretical and policy implications. Theoretically, they extend Human Capital Theory and Signaling Theory by showing that educational choices are shaped more by employability expectations and signalling effects than by perceived institutional labour market relevance. Policy-wise, higher education institutions should strategically integrate micro-credentials into formal programmes to strengthen employability signalling, while also rethinking the role of traditional degrees in an increasingly diversified credential ecosystem.

Declarations

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Declaration of Generative AI and AI-Assisted Technologies in the Manuscript Preparation Process

During the preparation of this work, the author used [ChatGPT by OpenAI] (https://openai.com/chatgpt/overview/?utm_source=chatgpt.com) to improve language flow, grammar, clarity, and consistency. After using this tool, the author carefully reviewed and edited the content as needed and takes full responsibility for the content of the published article. The intellectual content, analysis, interpretations, and conclusions presented in this manuscript are entirely the original work of the author.

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Figures

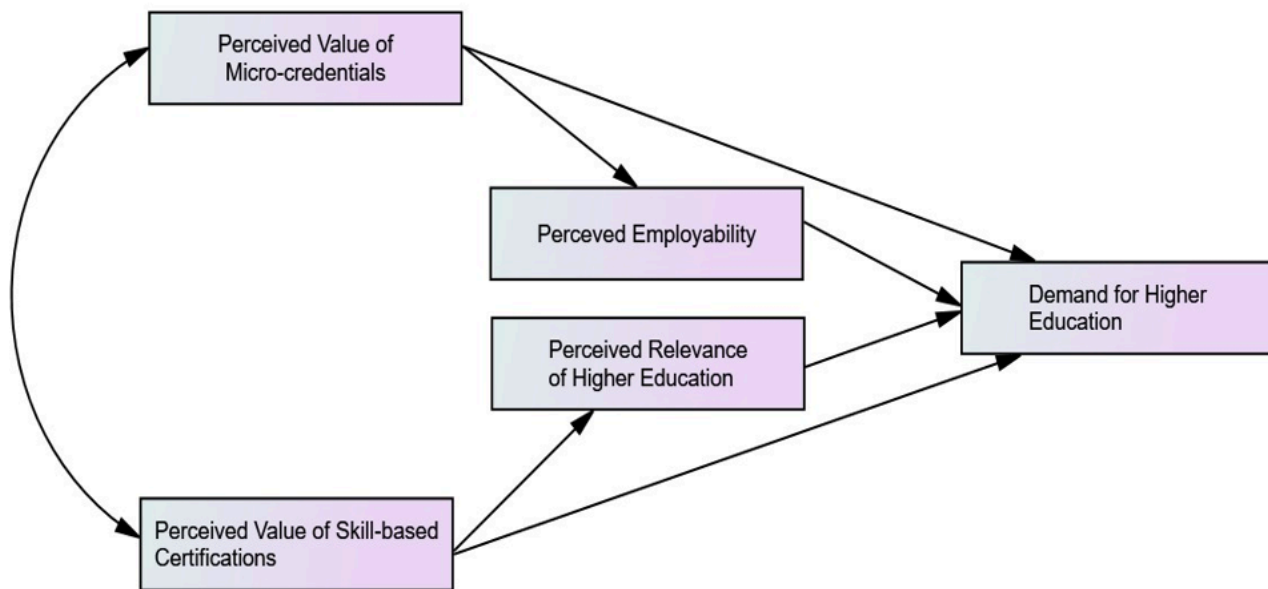


Figure 1

Conceptual framework of the study

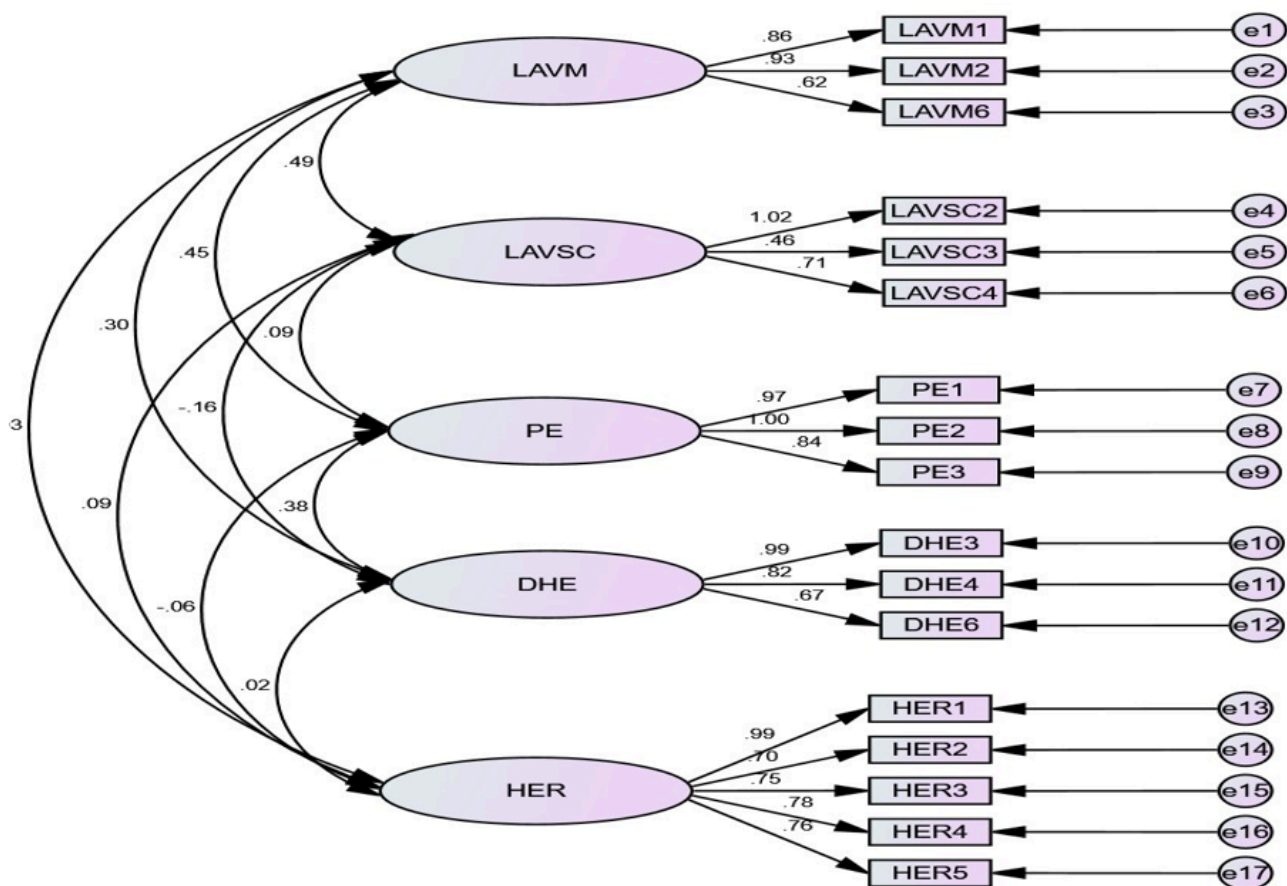


Figure 2

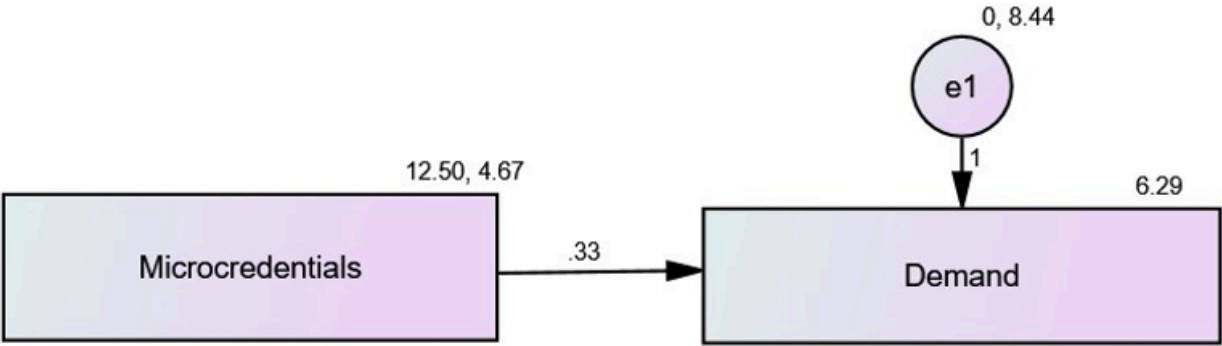


Figure 3

Path model for awareness and value of micro credentials and demand for traditional higher education.

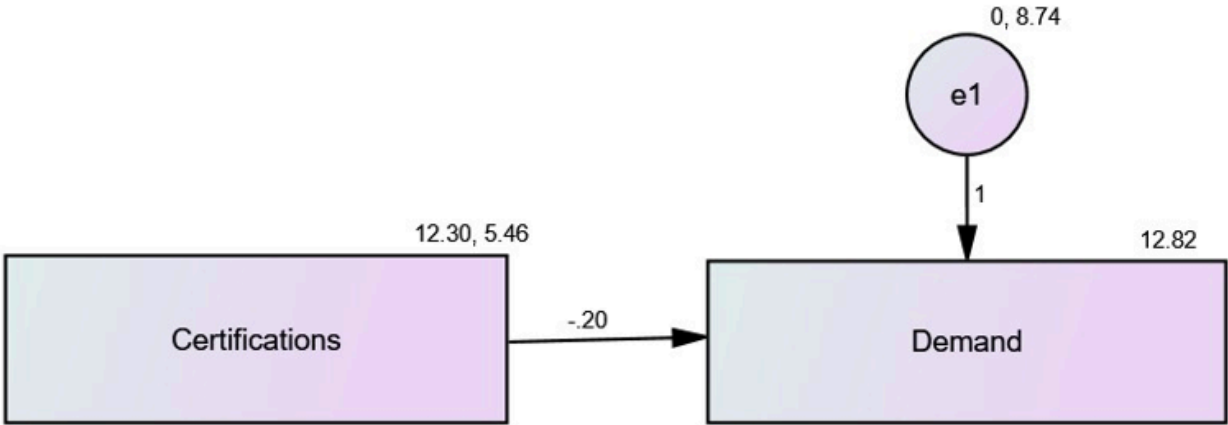


Figure 4

Path model for awareness and value of skill-based certifications and demand for higher education

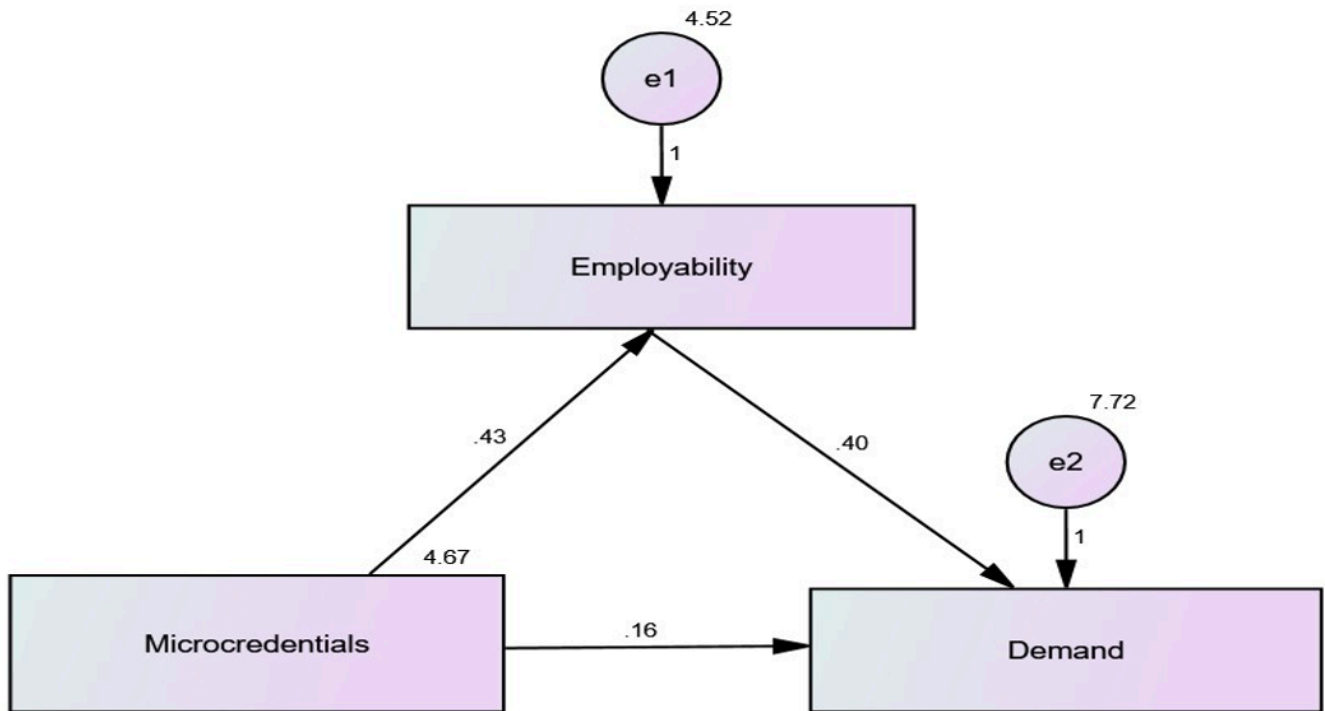


Figure 5

A model of mediation role of employability in the relationship between awareness and value of micro credentials and demand for traditional higher education.

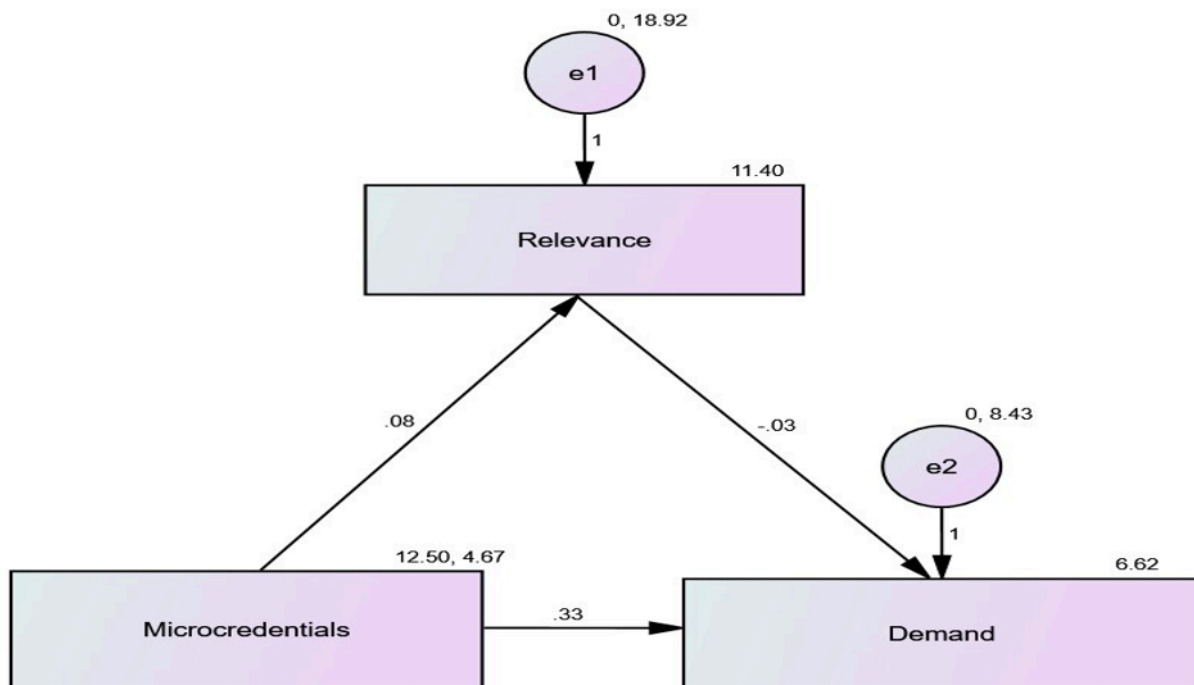


Figure 6

A model of mediation role of perceived market relevance of higher education in the relationship between awareness and value of micro credentials and demand for higher education.