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# Proposed Business Model Innovations in Digitalized Education in Jiangxi Province China

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**Abstract:** This study comprehensively examined the extent of Business Model Innovation and Digitized Education within a higher education institution located in Jiangxi Province, China. It analyzed significant differences across selected demographic profiles and explored the underlying relationship between these two main variables. Utilizing a rigorous quantitative descriptive-comparative and correlational research design, empirical data were systematically collected from 230 diverse respondents representing varied age groups, sex, educational attainment levels, and lengths of service. Business Model Innovation was meticulously assessed in terms of value proposition innovation, infrastructure and capability reconfiguration, revenue model transformation, and stakeholder engagement mechanisms. Concurrently, Digitized Education was evaluated through the lenses of digital literacy, digital pedagogy, technological infrastructure, learner engagement, and institutional support and leadership. The empirical results demonstrate that both variables are generally rated as highly evident within the institution. Specifically, value proposition innovation, infrastructure configuration, and institutional support obtained notably higher scores, whereas revenue model transformation remained relatively weak. Significant demographic differences were observed exclusively in infrastructure and capability reconfiguration across age and length of service. Furthermore, correlation analysis revealed significantly positive relationships between all dimensions of the two variables. These findings strongly indicate that digital education is inextricably integrated with business model restructuring. Ultimately, aligning digital education strategies with comprehensive institutional innovation is crucial for improving sustainability, inclusiveness, and long-term competitiveness in the modern digital education ecosystem.

**Keywords:** business model innovation; digitized education; higher education institution; digital empowerment; Jiangxi Province

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## 1. Introduction

In the rapidly evolving digital era, education systems are undergoing fundamental transformations that challenge traditional business models. Technologies such as AI, big data, and cloud learning platforms are reshaping educational delivery, enabling more flexible, scalable, and inclusive learning environments [1]. As a result, higher education institutions must innovate their business models to remain competitive, financially sustainable, and responsive to 21st-century learners.

Business model innovation in digitalized education involves reconfiguring institutional strategies, processes, and value propositions through digital technologies. It goes beyond simply digitizing existing practices to transforming the entire ecosystem of teaching, administration, and stakeholder engagement [2]. Despite growing demand for flexible, technology-enhanced learning, many institutions adopt digital solutions without clear long-term strategies, highlighting the need to align business models with digital capabilities and learner expectations [3].

This study addresses this gap by examining the drivers, barriers, and outcomes of business model innovation in digitalized education, particularly in developing and

transition economies. It aims to provide insights for educational leaders and policymakers and contribute to building a sustainable, digitally empowered education ecosystem.

### *1.1. Background of the Study*

In recent years, China's higher education sector has undergone significant digital transformation driven by national policies such as Education Informatization 2.0 and Smart Education of China [3]. As a private applied undergraduate institution in Nanchang, H Vocational University must align with these strategies to remain competitive.

Business model innovation has become essential in the digital era [4]. Unlike traditional tuition-based models, modern education models emphasize digital resources, industry collaboration, and data-driven value creation. For H Vocational University, this involves redesigning academic programs, optimizing processes, and delivering value aligned with digitally empowered stakeholders [5].

The new education ecology underscores interactions among learners, educators, technology, policy, and markets [6]. While digital empowerment enhances teaching and governance, challenges persist, including limited faculty readiness, resistance to change, and weak alignment between technology and institutional goals [7].

This study explores digital empowerment strategies and their impact on business model innovation at H Vocational University. Founded in 1993, the university focuses on engineering, with 10 colleges, over 40 majors, and 18,520 students. The research aims to inform sustainable digital transformation and business model innovation in local applied universities.

### *1.2. Theoretical Framework of the Study*

This study is grounded in Teece's Dynamic Capabilities Theory, which emphasizes that organizations must continuously integrate and reconfigure internal and external competencies to adapt to rapid change. In higher education, business model innovation (BMI) is therefore critical for enhancing resilience, competitiveness, and value creation. BMI involves redesigning value creation, delivery, and capture mechanisms, including value propositions, capabilities, revenue models, and stakeholder engagement [2,8].

The study also draws on Digital Empowerment Theory, which views digitalized education as a comprehensive empowerment system rather than merely technological adoption [9,10]. It encompasses digital literacy, pedagogy, infrastructure, learner engagement, and institutional support, fundamentally transforming organizational operations and value delivery in higher education.

### *1.3. Research Framework*

The research framework of the study is illustrated in Figure 1 below, titled the research paradigm of the study. It comprises three main components:

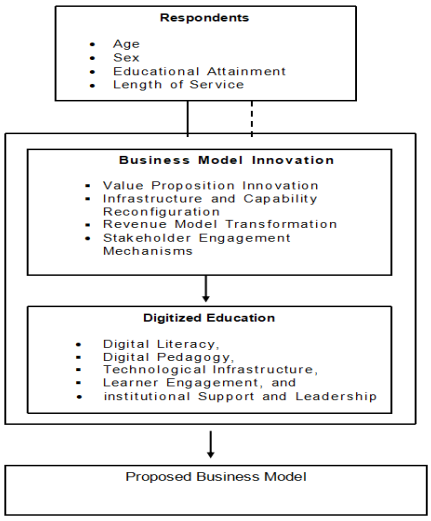


**Figure 1.** Research Paradigm

1. Background variables include age, gender, highest educational attainment, and length of service.
2. Core variables encompass business model innovation and digitized education.
3. The outcome variable is the proposed business model innovation plan for digitized education.

*1.4. Statement of the Problem*

This study evaluates the business model innovation and digitized education at H Vocational University. Specifically, it addresses the following questions:

1. What is the demographic profile of the respondents?
2. How do the respondents evaluate the dimensions of business model innovation?
3. Are there significant differences in the assessments of business model innovation across demographic profiles?
4. How do the respondents evaluate the dimensions of digitized education?
5. Are there significant differences in the assessments of digitized education across demographic profiles?
6. Is there a significant relationship between business model innovation and digitized education?
7. What business model innovation can be proposed based on the findings?

*1.5. Hypotheses*

1. There is no significant difference in the assessment of respondents on business model innovation in terms of Value Proposition Innovation, Infrastructure and Capability Reconfiguration, Revenue Model Transformation, and Stakeholder Engagement Mechanisms when their profile is taken as a test factor.
2. There is no significant difference in the assessment of respondents on digitized education in terms of Digital Literacy, Digital Pedagogy, Technological Infrastructure, Learner Engagement, and Institutional Support and Leadership when their profile is taken as a test factor.
3. There is no significant relationship in the assessment of respondents between business model innovation and digitized education.

*1.6. Significance of the Study*

This study holds great significance amid the global digital transformation of education, particularly for higher education institutions in China. By investigating digital empowerment-driven business model innovation at H Vocational University, it provides theoretical, practical, and policy-related value for multiple stakeholders.

It offers a framework for regional universities to align digital resources with sustainable development, supports institutional leaders in evidence-based decision-making, helps faculty improve digital literacy, and enhances students' learning experiences and employability.

The findings can also assist policymakers in optimizing digital education strategies and help EdTech firms better cooperate with universities. Overall, this study connects theory with practice to explore how digital empowerment promotes business model innovation, contributing to sustainable and inclusive digital education.

*1.7. Scope and Delimitation of the Study*

The study was conducted at H Vocational University (anonymized), involving 230 full-time faculty members with at least three years of service as respondents. It focuses on BMI and digitized education dimensions as defined, without extending to other institutions or student samples.

## 2. Methodology

This study employed a quantitative descriptive survey design to evaluate faculty perceptions of business model innovation (BMI) and digitalized education. BMI was analyzed in terms of value proposition innovation, infrastructure and capability reconfiguration, revenue model transformation, and stakeholder engagement. Digitalized

education encompassed digital literacy, digital pedagogy, technological infrastructure, learner engagement, and institutional support and leadership.

*2.1. Research Setting and Participants*

The study was conducted at H Vocational University in Nanchang, China. A total of 230 full-time faculty members with at least three years of service were selected through purposive sampling to ensure relevance and reliability.

*2.2. Research Instrument*

Data were collected using a self-developed questionnaire validated by the research adviser. The instrument measured BMI and digitalized education variables using a four-point Likert scale, as shown in Table 1.

**Table 1.** Rating Scale Used in the Study

| Scale | Range | Degree |
|---|---|---|
| 4 | 3.51-4.00 | Strongly Agree (SA)/Highly Evident (HE) |
| 3 | 2.51-3.50 | Agree (A)/ Evident (E) |
| 2 | 1.51-2.50 | Disagree (DA)/Slightly Evident (SE) |
| 1 | 1.00-1.50 | Strongly Disagree (SD)/ Not Evident (NE) |

*2.3. Data Collection Procedure*

Permission was obtained from university authorities prior to data collection. Respondents were provided with an introductory letter explaining the purpose of the study. The survey questionnaire was then administered to gather data on BMI and digitalized education.

*2.4. Data Analysis*

The weighted mean was used to summarize responses. Analysis of Variance (ANOVA) tested differences in assessments, while Pearson's r examined relationships between BMI and digitalized education variables.

*2.5. Ethical Consideration*

Informed consent was obtained from all participants. Anonymity and confidentiality were ensured, and participation was voluntary. Respondents were allowed to withdraw at any time, and all data were securely stored and used exclusively for research purposes.

## 3. Results and Analysis

*3.1. Demographic Profile of Respondents*

The demographic characteristics of 230 respondents are summarized in Table 2.

**Table 2.** Respondents' Demographic Profile (N = 230)

| Indicator | Classification | Frequency (N) | Percentage (%) |
|---|---|---|---|
| Age | 20–30 years old | 76 | 33.0 |
| | 31–40 years old | 61 | 26.5 |
| | 41–50 years old | 50 | 21.7 |
| | 51 years old and above | 43 | 18.7 |
| Sex | Male | 110 | 47.8 |
| | Female | 120 | 52.2 |
| Highest Educational Attainment | Bachelor's Degree | 113 | 49.1 |
| | Master's Degree | 74 | 32.2 |

| | | | |
|---|---|---|---|
| | Doctorate Degree | 43 | 18.7 |
| Length of Service | Below 5 years | 76 | 33.0 |
| | 5–10 years | 40 | 17.4 |
| | 11–15 years | 49 | 21.3 |
| | Above 15 years | 65 | 28.3 |
| Total | | 230 | 100% |

Table 2 presents the demographic characteristics of the respondents. The majority are aged between 20–40 years (59.5%), indicating a concentration of early- to mid-career faculty. The distribution by sex is relatively balanced, with 52.2% female and 47.8% male respondents.

In terms of educational attainment, most respondents hold a bachelor's degree (49.1%), followed by master's (32.2%) and doctorate degrees (18.7%). Regarding length of service, the largest groups are those with below 5 years (33.0%) and above 15 years (28.3%), suggesting a mix of new and experienced faculty.

Overall, the sample demonstrates sufficient diversity, although it is slightly skewed toward younger and less experienced respondents.

*3.2. Assessment of Business Model Innovation*

The assessment results of business model innovation are shown in Table 3.

**Table 3.** Assessment of Respondents on Business Model Innovation in Terms of Value Proposition Innovation.

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. The institution has successfully redefined its academic offerings to better meet the evolving needs of students in a digital environment | 3.27 | 0.909 | Agree | Evident |
| 2. Our current programs and services are more personalized and student-centered due to digital innovations | 3.18 | 0.958 | Agree | Evident |
| 3. The institution integrates digital tools to deliver unique value that differentiates us from other universities or colleges | 3.30 | 0.917 | Agree | Evident |
| 4. Digital transformation has enabled us to co-create educational experiences with students, faculty, and industry partners | 3.20 | 0.900 | Agree | Evident |
| 5. The use of technology has improved the accessibility and inclusiveness of our academic services | 3.15 | 0.899 | Agree | Evident |
| 6. There is a clear alignment between the institution's digital initiatives and its mission to provide quality education | 3.20 | 0.889 | Agree | Evident |
| 7. Innovations in value delivery (e.g., hybrid classes, online certifications, e-learning platforms) have significantly enhanced the student learning experience | 3.21 | 0.911 | Agree | Evident |
| Overall Mean | 3.22 | 0.79 | Agree | Evident |

Note: WM = Weighted Mean; SD = Standard Deviation; QD = Qualitative Description; VI = Verbal Interpretation (Subsequent tables use the same abbreviations). Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Table 3 shows respondents hold a generally positive view of value proposition innovation in business model innovation, with an overall mean of 3.22 (SD = 0.79), indicating agreement that digital tools have effectively redefined academic value. The

highest rating (mean = 3.30, SD = 0.917) was for digital tools that create institutional distinctiveness, such as learning platforms and hybrid education. The lowest rating (mean = 3.15, SD = 0.899) was for technological improvements in academic accessibility and inclusivity, suggesting uneven progress in this area [11].

Most indicators cluster around 3.18–3.21, showing consistent perceptions across personalized programs, co-creation, mission alignment, and hybrid learning. Moderate standard deviations (0.89–0.96) reflect some individual differences, likely due to varying departmental resources and digital exposure.

These findings align with existing literature, which notes that visible digital applications are more readily recognized than long-term inclusive goals. Overall, the institution has made clear progress in digital value proposition innovation, though continued efforts are needed to improve inclusivity.

Turning to Table 4, which examines infrastructure and capability restructuring, the overall mean of 3.09 (SD = 0.79) falls within the "Agree/Evident" range, indicating respondents generally view the institution as having established a functional foundation for digital transformation. The highest-rated indicator is the empowerment of internal departments and teams to adapt practices in response to emerging digital technologies (mean = 3.17, SD = 0.946), suggesting that flexibility at the unit level is more visible or valued than top-down infrastructure investments alone. In contrast, the lowest-rated indicators are the adequacy of digital infrastructure and the clarity of institutional strategy guiding digital integration (both mean = 3.02). While still perceived as evident, their relatively lower scores suggest lingering concerns about consistency, system reliability, or long-term strategic coherence.

**Table 4.** Assessment of Respondents on Business Model Innovation in Terms of Infrastructure and Capability Reconfiguration

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. The company has adequate digital infrastructure (e.g., LMS, network systems, online tools) to support academic and administrative operations | 3.02 | 0.836 | Agree | Evident |
| 2. There is consistent access to reliable technical support for faculty and staff in using digital systems | 3.06 | 0.899 | Agree | Evident |
| 3. The institution has restructured its workflows and processes to align with the demands of digital transformation | 3.16 | 0.921 | Agree | Evident |
| 4. Training and development programs are regularly provided to enhance the digital competencies of employees | 3.08 | 0.919 | Agree | Evident |
| 5. The institution has invested in upgrading systems and tools to improve operational efficiency and digital service delivery | 3.10 | 0.998 | Agree | Evident |
| 6. Internal departments and teams are empowered to adapt their practices in response to emerging digital technologies | 3.17 | 0.946 | Agree | Evident |
| 7. There is a clear institutional strategy guiding the integration and use of digital infrastructure in our core functions | 3.02 | 0.896 | Agree | Evident |
| Overall Mean | 3.09 | 0.79 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Notably, means across indicators range narrowly from 3.02 to 3.17, indicating respondents perceive infrastructure, technical support, workflow restructuring, training, and system upgrades as progressing at a similar pace. However, relatively large standard

deviations, especially for system upgrade investments (SD = 0.998), reflect uneven experiences, with some units benefiting from updated tools and strong support while others rely on legacy systems.

Overall, the findings suggest that infrastructure and capability restructuring is underway but still transitional. While steady progress has been made, continued attention is needed to improve strategic guidance, infrastructure consistency, and resource equity.

Table 5 examines revenue model transformation for business model innovation. The overall mean is 3.10 (SD = 0.83), indicating respondents cautiously agree that the institution has implemented revenue-related digital initiatives.

**Table 5.** Assessment of Respondents on Business Model Innovation in Terms of Revenue Model Transformation

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. The institution has introduced new revenue-generating programs or services supported by digital platforms (e.g., online courses, certifications) | 3.15 | 0.951 | Agree | Evident |
| 2. Digital transformation has opened opportunities for the institution to diversify its income sources beyond traditional tuition fees | 3.05 | 0.926 | Agree | Evident |
| 3. Partnerships with industry, EdTech providers, or other institutions have contributed to innovative funding or revenue streams | 3.04 | 0.941 | Agree | Evident |
| 4. There is a clear strategy for monetizing digital content, platforms, or services developed by the institution | 3.13 | 0.944 | Agree | Evident |
| 5. The institution effectively uses data analytics to identify new market opportunities for educational offerings | 3.16 | 0.963 | Agree | Evident |
| 6. Digital innovations have enhanced the financial sustainability of the institution's academic and support services | 3.06 | 0.978 | Agree | Evident |
| 7. There is transparency and employee awareness regarding how digital initiatives contribute to institutional revenue growth | 3.10 | 0.961 | Agree | Evident |
| Overall Mean | 3.10 | 0.83 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

The highest-rated item is using data analytics to identify new market opportunities (mean = 3.16, SD = 0.963), showing that respondents recognize data-driven decision-making as a meaningful improvement. The lowest-rated item is innovative funding or revenue streams from partnerships (mean = 3.04, SD = 0.941), suggesting that the financial impact of partnerships is not highly visible to employees.

Most means cluster narrowly between 3.04 and 3.16, showing uniform perceptions across revenue model aspects. However, large standard deviations (close to or above 0.95) indicate high variability among respondents, likely due to differences in involvement in financial or strategic planning.

Consistent with existing literature, revenue model innovation in higher education often progresses more slowly than instructional or infrastructure digital changes. Overall, revenue model transformation is ongoing but is perceived as tentative and uneven across the institution.

Table 6 shows stakeholder engagement mechanisms are generally evident (overall mean = 3.10, SD = 0.85). The highest-rated items are using feedback to improve digital programs and building industry/community partnerships (both 3.12), meaning formal

engagement structures are highly visible. The lowest-rated item is institutional responsiveness to stakeholder input (3.05, SD = 0.990), suggesting a perceived gap between feedback collection and actual follow-through.

**Table 6.** Assessment of Respondents on Business Model Innovation in Terms of Stakeholder Engagement Mechanisms

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. The institution regularly engages students, faculty, and external partners in discussions about digital initiatives and innovations | 3.10 | 1.005 | Agree | Evident |
| 2. Feedback from stakeholders is actively collected and used to improve digital programs and services | 3.12 | 0.966 | Agree | Evident |
| 3. There are formal mechanisms (e.g., digital surveys, consultations, forums) to involve stakeholders in institutional planning | 3.10 | 0.914 | Agree | Evident |
| 4. The institution has established collaborative partnerships with industry and community organizations to co-develop digital learning experiences | 3.12 | 0.993 | Agree | Evident |
| 5. Students are empowered to contribute ideas and participate in shaping the digital learning environment | 3.10 | 0.913 | Agree | Evident |
| 6. Digital platforms (e.g., portals, social media, apps) are effectively used to maintain two-way communication with key stakeholders | 3.08 | 0.952 | Agree | Evident |
| 7. The institution values and responds to stakeholder input in its ongoing digital transformation efforts | 3.05 | 0.990 | Agree | Evident |
| Overall Mean | 3.10 | 0.85 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Notably high standard deviations (many > 0.99) reveal widely varying experiences of engagement: some staff are actively involved, while others only see it indirectly.

Overall, Table 3–6 confirm business model innovation is perceptible but uneven across value, infrastructure, revenue, and engagement. Strongest visibility appears in digital tools, workflow changes, and formal partnerships; weaker areas include inclusiveness, strategic clarity, and transparency. Progress is steady but cautious, pointing to needs for better communication, alignment, and consistent implementation.

*3.3. Differences in Business Model Innovation*

Table 7 presents differences in business model innovation perceptions by sex. Results show no statistically significant differences across all constructs between male and female respondents. Mean scores were similar for value proposition, infrastructure reconfiguration, revenue model transformation, and stakeholder engagement; all differences were small and non-significant. Overall, sex does not significantly shape perceptions of business model innovation.

**Table 7.** Test of Difference in the Assessment of Business Model Innovation in Terms of Sex.

| Indicator | Sex | Mean | t | Sig. | Decision on Ho | Interpretation |
|---|---|---|---|---|---|---|
| Value Proposition Innovation | Male | 3.17 | -.832 | .406 | Fail to Reject Ho | Not Significant |
| | Female | 3.26 | | | | |
| Infrastructure and Capability Reconfiguration | Male | 3.07 | -.320 | .749 | Fail to Reject Ho | Not Significant |
| | Female | 3.10 | | | | |
| | Male | 3.17 | 1.240 | .216 | Fail to Reject Ho | Not Significant |

| | | | | | | |
|---|---|---|---|---|---|---|
| Revenue Model Transformation | Female | 3.03 | | | | |
| Stakeholder Engagement Mechanisms | Male | 3.04 | -.962 | .337 | Fail to Reject Ho | Not Significant |
| | Female | 3.15 | | | | |
| Overall Business Model Innovation | Male | 3.11 | -.299 | .766 | Fail to Reject Ho | Not Significant |
| | Female | 3.14 | | | | |

Table 8 focuses on age as a grouping variable. For value proposition innovation, mean scores decrease slightly with age, but differences are not statistically significant. Similar non-significant results are found for revenue model transformation, stakeholder engagement, and overall business model innovation.

**Table 8.** Test of Difference in the Assessment of Business Model Innovation in Terms of Age.

| Indicator | Age | Mean | F | Sig. | Decision on Ho | Interpretation |
|---|---|---|---|---|---|---|
| Value Proposition Innovation | 20–30 years old | 3.29 | .727 | .537 | Fail to Reject Ho | Not Significant |
| | 31–40 years old | 3.23 | | | | |
| | 41–50 years old | 3.22 | | | | |
| | 51 years old and above | 3.07 | | | | |
| Infrastructure and Capability Reconfiguration | 20–30 years old | 3.23 | 5.768 | .001 | Reject Ho | Significant |
| | 31–40 years old | 3.24 | | | | |
| | 41–50 years old | 3.01 | | | | |
| | 51 years old and above | 2.69 | | | | |
| Revenue Model Transformation | 20–30 years old | 3.08 | .218 | .884 | Fail to Reject Ho | Not Significant |
| | 31–40 years old | 3.12 | | | | |
| | 41–50 years old | 3.04 | | | | |
| | 51 years old and above | 3.17 | | | | |
| Stakeholder Engagement Mechanisms | 20–30 years old | 3.15 | .248 | .863 | Fail to Reject Ho | Not Significant |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 31–40 years old | 3.09 | | | | |
| | 41–50 years old | 3.02 | | | | |
| | 51 years old and above | 3.10 | | | | |
| Overall Business Model Innovation | 20–30 years old | 3.19 | 1.130 | .338 | Fail to Reject Ho | Not Significant |
| | 31–40 years old | 3.17 | | | | |
| | 41–50 years old | 3.07 | | | | |
| | 51 years old and above | 3.01 | | | | |

A significant exception is infrastructure and capability reconfiguration, which shows a statistically significant difference across age groups. Younger and middle-aged respondents give higher scores, while those aged 51 and above score the lowest. This may be because younger staff are more engaged with daily digital systems, while older respondents face greater challenges with frequent platform changes.

Table 9 explores differences by highest educational attainment and finds no statistically significant variation across groups.

**Table 9.** Test of Difference in the Assessment of Business Model Innovation in Terms of Highest Educational Attainment

| Indicator | Educational Attainment | Mean | F | Sig. | Decision on Ho | Interpretation |
|---|---|---|---|---|---|---|
| Value Proposition Innovation | Bachelor's Degree | 3.26 | 1.228 | .295 | Fail to Reject Ho | Not Significant |
| | Master's Degree | 3.10 | | | | |
| | Doctorate Degree | 3.30 | | | | |
| Infrastructure and Capability Reconfiguration | Bachelor's Degree | 3.19 | 1.864 | .157 | Fail to Reject Ho | Not Significant |
| | Master's Degree | 2.97 | | | | |
| | Doctorate Degree | 3.03 | | | | |
| Revenue Model Transformation | Bachelor's Degree | 3.09 | 1.860 | .158 | Fail to Reject Ho | Not Significant |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Master's Degree | 2.99 | | | | |
| | Doctorate Degree | 3.30 | | | | |
| Stakeholder Engagement Mechanisms | Bachelor's Degree | 3.05 | .794 | .453 | Fail to Reject Ho | Not Significant |
| | Master's Degree | 3.08 | | | | |
| | Doctorate Degree | 3.24 | | | | |
| Overall Business Model Innovation | Bachelor's Degree | 3.15 | 1.497 | .226 | Fail to Reject Ho | Not Significant |
| | Master's Degree | 3.04 | | | | |
| | Doctorate Degree | 3.22 | | | | |

Doctorate holders scored highest in value proposition innovation (3.30), followed by bachelor's (3.26) and master's (3.10) holders, but the F-value (1.228, p =.295) showed no significant difference. Similar non-significant patterns appeared in infrastructure, revenue, and stakeholder engagement.

Overall business model innovation scores also showed no significant differences by education (F = 1.497, p =.226). This suggests perceptions of innovation are shaped more by organizational context and shared practices than by individual educational attainment.

Table 10 explores length of service and finds most items show no significant differences across tenure groups. Value proposition, revenue model, stakeholder engagement, and overall business model innovation are not statistically significant (all p >.05), with means stable around 3.0–3.4, meaning perceptions are similar regardless of tenure.

**Table 10.** Test of Difference in the Assessment of Business Model Innovation in Terms of Length of Service

| Indicator | Length of Service | Mean | F | Sig. | Decision on Ho | Interpretation |
|---|---|---|---|---|---|---|
| Value Proposition Innovation | Below 5 years | 3.29 | .893 | .445 | Fail to Reject Ho | Not Significant |
| | 5–10 years | 3.33 | | | | |
| | 11–15 years | 3.13 | | | | |
| | Above 15 years | 3.13 | | | | |
| Infrastructure and Capability Reconfiguration | Below 5 years | 3.23 | 4.235 | .006 | Reject Ho | Significant |
| | 5–10 years | 3.22 | | | | |
| | 11–15 years | 3.12 | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Above 15 years | 2.80 | | | | |
| Revenue Model Transformation | Below 5 years | 3.08 | .338 | .798 | Fail to Reject Ho | Not Significant |
| | 5–10 years | 3.01 | | | | |
| | 11–15 years | 3.11 | | | | |
| | Above 15 years | 3.17 | | | | |
| Stakeholder Engagement Mechanisms | Below 5 years | 3.15 | 1.494 | .217 | Fail to Reject Ho | Not Significant |
| | 5–10 years | 3.20 | | | | |
| | 11–15 years | 2.87 | | | | |
| | Above 15 years | 3.13 | | | | |
| Overall Business Model Innovation | Below 5 years | 3.19 | .927 | .428 | Fail to Reject Ho | Not Significant |
| | 5–10 years | 3.19 | | | | |
| | 11–15 years | 3.06 | | | | |
| | Above 15 years | 3.06 | | | | |

However, infrastructure and capability reconfiguration is a significant exception (F = 4.235, p =.006). Employees with below 5 years of service report the highest mean (3.23), while those with above 15 years report the lowest (2.80). Newer staff may view infrastructure more positively, while long-tenured employees may be more sensitive to system limitations.

Overall, sex and education do not significantly affect perceptions of business model innovation, while age and length of service matter only for infrastructure and capability reconfiguration.

*3.4. Assessment of Digitized Education*

Table 11 shows respondents' assessment of digital literacy, with an overall mean of 3.08 (SD = 0.84), indicating generally positive perceptions. The highest-rated item was awareness of data privacy and responsible technology use (3.10), followed by confidence in using digital tools and evaluating resources (both 3.09). Lower scores (3.07) appeared in training opportunities, self-directed learning of new tools, and digital collaboration, suggesting these areas are present but inconsistent.

**Table 11.** Assessment of Respondents on Digitized Education in Terms of Digital Literacy

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. I am confident in using digital tools and platforms relevant to my academic or administrative role | 3.09 | 0.951 | Agree | Evident |
| 2. I can troubleshoot basic technical issues when using online systems for work-related tasks | 3.08 | 0.992 | Agree | Evident |
| 3. The institution provides opportunities for developing digital skills through training or workshops | 3.07 | 0.993 | Agree | Evident |
| 4. I actively seek out new digital tools to enhance my productivity and effectiveness | 3.07 | 0.903 | Agree | Evident |

| | | | | |
|---|---|---|---|---|
| 5. My colleagues and I have the necessary digital skills to work collaboratively in virtual environments | 3.07 | 1.015 | Agree | Evident |
| 6. I am familiar with best practices in data privacy and responsible use of digital technology | 3.10 | 0.971 | Agree | Evident |
| 7. I can evaluate and select appropriate digital resources for teaching, learning, or administrative use | 3.09 | 0.904 | Agree | Evident |
| Overall Mean | 3.08 | 0.84 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Standard deviations ranging from 0.903 to 1.015 reflect noticeable individual differences, especially in virtual teamwork. While basic digital competence is strong, improvements are needed in consistent training and collaborative digital practices.

Table 12 focuses on digital pedagogy, with an overall mean of 3.05 (SD = 0.88), rated as evident but lower than other digital education dimensions. The highest score was for adapting teaching strategies for online and blended learning (3.11), showing strong instructional flexibility. The lowest was institutional support for online teaching and assessment innovation (2.99), suggesting support is perceived as insufficient.

**Table 12.** Assessment of Respondents on Digitized Education in Terms of Digital Pedagogy

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. I use digital tools to create engaging and interactive learning experiences for students | 3.00 | 0.976 | Agree | Evident |
| 2. I modify my teaching strategies to suit online and blended learning environments | 3.11 | 0.998 | Agree | Evident |
| 3. I feel confident designing course content that is optimized for digital delivery | 3.07 | 0.982 | Agree | Evident |
| 4. The institution supports innovation in online teaching and assessment methods | 2.99 | 0.998 | Agree | Evident |
| 5. I regularly use student feedback to improve my digital teaching practices | 3.06 | 1.011 | Agree | Evident |
| 6. I integrate multimedia, simulations, or educational apps to enhance student learning | 3.02 | 1.030 | Agree | Evident |
| 7. I am knowledgeable about online assessment tools and strategies to measure learning outcomes | 3.07 | 0.991 | Agree | Evident |
| Overall Mean | 3.05 | 0.88 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Most indicators clustered between 3.02 and 3.07, with high standard deviations revealing uneven implementation among educators. In line with related literature, institutional adoption has outpaced full pedagogical transformation. Overall, digital pedagogy is present but still in a transitional stage.

Table 13 shows respondents generally agree the institution's technological infrastructure is adequate, with an overall mean of 3.06 (SD = 0.86). The highest-rated items were user-friendly learning management systems and integrated digital tools (both 3.10), while investment in infrastructure upgrades scored the lowest at 3.01, suggesting improvements are not equally visible to all

**Table 13.** Assessment of Respondents on Digitized Education in Terms of Technological Infrastructure

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. The institution provides reliable internet access and digital platforms for academic and administrative use | 3.08 | 0.964 | Agree | Evident |

| | | | | |
|---|---|---|---|---|
| 2. Online learning management systems (e.g., Moodle, Blackboard) are user-friendly and regularly updated | 3.10 | 0.983 | Agree | Evident |
| 3. I have access to the hardware (e.g., computers, tablets) necessary for my digital work tasks | 3.03 | 0.952 | Agree | Evident |
| 4. Technical support services are responsive and helpful when digital issues arise | 3.06 | 0.983 | Agree | Evident |
| 5. The institution invests in upgrading its digital infrastructure to meet evolving needs | 3.01 | 0.978 | Agree | Evident |
| 6. Our digital tools and platforms are integrated across departments for seamless operations | 3.10 | 0.998 | Agree | Evident |
| 7. The digital systems used at the institution ensure security and protection of data | 3.05 | 0.994 | Agree | Evident |
| Overall Mean | 3.06 | 0.86 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Standard deviations between 0.952 and 0.998 indicate uneven experiences across departments. Overall, the institution has a functional digital infrastructure, but views on sustained investment and modernization remain mixed.

Table 14 shows respondents view digital tools as supportive of learner engagement, with an overall mean of 3.06 (SD = 0.84). The highest rating went to inclusive and accessible digital learning environments (3.11), followed by student involvement with appropriate digital tools (3.09). Lower scores (3.03) appeared in discussion board use and student feedback on digital methods, indicating inconsistent implementation.

**Table 14.** Assessment of Respondents on Digitized Education in Terms of Learner Engagement

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. Digital platforms allow me to interact with students more frequently and effectively | 3.05 | 0.956 | Agree | Evident |
| 2. Students are more actively involved in learning when digital tools are used appropriately | 3.09 | 0.963 | Agree | Evident |
| 3. The institution encourages the use of digital technologies that support collaborative learning | 3.03 | 0.989 | Agree | Evident |
| 4. Online tools help personalize the learning experience based on students' needs | 3.07 | 0.906 | Agree | Evident |
| 5. I use discussion boards, chats, or other digital tools to keep students engaged | 3.03 | 0.991 | Agree | Evident |
| 6. Students provide feedback that digital methods help them understand lessons better | 3.03 | 0.975 | Agree | Evident |
| 7. Digital learning environments at the institution are inclusive and accessible to all students | 3.11 | 0.963 | Agree | Evident |
| Overall Mean | 3.06 | 0.84 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Engagement is stronger in accessibility and goal-aligned use, but weaker in sustained interactive activities. Moderate standard deviations reflect varying practices across instructors. Overall, digital learner engagement is evident but depends highly on individual implementation.

Table 15 focuses on institutional support and leadership, which has the highest overall mean among digitized education dimensions at 3.20 (SD = 0.76). The highest-rated item was leaders recognizing and rewarding digital teaching innovation (3.24), followed

by clear policy communication and goal alignment. The lowest mean was alignment with institutional mission (3.10).

**Table 15.** Assessment of Respondents on Digitized Education in Terms of Institutional Support and Leadership

| Indicator | WM | SD | QD | VI |
|---|---|---|---|---|
| 1. Leadership provides a clear vision for the institution's digital transformation | 3.18 | 0.861 | Agree | Evident |
| 2. There is strong administrative support for implementing digital initiatives in my department | 3.20 | 0.947 | Agree | Evident |
| 3. Policies and guidelines for digital education are communicated effectively across the institution | 3.22 | 0.924 | Agree | Evident |
| 4. Leaders recognize and reward innovation in digital teaching and service delivery | 3.24 | 0.912 | Agree | Evident |
| 5. There are sufficient resources allocated for digital projects and infrastructure | 3.21 | 0.912 | Agree | Evident |
| 6. The institution encourages a culture of continuous learning in digital competencies | 3.22 | 0.886 | Agree | Evident |
| 7. Digital transformation efforts are aligned with the institution's mission and strategic goals | 3.10 | 0.770 | Agree | Evident |
| Overall Mean | 3.20 | 0.76 | Agree | Evident |

Legend: 3.51–4.00 (Strongly Agree – Highly Evident); 2.51–3.50 (Agree – Evident); 1.51–2.50 (Disagree – Slightly Evident); 1.00–1.50 (Strongly Disagree – Not Evident).

Lower standard deviations show consistent perceptions across respondents, supporting the role of strong leadership in digital transformation. Overall, institutional support and leadership are viewed as a key strength in the institution's digital education.

*3.5. Differences in Digitized Education*

Results indicated no statistically significant differences in the assessment of digitized education across sex, age, educational attainment, and length of service ($p > 0.05$). This suggests that perceptions of digitized education were relatively consistent among all respondent groups. The uniform implementation of institutional digital systems, policies, and support may have contributed to the similar experiences and evaluations across demographic characteristics. Overall, demographic factors did not significantly influence how faculty members perceived digitized education at the institution.

*3.6. Correlation between BMI and Digitized Education*

The correlation results between business model innovation and digitized education are shown in Table 16.

**Table 16.** Relationship between Business Model Innovation and Digitized Education.

| Business Model Innovation Construct | Digitized Education Construct | Pearson r | Sig. (2-tailed) | Decision on Ho | Interpretation |
|---|---|---|---|---|---|
| Value Proposition Innovation | Digital Pedagogy | .338** | .000 | Reject Ho | Significant |
| | Technological Infrastructure | .416** | .000 | Reject Ho | Significant |
| | Learner Engagement | .432** | .000 | Reject Ho | Significant |

| | | | | | |
|---|---|---|---|---|---|
| | Institutional Support and Leadership | .432** | .000 | Reject Ho | Significant |
| | Overall Digitized Education | .589 ** | .000 | Reject Ho | Significant |
| Infrastructure & Capability Reconfiguration | Digital Pedagogy | .337** | .000 | Reject Ho | Significant |
| | Technological Infrastructure | .281** | .000 | Reject Ho | Significant |
| | Learner Engagement | .274** | .000 | Reject Ho | Significant |
| | Institutional Support and Leadership | .310** | .000 | Reject Ho | Significant |
| | Overall Digitized Education | .450 ** | .000 | Reject Ho | Significant |
| Revenue Model Transformation | Digital Pedagogy | .351** | .000 | Reject Ho | Significant |
| | Technological Infrastructure | .180** | .006 | Reject Ho | Significant |
| | Learner Engagement | .266** | .000 | Reject Ho | Significant |
| | Institutional Support and Leadership | .296** | .000 | Reject Ho | Significant |
| | Overall Digitized Education | .429 ** | .000 | Reject Ho | Significant |
| Stakeholder Engagement Mechanisms | Digital Pedagogy | .269** | .000 | Reject Ho | Significant |
| | Technological Infrastructure | .282** | .000 | Reject Ho | Significant |
| | Learner Engagement | .261** | .000 | Reject Ho | Significant |
| | Institutional Support and Leadership | .345** | .000 | Reject Ho | Significant |
| | Overall Digitized Education | .430 ** | .000 | Reject Ho | Significant |
| Overall Business Model Innovation | Overall Digitized Education | .660 ** | .000 | Reject Ho | Highly Significant Relationship |

Table 16 reveals that all dimensions of business model innovation are positively and significantly correlated with digitized education ($p < .01$). Correlation coefficients range from 0.180 to 0.589, indicating moderate to strong relationships.

Among the dimensions, value proposition innovation shows the strongest correlations, particularly with learner engagement and institutional support. Infrastructure and capability reconfiguration and stakeholder engagement mechanisms demonstrate moderate relationships, while revenue model transformation shows comparatively weaker but still significant correlations.

Notably, the relationship between overall business model innovation and overall digitized education is strong ($r = 0.660$, $p < .001$), indicating a highly significant association.

These findings suggest that digitized education is not an isolated development but is deeply embedded within broader business model innovation processes.

## 4. Discussions

The respondents are generally early- to mid-career and relatively balanced in terms of sex, education, and length of service, providing a diverse perspective on digital transformation within the institution.

Business model innovation (BMI) is perceived as evident, indicating ongoing but not fully mature digital transformation. Value proposition innovation is the most developed dimension, reflecting visible improvements in teaching and learning through digital tools. In contrast, infrastructure and capability reconfiguration is comparatively weaker, especially among older staff, suggesting uneven adaptability to digital systems. Revenue model transformation and stakeholder engagement are moderately developed, indicating that financial diversification and collaboration practices exist but are not yet strongly institutionalized. Overall, BMI reflects partial alignment with Dynamic Capabilities Theory, where innovation is stronger in value creation than in organizational restructuring [12].

Digitized education is also evident across all dimensions, with relatively close mean scores, suggesting a standardized level of digital implementation. Institutional support and leadership is the strongest dimension, highlighting the importance of governance and resource allocation in driving digital transformation. Other areas—digital literacy, pedagogy, infrastructure, and learner engagement—are relatively balanced, although pedagogical transformation remains slightly weaker, indicating that digitalization is still more operational than pedagogically transformative. These findings align with Digital Empowerment Theory, emphasizing the need for integration between technology, pedagogy, and institutional support.

No significant differences are found in BMI across sex, education, or length of service. However, age significantly influences perceptions of infrastructure and capability reconfiguration, with younger respondents reporting higher scores, suggesting a generational digital divide in system adaptability. For digitized education, no significant differences are observed across all demographic variables, indicating a highly uniform institutional digital experience, likely due to centralized systems and policies.

A strong positive relationship exists between business model innovation and digitized education. All BMI dimensions are significantly correlated with digitized education, with the strongest association between their overall constructs. This indicates that institutions with stronger innovation in value creation, capability restructuring, and stakeholder engagement tend to have more advanced digital education systems. The findings support both Dynamic Capabilities Theory and Digital Empowerment Theory, highlighting the interdependence between organizational transformation and digital education development.

Notably, uniform digitized education experiences likely stem from centralized institutional strategies reducing digital engagement and competence disparities, aligning with consistent implementation.

## 5. Recommendations

Based on the findings of this study, the following recommendations are provided to enhance business model innovation and digitized education:

### *5.1. Value Proposition Innovation*

Redesign academic programs and courses by integrating hybrid delivery methods and micro-credential courses to enhance the distinctiveness and competitiveness of the education provided.

Strengthen partnerships with industry to improve learning experiences, and leverage digital technologies to provide personalized learning pathways that address the evolving needs of students.

*5.2. Infrastructure and Capability Reconfiguration*

Upgrade the existing learning management system (LMS) and technological infrastructure to ensure the reliability and stability of digital tools and platforms.

Provide regular digital skills training, particularly for older faculty members and those with long service, to help them adapt to new teaching tools and digital technologies. This ensures that all educators can effectively utilize digital platforms for teaching.

*5.3. Revenue Model Transformation*

Develop online certification programs and short-term industry collaboration projects to diversify revenue streams and reduce dependence on traditional tuition fees.

Implement a pricing strategy for digital content and platforms to optimize revenue structures and enhance income from online services and content.

*5.4. Stakeholder Engagement Mechanisms*

Develop online feedback and consultation platforms to strengthen interaction and collaboration with students, faculty, and industry partners.

Form industry advisory groups to collaboratively design innovative digital learning experiences and drive educational reforms, ensuring stakeholder feedback is translated into practical educational advancements.

Implementing these targeted improvements enables educational institutions to foster business model innovation, seamlessly integrate digitized education, and establish a robust foundation for future growth.

## 6. Conclusions

The balanced and heterogeneous respondent profile ensures that perceptions of business model innovation and digitized education reflect diverse professional, career, and educational backgrounds, providing a robust foundation for the study.

Business model innovation is evident across all dimensions, with the institution initiating strategic changes in value creation, infrastructure, revenue, and stakeholder engagement, although these initiatives are not yet fully institutionalized.

Digitized education is similarly evident, with institutional support and leadership emerging as its strongest dimension, reflecting a clear digital strategic direction. However, instructional and technological integration remains consistently at a mid-level.

No significant demographic differences in perceptions are observed across sex, education, or service length, indicating consistent implementation. However, infrastructure and capability reconfiguration show age-related differences, suggesting generational gaps in digital adaptability.

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