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Technopreneurial Strategies Using Digitalization and Innovation to Strengthen Student Loyalty

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ABSTRACT

This study aims to explore the interaction between service quality and digital transformation in reconstructing students' loyalty in higher education, with a specific focus on academic and non-academic services at Indonesian universities. **The theoretical framework** integrates service quality dimensions, digital transformation concepts, and loyalty models to provide a comprehensive understanding of how these factors shape students' loyalty in the digital era. Utilizing a Grounded Theory approach, data were collected through in-depth interviews with students, faculty members, and administrative staff. Data analysis involved open coding, axial coding, and selective coding to develop Digital-Service Synergy Theory explaining the loyalty reconstruction process. **Findings** indicate that while both service quality and digital transformation significantly influence student loyalty, their interaction creates a more complex dynamic that determines overall satisfaction and loyalty. **Key factors** influencing effectiveness include e-learning system quality, instructor responsiveness, technical support, and digital anxiety management. **The study** provides insights into optimizing the synergy between traditional service quality and digital transformation to enhance student loyalty and offers practical solutions for implementation challenges in higher education institutions.

1. INTRODUCTION

Higher education worldwide, including in Indonesia, is experiencing significant changes due to the implementation of digital technology in academic and non-academic service. student satisfaction and loyalty are influenced by service quality offered in higher education, both in academic (teaching and curriculum) and non-academic (administrative service, campus facilities, and e-learning support) contexts [1–4].

These are promoted by service quality dimensions, such as reliability, tangibility, responsiveness, empathy, and assurance [5–7]. For example, effective and high-quality e-learning service can increase students' motivation and satisfaction, which affects loyalty to higher education [3, 7–9].

Digital transformation in higher education has become a phenomenon that changes many aspects of academic and non-academic service. Higher education improves the efficiency and service quality provided

to students by using digital technology in e-learning, institution applications, management systems, and IT infrastructure [10–12]. Although many studies have assessed the effect of technology on education, sufficient exploration of interaction between service quality and digital transformation in shaping student loyalty is lacking, specifically in Indonesian context [5, 13, 14].

In Indonesia, this issue becomes increasingly relevant following the enactment of Permendikbudristek No. 53 of 2023, which mandates the integration of digital-based learning and continuous quality assurance in higher education. The regulation emphasizes the provision of inclusive, adaptive, and student-centered academic and non-academic services, reinforcing the strategic importance of digital transformation and service quality enhancement in strengthening student loyalty.

Separate examinations of service quality and digital transformation have been conducted, but interaction between the two elements in determining loyalty is not widely explored, particularly from the perspectives of students [7, 15–17]. There is a significant gap in understanding how the synergy between good service quality and effective digital transformation can strengthen student loyalty to higher education [18–20]. Furthermore, no grounded theory-based model has examined interaction between these two aspects in shaping student loyalty [3, 10, 21].

Previous studies showed that despite the significant effect of some service quality dimensions on student satisfaction, such as the quality of e-learning systems and teaching, not all digital elements could be effectively integrated into the teaching and learning process [13, 22–24]. This suggests an opportunity for the exploration of more relevant and contextual dominant factors determining student loyalty in digital era, as well as the framework provided by grounded theory to explain interaction between service quality and digital transformation.

Filling the existing gap is crucial to provide a more comprehensive understanding of how higher education can optimize service quality and digital transformation to strengthen student loyalty. This study aims to explore the reconstruction of student loyalty using the Grounded Theory Approach (GTA), focusing on the interaction between academic and non-academic service quality and digital transformation. The findings are expected to enrich the literature on these topics and offer new insights into their synergistic management in the digital era. Additionally, the study seeks to provide practical guidance for developing more effective policies and strategies to improve student retention and institutional reputation [25–28].

This study supports the Sustainable Development Goals (SDGs), particularly Goal 4 (Quality Education) and Goal 9 (Industry, Innovation, and Infrastructure), by promoting inclusive, student-centered education through the integration of digital transformation and service quality. The proposed hypothesis states that high-quality academic and non-academic services, combined with effective digital transformation, increase student satisfaction and foster loyalty to higher education. To examine this, three Research Questions (RQ) are presented:

- RQ1 – How does the interaction between service quality (academic and non-academic) and digital transformation affect student loyalty at 17 Agustus 1945 University Surabaya?

- RQ2 – What are the most dominant factors in shaping loyalty in the era of digital transformation based on students' perspectives?

- RQ3 – How can Grounded Theory explain the reconstruction of student loyalty in the context of synergy between service quality and digital transformation?

2. LITERATURE REVIEW
2.1. The Effect of Service Quality on student Satisfaction and Loyalty
2.1.1. Dimensions of Service Quality

Service quality in higher education plays an important role in determining student satisfaction and loyalty. Various dimensions of service quality, such as tangibility, responsiveness, assurance, reliability, empathy, and e-learning, significantly affect satisfaction and academic performance [5, 29]. Additionally, service quality determines loyalty indirectly through satisfaction [1, 3].

Effective and high-quality e-learning service can increase students' motivation and satisfaction, which affects loyalty to higher education [3, 30]. Moreover, Perceived Service Quality (PSQ) has a significant effect on satisfaction, loyalty, and intention to recommend higher education [1].

2.1.2. Quality-Value-Loyalty Model

The simple model that combines the key drivers of customer loyalty and develops a conceptual framework to integrate the pyramid model with the quality-value-loyalty chain emphasizes the importance of the technology-customer, technology-employee, and technology-company relationships in serving customers [31, 32].

This study shows the importance of service quality, perceived value, and customer loyalty, which are interrelated. Service quality enhances perceived value, which contributes to customer loyalty, a concept consistent with service-profit chain theory. Several issues are proposed for further analysis related to the effect of technology on business relationship to serve customers more effectively in the 21st century.

2.1.3. E-Learning Service Quality

Specific dimensions of e-learning service quality, including system quality, course materials, instructor quality, and IT support, have a positive effect on student satisfaction. Efficient e-learning service increases satisfaction, specifically in a digital environment [5, 7]. For example, e-learning system quality is the most influential dimension in shaping satisfaction and loyalty [7]. Good e-learning service quality can increase motivation and engagement in the learning process [30].

2.2.   Digital Transformation in Higher Education

Digital transformation in higher education, driven by technological advances, enhances education quality, talent development, research, and managerial services. The use of e-learning systems, management tools, and digital collaboration platforms significantly impacts student experience and overall education quality. Service quality including academic, administrative, and facility support plays a key role in boosting student satisfaction, which in turn fosters loyalty and retention [3, 31]. Digital transformation also improves institutional efficiency, leading to better education outcomes and satisfaction [7], while technology integration in learning increases student participation and supports teaching and learning processes.

Despite its many benefits, digital transformation in higher education presents challenges that must be addressed. These include barriers to student lecturer collaboration due to technological limitations or digital anxiety among students [33]. Digital self efficacy influences student adaptability, while anxiety can hinder the transformation process [33]. Managing the quality of e-services and e-learning also requires attention to system performance, instructor competence, and administrative support [6]. On the other hand, digital transformation offers opportunities to enhance student engagement and support flexible, personalized learning. Institutions that effectively manage this transformation can improve learning experiences, operational efficiency, and teaching quality [31].

Digital transformation in higher education opens opportunities to increase the retention of students. Good quality of education service, including cleanliness of facilities, teaching skills of lecturers, and adequate administrative support contributes to satisfaction, which promotes loyalty to educational institution [33]. A study indicated that satisfaction could mediate the relationship between service quality and loyalty [34]. Consequently, effective digital transformation enhances the quality of educational services and improves the overall student experience, leading to increased retention and loyalty to educational institutions [34].

Education quality, managerial efficiency, satisfaction, and loyalty can be improved by digital transformation. However, achieving these benefits will require educational institution to address rising issues in the form of digital anxiety and collaboration barriers, as well as ensure continuous improvement of all service quality aspects, including systems, instructors, and administrative support, are continuously improved.

2.3.   Student Satisfaction and Loyalty in Digital Context

Student satisfaction plays a vital role in shaping loyalty to higher education institutions, especially in educational services. Research shows that satisfaction mediates the relationship between service quality and loyalty, where high-quality teaching, administration, and technical support increase satisfaction and, in turn, foster loyalty [3, 4, 33]. Satisfaction serves as a key indicator linking service quality to student intention to stay and engage in the academic community [34]. Also confirmed that loyalty is significantly influenced by the level of satisfaction. Therefore, improving service quality is essential to enhance satisfaction and strengthen student loyalty.

E-learning platforms play a crucial role in digital higher education, with their quality significantly influencing student satisfaction and motivation. User-friendly interfaces, reliable access, and strong technical support contribute to more effective and engaging learning experiences [7]. Showed that both content quality

and student–lecturer interaction within e-learning systems strongly impact satisfaction. Well-designed platforms help students connect better with the material and access resources efficiently, thereby enhancing overall satisfaction with the educational experience.

Positive perspectives about service quality provided through the platforms are key factors in ensuring e-learning effectiveness. Good service quality, including instructor quality, clarity of learning materials, and responsive administrative support, are closely related to satisfaction levels. In this context, [5] showed the quality of e-learning service, both in terms of instructors and platforms, played a direct role in shaping satisfaction. Students receiving good technical and academic support tend to feel satisfied and loyal to higher education [35, 36].

Student loyalty in a digital context is influenced by other factors, such as trust in educational technology, ease of system usage, and the benefits felt during the learning process. This corresponded with the results of [14] showing that factors such as perceived ease of accessibility and usefulness had a significant effect on students' intention to continue using virtual learning platforms. Therefore, educational institution should ensure that the used technology meets technical requirements and is designed to satisfy students' comfort and needs.

Satisfaction is important in shaping loyalty to higher education in digital context. High service quality, both related to teaching and learning technology, can increase satisfaction, which strengthens loyalty. Effective platforms, with a good system and service quality, play a major role in ensuring a satisfying e-learning experience and increasing motivation to engage in digital education process. Therefore, educational institution should focus on improving service quality, specifically in relation to technology and teaching to provide a satisfying experience and increase student loyalty in digital era.

Proposed a simple model that summarizes the key drivers of loyalty and developed a conceptual framework to integrate the pyramid model with the quality-value-loyalty chain [31]. The pyramid model emphasizes the importance of the technology-customer, technology-employee, and technology-company relationships in serving customers. This study will show the importance of service quality, perceived value, and customer loyalty, which are interrelated. Service quality enhances perceived value, which contributes to customer loyalty, a concept consistent with service-profit chain theory. In addition, several issues are proposed for further analysis regarding the effect of technology on business relationship to serve customer more effectively in the 21st century.

3. RESEARCH METHOD

3.1. Design

Considering the literature and existing gap, this study adopts GTA to explore critical insights into the relationship between traditional service, digital transformation, and student loyalty to higher education. As a systematic inductive method for conducting qualitative analysis [37], this study aims to develop theory through critical observation and experience. GTA provides sequential guidelines for conducting qualitative analysis, integrates the data collection and analysis phases, assists in advancing the conceptual analysis of qualitative data, and legitimizes the total qualitative effort as a scientific inquiry [38].

3.2. Data Collection and Sampling

Table 1. Description of Participants

No	Name	Gender	Age	Current Semester	student Status	Types of Digital Service	Initial Assessment of Digital Transformation in Institution
P1	Gilang Arie Wijaya	Male	23-30 years	Semester 5-8	Active	E-learning	Very Good (5)
P2	Agata Winda	Female	18-22 years	Semester 5-8		Institution Social Media	Pretty Good (3)
P3	Yulia Purni Fidiastuti	Female	18-22 years	Semester 5-8	Active	Institution Social Media	Very Good (5)
P4	Rania Noorandjani Riandita	Female	18-22 years	Semester 5-8	Active	E-learning	Good (4)
P5	Ananta	Male	18-22 years	Semester 5-8	Active	E-learning	Very Good (5)
P6	Muhammad Hafizol	Male	23-30 years	Semester 5-8	Active	Academic Portal	Good (4)
P7	Amanda Arya Dwi Yanti	Female	18-22 years	Semester 5-8	Active	Institution Applications	Very Good (5)
P8	Reicha	Female	18-22 years	Semester 5-8	Active	Academic Portal	Pretty Good (3)
P9	Devika Amalia Damayanti	Female	18-22 years	Semester 5-8	Active	E-learning	Good (4)
P10	Daffa Rafi Rahmadiansyah	Male	18-22 years	Semester 5-8	Active	Academic Portal	Very Good (5)
P11	Mireya Firanda	Female	23-30 years	Semester 5-8	Active	Institution Applications	Very Good (5)
P12	Via	Female	18-22 years	Semester 5-8	Active	E-learning	Very Good (5)
P13	Dika Nabil	Male	18-22 years	Semester 5-8	Active	Institution Social Media	Good (4)

No	Name	Gender	Age	Current Semester	student Status	Types of Digital Service	Initial Assessment of Digital Transformation in Institution
P14	Septi Calista Nanda	Female	18-22 years	Semester 5-8	Active	Institution Social Media	Very Good (5)
P15	Risyda	Female	18-22 years	Semester 5-8	Active	Institution Social Media	Very Good (5)
P16	Dwi Adianti Tasya Putri	Female	18-22 years	Semester 5-8	Active	E-learning	Very Good (5)
P17	Cantika Al Madinah	Female	18-22 years	Semester 5-8	Active	Academic Portal	Good (4)
P18	Rifaldi	Male	23-30 years	Semester 5-8	Active	E-learning	Pretty Good (3)
P19	Fitri A'isya	Female	18-22 years	Semester 5-8	Active	E-learning	Good (4)
P20	Rizka	Female	18-22 years	Semester 5-8	Active	Institution Social Media	Good (4)
P21	Sunarti	Female	23-30 years	Semester 5-8	Active	Academic Portal	Good (4)
P22	Attala	Female	23-30 years	Semester 5-8	Active	E-learning	Good (4)

The "Initial Assessment of Digital Transformation in Institution" in Table 1 reflects participants' perceptions regarding the effectiveness of digital service implementation at their university. This evaluation uses a 5-point Likert scale, where 1 = Poor and 5 = Very Good, based on accessibility, responsiveness, and contribution to learning support. Most students rated the digital transformation between Good (4) and Very Good (5), indicating a generally positive reception. Services such as e-learning, academic portals, and institutional applications were viewed as integral to their academic experience. However, a few students assigned Pretty Good (3), revealing gaps in system responsiveness or digital literacy support. This variation suggests that while digital transformation has progressed, continuous improvement is necessary particularly in ensuring equal access, system reliability, and user guidance.

Under GTA guidelines [37], the data collection process for this study was conducted with three main methods, including in-depth interviews, observation of participants and non-participants, as well as document analysis. These methods were used to collect rich qualitative data from students at 17 Agustus 1945 University in Surabaya. Interviews were conducted with students at undergraduate (S1), master (S2), and doctoral (S3) academic levels, to gain various perspectives about the effect of digital service on academic experience and loyalty.

The collection process used purposeful sampling to focus on students with diverse academic backgrounds, digital service experience, and perspectives of service quality [38]. Data were collected until theoretical saturation was reached, implying that no new insights originated from additional interviews [37]. Theoretical sampling procedures were implemented to ensure the data were continually refined and analyzed in real-time, allowing for the formation of new constructs as the study progressed [39].

Interviews were supplemented with observations of digital and traditional service in the higher education environment, including e-learning platforms, academic information systems, and face-to-face interactions with administration staff. The data collection process was conducted in several stages, similar to the method used in focus group discussion (FGD) preferred for the conversational and participatory nature.

Table 1 presents a brief overview of participants. Most were female (15), with 7 males. The majority (16) were aged 18–22, and the rest (6) were 23–30 years old. All were in semesters 5 to 8, indicating they were final-year students. The most accessed digital services were institutional social media and e-learning (7 each), followed by academic portals (4) and institutional apps (3). Most participants rated the institution's digital transformation positively 9 as "Very Good," 8 as "Good," and 5 as "Pretty Good."

3.3. Data Analysis

Data analysis followed three main phases of Grounded Theory [37], namely open coding, axial coding, and selective coding. In the open coding phase, interview transcripts, observation notes, and institutional documents were analyzed to identify initial categories and concepts related to student experience with digital and traditional service. Through axial coding, these categories were further refined and connected based on cause-and-effect relationship, contextual factors, and consequences. The final phase of selective coding integrated key categories into a coherent theoretical model that explains the effect of interaction between traditional service and digital transformation on student loyalty [38].

4. RESULT AND DISCUSSION

Based on FGD results, this study identified 17 loyalty factors grouped into three categories. First, the synergy of service quality and digital transformation shows that their integration, along with institutional responsiveness to digital issues, enhances loyalty. Second, key loyalty drivers include service quality, affordability, digital access, financial support, emotional attachment, and student recommendations. Third, grounded

theory reconstruction explains how both digital and face-to-face services shape loyalty. Overall, the interaction between service quality and digital transformation is central to building student loyalty in educational services. The answers to the research questions are as follows:

4.1. RQ1. How does the interaction between service quality (academic and non-academic) and digital transformation affect student loyalty?

Synergy of Service Quality and Digital Transformation as student Loyalty Strength. Prior studies, such as, emphasize the strong link between service quality and customer loyalty, where higher quality boosts satisfaction and retention while reducing switching barriers. Similarly, [18, 31] found that academic, administrative, and facility service quality play a key role in student loyalty in higher education.

Participant responses also support this. P4 noted a clear and structured learning process, P14 appreciated flexible academic guidance, and P17 highlighted the comfort of interactive digital platforms and journal access. These findings reinforce the crucial role of digital transformation in enhancing the student experience.

4.1.1. Academic and Non-Academic Service Quality as a Key Factor of Loyalty

The study found that service quality influences perceived value and satisfaction, which mediate the relationship between service quality and students' behavioral intentions [4]. Similarly, [40, 41] highlighted that both technical and non-technical services such as facilities and administrative support significantly shape student perceived value and institutional image.

Participant responses reflect the positive impact of both academic and non-academic service quality. P1 mentioned receiving excellent overall service, while P14 highlighted satisfaction with complete facilities. P16 noted that additional non-academic facilities support student needs, and P18 emphasized the helpfulness of services like the career center and digital library. These responses suggest that non-academic service quality significantly contributes to student satisfaction and loyalty.

4.1.2. Digital Transformation as a Catalyst for student Loyalty

Satisfaction is greatly influenced by the use of virtual classes and the quality of digital transformation offered by higher education [14]. This digital transformation increases the convenience and accessibility of education services, which has an impact on loyalty to the institution. Digital transformation can enhance managerial efficiency, satisfaction, and overall quality of education, as emphasized by [10, 42].

Participant responses indicate that digital transformation significantly enhances the learning experience. P1 noted that technology-based services simplify academic tasks, while P14 appreciated easy access to materials through digital platforms. P19 highlighted the usefulness of e-learning systems and academic portals in managing studies, and P18 emphasized that digital technology broadens access to learning resources. These insights show that technology not only supports learning efficiency but also strengthens student loyalty.

4.1.3. Barriers to Digital Service and Institutional Responsiveness

Digital anxiety can reduce the effectiveness of digital transformation and decrease student satisfaction, as reported by [34]. Additionally, technical barriers in e-learning systems diminish student satisfaction, which impacts their loyalty to higher education [22]. Therefore, improvements to digital systems and better support are needed to maximize digital transformation benefits.

Several participants reported technical issues that disrupted their academic experience. P2 mentioned frequent errors on the e-learning platform, especially during online exams. P4 highlighted problems with systems like SIM KKN, while P9 experienced difficulties uploading exam answers due to system errors and slow performance educational services. P18 expressed frustration over unresolved issues in digital services. These responses indicate that technical problems in digital systems can negatively impact student satisfaction and loyalty.

4.1.4. Integration of Service Quality and Digital Transformation as the Foundation of Loyalty

The integration of service quality with digital transformation could strengthen customer relationships and increase loyalty, as stated by [43]. Combining high-quality service with efficient technology provides a better experience for students, which increases loyalty to higher education. The quality of academic service integrated with digital technology strengthened loyalty, as emphasized by [18].

Participants emphasized the importance of service quality in shaping their perception and experience. P6 stated that service quality is a key factor in evaluating an institution, while P14 felt well-supported by the services provided. P13 noted that service quality influences the teaching and learning process, and P22 shared

that staff attitude directly affects satisfaction. These responses highlight that strong academic and non-academic service quality, supported by digital technology, plays a vital role in fostering student loyalty.

4.2. RQ2. What are the most dominant factors in shaping loyalty in the era of digital transformation based on student perspectives?

4.2.1. Key Factors in Student Loyalty: Service Quality, Affordability, and Ease of Access to Digital Service

Service quality, affordability, and ease of access to digital services are key factors influencing student loyalty. Transcript data show that students value institutions offering quality academic and non-academic services, especially when supported by digital systems that simplify access to information and administration. P1 noted no issues with digital services, highlighting the importance of system stability, and also cited affordability and academic support as reasons for recommending the institution. These findings align with [4], which show that service quality impacts perceived value and student satisfaction.

The institution needs to focus on improving the quality of digital service, such as e-learning platforms and online administration systems, while ensuring that tuition fees remain affordable. The combination of service quality and affordability can be a determining factor in building loyalty. The stability and reliability of digital systems need to be considered to ensure a positive experience among students educational services.

4.2.2. Financial and Career Support as Loyalty Factors

Financial support, such as scholarships and career development opportunities like internships and industry partnerships play a vital role in fostering student loyalty. P2 emphasized that scholarships ease financial burdens, while internship availability increases institutional appeal. These findings are consistent with [18], which highlights the positive impact of financial and career support on satisfaction and loyalty. Institutions should therefore expand accessible financial aid and strengthen industry collaborations. Additionally, digital transformation through e-learning and academic systems enhances loyalty by offering flexibility, as noted by P12, though technical issues like system errors and limited compatibility, as P4 described, can hinder satisfaction, underscoring the importance of improving digital infrastructure and student digital self efficacy [18].

4.2.3. Emotional Attachment and Pride in Institution

Emotional attachment and pride in the institution are important factors in building loyalty. One participant stated, "I am proud and satisfied to be part of 17 Agustus 1945 University Surabaya, not because of what is given to me, but in terms of supporting learning, service that I feel is good, and the facilities supporting students to learn and be creative are very many" (P3). This shows pride in the institution can increase student loyalty, corresponding with the report by [40] on how institutional image significantly affects satisfaction and loyalty.

4.2.4. Barriers to Digital Service and Institutional Responsiveness

Digital transformation offers many benefits, but technical barriers like system errors and slow performance can lower student satisfaction. P8 reported errors in academic portals during study plan registration, hindering the process and loyalty building. Institutional responsiveness is vital, as P16 shared that slow digital services were manageable with institutional support. These findings align with [44], which shows that students with low digital skills face greater challenges.

4.2.5. Recommendation and Promotion of Institution by Students

Students satisfied with institutional services and facilities are more likely to recommend the university. P3 stated, "I have recommended 17 Agustus 1945 University Surabaya several times due to excellent service and complete facilities," illustrating how satisfaction drives positive referrals. This aligns with [44], which found that service quality influences satisfaction and willingness to recommend. Institutions often leverage such recommendations for promotion, highlighting career support and facilities as key attractions. Ensuring services meet student needs and expectations remains essential.

4.3. RQ3. How can grounded theory explain the reconstruction of student loyalty in the context of synergy between service quality and digital transformation?

4.3.1. Reconstructing student Loyalty through Synergy of Service Quality and Digital Transformation

The synergy between academic service quality and digital transformation is key to building student loyalty. Students value institutions that balance quality academic services with digital tools that enhance ef-

ficiency and convenience. P2 stated, "If the academic system and digitalization run in balance, I feel more comfortable and loyal." This highlights the importance of combining traditional interactions with technological convenience. This aligns with [34], which shows that effective digital transformation boosts satisfaction and loyalty. Institutions should ensure digital initiatives are fully integrated into academic and non academic services to create a holistic, satisfying learning experience.

4.3.2. Academic and Non Academic Service Quality as Key Factors of Loyalty

Good quality of academic and non academic service is a key factor in building loyalty. One participant reported "Excellent service in academic and non-academic service" (P1), suggesting that students value institution that provide responsive academic guidance, adequate learning facilities, and non-academic service such as a complete digital library and career center. This is consistent with the results of [1] showing that PSQ has a significant effect on satisfaction.

4.3.3. Digital Transformation as a Catalyst for student Loyalty

Digital transformation through e-learning platforms and academic information systems is a key catalyst for increasing student loyalty. P1 noted that technology-based services simplify academic tasks by providing easy access to materials, assignments, and grades. However, technical issues like frequent system errors, especially during online exams as reported by P2, can cause frustration and reduce satisfaction. These findings align with [44, 45], which show that students with low digital skills face greater challenges.

4.3.4. Barriers to Digital Service and Institutional Responsiveness

Digital transformation offers many benefits, but technical issues like frequent system errors or slow performance can lower student satisfaction. P22 reported, "SIAKAD often has errors, and there is no IT contact to solve the issue," highlighting the importance of institutional responsiveness. This aligns with [46–48], which shows that self efficacy mediates the positive impact of digital transformation on helping behavior.

4.3.5. Student Emotional Attachment to Institution

Student emotional attachment, such as pride in being part of the institution and positive recommendations to others, are important factor in building loyalty. One participant stated, "I am proud to be part of this institution because of the possession of good accreditation and many achievements" (P12). The statement shows that students feeling proud of the institution tend to have more loyalty and provide recommendations. This is consistent with [18, 49–51], reporting that higher modern learning management and systems education image moderates the relationship between satisfaction and loyalty.

4.3.6. Combination of Digital and Face-to-Face Service as Loyalty Strategy

The combination of digital and face-to-face service is an important strategy in building loyalty. One participant stated, "Technology helps learning flexibility, but direct interaction is still needed" (P5), suggesting that students appreciate the flexibility provided by digital technology but direct interaction is still needed with lecturers and staff for academic guidance and consultation. This corresponds with the results of [10] showing that digital transformation increases student satisfaction by 25% and education quality by 20%.

4.4. Theoretical Implications

The Digital Service Synergy Theory offers key theoretical implications by redefining student loyalty as a multifactorial construct shaped by both service quality and the effectiveness of digital transformation. This perspective promotes a holistic approach to managing student experience one that balances traditional services with digital innovation. The theory also highlights the need for integrated institutional strategies that align service excellence with digital development to enhance satisfaction and foster loyalty.

Furthermore, the theory emphasizes the critical role of student voice in shaping and refining academic services and digital platforms, asserting that responsiveness to student needs strengthens institutional relationships. Technology is framed not as a peripheral support, but as a central, strategic element of institutional management that requires deliberate integration. Importantly, the theory also underscores the necessity of balancing digital systems with human interaction; the continued presence of lecturers and staff remains essential in fostering emotional bonds and maintaining a supportive learning environment, thereby reinforcing the affective dimensions of loyalty in the digital age.

4.5. Theoretical Contributions

Figure 1 illustrates the Conceptual Model of Digital-Service Synergy Theory, which unifies academic and non-academic service quality with digital transformation to offer a fresh perspective on student loyalty. Unlike traditional models that separate service quality and digitalization, this theory highlights their synergy. Grounded in student lived experiences, it shows how the integration of traditional and digital services fosters a holistic learning environment that builds emotional attachment, such as pride, trust, and belonging, strengthening student loyalty.
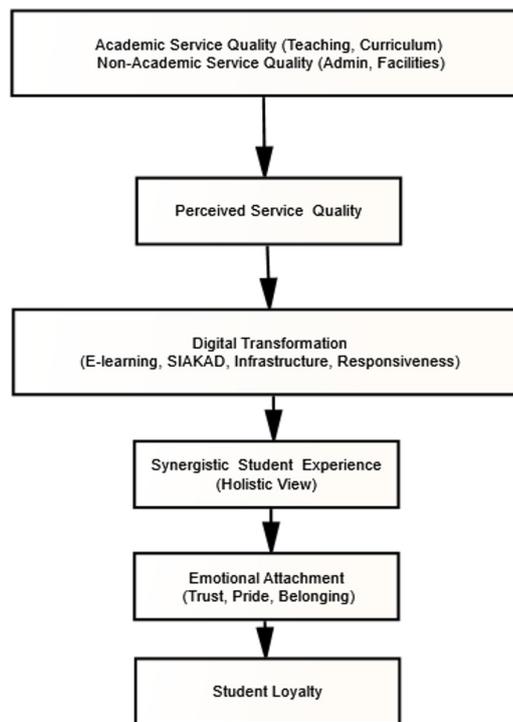

Figure 1. The Conceptual Model of Digital-Service Synergy Theory

This theory significantly advances student experience theory by emphasizing the importance of balancing face-to-face and digital interactions in fostering loyalty. By integrating emotional dimensions and student-centered service design, it offers both theoretical and practical guidance for higher education management. The model promotes strategic alignment between service quality and technological innovation, helping institutions meet evolving student expectations. Overall, the Digital-Service Synergy Theory provides a holistic view of student loyalty, positioning the synergy between service excellence and digital transformation as key to sustaining loyalty in the digital era.

4.6. Scope and Limitations

The scope of Digital-Service Synergy Theory covers various aspects of managing student experience in higher education, specifically related to interaction between academic and non-academic service quality and digital transformation. Some aspects of the scope of this theory are as follows:

- Academic and Non-Academic Service Quality: This theory covers how various elements of academic service (lecturer guidance, curriculum, and learning processes) and non-academic service (library facilities, career centers, and administrative service) affect loyalty. The scope includes the provision of service that meets student expectations as well as the effect on satisfaction and loyalty.

- Digital Transformation in Education: This theory emphasizes the role of digital technology in improving student experience, such as through e-learning platforms, SIAKAD, and access to digital learning materials. The scope includes the influence of digital transformation on student efficiency and convenience in education process.

- Synergy between Traditional and Digital Service: A major concept of Digital-Service Synergy Theory is the importance of synergy between traditional (face-to-face) and digital service. This covers how the two service types can collaborate harmoniously to produce a more satisfying learning experience.

- Students' Emotional Attachment to Institutions: This theory also covers the psychological and emotional aspects of student experience, such as pride, attachment, and satisfaction with educational institutions. The scope includes how reputation, facilities, and development programs strengthen loyalty to the institution.

- Responsiveness to Technical Barriers: The scope of Digital-Service Synergy Theory covers the effect of the responsiveness of the institution in addressing technical barriers, specifically in digital systems, on student satisfaction. This includes the role of IT team in ensuring the smooth running of the used digital systems and infrastructure.

Digital-Service Synergy Theory provides great insight into the factors influencing student loyalty. However, there are several limitations in the application of this theory that need to be considered. The theory is based on student experiences at 17 Agustus 1945 University Surabaya, limiting its direct applicability to other institutions. Differences in culture, infrastructure, and education policies across regions may require contextual adjustments for broader use. The Digital-Service Synergy Theory mainly focuses on internal factors like service quality and digital transformation, overlooking external variables such as institutional competition, policy changes, and global economic conditions that may impact student loyalty. Emotional attachment is a key concept in the Digital-Service Synergy Theory, yet it is highly subjective and difficult to measure accurately. Individual differences and influencing factors pose challenges for both research and practical application. The Digital-Service Synergy Theory assumes institutions can swiftly address technical barriers, but not all have adequate infrastructure or resources. In some cases, these issues may persist and remain unresolved, limiting the theory's applicability. The Digital-Service Synergy Theory is based on a qualitative study at a single university, limiting its generalizability. Results may not fully apply to students in other institutions, especially in regions with different characteristics. As technology and student needs evolve rapidly, the Digital-Service Synergy Theory must be continuously updated to stay relevant. Ongoing digital transformation in higher education may require revisions to address emerging innovations not yet covered by the theory.

4.7. Future Study Agendas

The Digital-Service Synergy Theory enriches understanding of student loyalty in the digital era, but further research is needed. Future studies should quantitatively test the model using validated instruments to examine how service quality, digital transformation, and emotional attachment influence loyalty.

Exploring the impact of digital transformation across different institutions public, private, and vocational can offer valuable insights. Comparative studies on digital infrastructure, teaching policies, and student interaction may reveal how these elements influence loyalty.

Additionally, examining educational policies investigating student experiences in hybrid or distance learning is crucial in the post-pandemic era. Longitudinal studies can track changes in loyalty, especially with emerging technologies like AI and VR/AR. Exploring social, cultural, financial, and institutional factors may offer a more comprehensive view of loyalty drivers. These research directions can further refine the Digital-Service Synergy Theory and support better educational policies and student experience management.

5. MANAGERIAL IMPLICATIONS

5.1. Integration of Digital and Traditional Services

University management should integrate digital services such as e-learning platforms, academic portals, and institutional apps with traditional face-to-face services like academic advising, administrative support, and campus activities. Rather than replacing human interaction, digital transformation should complement it, creating a seamless and satisfying student experience.

5.2. Improving Responsiveness to Technical Issues

Responsiveness to digital service issues is crucial for student loyalty. Institutions must ensure reliable IT support, as unresolved system errors especially during exams or registration can frustrate students and reduce satisfaction.

5.3. Strengthening student Emotional Attachment

Beyond service quality, student loyalty is influenced by emotional attachment and institutional pride. Management should foster a supportive campus environment by recognizing achievements, offering modern facilities, and involving students in decision-making to strengthen belonging and long-term loyalty.

In conclusion, fostering student loyalty in the digital era requires a balanced approach that integrates quality academic and non-academic services with responsive digital systems and emotional engagement. By combining technology with human interaction, addressing technical issues promptly, and strengthening student emotional connection to the institution, universities can build a more holistic and lasting student experience.

6. CONCLUSION

The digital-service synergy theory developed in this study highlights that student loyalty stems from the dynamic interaction between academic and non-academic service quality and effective digital transformation. Loyalty is not only influenced by responsive support and quality facilities but also by the seamless integration of digital tools like e-learning and academic systems. Technical reliability and user-centered design are crucial in enhancing satisfaction and emotional attachment.

These findings provide practical insights for higher education leaders to align service quality with digital innovation, ensuring services remain responsive to students' evolving needs. The theory contributes to the literature by offering a framework that balances traditional and digital service elements to strengthen loyalty.

However, the theory is limited by its specific higher education context and does not account for broader external influences such as policy or cultural factors. Future research should validate the model across diverse institutional settings. Ultimately, sustaining loyalty in the digital era requires continuous innovation while maintaining the human aspects of education that foster connection and trust.

7. DECLARATIONS

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Conceptualization: AM, IA, DC, and CG; Methodology: AM, IA, DC, and CG; Software: AM, IA, DC, and CG; Validation: AM, IA, DC, and CG; Formal Analysis: AM, IA, DC, and CG; Investigation: AM, IA, DC, and CG; Resources: AM, IA, DC, and CG; Data Curation: AM, IA, DC, and CG; Writing Original Draft Preparation: AM, IA, DC, and CG; Writing Review and Editing: AM, IA, DC, and CG; Visualization: AM, IA, DC, and CG; All authors, AM, IA, DC, and CG, have read and agreed to the published version of the manuscript.

7.3. Data Availability Statement

The data presented in this study are available on request from the corresponding author.

7.4. Funding

7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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