

Hybrid Working and Its Impact on Work Effectiveness & Student Learning Outcomes

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Abstract. The development of digital technology and changes in work patterns due to the COVID-19 pandemic have prompted various higher education institutions to implement hybrid work and learning systems. Hybrid working is a combination of online and offline work and learning that is flexible, efficient, and adaptive. This study aims to analyze the effect of hybrid working on the work effectiveness of educational staff and student learning outcomes. Additionally, the DeLone and McLean model is used to measure the success of hybrid working implementation through six main variables: system quality, information quality, service quality, use, user satisfaction, and net benefit. The study involved 150 respondents, including educational staff and third-year students at PGRI Banten Polytechnic. Data was collected via an online questionnaire using Google Forms. Analysis was conducted using validity and reliability tests via SPSS 22, followed by structural equation modeling (SEM) to test the relationships between variables in the model. The analysis results indicate that the hybrid system has a significant impact on the work effectiveness of educational staff and student learning outcomes. System quality and information quality are the dominant indicators influencing user satisfaction and net benefit from the hybrid system. Furthermore, a SWOT analysis was conducted to formulate strategies for strengthening the implementation of hybrid working in higher education institutions. Effective strategies include improving digital literacy, utilizing more stable technology, and strengthening communication and monitoring based on digital platforms. The DeLone and McLean model has proven to be a reliable measurement tool for evaluating the success of hybrid work systems and providing direction for sustainable development strategies. With these findings, educational institutions are expected to be more prudent in designing hybrid working policies that are not only efficient but also have a positive impact on all stakeholders.

Keywords: hybrid working, educational staff, DeLone and McLean, work effectiveness, SWOT strategy.

1 Introduction

Major changes in work and learning systems have become inevitable since the world was hit by the COVID-19 pandemic. One of the most significant transformations in higher education is the shift towards a hybrid system, both in academic and administrative activities. Hybrid working refers to a work model that combines online and offline

activities, allowing educators, educational staff, and students to carry out their tasks and learning processes more flexibly and efficiently. This model was initially adaptive during times of crisis, but over time it has become a strategic choice in facing global challenges and organizational efficiency needs.

In higher education, administrative staff play a very important role in supporting the smooth running of academic and non-academic processes. All administrative, financial, student services, and facility and infrastructure management services are highly dependent on the performance and effectiveness of administrative staff. In a hybrid system, most administrative work is done from home or online, so work effectiveness depends on the readiness of infrastructure, digital skills, campus information systems, and managerial abilities that are adaptive to technology.

Meanwhile, students, as the main actors in learning, also experience significant changes in their learning process. The implementation of hybrid learning, which combines online and face-to-face learning, requires the right pedagogical strategy so that learning outcomes do not decline. Challenges in hybrid learning include student activity, the ability to adapt to learning technology, internet network stability, and the quality of interaction between lecturers and students. Therefore, it is important to measure the extent to which hybrid learning affects student learning outcomes, both in cognitive, affective, and psychomotor aspects.

To measure the overall success of hybrid working implementation, the DeLone and McLean Model is used, which is one of the most comprehensive models for assessing information systems. This model integrates various aspects, ranging from system quality, information, services, to satisfaction and tangible benefits felt by users. Thus, this model not only assesses the success of the system from a technical perspective, but also from the psychological and functional perspectives of users.

In addition to measurement through theoretical models, a strategic approach is also needed to help institutions design and improve hybrid systems in the future. One such approach is to use SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis. SWOT helps map the internal and external conditions that affect the success of hybrid working and formulate appropriate strategies to enhance the competitive advantage of educational institutions.

Therefore, this study focuses on four main points, namely:

- a. Measuring the effect of hybrid working on the work effectiveness of educational personnel.
- b. Analyzing the effect of hybrid learning on student learning outcomes.
- c. Using the DeLone and McLean model as a measure of the success of hybrid working implementation.
- d. Developing appropriate strategies through SWOT analysis based on empirical data results.

Based on this background, the research questions in this study are (a) How does the implementation of hybrid working affect the work effectiveness of educational staff?; (b) How does hybrid learning affect student learning outcomes?; (c) How can the DeLone and McLean model be used as a tool to measure the success of hybrid working?; (d) What strategies are effective based on the results of SWOT mapping?

This study aims to (a) analyze the effect of hybrid working on the work effectiveness of educational personnel in higher education institutions; (b) analyze the effect of hybrid learning on the learning achievements of final-year students; (c) examine the success of hybrid working implementation using the DeLone and McLean Model; (d) formulate strategies to strengthen hybrid working implementation based on SWOT analysis results.

Benefits This research is expected to provide the following benefits (a) Theoretical Benefits: Contribute academically to the development of information systems and human resource management studies in the context of hybrid-based higher education; (b) Practical Benefits: Provide strategic recommendations for higher education leaders in designing more effective and quality-oriented hybrid work and learning policies; (c) Policy Benefits: Serving as a reference for education policymakers in drafting regulations on hybrid working and technology-based learning.

In Indonesian higher education, prior studies typically examine either hybrid learning among students or hybrid working among academic staff, often relying on generic satisfaction. Few works integrate both constituencies within a single casual framework that explains the system qualities into user satisfaction and tangible net benefits and even fewer convert those empirical signals into an institutional strategy. This research address this gap by jointly modeling staff work effectiveness and student learning outcomes under one success architecture, estimating casual paths using the DeLone and McLean model so that downstream “net benefits” are explicitly to turn metrics into implementable improvement for Indonesian higher education context.

2 Framework

The DeLone and McLean (2003)¹ model assesses the success of information systems through six dimensions:

1. System Quality: The extent to which the hybrid system is easy to use, reliable, and quickly accessible.
2. Information Quality: The accuracy, completeness, and relevance of the information available.
3. Service Quality: The responsiveness and technical support received by users.
4. Use: The intensity and frequency of system utilization by users.
5. User Satisfaction: Users' subjective satisfaction with the system.
6. Net Benefit: Positive impacts felt, such as increased effectiveness, efficiency, and work or learning outcomes.

The following is an image of the research framework.

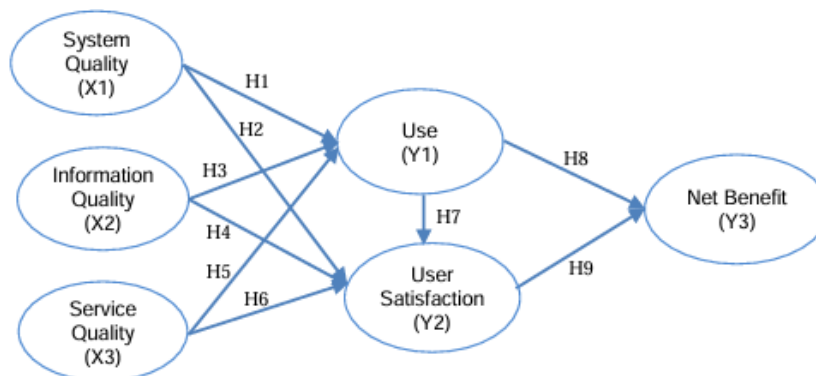


Fig.1. Framework

This using of updated DeLone and McLean model because of it links system, information and service quality to use and user satisfaction and also ultimately to net benefits a crucial endpoint for institutions aiming to improve effectiveness and outcomes. DeLone and McLean model foregrounds organizational impact which matches for evaluation focus. SWOT analysis is used as a strategy translation layer to prioritize interventions. DeLone and McLean Model remains the main explanatory model of its outcome orientation.

2.1 The Concept of Hybrid Working and Hybrid Learning

Hybrid working is a work approach that combines office and remote work. According to ², hybrid working allows employees to have high flexibility, but requires a good management system and technological infrastructure to maintain productivity. In the context of higher education, hybrid working involves educational staff who perform administrative and academic service tasks alternately between home and office.

Meanwhile, hybrid learning is a combination of face-to-face and online learning. This model has become the main strategy during and after the COVID-19 pandemic. According to ³, effective hybrid learning must provide a flexible, interactive, and results-oriented learning environment.

2.2 Effectiveness of Education Personnel in a Hybrid System

Work effectiveness is defined as the ability of individuals or teams to complete tasks efficiently, on time, and according to targets. In a hybrid system, effectiveness is influenced by several factors: digital communication, technology availability, time management, and role clarity. ⁴ show that hybrid working can increase workforce productivity if supported by technology training and a structured work system.

However, ⁵ warns that hybrid working can also cause digital fatigue, lack of social engagement, and collaboration difficulties if not managed properly. Therefore, periodic evaluation of the hybrid work system is important to ensure continued effectiveness.

2.3 The Effect of Hybrid Learning on Student Learning Outcomes

Learning outcomes refer to the results obtained by students in terms of knowledge, skills, and attitudes. In the hybrid learning model, these outcomes are greatly influenced by the quality of online teaching, access to technology, and student engagement. ⁶ state that hybrid learning designed with a student-centered approach can improve understanding and retention of material.

However, challenges such as uneven internet access, low motivation for online learning, and lack of lecturer-student interaction can reduce the effectiveness of hybrid learning ⁷. Research by ⁸ also emphasizes the importance of digital training for lecturers to optimize student learning outcomes.

2.4 DeLone and McLean Model as a Measure of Hybrid System Success

The DeLone and McLean model was developed to evaluate the success of information systems. ¹ the latest version (2003) includes six dimensions:

- a. System Quality: Reliability, ease of use, response time.
- b. Information Quality: Relevance, accuracy, completeness of information.
- c. Service Quality: Technical assistance, speed of service, professionalism.
- d. Use: How often and in what context the system is used.
- e. User Satisfaction: The extent to which users are satisfied with their experience of the system.
- f. Net Benefit: Impact on the organization and individuals (productivity, time savings, etc.).

⁹ emphasize that this model can be widely applied, including in the context of higher education. In hybrid working and learning, these six variables can be used to identify the strengths and weaknesses of the system and to design continuous improvements.

2.5 Hybrid Implementation Strategy through SWOT Analysis

SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) is a strategic method for assessing an institution's position in implementing policies. In the context of hybrid working, strengths can include time and cost efficiency, while weaknesses include technological and communication constraints. Opportunities arise from technological developments, while threats stem from the risk of declining service quality.

According to ¹⁰, the use of SWOT analysis in campus digital transformation helps formulate data-driven strategies. For example, weaknesses such as limited technological human resources can be overcome with continuous training. Threats such as resistance to change can be addressed with a participatory approach to decision-making.

2.6 Digital Literacy as a Determinant of Hybrid Success

One important factor in the success of hybrid working is the digital literacy of all stakeholders. ¹¹ mention that a high level of digital literacy correlates positively with the

successful use of online systems and virtual collaboration. Without adequate digital competence, technology will not have an optimal impact.

Especially among teaching staff, digital literacy determines how effectively they use academic information systems, digital communication, and cloud-based work platforms. For students, digital literacy supports their ability to explore learning resources and engage in online learning interactions.

2.7 Digital Transformation in Higher Education

Hybrid working is part of a broader digital transformation in higher education. ¹² state that digital transformation is not merely a shift of activities to digital platforms, but also a fundamental change in work culture, learning, and organizational management. Therefore, change management is an important aspect.

This transformation must involve institutional policies, infrastructure investment, human resource training, and periodic impact measurement. Universities that fail to adapt will lag behind in terms of competitiveness and service quality.

2.8 Change Management and Digital Leadership

Change management is key to the successful implementation of hybrid systems. ¹³ emphasizes that change in education must be supported by leadership that is inspiring, adaptable to technology, and communicative across all lines. Digital leadership is not only about knowing technology, but also about creating a collaborative culture in the digital ecosystem.

Strong leadership will help organizations navigate the hybrid transition, reduce resistance, and increase user confidence in the implemented system.

3 Method

3.1 Type of Research

This research uses a quantitative approach with an explanatory survey method. This study aims to explain the effect of hybrid working on the work effectiveness of educational staff and student learning outcomes, as well as to measure the success of the implementation of this system using the modified DeLone and McLean Model. In addition, a strategy was developed using SWOT analysis.

3.2 Population and Sample

The frame comprised administrative staff and third year students who had experience hybrid arrangements for ≥ 1 semester. This research implemented proportionate stratification to achieve balance (75 staff and 75 students). A priori adequacy follows the PLS “10 times rule” ($\geq 10 \times$ the maximum number of arrows pointing at an endogenous

construct, here ≤ 4 , thus ≥ 40 is sufficient). With $n = 150$ and medium effects, statistical power is adequate for path testing.

An online survey (5 point Likert) was distributed through institutional channels; participation was voluntary with consent obtained. Missingness ($<5\%$) was handled via pairwise deletion after confirming MCAR assumptions. Harman's single factor test ($<50\%$ variance) and full collinearity VIFs (<3.3) to indicate low common method risk, inner VIFs were <5 , suggesting no severe multicollinearity. SmartPLS 4 with 5,000 bootstrap resamples was used in this research. Convergent validity (loadings ≥ 0.70 ; AVE ≥ 0.50), reliability (CR ≥ 0.70 ; $\alpha \geq 0.70$) and discriminant validity (HTMT < 0.85) were evaluated. Global fit was summarized with SRMR and overall GoF.

3.3 Research Instrument

The instrument used in this study was a Google Form-based questionnaire, consisting of closed statements with a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire was compiled based on six main variables from the DeLone and McLean (2003) Model, namely:

- a. System Quality : reliability, response time and ease of use; 4-5 items adapted from prior DeLone and McLean operationalizations
- b. Information Quality : Accuracy, completeness, timeliness
- c. Service Quality : Support responsiveness, competence, problem resolution
- d. Use : Frequency of accessing key functions
- e. User Satisfaction : Contentment with overall hybrid experience
- f. Net Benefit Each variable was measured using 3–5 indicators adapted from previous studies ^{9,14}. E.g time savings, productivity, collaboration quality (staff) and perceived learning effectiveness and efficiency (students)
- g. Work effectiveness : Task completion, coordination, error reduction under hybrid routines.
- h. Learning outcomes : cognitive (perceived mastery and assessment performance alignment), affective (engagement, motivation and sense of belonging), psychomotor (performance based rubric for practice heavy course). Each multi item scale was pretested, all constructs met α and CR ≥ 0.70 and AVE ≥ 0.50 .

3.4 Data Analysis Techniques

1. Preliminary Validity and Reliability Tests
 - a. Validity tests were conducted using Pearson's correlation (r) between items and the total scores of each variable.
 - b. Reliability tests were conducted by calculating Cronbach's Alpha, where $\alpha > 0.7$ is considered reliable.
2. Model Analysis: Structural Equation Modeling (SEM-PLS)

This study used SEM-PLS (Partial Least Squares) because:

- a. The sample size was relatively small ($n = 150$).
- b. The data did not have to be normally distributed.
- c. It was suitable for exploring complex relationships between latent variables.

The analysis was conducted using SmartPLS 4 software. The analysis steps included:

- a. Outer Model Testing
 - 1) Loading Factor: values > 0.7 are considered good.
 - 2) Average Variance Extracted (AVE): values > 0.5 indicate convergent validity.
 - 3) Composite Reliability: values > 0.7 indicate construct reliability.
- b. Inner Model Testing
 - 1) R-square (R^2): indicates the predictive power of the model.
 - 2) Q-square (Q^2): tests for relevant predictions (> 0 indicates relevance).
 - 3) Path Coefficient: indicates the direction and strength of influence between variables.
 - 4) t-statistic and p-value: $t > 1.96$ and $p < 0.05$ indicate a significant influence.
- c. Goodness of Fit (GoF) Test

GoF values are interpreted as follows:

- 1) Small GoF = 0.1
- 2) Moderate GoF = 0.25
- 3) Large GoF = 0.36
- 4) SWOT Analysis

SWOT analysis was conducted based on the results of open questionnaires and quantitative findings, with the following steps:

- a. Identification of Internal Factors (Strengths and Weaknesses): using the perceptions of teaching staff and students regarding the hybrid system.
- b. Identification of External Factors (Opportunities and Threats): through technology trends, government policy support, and infrastructure challenges.
- c. SWOT Matrix Mapping: to develop SO, WO, ST, and WT strategies.

To ensure that staff and student responses are comparable, MICOM (configural equivalence, compositional invariance and equality of means/variance) are conducted in this research. Having established partial measurement invariance, MGA to test group differences in structural paths was conducted. Group specific R^2 and path coefficient, nothing where affects are stronger for staff versus students and vice versa.

4 Results and Discussion

4.1 Validity and Reliability Test Results

- a. Loading factor of all indicators > 0.7
- b. AVE (Average Variance Extracted) of all constructs > 0.5
- c. Composite Reliability and Cronbach's Alpha > 0.8

These results indicate that all instruments are valid and reliable.

4.2 SEM-PLS Testing Results

- a. Hypothesis Testing

The following are the results of the research hypothesis testing:

Table 1. Hypothesis Testing

Hypothesis	Variable Relationships	Path Coefficient	t-statistic	p-value	Results
H1	System Quality → Use	0,31	3,67	<0,001	Sig
H2	System Quality → User Satisfaction	0.28	3.44	<0.001	Sig
H3	Information Quality → Use	0.27	3.12	0.002	Sig
H4	Information Quality → User Satisfaction	0.24	2.96	0.004	Sig
H5	Service Quality → Use	0.29	3.38	0.001	Sig
H6	Service Quality → User Satisfaction	0.22	2.85	0.005	Sig
H7	Use → User Satisfaction	0.26	3.01	0.003	Sig
H8	Use → Net Benefit	0.32	3.76	<0.001	Sig
H9	User Satisfaction → Net Benefit	0.41	4.82	<0.001	Sig

Source: Data Processing Results

From the data processing results above, it is known that all hypotheses (H1–H9) are accepted with a p value < 0.05 and t > 1.96.

b. R-Square Value

The R-Square value results are as follows:

Tabel 2. Value of R-Square

Variable	R-Square	Interpretation
<i>Use</i>	0,64	Strong Enough
<i>User Satisfaction</i>	0,69	Strong
<i>Net Benefit</i>	0,73	Very Strong

Source: Data Processing Results

c. Goodness Of Fit (GoF)

Based on the calculation results, the GoF value is 0.71, which means that this research has a very good GoF value (GoF > 0.36).

4.3 Discussion

1. System Quality → Use and User Satisfaction (H1 & H2):

System quality, such as server stability, loading speed, and platform compatibility, is a key factor. When the system is easy to use, respondents are more active in accessing it and feel satisfied.

2. Information Quality → Use and User Satisfaction (H3 & H4):

Clear, accurate, and relevant information, such as schedules, announcements, and assessments, has a positive impact on system usage. Students feel helped and tend to be satisfied with the information they receive.

3. Service Quality → Use and User Satisfaction (H5 & H6):

Technical support such as helpdesk services, responsiveness of lecturers and administrative staff encourage intensity of use and increase satisfaction.

4. Use → User Satisfaction and Net Benefit (H7 & H8):

The more frequently the system is used smoothly, the higher the level of satisfaction and perceived benefits, such as work efficiency (teachers) and learning effectiveness (students).

5. User Satisfaction → Net Benefit (H9):

Satisfaction is an important link to real benefits. Those who are satisfied feel that hybrid working/learning supports productivity and better results.

4.4 Path Analysis of the SEM-PLS Model based on 9 Hypotheses

System Quality → Use and User Satisfaction

- a. Interpretation: Good system quality (e.g., easy to use, stable, and compatible) contributes directly to the intensity of use and user satisfaction.
- b. Implications: IT infrastructure and user interface must be continuously improved. An unstable system will reduce user engagement and trust.
- c. Relevance to Higher Education: A user-friendly hybrid learning platform or academic information system will encourage more active participation from teaching staff and students.
- d. Interpretation:
When hybrid working systems or LMS (Learning Management Systems) perform well (stable, fast, compatible), users feel more comfortable using them regularly. This is in line with DeLone & McLean's (2003) theory, which states that system quality is one of the main determinants in shaping the intensity of use and satisfaction with the system. The high e-learning system quality during the pandemic significantly increased user comfort and loyalty to the platform.

Information Quality → Use and User Satisfaction

- a. Interpretation: Accurate, relevant, and up-to-date information encourages continuous use of the system and creates satisfaction with the work/learning process.
- b. Supporting Facts: Many users become frustrated when the information displayed does not match reality (e.g., incorrect schedules, outdated grades).
- c. Special Note: Validating information is an important task for system administrators.
- d. The results of tests H3 and H4 state that Information Quality also has a significant effect on Use and User Satisfaction. This means that clear, timely, and relevant content will encourage system usage and increase user satisfaction. The information quality has an influence on user behavioral intention. If the available information is ambiguous or irrelevant, the system will be considered useless even if the technology is sophisticated.

Service Quality → Use and User Satisfaction

- a. Interpretation: Responsive technical support services significantly influence perceptions of convenience and encourage more users to access the system.
- b. General Trend: When users feel accompanied (not abandoned), they adapt more quickly to changes in the way online classes work.
- c. Recommendation: Provide a hybrid helpdesk based on WhatsApp, email, and campus applications.
- d. Hypotheses H5 and H6 show that Service Quality plays an important role in encouraging usage and satisfaction. Fast, friendly, and always-available technical support provides users with a sense of security. Theoretical Correlation:

In the SERVQUAL concept, the dimensions of Responsiveness and Assurance are crucial in determining the perception of service quality. This study proves that these aspects are also very influential in the context of hybrid working in a university environment.

Analysis of the Relationship between Use and Net Benefit

a. Use → User Satisfaction & Net Benefit

- 1) Explanation: Frequency and ease of use promote satisfaction, ultimately creating tangible benefits for work or learning.
- 2) Real Example: Teachers who regularly use the hybrid system will find their work easier and more productive → creating direct benefits such as time efficiency.
- 3) Domino Effect: More frequent use → more familiarity → greater satisfaction → greater benefits.
- 4) Hypotheses H7 and H8 support the D&M model, in which consistent use of the system increases satisfaction and produces tangible benefits. Students who frequently use the system feel more prepared for exams and more independent in the learning process.
- 5) In the Technology Acceptance Model (TAM) approach, perceived ease of use influences attitudes toward technology. This study expands on that model by showing that actual use (not just intention) has a direct impact on perceived benefits.

b. User Satisfaction as a Key Variable

User Satisfaction → Net Benefit

- 1) Conclusion: Satisfaction is a strong mediator between system usage and the ultimate benefits perceived by users.
- 2) Strategic Implications: User satisfaction is the “bridge” that connects technology input with organizational output.
- 3) Indication: Even if the system is already in use, without satisfaction, the benefits will not be maximized → the importance of regular feedback to users.
- 4) Another important finding is that user satisfaction acts as a bridge between the system and real benefits. This shows that the success of a system is not just a

matter of access or features, but how users feel valued, comfortable, and helped by the system.

- 5) Compare with DeLone & McLean (2003): They refer to User Satisfaction as a central construct that connects the system and organizational outcomes. This study reinforces that argument and extends it to the context of hybrid education in Indonesia.

c. Goodness of Fit and R²: Is the Model Valid?

- 1) R² User Satisfaction = 0.69: This means that 69% of the variation in satisfaction can be explained by system quality, information, service, and usage → very strong.
- 2) R² Net Benefit = 0.73: This shows that 73% of the variation in final benefits can be explained by satisfaction and system usage → very good.
- 3) GoF = 0.71: A figure above 0.50 indicates that the model as a whole is very feasible to be applied in the context of hybrid-based higher education

d. SWOT Analysis

The following is a SWOT analysis of the research:

Table 3. SWOT Analysis

Strengths	Weaknesses
IT infrastructure is available	Low digital literacy among teaching staff
Students are familiar with the system	Information quality is not always consistent
Opportunities	Threats
Improving efficiency and flexibility	Technical glitches and digital fatigue
Potential for online collaboration	The digital divide

Source: Data Processing Results

5 Conclusion and Recommendations

5.1 Conclusion

Thus, the results of quantitative (SEM-PLS) and strategic (SWOT) research show that hybrid working is effective when all dimensions of system quality, information, and services are well managed.

This study aims to examine the effect of hybrid working on the work effectiveness of educational staff and student learning outcomes, using the DeLone and McLean Model as a measure of system implementation success. Data collection was conducted by distributing questionnaires to 150 respondents consisting of educational staff and third-year students at the PGRI Banten Polytechnic, and analyzed using the Structural Equation Modeling - Partial Least Squares (SEM-PLS) approach.

Overall, the results of this study confirm that hybrid working and hybrid learning can be effectively implemented in higher education environments, as long as institutions are able to ensure the quality of systems, information, services, and provide adequate strategic support to users.

Based on the analysis results, the following conclusions can be drawn:

- a. All hypotheses (H1–H9) were accepted, indicating that all relationships between variables in the DeLone and McLean Model were statistically significant. This reflects that system quality, information quality, and service quality contribute positively to the level of system usage and user satisfaction.
- b. System Quality, Information Quality, and Service Quality have a direct and positive influence on Use and User Satisfaction. This means that the better the quality of the hybrid system implemented, the more active users are in using the system and the higher their satisfaction.
- c. Use acts as an intermediate variable that influences both User Satisfaction and Net Benefit. Intensive and effective use of the system has an impact on user satisfaction and increases net benefits, both in terms of the work efficiency of educational staff and the learning achievements of students.
- d. User Satisfaction is the main predictor of Net Benefit. Students and educational staff who are satisfied with the hybrid experience show an increase in motivation, performance, and overall learning or work outcomes.
- e. The DeLone and McLean model has been proven to explain the relationship between variables with an excellent level of Goodness of Fit ($GoF = 0.71$). This model can be used validly in the context of hybrid-based higher education.
- f. SWOT analysis shows that although the hybrid system has many strengths and opportunities, there are still significant weaknesses such as limitations in equipment and human resource training. Therefore, strengthening strategies should be directed at providing continuous training, digital assistance, and improving more flexible hybrid policies.

5.2 Recommendations

Based on the results of research on the effect of hybrid working on the work effectiveness of educational staff and student learning outcomes using the DeLone and McLean Model approach, several recommendations for future research development are presented:

- a. Expansion of Research Population and Location. This study was only conducted at one institution (PGRI Banten Polytechnic). To strengthen the generalization of the results, it is recommended that future studies include more public and private universities, as well as those with more diverse characteristics in terms of geographical location and institutional capacity.
- b. Addition of Moderating or Mediating Variables. Future research can enrich the model by including moderating variables such as digital literacy, work motivation, or organizational support. This aims to understand the factors that can strengthen or weaken the relationship between variables in the DeLone and McLean model.
- c. Mixed Methods Approach. This study is quantitative in nature. To gain a deeper understanding of users' experiences with hybrid working and learning,

it is recommended that future research use mixed methods, combining quantitative surveys with in-depth interviews or focus group discussions (FGD).

- d. Development of a Specific Evaluation Model for Higher Education. Although the DeLone and McLean Model is highly relevant, it is not specifically designed for the context of higher education. Therefore, future researchers can develop or modify a more contextual evaluation model by adding pedagogical or campus cultural dimensions.
- e. Longitudinal Evaluation. This study collected data at a single point in time (cross-sectional). Future research can be designed longitudinally to observe changes in user perceptions, effectiveness, and satisfaction over time as the hybrid system develops and human resources adapt.
- f. Integration of Performance Evaluation with Institutional Output. In addition to user perceptions, another suggestion is to examine the relationship between the success of hybrid working and macro-level institutional performance, such as accreditation, student retention, stakeholder satisfaction, and operational efficiency.

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