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Evaluating the Impact of Servicescape and Information Systems on University Students' Academic Performance in Malang

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ABSTRACT

In the ever-changing world of higher education services, examining factors that impact students' performance is important in making sure that student's learning experience can be improved to reach academic success. This research investigates the impact of University Servicescape (USc) and Information Systems Implementation Quality (ISQ) on student performance in higher education institutions in Malang. USc refers to the physical environment and facilities provided by the university. At the same time, the ISQ pertains to the effectiveness and efficiency of the technological systems employed for academic and administrative purposes. Both factors have been deeply researched separately in the context of higher education service management, but no research has delved into both at the same time. A quantitative empirical survey-based study is employed to examine this topic. The sample consists of university students studying in Malang, East Java, Indonesia. The results empirically show that USc and ISQ significantly impact university student performance in higher education, particularly within institutions in Malang, East Java, Indonesia. These findings should be useful for policymakers, university administrators, and educators in enhancing the delivery of educational services in higher education institutions across Indonesia.

Keywords: Academic Performance; Higher Education; ISQ; Service Operations Management; USc

JEL Classification: D02; I23; M21; O30

INTRODUCTION

One of the goals of higher education in the current era is, arguably, preparing university graduates to contribute to society through employment or creating their own employment (Abreu & Grinevich, 2024). To ensure employability, university students need to experience effective learning on campus and—due to the advances in technology—online. Conventionally, effective learning must be done through well-executed teaching methods from a qualified teaching staff. However, supporting factors also play a part in making sure effective learning happens. Supporting effective learning can be done by ensuring a physical environment that supports said learning (Wilkins et al., 2022) as well as making sure that the learning methodologies keep up with the times by ensuring apt technological integration is reached through the usage of high-quality e-learning systems to enrich the student's experiences (Nikou & Maslov, 2023). In the realm of service operations management and management of higher education, examining University Servicescape (USc) and Information Systems Implementation Quality (ISQ) simultaneously provides a more holistic outlook of supporting factors that might affect university students' performance in the academic conversation.

A study that examines the suitability of the physical environment as a supporting element in a university to facilitate better learning can be done by using the lens of servicescape (Wilkins et al., 2022). Servicescape itself was a model that was first proposed to examine the suitability of physical environments on organizations, particularly on the behavior of their employees and customers (Bitner, 1992). This research considers the university as an organization that offers a service in the form of higher education to their students as the customers, which results in equipping its graduates with skills relevant to their chosen fields so that they can be employed or create employment in those fields (Abreu & Grinevich, 2024). By doing so, fulfilling that particular goal of ensuring graduates have high employability can be seen as a net benefit for the organization. It can also reflect positively on the university in the long run (Schlesinger et al., 2023). This particular form of servicescape in university to fulfill the goal of improving the learning effectiveness of university students will be referred to as USc in this study. However, in this constantly developing world, focusing only on the physical aspects of higher education is not enough, as technology also plays a part in ensuring a more holistic educational experience for university students (Riandi et al., 2021).

Implementing technology as a supporting element into the academic sphere in the form of digital learning has been done well over the past five years as it is seen as a necessity in ensuring remote learning can be done to reduce the spread of the COVID-19 virus from 2020 onwards (Guppy et al., 2022). Digital learning itself requires proper implementation and can be studied using the lens of the information systems success model (DeLone & McLean, 1992, 2003, 2016). An effort to examine the success of technology implementation in higher education using the information systems success model has been conceptualized in the past (Riandi et al., 2021) as well as examined empirically by other researchers (Al-Fraihat et al., 2020; Shahzad et al., 2021). The study results show that good implementation of technology plays an important role in ensuring effective education is received by university students. This is so because well-implemented digital learning can improve students' satisfaction with learning and, in turn, improve their performance in learning (Nikou & Maslov, 2023). The quality or success of information systems implementation in higher education within this study will be referred to as ISQ.

Studies that separately examine USc impacts on university student performance (Alagarsamy et al., 2022; Wilkins et al., 2022) and ISQ effects on student performance (Al-Fraihat et al., 2020; Schlesinger et al., 2023; Shahzad et al., 2021) has been done

before. However, a study that examines both USc and ISQ simultaneously has not been done before. This gap in literature needs to be addressed, and this study is an attempt to fill that gap by studying both USc and ISQ and their impacts on university student performance in Malang, an educationally vibrant city full of both state-owned and private universities (Graha et al., 2019). Therefore, the research questions of this study are as follows:

RQ1: How significant is the impact of USc as a supporting element on university students' performance in Malang?
RQ2: How significant is the impact of information ISQ as a supporting element on university students' performance in Malang?
RQ3: How significant is the simultaneous impact of USc and ISQ as supporting elements on university students' performance in Malang?

This study contributes to the academic domains of service operations management, particularly in the field of higher education management service, by examining factors that might have impacts on university students' performances that have not been examined simultaneously before, namely USc and ISQ. By examining the impact physical environments have on university students' performances using servicescape model (Bitner, 1992) while at the same time examining the impact of information systems implementation on university students' performance using an information systems success model (DeLone & McLean, 1992, 2003, 2016), this paper aims to paint a more holistic picture of factors that might have impacts on university students' performance.

The practical contributions of this study include providing empirical evidence for higher education management that focuses on both physical facilities and information systems implementation, which should be more balanced. This is because emphasizing one aspect of development while ignoring the other might be more detrimental in the long run for universities. Overreliance on digitalization in higher education can lead to many detrimental scenarios whereby the focus on technology is only used for administrative matters instead of creative learning (Yureva et al., 2020), increasing the digital divide whereby only the more financially affluent can afford to fully utilize the digital facilities of university (Pashkov & Pashkova, 2022), or even reducing memory capabilities of students due to cognitive overload caused by overreliance on technology among university students (Khrapov & Baeva, 2021).

On the other hand, insufficient focus on well-integrated information systems might also negatively impact universities. Inadequate implementation of information systems into the academic process may raise concerns within the student psyche that they are not receiving up-to-date learning methodologies (Noskova et al., 2021) while, at the same time, improper implementation may hamper the effectiveness of information systems implementation, resulting in fragmented efforts and limited impacts on the learning process (Orr et al., 2020). Therefore, balancing the management of the physical environments of the universities with the improvement of technology that most higher education management tends to focus on must be done so that a more holistic approach in supporting the improvement of learning efficiency can be achieved.

LITERATURE REVIEW

As stated before, past studies have discussed and focused on the impacts of servicescape and ISQ on students' performance separately but never at the same time. The following review of literature will provide context and definitions that will be useful in understanding the impacts of both variables on university students' performance and why examining both simultaneously can be more beneficial in the long run.

University Servicescape (USc)

Servicescape is defined as the physical environment in which the service is assembled and the service providers interact with customers, combined with tangible commodities that facilitate the performance or communication of the service (Arifin et al., 2022; Bitner, 1992). In the context of higher education, whereby the service provided is in the form of education catered for university students, USc refers to the physical environment and facilities of the campus that can influence students' experiences, perceptions, and behaviors in learning processes. Servicescape in the higher education context has a supporting role in improving university students' performance (Wilkins et al., 2022).

USc consists of three main elements, namely: (1) ambient conditions, (2) spatial layout and functionality, as well as (3) signs, symbols, and artifacts (Bitner, 1992; Wilkins et al., 2022). Ambient condition refers to the environmental factors that influence university students' experiences and perceptions in the learning process, such as lighting, temperature, and noise levels. Spatial layout and functionality refer to the physical arrangement and design of the learning environment within the university, which includes room layouts, furnishing, proper equipment, and the functionality of the spaces. Signs, symbols, and artifacts refer to the visual cues and elements of servicescape in the university that convey information and meaning to the students as customers of the service, which includes attractive building or furniture designs that convey the image and prestige of the university towards students and other stakeholders and signage that state rules and regulations that are clearly stated to ensure clarity of things that can or cannot be done within the university compound (Wilkins et al., 2022).

The role of servicescape as a facilitator of effective learning is manifold. First, the optimal physical environment through a well-conditioned classroom, as well as functional fixtures, plays a part in improving the learning conditions of university students (Kassaw & Demareva, 2024). Second, well-maintained and functional facilities also facilitate the social environment on campus, fostering better and more meaningful face-to-face peer and faculty interactions, which improve mental health and enhance students' academic performance in the long run (Barankevich & Loebach, 2022). Third, symbolic signs and artifacts that signify university culture can help students feel more connected to the university as they can see that their values align with the university mission and thus create better motivation for them to perform better academically (Li et al., 2023). Therefore, it can be seen that improving the physical environment in the university compound can support more effective learning by uplifting university students' motivation and creating a safe space for students' better well-being that translates to better academic performance in the long run. This leads us to our first hypothesis:

H1: USc is a significant supporting element in improving university students' performance in Malang.

Information Systems Implementation Quality (ISQ) in Higher Education

ISQ, or the success of implementing information systems, refers to the measure of achievement in fulfilling the stated objectives of the system and realizing the system's full potential (DeLone & McLean, 2016). In the context of higher education, the successful implementation of information systems in the academic system is characterized by the ability of the system to provide tangible and intangible benefits, improving students' engagement and satisfaction while at the same time supporting the university's strategic objectives. This success can be measured through the factors mentioned in the DeLone and McLean IS success model (Umaroh & Barmawi, 2021).

Many elements are used to measure information systems success models. The indicators within the information systems success model we are interested in studying in this research are systems quality, information quality, service quality, and net benefits. Systems quality is defined as the intended positive characteristics of the information systems, such as ease of use, systems reliability, and flexibility, as well as ease of understanding. On the other hand, service quality is the quality of support that university students receive from the systems, such as responsiveness, functional features, and two-way communications. Information or knowledge quality is the quality of the output processed and generated by the systems, which can be analyzed based on its accuracy, completeness, how well-organized it is, and how up-to-date it is. Last but not least, net benefits are the final dependent variable of this model, which is defined as the extent to which the systems contribute to the success of users, in this case, the university students' performance (Aldholay et al., 2019; Umaroh & Barmawi, 2021).

Based on previous studies, the three indicators of information systems' success—systems quality, information quality, and service quality— influence the achievement of net benefits in the form of student performance. High-quality learning management systems significantly improve the usage of the systems and enhance learning experiences as well as students' satisfaction, which leads to better learning outcomes and improvement in university students' performance (Danso et al., 2021). Well-implemented service quality in the learning management systems also improves university students' learning experience, increasing their engagement and, in doing so, contributing to the improvement of the student's academic performance (Waluyowati & Riandi, 2024; Zhao & Sun, 2024). Last but not least, good information quality relates to better satisfaction with the systems and improving students' engagement with learning management systems, which results in better academic performance of students as well (Danso et al., 2021). The interplay between these indicators and net benefits in the form of university students' performance leads us to our second hypothesis:

H2: ISQ is a significant supporting element in improving university students' performance in Malang.

Simultaneous Impact of USc and ISQ on University Students' Performance

University students' performance here is defined as students' self-efficacy or the belief in their own ability to utilize the systems effectively to gain their objectives, namely knowledge attainment and better academic performance (Sendogdu & Koyuncuoglu, 2021; Waluyowati & Riandi, 2024; Wilkins et al., 2022). Based on the literature review, other than well-received teaching, the supporting factors that affect this dependent variable are USc (Barankevich & Loebach, 2022; Kassaw & Demareva, 2024; Li et al., 2023) and ISQ (Danso et al., 2021; Waluyowati & Riandi, 2024; Zhao & Sun, 2024).

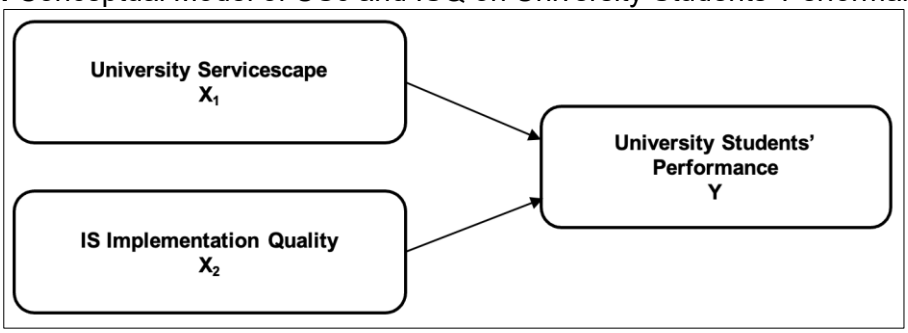
Based on our extensive search on the Scopus database, Web of Science database, as well as Google Scholar, there is no research that combines both the DeLone McLean information systems success model and servicescape model in the same study in the context of higher education learning. What we found closest to this combination is e-Servicescape, which is markedly different from our dual focus on both physical and digital aspects of higher education. E-Servicescape is only concerned with the functions and user interface of e-learning systems (D'Souza et al., 2023). Therefore, combining both models to examine university students' performance is still considered a new foray into the sphere of service operations management and higher education management. Therefore, in an attempt to extrapolate the significant impact of USc and ISQ on university students' performance based on previous separate studies, we hypothesize:

H3: USc and ISQ have a significant simultaneous impact as supporting elements on university students' performance in Malang

Conceptual Framework

To better portray the idea of this study, the conceptual model of the study is shown in Figure 1.

Figure 1. Conceptual Model of USc and ISQ on University Students' Performance



RESEARCH METHOD

This is an explanatory study that utilizes a quantitative survey-based method. This study determines the relationship between variables in the research model and describes why the relationship can occur. This study analyses the impact of the independent variables USc (X1) and ISQ (X2) on university students' performance (Y), which is considered the dependent variable. Linear regression analysis is done to examine the interplay between these variables, and SPSS is used as an analysis tool to examine the data resulting from the questionnaires.

The location of the study is Malang, one of the main cities chosen by many potential university students in Indonesia due to its vibrant academic atmosphere and abundant choices of higher education institutions (Graha et al., 2019). This is shown by the number of university students in Malang city, which reached 255.481 university students in 2022, the second highest in East Java province, just below Surabaya, the provincial capital city of East Java (Central Agency of Statistics of East Java Province [BPS Provinsi Jawa Timur, 2023). The population examined for this study is university students population studying in higher education institutions located in Malang city. As the current number of university students in 2024 is still unknown, maximum likelihood estimation (Kline, 2016) is used, which determines a minimum sample number of 200, which is ideal for providing good statistical results.

The forced-choice questionnaire is used as the instrument whereby the options after each statement contain no neutral options and only consist of strongly disagree (symbolized by 1), disagree (symbolized by 2), agree (symbolized by 3), and disagree (symbolized by 4) (Brown, 2016; Watrin et al., 2019). An online questionnaire was shared using the Google Forms platform to enhance the reach and improve the ease of filling out the survey. The survey was conducted in 2024. The details of statements within the survey can be seen in Table 1.

Table 1. Questionnaire Statements

No	Variable	Indicator	Questionnaire Statement
1.	USc (X1)	Ambient Conditions	1. University facilities have comfortable temperatures.

No	Variable	Indicator	Questionnaire Statement
	(Azmi, 2021)		2. University facilities have a good level of cleanliness.
			3. University facilities have good lighting for learning.
			4. University facilities have paint colours that support a learning atmosphere.
			5. University facilities have a calm atmosphere for better learning.
		Spatial Layout and Functionality	6. Furniture in each university facility is neatly arranged and sufficiently tidy.
			7. All furniture and furnishings at the university are well arranged according to their function.
			8. There are seating areas that can be used well.
			9. All learning equipment can be used properly.
		Signs, Symbols, and Artifacts	10. The University symbol is visible within the University complex.
			11. The university complex has clearly visible signs to guide you to the available facilities.
			12. There are signs with clear instructions for using facilities within the university.
			13. There are signs that clearly shows prohibitions within the university.
2	ISQ (X2) (Umaroh & Barmawi, 2021)	Systems Quality	14. Learning Information System is easy to use.
			15. Learning Information System can be accessed from more than one type of device (e.g.: laptop, smartphone, and PC).
			16. Learning Information System is easy to understand.
		Service Quality	17. The response provided by the Learning Information System is in accordance with the request.
			18. The Learning Information System has features that function well.
			19. The Learning Information System provides two-way communication facilities.
		Knowledge/ Information Quality	20. The Learning Information System provides accurate information.
			21. The Learning Information System provides complete information regarding the implementation of learning.
			22. The Learning Information System provides well-organized information.

No	Variable	Indicator	Questionnaire Statement
			23. The Learning Information System provides up-to-date information (can be accessed immediately after updates are made by lecturers or admins).
3.	University Students' Performance (Y) (Umaroh & Barmawi, 2021)	Productivity	24. The facilities provided by the university improve the student learning process.
			25. The facilities provided by the university make it easier for students to submit assignments.
		Effectiveness improvement	26. Learning becomes more effective with the facilities provided by the university.
			27. I feel more enthusiastic about learning through the facilities provided by the university.
			28. The facilities provided by the university make students more responsible in carrying out their tasks.
		Time saving	29. The facilities provided by the university save students time searching for learning materials.
			30. The facilities provided by the university save students time in submitting assignments.
		Usefulness in increasing knowledge	31. The facilities provided by the university help broaden students' horizons.
			32. The facilities provided by the university help satisfy students' curiosity about new knowledge.

RESULTS

The study's result shows that 219 students answered the questionnaires, which is higher than the minimum 200 mentioned in the methodology section. Assessment of the received data was done on the collected data using SPSS.

Table 2. Frequency distribution of the Questionnaire

Variable	Cronbach's Alpha	Note
USc (X1)	0.888	Reliable
ISQ (X2)	0.898	Reliable
University Students' Performance (Y)	0.897	Reliable

Before we examine the data collected to analyze it using regression analysis, we have to check the validity and reliability of the data. Table 2 shows that every question within the survey is reliable due to the value of Cronbach's alpha for each variable, which is higher than 0.6. Furthermore, every question also underwent validity checks, resulting in a 2-tailed significance lower than 0.001. It means that each question is also valid. This shows that the data is valid and reliable.

Table 3. Frequency Distribution of Questionnaire Results (N = 219)

Indicator	Questionnaire Statement	Answer Score								Mean
		Strongly Agree (4)		Agree (3)		Disagree (2)		Strongly Disagree (1)		
		F	%	F	%	F	%	F	%	
USC										
Ambient Conditions (X1.1)	University facilities have comfortable temperatures.	88	40.2	116	53.0	15	6.8	0	0.0	3.33
	University facilities have a good level of cleanliness.	88	40.2	119	54.3	12	5.5	0	0.0	3.35
	University facilities have good lighting for learning.	100	45.7	107	48.9	12	5.5	0	0.0	3.40
	University facilities have paint colours that support a learning atmosphere.	79	36.1	123	56.2	15	6.8	2	0.9	3.27
	University facilities have a calm atmosphere for better learning.	89	40.6	113	51.6	16	7.3	1	0.5	3.32
Mean score of Ambient Conditions (X1.1)										3.34
Spatial Layout and Functionality (X1.2)	Furniture in each university facility is neatly arranged and sufficiently tidy.	70	32	131	59.8	16	7.3	2	0.9	3.23
	All furniture and furnishings at the university are well arranged according to their function.	69	31.5	125	57.1	24	11.0	1	0.5	3.20
	There are seating areas that can be used well.	73	33.3	127	58.0	17	7.8	2	0.9	3.24
	All learning equipment can be used properly.	70	32	96	43.8	46	21.0	7	3.2	3.05
Mean score of Spatial Layout and Functionality (X1.2)										3.18
Signs, Symbols, and Artifacts (X1.3)	The University symbol is visible within the University complex.	97	44.3	112	51.1	9	4.1	1	0.5	3.39
	There are clearly visible signs within the university complex to guide you to the available facilities.	77	35.2	105	47.9	37	16.9	0	0.0	3.18
	There are signs with clear instructions for using facilities within the university.	62	28.3	112	51.1	44	20.1	1	0.5	3.07
	There are signs that clearly shows prohibitions within the university.	63	28.8	108	49.3	41	18.7	7	3.2	3.04
Mean score of Signs, Symbols, and Artifacts (X1.3)										3.17
Mean score of USc (X1)										3.24
ISQ										
	Learning Information System is easy to use.	68	31.1	131	59.8	18	8.2	2	0.9	3.21

Indicator	Questionnaire Statement	Answer Score								Mean
		Strongly Agree (4)		Agree (3)		Disagree (2)		Strongly Disagree (1)		
		F	%	F	%	F	%	F	%	
Systems Quality (X2.1)	Learning Information System can be accessed from more than one type of device (e.g.: laptop, smartphone, and PC).	128	58.4	89	40.6	2	0.9	0	0.0	3.58
	Learning Information System is easy to understand.	77	35.2	129	58.9	12	5.5	1	0.5	3.29
Mean score of Systems Quality (X2.1)										3.36
Service Quality (X2.2)	The response provided by the Learning Information System is in accordance with the request.	71	32.4	136	62.1	10	4.6	2	0.9	3.26
	The Learning Information System has features that function well.	72	32.9	131	59.8	14	6.4	2	0.9	3.25
	The Learning Information System provides two-way communication facilities.	61	27.9	118	53.9	36	16.4	4	1.8	3.08
Mean score of Service Quality (X2.2)										3.19
Knowledge / Information Quality (X2.3)	The Learning Information System provides accurate information.	76	34.7	136	62.1	7	3.2 %	0	0.0	3.32
	The Learning Information System provides complete information regarding the implementation of learning.	81	37.0	133	60.7	5	2.3	0	0.0	3.35
	The Learning Information System provides well-organized information.	76	34.7	126	57.5	15	6.8	2	0.9	3.26
	The Learning Information System provides up-to-date information (can be accessed immediately after updates are made by lecturers or admins).	90	41.1	101	46.1	26	11.9	2	0.9	3.27
Mean score of Knowledge/Information Quality (X2.3)										3.30
Mean score of ISQ (X2)										3.29
University Students' Performance										
Productivity (Y.1)	The facilities provided by the university improve the student learning process.	97	44.3	107	48.9	14	6.4	1	0.5	3.37
	The facilities provided by the university make it easier for students to submit assignments.	101	46.1	113	51.6	3	1.4	2	0.9	3.43

Indicator	Questionnaire Statement	Answer Score								Mean
		Strongly Agree (4)		Agree (3)		Disagree (2)		Strongly Disagree (1)		
		F	%	F	%	F	%	F	%	
Mean score of Productivity (Y.1)										3.40
Effectiveness improvement (Y.2)	Learning becomes more effective with the facilities provided by the university.	109	49.8	107	48.9	3	1.4	0	0.0	3.48
	I feel more enthusiastic about learning through the facilities provided by the university.	98	44.7	109	49.8	9	4.1	3	1.4	3.38
	The facilities provided by the university make students more responsible in carrying out their tasks.	82	37.4	120	54.8	17	7.8	0	0.0	3.30
Mean score of Effectiveness improvement (Y.2)										3.39
Time saving (Y.3)	The facilities provided by the university save students time searching for learning materials.	65	29.7	129	58.9	22	10.0	3	1.4	3.17
	The facilities provided by the university save students time in submitting assignments.	69	31.5	122	55.7	28	12.8	0	0.0	3.19
Mean score of Time saving (Y.3)										3.18
Usefulness in increasing knowledge (Y.4)	The facilities provided by the university help broaden students' horizons.	84	38.4	129	58.9	5	2.3	1	0.5	3.35
	The facilities provided by the university help satisfy students' curiosity about new knowledge.	78	35.6	124	56.6	17	7.8	0	0.0	3.28
Mean score of Usefulness in Increasing Knowledge (Y.4)										3.32
Mean score of University Students' Performance (Y)										3.33

The observation results presented in Table 3 indicate that the mean score for the USc (X1) variable is 3.24. Among the indicators associated with this variable, Ambient Condition (X1.1) stands out with the highest average score of 3.34, making it the most representative of USc. This suggests that factors related to the physical environment, such as lighting, temperature, noise levels, and overall ambiance, play a crucial role in shaping students' perceptions of university service quality. On the other hand, the indicators with the lowest average score are Signs, Symbols, and Artifacts (X1.3), which received an average score of 3.17. The findings reveal that respondents generally agreed that Ambient Conditions in university facilities had the greatest impact on their experience, while Signs, Symbols, and Artifacts contributed the least to their overall perception of university service quality.

In the case of the ISQ (X2) variable, the results show an average score of 3.29. Among the indicators, Systems Quality (X2.1) achieved the highest average score of 3.36, making it the most representative aspect of ISQ. This suggests that respondents place significant importance on the reliability, efficiency, and functionality of the systems used in online learning, including the responsiveness of digital platforms, accessibility of

learning materials, and seamless integration of technological tools in the educational process. Conversely, the indicator with the lowest average score is Service Quality (X2.2), which obtained a mean score of 3.19. The results indicate that respondents generally agreed that Systems Quality within the online learning framework had the most significant impact on ISQ, while Service Quality played a comparatively lesser role in shaping their perceptions.

With regard to university students' performance (Y), the results indicate an average score of 3.33. Among the performance indicators, Performance Improvement (Y.1) emerged as the most significant, with the highest average score of 3.40. This suggests that students place considerable value on aspects related to their academic progress, skill enhancement, and overall improvement in their learning outcomes. The ability to develop critical thinking skills, problem-solving capabilities, and academic competencies is regarded as a key determinant of university students' performance. On the other hand, Time Saving (Y.3) received the lowest average score of 3.18, indicating that while students appreciate the benefits of time efficiency, they view it as a less critical factor in their overall performance. The results highlight that respondents overwhelmingly agreed that improvements in academic performance had the most significant impact on university students' overall success, while time-saving considerations had the least influence among all performance indicators.

Before examining the data using regression analysis, classic assumptions test must be done to ensure that the data is suitable to be examined through that analysis. The result of the classic assumption is shown in the table and figures below.

Table 4. VIF and Durbin-Watson Values of Variables

Dependent Variable	Independent Variable	VIF	Durbin-Watson
University Students' Performance (Y)	Usc (X1)	1.742	2.082
	ISQ (X2)	1.742	

Table 4 shows that the relationship between USc and ISQ on university students' performance has VIF values that are all at 1.742, which is lower than five. This shows that the model is free of multicollinearity. Further examination using the Durbin-Watson value, which is 2.082, shows that there is no autocorrelation in the same relationship. This is so as using du of 1.789 (200 samples and 2 independent variables), the Durbin-Watson value of 2.082 is located between 1.789 and 2.211, the critical values of the Durbin-Watson test.

Figure 1. Scatterplot of USc and ISQ on University Students' Performance

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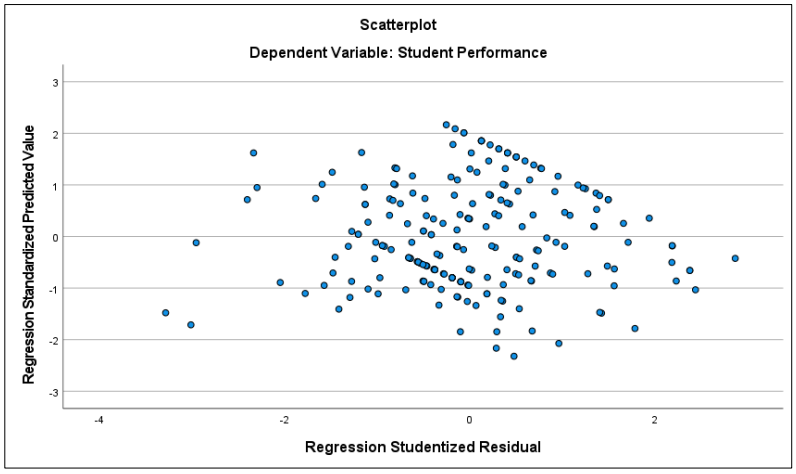


Figure 2 above shows a scatterplot diagram that is scattered and spread with no apparent pattern. This shows that there is no heteroscedasticity within the relationship between USc and ISQ and university students' performance.

Figure 2. Normal P-plot of USc and ISQ on University Students' Performance

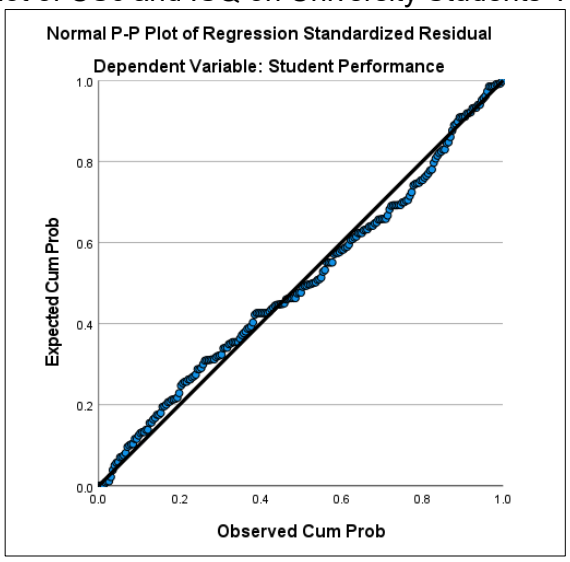


Figure 3. Histogram of USc and ISQ on University Students' Performance

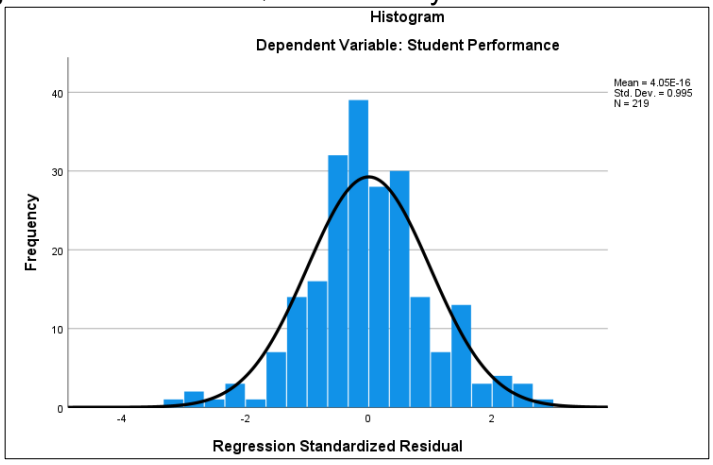


Figure 3 shows a normal P-plot that has dots that are always around the diagonal distribution line, while Figure 4 shows a histogram of the data that is close to a bell-

shaped curve. Both diagrams mean that the data is normally distributed, and analysis using that assumption can be done, including regression analysis.

Table 5. Model summary and ANOVA

Dependent Variable	Independent Variable	Adjusted R-square	F	Sig.
University Students' Performance (Y)	USc (X1)	0.588	156.782	<0.001
	ISQ (X2)			

From Table 5, we can see that the adjusted R-square value is 0.588, which means the model can explain 58.8% of supporting factors that may influence university students' performance by the independent variables provided in this study, USc and ISQ. The remaining 41.2% can only be explained by factors not yet studied in this research. However, the adjusted R-square value shows that the model has a moderately good fit in explaining factors related to supporting the improvement of university students' performance.

From the ANOVA result in Table 5, the high value of the F test, 156.782, and the significance that is lower than 0.05, even lower than 0.001, are observed. This shows that USc and ISQ simultaneously significantly impact university students' performance in this study.

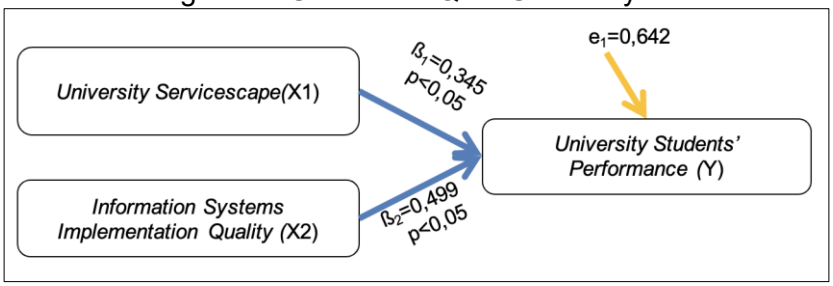
Table 6. Regression Result Between USc and ISQ on University Students' Performance

Dependent Variable	Independent Variable	Standardized Coefficient (Beta)	t	Sig.
University Students' Performance (Y)	USc (X1)	0.345	6.01	<0.001
	ISQ (X2)	0.499	8.70	<0.001

Referring to Table 6, it can be observed that in the relationship of USc and ISQ to university students' performance, the significance value regression between USc and university students' performance is lower than 0.001. The same value of lower than 0.001 is also observed for the regression significance between ISQ and university students' performance. As these significances are lower than 0.05, the result shows that USc significantly impacts university students' performance. The same holds true for ISQ, whereby it also has a significant impact on university students' performance.

Using the adjusted r-squared value from Table 5, we can also deduce the value of e_1, which can be searched by the formula e1 = √ (1-R2) = √ (1-0.588) = 0.642. The result of the analysis of Tables 5 and 6 is the model path diagram that can be seen in Figure 5.

Figure 5. Model Path Diagram of USc and ISQ on University Students' Performance



DISCUSSION

The result of the study shows that USc and ISQ have significant impacts as supporting factors on university students' performance both separately and simultaneously. This is

so as both the significance of the t-test and F-test for all independent variables are lower than 0.05. This leads to the following evidence for all hypotheses.

The data analysis presented in Table 6 indicates that the significance value for the relationship between USc (X1) and university students' performance (Y) is 0.000, which is lower than the threshold of 0.05. Additionally, the standardized coefficient is positive, confirming a significant positive influence of USc as a contributing factor to university students' performance. Consequently, H1 is supported. These findings further reinforce the empirical evidence provided by Wilkins et al. (2022), who highlighted the critical role of servicescape in enhancing university students' satisfaction and engagement. Their study suggests that an improved servicescape fosters a more conducive learning environment, leading to higher student satisfaction and engagement, which ultimately contributes to better academic performance. The present study aligns with these conclusions, underscoring the importance of university servicescapes in shaping students' overall educational experiences and outcomes.

Similarly, the data analysis in Table 6 reveals that the significance value for the relationship between ISQ (X2) and university students' performance (Y) is 0.000, which is also lower than 0.05, with a positive standardized coefficient. These results indicate a significant positive influence of ISQ as a supporting factor in enhancing university students' performance. Accordingly, H2 is confirmed. This finding is consistent with the empirical evidence provided by Umaroh and Barmawi (2021), who demonstrated that the successful implementation of information systems plays a crucial role in improving university students' satisfaction and engagement. Their research emphasizes that well-functioning information systems enhance accessibility, streamline academic processes, and facilitate effective learning, all of which contribute to better student outcomes. The present study corroborates these insights, reinforcing the notion that a robust information systems infrastructure is essential for fostering academic success by improving students' learning experiences and overall performance.

The data analysis in Table 5 yielded a significance value of the F test between two independent variables, USc (X1) and ISQ (X2), on the dependent variable, Student Performance (Y2), of 0.000, lower than 0.05. Based on this result, there is a simultaneous significant influence between USc and ISQ on university students' performance, so H3 is proven. This has never been studied before, and this empirical result proves that the combination of USc and ISQ can be combined to create a moderately good model to explain factors that might support improving university students' performance.

As far as we know, this study is the first one to try to answer the duality of physical and digital service operations using DeLone McLean's information systems success model and servicescape model. The result shows that the combination of these two models can create a moderately good model, as shown by the adjusted R-square value of 0.588, as shown in Table 5.

This study also aims to make significant contributions to higher education management as providers of services catered to university students, equipping them with skills and competitive advantages to prepare them for the real world. The result of this study can be used as fundamental evidence for higher education management to consider balancing focus on both servicescapes as the basis for the university's physical environment and information systems success model as a basis for digitalization. This is because an overreliance on digitalization can be as bad as an overreliance on physical environmental aspects of higher education, and the way forward should be a more

holistic approach where both needs must be fulfilled, as mentioned in the introduction section.

Future research can examine the interplay between supporting factors such as USc and ISQ and the main factors of university students' performance, namely the quality of teaching staff and the pedagogical approach used in the learning process. This can be an interesting interplay to see which factors contribute the most towards improving university students' performance and might provide deeper insights into challenges we may face in the future of higher education service operations management. Additionally, future studies could explore how emerging technologies such as artificial intelligence and virtual reality influence the balance between physical and digital learning environments. As digital transformations accelerate day by day, universities must also assess whether these disruptions by emerging technologies can be a hindrance or even advantageous tools to improve learning experiences. Furthermore, comparative studies across different cultural and economic contexts could reveal whether the optimal balance of servicescape and information systems implementation varies based on regional educational policies and expectations of university students. This research can be very helpful towards institutions to develop more agile and adaptive strategies that align with the needs of students while still maintaining a high quality of education.

CONCLUSION

The results of this study show that USc and ISQ simultaneously and separately might have a significant impact on university students' performance. This means that the better the quality of USc and ISQ, the better the facilities are that can improve the quality of university students' performance. This dual focus on both the physical environmental aspect and the digital aspect of facilities in higher education must be seen as an important aspect in optimizing both factors to create a more holistic environment for university students to thrive in.

To optimally improve university students' performance in their learning activities, management of higher educational institutions must remember to balance the quality of USc and information systems implementation quality. This is of great importance, especially to the institutions located in Malang, East Java, Indonesia, which is the specific location of this investigation. This is because face-to-face learning still has an important role in university teaching and learning activities and must be supported by both physical and digital learning methods facilitated by the combination of USc and ISQ.

LIMITATION

This research has several limitations. First, the research was conducted in one city, Malang, East Java, Indonesia. It is possible that these findings may not be generalized to other cities outside East Java with different cultures or slightly different educational system capabilities. Second, this study uses self-report surveys, which are subject to biases such as social desire biases. Third, this study is cross-sectional, so it cannot establish a causal relationship between variables.

Future research must overcome the limitations of this research by several methods. First of all, to solve the limited generalizability of the study, longitudinal studies in several cities in various regions in Indonesia can be conducted so that results can be compared. Comparing findings with existing studies from different regions can also be done to identify cultural or even systemic influences that might affect the result of the research.

Secondly, we also have to address the fact that relying only on surveys might cause self-report bias whereby respondents are giving only socially acceptable answers. To

overcome this, other methods can also be conducted at the same time, such as triangulation by using multiple data sources, such as adding in observations and using institutional records to validate survey responses. Future researchers can also mix qualitative interviews to gain deeper insights and further validate the results of the questionnaires. Indirect scenario-based questions can also be used in the questionnaires so that it will be harder for respondents to manipulate their responses.

Finally, future research should also investigate the causal relationship between USc and ISQ on student performance as cross-sectional design as a cross-sectional study such as this one cannot exactly establish a causal relationship between variables. Follow-up research over time can be conducted to observe changes and infer causality. Future research can also consider using experiments or quasi-experimental research methods, such as introducing interventions to test the causal effects of variables in the study.

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