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The Effect of Self-Checkout System Implementation on Customer Satisfaction and Intent: A Study on Modern Retail Consumers

Nava Dyana[1*], Hery Suliantoro[1], Naniek Utami Handayani[1]
[1]*Department of Industrial Engineering, Faculty of Engineering*
Diponegoro University, semarang, Indonesia

Abstract
Self-service technology (SST) is increasingly being adopted by modern retailers to improve transaction efficiency, including through the use of self-checkout. But the success of its implementation depends on how consumers assess the quality of the system and the experience provided. This study aims to analyze the influence of customer satisfaction and reuse intention on the use of self checkout in the modern Indonesian retail sector. This study used a quantitative approach involving 50 respondents aged 20-51 years who had used self checkout technology. The method used is structural equation modeling (SEM)-PLS. The results show that system quality (SYQ) is the most influential factor on perceived value (PV), customer satisfaction (CS), and reuse intention (RI). Service quality (SQ) has a significant effect on perceived value (PV) and reuse intention (RI), but it does not affect customer satisfaction (CS). In contrast, information quality (IQ) and customer experience (CE) did not show a significant influence on all dependent variables. In addition, customer satisfaction (CS) has proven to be the strongest determinant in increasing reuse intention (RI), while perceived value (PV) only affects reuse intention (RI) and does not affect customer satisfaction (CS). This study confirms that consumers prioritize the technical aspects of the system over information or emotional experiences in using self-checkout. These findings provide important implications for retailers to prioritize improving system performance in driving the sustainability of self-service technology.
Keywords: *Self Service Technology, Self Checkout, Customer Satisfaction, SEM-PLS*

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I. Introduction

The rapid evolution of digital technologies related to Industry 4.0 has reshaped the operational structure of industries around the world, including the modern retail sector. The integration of artificial intelligence, the Internet of Things, data analytics, and automation enables retailers to improve process efficiency, inventory accuracy, and customer interaction mechanisms [1]. At the same time, the transition to the Industry 5.0 paradigm has a greater impact on quality improvement, which means that businesses need to adapt technological innovations to the changes that occur. In Indonesia, the trend of supermarkets and hypermarkets has increased since the early 2000s due to changes in consumer expectations regarding comfort, cleanliness, and diversification of goods sold. This digital shift increased significantly during the COVID-19 pandemic, forcing retail businesses to adopt touchscreen service systems and alternative purchasing channels to remain resilient [2]]. Despite these technological advancements, retailers continue to face persistent operational efficiencies, especially long cashier queues during busy shopping times. Previous studies in Indonesia's retail environment reported that traditional cashier performance remained suboptimal, with queue lengths and service times significantly reducing customer satisfaction [3]

In addition, fluctuations and declines in national retail sales performance between 2021 and 2025 decrease, highlighting the importance of operational innovations that can improve service delivery, maintain customer loyalty, and support long-term competitiveness [4] One of the current technological solutions that has been implemented in the global market is the self-checkout (SCO) system, which allows customers to scan, pay and bag groceries independently. SCO's technologies including fixed terminal systems, mobile-based scan-and-go solutions, and AI-powered computer-vision cashiers offer potential advantages in speed, accuracy, and reduced reliance on traditional cashier labor [5].

However, the effectiveness in adopting SCO is highly dependent on the customer's perception of the attributes of its technology and services. Empirical studies report various determinants of customer satisfaction and reuse intent. Gunawan et al. (2025), integrating the Information Systems Success Model (ISSM), found that system quality, service quality, and information quality significantly affect satisfaction and reuse intent in the context of self-service [6]. In contrast, Marinakou (2023), implementing the SERVQUAL framework, identifies perceived value and customer experience as a solution in improving satisfaction and sustainable use [7]. These

inconsistencies suggest that existing research has not yet established a theoretical understanding of SCO acceptance. Previous studies have been limited by fragmented constructions, context-specific findings, and inadequate integration of technology, experience, and service-related dimensions. In addition, empirical evidence from Indonesia where retail operational structures, consumer behavior, and technological infrastructure differ from that of the West and East Asian markets remains limited, underscoring the need for local investigations.

To overcome the limitations of this study, this study proposes an integrated analytics model that combines the essential constructions of ISSM and SERVQUAL: system quality, information quality, service quality, perceived value, customer experience, customer satisfaction, and reuse intent. The Technology Acceptance Model (TAM) is further used to support theoretical justifications for customer perceptions of the technology's usability and ease of use. Through this integrated approach, this study aims to identify the factors that most strongly influence customer satisfaction and their behavioral intent to reuse the self-service cashier system in Indonesia's modern retail environment.

This research contributes to the growing literature on the adoption of self-service (SST) technologies by (1) providing empirical validation of the expanded SCO acceptance model, (2) addressing inconsistencies identified in previous international studies, and (3) offering context-specific insights relevant to the emerging retail market. In practical terms, these findings are expected to assist retail managers, system designers, and decision-makers in formulating strategies that optimize SCO implementation, increase customer acceptance, and strengthen retail competitiveness amid ongoing digital transformation.

II. Literature Review

Self-service technology (SST) refers to an automated service interface that allows customers to perform service tasks independently without the help of direct employees [8] In the retail sector, the self-checkout (SCO) system has become a leading SST application, allowing consumers to scan products, process payments, and complete transactions independently. Previous studies have highlighted that SCO adoption is driven by operational efficiency, speed, and flexibility, especially in high-traffic retail environments [9] Latest technological innovations such as fixed terminals, mobile-based scan-and-go solutions, and AI-based computer vision checkout are further supporting retailers in improving service flow and reducing queue times. In Indonesia, the spread of SCO is still in the early diffusion stage compared to the western market. There is limited empirical evidence on how Indonesian consumers perceive these technologies, which suggests the need for a deeper investigation into the factors of technology and experience that shape usage behavior.

2.1 Hypothesis Development

2.2.1 Service Quality and Perceived Value

Sweeney & Soutar (2001) state that the quality of service is an important component of perceived value [10] Good service, such as a quick and easy self-checkout process , will make customers feel like they are getting more benefit (value) from what they provide. Perceived value is a response to quality services that increase efficiency and control, reduce the time and burden felt by customers [11]

2.1.2 System Quality and Information Quality

System quality reflects the technical performance of a system, including usability, stability, ease of navigation, and response time [12] The quality of information concerns the completeness, accuracy, and relevance of the information conveyed to the user. Both constructions are derived from the Information Systems Success Model (ISSM), which has been widely used to assess SST performance. Gunawan et al. (2025) show that system quality and information quality significantly increase perceived value and customer satisfaction in self-service environments. The high reliability of the system reduces operational friction and increases user confidence, while accurate pricing information and transaction transparency minimize perceived risk. Nonetheless, some SCO studies report inconsistent results regarding the magnitude of the influence of system quality on behavioral intent, suggesting the need to extend the model beyond purely technical attributes.

2.1.3 Perceived Value and Customer Experience

Perceived value represents the trade-off between the perceived benefits and the sacrifices encountered during the use of the service (Zeithaml, 1988). In the context of SCOs, value is often associated with time savings, convenience, autonomy, and reduced reliance on cashier interactions. Evidence from Vakulenko et al. (2018) highlights that perceived value significantly predicts reuse intent in an SST environment. Customer experience, which includes cognitive, emotional, and behavioral interactions during the checkout process, has emerged as a defining factor in the adoption of SST. Marinakou (2023) reports that customer experience greatly influences satisfaction and reuse intent in self-ordering kiosks, especially when users face intuitive interfaces, seamless interactions, and low operational barriers. However, many technical-focused SCO studies tend to

underrepresent the experiential dimension, creating a conceptual gap that necessitates the integration of experiential variables into the SST acceptance model.

2.1.4 Customer Satisfaction and Reuse Intention

Customer satisfaction acts as a central mediator within the framework of technology acceptance and service quality. Previous studies have consistently confirmed its role in shaping customer intent to reuse SCO systems. Oliver's (1997) expectation confirmation theory supports the premise that satisfaction leads to repeated use when performance meets or exceeds expectations. Empirical findings reinforce this relationship. [13] and [6] both reported that satisfaction served as a significant predictor of reuse intent in SCO settings. Nevertheless, the strength of this relationship varies depending on contextual factors such as user experience, technological familiarity, and store environment. This variability highlights the need for models that combine broader antecedents such as perceived value, system attributes, and experience to generate a holistic understanding of reuse behavior.

III. Material And Methods

3.1 Research Design

This study uses quantitative and explanatory research designs to examine the determinants of customer satisfaction and reuse intention of the self-checkout system (SCO) in the modern retail environment in Indonesia. The structural equation modeling (SEM) approach using the variance-based Partial Least Squares (PLS) method was chosen for its suitability for predictive modeling, the ability to assess the complex relationships between latent variables and resistance to non-normal data distribution. The research framework integrates constructions adapted from the Information Systems Success Model (ISSM) and SERVQUAL.

3.2 Populasi dan Sampel

The target population consists of consumers who have used the self-checkout system in various fields of the modern retail industry located in Semarang, indonesia. The researcher used purposive random sampling, namely sampling by combining the elements of purposive sampling (selection of certain criteria), namely age (20 years to 51 years) and random sampling (random sample selection) to reduce the risk of errors that may occur in the research. Following the requirements of SEM-PLS, a minimum sample size of 30 – 100 is considered acceptable under the "10 times rule". This study uses ratios based on structural pathways. Thus, the ratio guideline used is 10:1, resulting in 5 x 10 = 50 valid samples collected, exceeding the recommended thresholds for model stability and statistical strength [13].

3.4 Measurement of Variables

There are 7 latent variables along with each of the indicators in this study. The measurement items are derived and adapted from the previous literature:

Table 1 : Variable and indicator measurements

No	Variabel	Kode		Indicator	Referensi
1	Service Quality	SQ	SQ1	**Responsive** : Employees respond to every question I ask	shi & lee 2021
			SQ2	**Friendly** :Friendly employees	
			SQ3	**Clean:** Self-service technology machines (Kioks) are clean.	
			SQ4	**Result:** Ordering from self-service technology yielded what I expected.	
			SQ5	**Reliable** : Payments in self-service technology are reliable	parasuraman dkk, 1988
			SQ6	**Secure :** The payment system in self-service technology is secure	
			SQ7	**Believe:** I don't feel worried about using the technology	
			SQ8	**Confirmation:** The system shows my order for me to confirm	
			SQ9	**Easy :** Self-service technology is easy to use	
			SQ10	**Responsive:** Self-service technology is fast and responsive	
			SQ11	**Needs:** Self-service technology meets my needs quickly	
2	System Quality (Kualitas Sistem)	SYQ	SYQ1	**Brief :** I can get my services with SST in no time	DeLone & McLean, 1978
			SYQ2	**Clear :** Self-service technology service process is clear	

			SYQ3	**Effort:** Using self-service technology requires little effort	
			SYQ4	**smooth:** I can get service smoothly using self service technology	
			SYQ5	**Accurate :** Self service technology service function error-free	
3	Information Quality (Kualitas Informasi)	IQ	IQ1	**Information:** The information provided by self service technology meets my needs	DeLone & McLean, 1978
			IQ2	**Useful:** Information provided by self service technology in a useful format	
			IQ3	**Details :** The information provided by the self service technology is clear	
			IQ4	**True:** The information provided by the self service technology is accurate.	
			IQ5	**Latest :** Information provided by self-service technology is up-to-date	
			IQ6	**Credible :** The information provided by the self service technology is reliable	
4	Customer Experience	CE	CE1	**efficient:** The service is very efficient	Sipe and Testa, 2018
			CE2	**Fast:** The service speed is excellent	
			CE3	**Handling :** Issues are dealt with quickly	
5	Perceived Value	PV	PV1	**Value:** Self service technology according to the price given.	Nunkoo dkk, 2017
			PV2	**Balanced:** Overall self service technology service is acceptable considering what I paid	
			PV3	**Benefits:** Self service technology offers good value.	
6	Consumer Satisfaction	CS	CS1	**Satisfied :** I am satisfied with the overall performance of the kiosk	Nunkoo dkk, 2017
			CS2	**Expectation:** The performance of the kiosk met all my expectations	
			CS3	**ideal :** Tingkat kepuasan terhadap kinerja kios mendekati layanan ideal saya dari ekspekstasi	
7	Reuse Intention	RI	RI1	**Use:** I will use self service technology again on my next visit	Nunkoo dkk, 2017
			RI2	**Select:** I will choose to use self service technology on my next visit	
			RI3	**avoidance:** I prefer to avoid self-service technology	

IV. Results

4.1 Respondent Characteristics

A total of 50 samples were collected from consumers who had previously used self-checkout technology. The majority of respondents were female (56%), and most were between the ages of 20–30 (78%), indicating that SCO adoption is higher among younger and digitally literate demographics. Respondents mainly consisted of students (48%), company employees (30%), and government or institutional workers (10%). Most consumers use SCO once a month (56%), and 90% prefer non-cash payment methods, such as QRIS and other e-wallets. The findings show that the sample represents active users who are familiar with digital transactions.

Table 2 : Characteristics of Respondents

Characteristics of respondents	Frequency	Persentase
Gender	50	100%
Man	22	44%
Woman	28	56%
Age	50	100%
< 20 years	8	16%
20 - 30 years	39	78%
31 - 40 years	3	6%
41 - 50 years	0	0%
> 51 years	0	0%
Work	50	100%
Official (PNS/POLRI/TNI/BUMN, dll)	5	10%
Employee	15	30%
IRT (housewives)	1	20%
businessman	5	10%
Student	24	48%

Frequency of using self-checkout	50	100%
Yes, it used to be.	50	100%
never	0	0%
Frequency of use of self checkout (Kiosk)	50	100%
Once a month	28	56%
Once a week	0	0%
2 to 3 times a month	18	36
More than 5 times a month	4	8%
Frequency of payment forms	50	100%
Cashless(Qris, E-wallet)	45	90%
Debit or Credit Card	2	4%
Cash	3	6%
Where do you use self-checkout?	50	100%
Restaurant (KFC, McD, Richeese Factory, etc)	24	48
Indonesian Railways	13	26
Bus Or Travel	6	12
Supermarket (scan and go, superindo)	6	12
Specialty retail (decathlon, uniqlo, dll)	1	2
Who recommends you use self-service technology?	50	100%
Myself	34	68
Friends	1	2
Family	4	8
Staf	9	18
Social Media	2	4

4.2 Conceptualization of the model

The conceptualization of the model consists of a structure formed by 7 latent variables, namely service quality (SQ), system quality (SYQ), information quality (IQ), customer experience (CE), perceived value (PV), customer satisfaction (CS), reuse intention (RI). Then the path diagram is compiled using SmartPLS software.

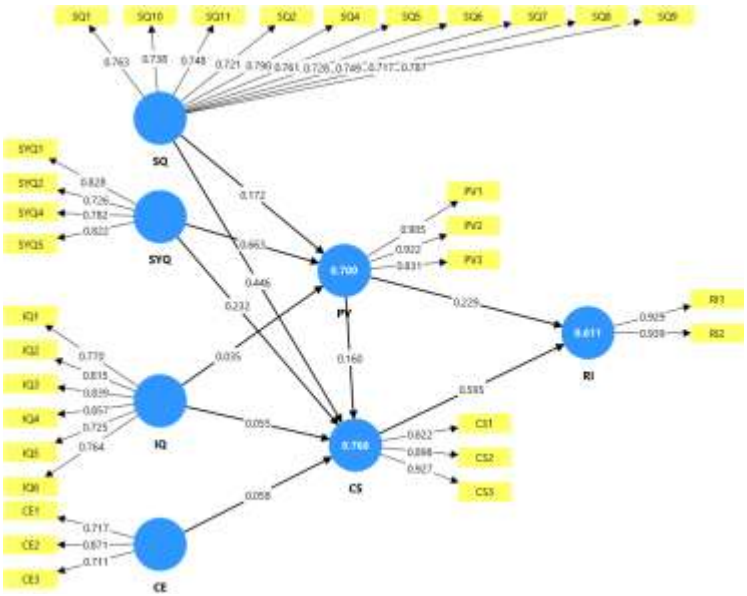

Figure 1 : Diagram Path

4.3 Evaluation of Measurement Models

4.3.1 Validitas Convergence

The theory from Ghozali (2006) states that the value of outer loading is still considered sufficient, which is between 0.5 - 0.6 as a condition for convergent validity. The common and frequently used condition value is the outer loading value > 0.7. If the value < 0.7, it means that the value has not met the requirements for convergent validity. As a result, all indicators on the seven latent variables, namely SQ, SYQ, IQ, PV, CE, CS, and RI, exceeded the convergent validity threshold. In addition, all constructions achieve an AVE value greater than 0.50, meaning that all indicators and latent variables on the outer loading are valid and adequate. So that it can conduct structural model tests. Cronbachs alpha or composite relliability acceptable is between >0.7 and values of 0.6 – 0.7 are still acceptable for exploratory research [15]

Table 3 : Convergent Validity

variabel	indicator	outer loading	AVE
SQ	SQ1	0,763	0,563
	SQ2	0,721	
	SQ4	0,790	
	SQ5	0,761	
	SQ6	0,728	
	SQ7	0,749	
	SQ8	0,717	
	SQ9	0,787	
	SQ10	0,738	
	SQ11	0,748	
SYQ	SYQ1	0,828	0,625
	SYQ2	0,726	
	SYQ4	0,782	
	SYQ5	0,822	
IQ	IQ1	0,770	0,634
	IQ2	0,815	
	IQ3	0,839	
	IQ4	0,857	
	IQ5	0,725	
	IQ6	0,764	
CE	CE1	0,717	0,593
	CE2	0,871	
	CE3	0,711	
PV	PV1	0,905	0,787
	PV2	0,922	
	PV3	0,831	
CS	CS1	0,822	0,781
	CS2	0,898	
	CS3	0,927	
RI	RI1	0,929	0,872
	RI2	0,939	

4.3.2 Discriminatory Validity

The Fornell-Larcker analysis confirms that the square root of the AVE of each construct is greater than the correlation between its constructs, meeting the criteria of discriminant validity. This shows that each construction measures the unique dimensions of the SCO experience. The result of the cross loading test is if an indicator on a certain variable must be greater than the cross loading value of other indicators and variables.

Table 4 Fornell Larcker Value

variable	CE	CS	IQ	PV	RI	SQ	SYQ
CE	0,770						
CS	0,710	0,884					

IQ	0,747	0,746	0,796				
PV	0,588	0,752	0,674	0,887			
RI	0,639	0,767	0,703	0,677	0,934		
SQ	0,766	0,842	0,821	0,739	0,814	0,751	
SYQ	0,756	0,811	0,751	0,829	0,672	0,812	0,791

4.4 Structural Model Evaluation

In the inner model, there are several analyses including the coefficient value (R^2), the Cross validated redundancy value (Q^2), the effect size value, the Standardized Root Mean Square Residual (SRMR) value, the Normed fix Index (NFI) value, and the hypothesis influence relationship.

Table 5 : Hypothesis Test

1	2	3	4
H1. SQ -> PV	0,172	0,845	0,199
H2. SQ -> CS	0,446	2,017	0,022
H3. SYQ -> PV	0,663	5,311	0,000
H4. SYQ -> CS	0,232	1,673	0,047
H5. IQ -> PV	0,035	0,172	0,432
H6. IQ -> CS	0,055	0,319	0,375
H7. CE -> CS	0,058	0,445	0,328
H8. PV -> CS	0,160	0,981	0,163
H9. PV -> RI	0,229	1,481	0,069
H10. CS -> RI	0,595	3,991	0,000

Note : 1 = hipotesis; 2 = path koefisien; 3 = t-statistic; 4 = f^2

The structural model shows strong explanatory strength, the value of the determinant coefficient (R^2) in the Customer Satisfaction variable is 0.766, meaning that the customer satisfaction (CS) variable can be explained by perceived value (PV), system quality (SYQ), customer experience (CE) and service quality (SQ) of 76.6% and 23.4% explained by other variables. The R^2 perceived value of 0.700 or 70% PV is explained by the system quality and service quality variables. The R^2 Perceived value in the reuse intention (RI) variable of 0.611 or 61.1% of RI is explained by customer satisfaction, perceived value, and system quality. Next, look at the predictive value of relevance (Q-Square) which functions to measure how well the observed value is produced or the level of predictive relevance of a construct model using the blindfolding procedure in smartPLS.

Results The predictive value of Q^2 relevance to dependent variables (CS, PV, RI) is 0.946 it is stated that $Q^2 > 0$ indicates that the model has substantial predictive relevance for self-checkout adoption behavior. The f^2 test serves to see how strong the effect of the influence size is between the independent variable and the dependent variable. The characteristic of the f^2 test value is that if the value of f^2 starting at 0.020 indicates a small influence of the construct, starting from 0.150 indicates that the construct has a moderate influence and starting from 0.350 indicates that the construct has a strong influence [16]. The results of the f^2 statistical test with the strongest effect were the effect of measurement on the customer satisfaction (CS) variable on reuse intention (RI) with a value of 0.395, the f^2 test on the variable system quality (SYQ) on perceived value (PV) with a value of 0.466 and followed by service quality (SQ) on customer satisfaction (CS) with a moderate effect of 0.184.

SRMR (Standardized Root Mean Square Residual) shows the difference between the correlation between the observed model (null model) and the prediction model (Hair et al., 2010). The characteristics of SRMR are < 0.08 (good fit); 0.08 - 0.1 (adequate fit). The result of the SRMR value is 0.097, which means that the model is an adequate fit. The Normed Fit Index (NFI) value is a measure of comparison between the proposed model and the null model. The characteristics of the NFI value > 0.900 can be declared a very good fit model and if the NFI value is between 0.500 – 0.800 the model is declared as marginal fit (Ghozali, 2011). The result of the NFI value is 0.502, which means that the model is included in the marginal fit. The hypothesis test consists of a dirrect effect and an indirrect effect. Where the two hypothesis tests function to find out how much influence independent variables have on dependent variables. The results of the hypothesis test on the dirrect

effect, the accepted hypothesis is System Quality on Customer Satisfaction with a p-value of 0.012 and a β value of 0.338 which means that customer satisfaction can increase influenced by system quality.

System Quality to Perceived Value with a p-value of 0.000 and β 0.663 which means that perceived can increase influenced by system quality. System Quality to Reuse Intention with a p-value of 0.001 hypothesis accepted and a value of β (0.353) means that reuse intention can increase influenced by system quality. Service Quality to Perceived Value with a p-value of 0.022, the hypothesis is accepted and the value of β (0.172) which means that the perceived value can increase influenced by service quality. Service Quality to Reuse Intention with a p-value of 0.028 and a value of β (0.321) means that the value of reuse intention can increase influenced by service quality. Perceived Value for Reuse Intention with a p-value of 0.040 and a value of β (0.324) means that the reuse intention can increase influenced by the perceived value. Customer Satisfaction to Reuse Intention with a po-value of 0.040 and β (0.324) means that reuse intention can increase influenced by customer satisfaction. Overall these findings highlight that System Quality is the strongest overall predictor, directly influencing PV, CS, and RI. Customer satisfaction also emerges as a substantial mediator and encourages strong behavioral intent.

In the indirect effect hypothesis test, the acceptable effect is the service quality variable on reuse intention with a p-value of 0.028, which means that the value of reuse intention can increase influenced by service quality through perceived value and customer satisfaction. The system quality variable for reuse intention with a p-value value of 0.001 which means that the value of reuse intention can increase is influenced by system quality through perceived value and customer satisfaction. In addition to the hypothesis of the rejected variable is an insignificant path indicating that the quality of SCO information and experience does not significantly affect Indonesian consumers, who tend to prioritize system efficiency and transactional smoothness.

V. Discussion And Conclusion

The findings of this study provide significant insights into the determinants of customer satisfaction and reuse intention of the self-checkout (SCO) system in Indonesia's modern retail environment. The results show that System Quality is the most dominant predictor influencing Perceived Value, Customer Satisfaction, and Reuse Intent. This is in line with the theoretical foundation of the Information Systems Success Model (ISSM), which posits that the performance of technical systems—such as stability, accuracy, and ease of operation—plays an important role in shaping positive user evaluations. The strong influence of System Quality shows that consumers in Indonesia prioritize efficiency and reliability as core expectations when interacting with SCO technology.

In contrast, Quality of Service shows a significant positive effect on Perceived Value and Reuse Intent but not on Customer Satisfaction. These findings partially support the SERVQUAL-based study, which emphasizes the role of service reliability and ease of assistance in a technology-mediated environment. In the context of SCO, users may appreciate fast and efficient service support when needed, but those dimensions may not directly shape their satisfaction compared to system performance factors. An insignificant effect on satisfaction suggests that customer evaluations are increasingly shaped by perceived technological convenience rather than traditional service elements.

Important findings concern Information Quality and Customer Experience, both of which did not show a significant influence on any dependent variables. Although descriptive results show that consumers view the accuracy of SCO information and experience positively, these dimensions do not significantly affect their satisfaction or behavioral outcomes. This contrasts with previous research in Western markets where attributes of experience and information often shape SST acceptance. The Indonesian context shows that users adopt SCO primarily for its functional utility and operational speed, not for the value of the experience or the content of the information. This may be related to the early stages of SCO adoption in Indonesia, where users primarily evaluate the effectiveness of the underlying system rather than the advanced experience factor.

The significant role of Customer Satisfaction in predicting Reuse Intent is consistent with expectation-confirmation theory. Satisfaction serves as the strongest direct determinant of sustainable use, underscoring the importance of positive post-use evaluation in shaping behavioral commitments. Additional findings that Perceived Value also significantly influences Reuse Intent are in line with consumer behavior theories that emphasize the trade-offs between benefits (faster checkout, independence, and reduced wait times) and perceived costs (effort, and potential errors).

Overall, the results reinforce the need for retailers to focus on system stability, transaction accuracy, and operational smoothness as key drivers of adoption. Traditional services and experience features are secondary and may only become influential once technology matures and consumer familiarity increases. This study contributes to the SST literature by showing that the predictors of SCO adoption in emerging markets differ from those in more technologically mature regions.

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