

Research Article

From Digital Engagement to Social Welfare: Measuring the Impact of the mSmart Application in a Developing Region

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Abstract: The mSmart platform, introduced as a pilot initiative in Labuan Bajo, Indonesia, was developed to strengthen community participation in local digital services. This study explores the extent to which the application delivers social value to its users and the broader community. Guided by the Information Systems Success Model (ISSM) and the WebQual framework, the research focuses on three main factors: System quality, user satisfaction, and continued usage. Data were collected from 119 respondents, representing residents, micro-enterprise owners, and local farmers groups considered as the primary stakeholders. The analysis, conducted using Partial Least Squares Structural Equation Modeling (PLS-SEM), confirmed that the measurement model achieved high validity and reliability (loadings above 0.80, AVE exceeding 0.50, and composite reliability over 0.90). Results from the structural model indicate that Use Intention has a notable positive effect on Net Benefit ($\beta = 0.53$, $f^2 = 0.45$, $R^2 = 0.65$), with predictive relevance supported ($Q^2 = 0.365$). Overall, the findings suggest that consistent platform use improves service quality perceptions, builds trust, and encourages digital engagement, contributing to SDG 11 and SDG 8 in the local context.

Keywords: Smart City, Msmart, Issm, Webqual, Social Impact, Labuan Bajo, Community-Based Technology, Digital Platform Evaluation

Introduction

Research Background

Labuan Bajo, in the West Manggarai Regency, is officially recognized as one of Indonesia's super-priority tourism destinations. This designation opens up opportunities for growth in both the economy and community well-being. However, it also introduces challenges, particularly in ensuring that local residents, MSMEs, and farming groups are not left behind in the digital shift. Although programs such as public information portals and community service centers have been launched, gaps persist. Limited infrastructure and low digital literacy continue to restrict access for many (Utomo et al., 2025; Setyawati, 2022). To address these concerns, the Manggarai Barat Communication and Information Office, in partnership with Binus University, introduced the mSmart application, an integrated platform for tourism, MSME promotion, agriculture, and public communication.

Problem Identification

While mSmart offers potential for digital inclusion, its contribution to community welfare has yet to be fully measured. Current smart city assessments tend to prioritize infrastructure and technology over social equity and citizen engagement (Senior et al., 2023; Hodson et al., 2023). There is little clarity on how tools like mSmart empower diverse groups or contribute to long-term social outcomes. Moreover, systematic frameworks for measuring social impact throughout the implementation cycle remain underdeveloped (Ekaputra et al., 2024).

Purpose of Research

This study addresses these gaps by applying a participatory evaluation approach that incorporates local users' perspectives. Guided by the Information System Success Model (ISSM) and WebQual dimensions, structured questionnaires will assess factors such as information quality, usability, satisfaction, and net benefits at both the personal and community levels. The data will be analyzed using PLS-SEM to explore direct

and indirect relationships among the constructs, offering a fuller picture of how digital platforms influence welfare in an emerging smart city.

Research Questions

The research explores:

1. The extent to which mSmart affects social and economic well-being directly and indirectly
2. The mediating influence of information quality, usability, and satisfaction
3. The role of participatory evaluation in capturing social impact within smart city programs

Research Benefits

Theoretically, the study advances smart city research by integrating multidimensional evaluation models with participatory methods. Practically, it offers guidance for policymakers, developers, and community groups in designing inclusive digital tools. By centering user perception and engagement, it also supports strategies to enhance literacy, empowerment, and equity.

Problem Scope

The focus is on Labuan Bajo, evaluating mSmart's influence on local communities, MSMEs, and farming groups in terms of quality, satisfaction, and net benefits. Broader smart city projects and technical performance metrics are beyond this study's scope.

Literature Review

Smart City

Recent studies portray the smart city as a multilayered ecosystem that blends Information and Communication Technologies (ICT) with social, environmental, and economic dimensions. The objective is to enhance residents' quality of life while promoting sustainable urban development. According to Addas (2023b), smart cities involve transformative urban strategies aimed at tackling climate change, pollution, and rapid population growth. These strategies combine green infrastructure, integrated urban services, and data-driven governance to strengthen social sustainability. Likewise, a widely recognized definition of a smart sustainable city highlights the simultaneous use of ICT to improve operational efficiency, citizen well-being, and environmental stewardship, while safeguarding future needs through participatory governance and equitable policy frameworks (Al Nasrawi et al., 2015).

While advanced technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and blockchain are widely associated with mature smart city ecosystems, the mSmart application represents a foundational stage of smart city implementation focused on service integration and

citizen engagement. In developing regions, smart city transformation often begins with digital platforms that enhance accessibility, information flow, and participation before incorporating advanced automation and data driven optimization. Therefore, this study positions mSmart as an enabling digital layer that prepares the socio-technical environment for future integration of AI driven analytics, IoT-based monitoring, and secure transaction mechanisms, rather than as a fully autonomous smart city system.

Information System Success Model

The DeLone & McLean Information System Success Model (ISSM) remains a cornerstone for evaluating the performance and value of information systems. Its main constructions include system quality, information quality, service quality, user satisfaction, intention to use, and net benefits. Applications in mobile and domain-specific contexts underscore its flexibility and real-world relevance. For example, Subiyakto et al. (2021) showed that adapting the ISSM to mobile learning in Indonesia provided deeper insights into student engagement and academic achievement, reinforcing its applicability in contemporary education (Fangqi et al., 2023; Subiyakto et al., 2021). In the e-health sector, (Hasan and Bao, 2022) extended the model using PLS-SEM and fsQCA, demonstrating how service quality and system performance contribute to user welfare and clinical outcomes, further illustrating the model's value in community welfare assessments.

Recent studies (Addas, 2023a; Sarstedt et al., 2022) extend the ISSM by emphasizing predictive power and contextual adaptability in digital transformation environments.

WebQual

WebQual remains an important tool for evaluating the quality of websites and applications from the user perspective, with emphasis on usability, information quality, and interaction quality. For instance, Firdaus et al. (2019) found that WebQual 4.0 significantly influenced satisfaction and engagement in online education platforms during the pandemic, demonstrating its continued relevance (Adellia and Abdillah, 2020). Similarly, Urbach et al. (2010) integrated WebQual with ISSM constructs in a study of portal success, concluding that early-stage user experience metrics improve the explanatory power of models when paired with postadoption outcomes, highlighting the benefit of merging perception-based measures with behavioral and welfare indicators.

PLS-SEM

Partial Least Squares Structural Equation Modeling (PLS-SEM) has become a preferred method for analyzing complex relationships in information systems research, especially in studies with moderate sample sizes or

predictive goals. Methodological progress in recent years has underscored the importance of thorough assessment of measurement (outer) and structural (inner) models, including discriminant validity through HTMT and the reporting of predictive metrics such as SRMR and Q² (Russo and Stol, 2022; Lin et al., 2020). Fangqi et al. (2023) demonstrated its usefulness in elearning research by showing how perceived quality can both directly and indirectly shape learning outcomes. In IT-related studies, the method is increasingly applied with enhanced validation techniques; Russo and Stol (2022) recommend using cross-validation and bootstrapping to ensure both explanatory strength and predictive accuracy, thereby increasing its relevance across diverse technology domains.

Materials and Methods

The combination of WebQual and ISSM offers a unified framework for examining how digital services and mobile applications perform and generate value. WebQual focuses on users' perceptions of quality through three key dimensions: Usability, information quality, and interactivity, factors that are central to evaluating the perceived strengths and weaknesses of a platform (Barnes and Vidgen, 2002). While this perspective is important, WebQual on its own does not account for what happens after the system is used, such as levels of user satisfaction, patterns of continued usage, or the wider personal and societal outcomes that may result. ISSM complements this gap by incorporating constructs that capture these post-use dimensions, including user satisfaction, intention to use, and net benefits. Together, these elements provide a more complete picture of how a system contributes to both individual experiences and broader community welfare (DeLone and McLean, 2003; Petter et al., 2008).

Figure 1 illustrates the integrated WebQual–ISSM research model, depicting the hypothesized structural relationships among perceived quality constructs, user satisfaction, use intention, and net benefits.

This research combines the WebQual framework with ISSM to provide a structured assessment of mobile application effectiveness. The evaluation incorporates nine variables: Usability quality (WQ1), information quality (WQ2), interaction quality (WQ3), system quality (ISSM1), service quality (ISSM2), information quality (ISSM3), user satisfaction (ISSM4), intention to use (ISSM5), and net benefits (ISSM6). Each construct is measured through validated indicators adapted from earlier empirical studies, ensuring both relevance and reliability. This approach makes it possible to capture not only perceived quality dimensions but also post-usage outcomes that influence individual experiences and broader community welfare. A detailed operationalization of these variables is presented in Table 1.

Hypothesis Development

The hypotheses in this study are formulated by integrating the WebQual framework with ISSM. In this conceptual structure, the dimensions of WebQual are positioned as antecedent factors that influence the system-related constructs within ISSM. The ISSM variables, in turn, are used to explain user satisfaction, behavioral intention, and the perceived net benefits derived from system use. This combined framework makes it possible to examine both direct and indirect pathways, offering insight into how perceptions of quality shape user satisfaction and, ultimately, how these experiences translate into benefits at both the individual and community levels. The complete set of hypotheses is presented in Table 2.

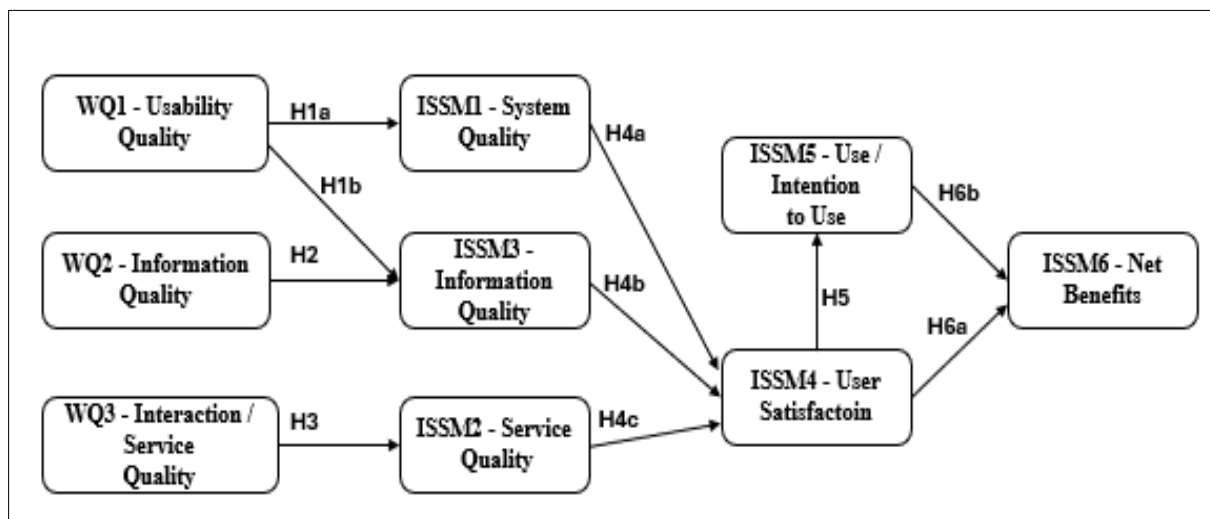


Fig. 1: Model in this research

Table 1: Research Constructors

Model	Variable	Indicators	Reff's
Webqual	WQ1 - Usability Quality	WQ1_1 - Easy navigation edited	(Barnes and Vidgen, 2002)
		WQ1_2 - Attractive and consistent interface	(Barnes and Vidgen, 2002)
		WQ1_3 - Quick response time	(Alshehri et al., 2012)
	WQ2 - Information Quality	WQ2_1 - Information accuracy	(DeLone and McLean, 2003)
		WQ2_2 - Relevance to user needs	(DeLone and McLean, 2003)
		WQ2_3 - Completeness of information	(DeLone and McLean, 2003)
	WQ3 - Interaction/Service Quality	WQ3_1 - Ease of interaction	(Barnes and Vidgen, 2002)
		WQ3_2 - Quick service response	(Barnes and Vidgen, 2002)
		WQ3_3 - Availability of assistance	(Barnes and Vidgen, 2002)
ISSM	ISSM1 - System Quality	ISSM1_1 - System reliability	(DeLone and McLean, 2003)
		ISSM1_2 - Ease of use	(DeLone and McLean, 2003)
		ISSM1_3 - Processing speed	(DeLone and McLean, 2003)
	ISSM2 - Service Quality	ISSM2_1 - Availability of technical support	(Urbach et al., 2010)
		ISSM2_2 - Responsiveness of service staff	(Urbach et al., 2010)
		ISSM2_3 - Support staff assistance	(Petter et al., 2008)
	ISSM3 - Information Quality	ISSM3_1 - Information Accuracy	(DeLone and McLean, 2003)
		ISSM3_2 - Information Relevance	(DeLone and McLean, 2003)
		ISSM3_3 - Information Timeliness	(Petter et al., 2008)
	ISSM4 - User Satisfaction	ISSM4_1 - Overall satisfaction	(DeLone and McLean, 2003)
		ISSM4_2 - Satisfaction with service quality	(DeLone and McLean, 2003)
		ISSM4_3 - Meeting user expectations	(Urbach et al., 2010)
	ISSM5 - Use / Intention to Use	ISSM5_1 - Frequency of use	(DeLone and McLean, 2003)
		ISSM5_2 - Willingness to continue use	(DeLone and McLean, 2003)
		ISSM5_3 - Recommendation to others	(Petter et al., 2008)
	ISSM6 - Net Benefit (Community Welfare)	ISSM6_1 - Individual benefits	(Petter et al., 2008)
		ISSM6_2 - Social benefits	(Petter et al., 2008)
		ISSM6_3 - Time and cost efficiency	(Petter et al., 2008)

Table 2: Hypothesis Development

Code	Statement	Expected Relationship	Reff's
H1a	Usability Quality (WQ1) has a positive effect on System Quality (ISSM1)	WQ1 → ISSM1 (+)	(Barnes and Vidgen, 2002; Urbach et al., 2010)
H1b	Usability Quality (WQ1) has a positive effect on Information Quality (ISSM3).	WQ1 → ISSM3 (+)	(Subiyakto et al., 2021)
H2	Information Quality (WQ2) has a positive effect on Information Quality (ISSM3).	WQ2 → ISSM3 (+)	(Petter et al., 2008)
H3	Interaction/Service Quality (WQ3) has a positive effect on Service Quality (ISSM2).	WQ3 → ISSM2 (+)	(Urbach et al., 2010)
H4a	System Quality (ISSM1) positively affects User Satisfaction (ISSM4)	ISSM1 → ISSM4 (+)	(DeLone and McLean, 2003)
H4b	Information Quality (ISSM3) positively affects User Satisfaction (ISSM4).	ISSM3 → ISSM4 (+)	(DeLone and McLean, 2003; Hasan and Bao, 2022)
H4c	Service Quality (ISSM2) positively affects User Satisfaction (ISSM4)	ISSM2 → ISSM4 (+)	(Petter et al., 2008)
H4c	Service Quality (ISSM2) positively affects User Satisfaction (ISSM4)	ISSM2 → ISSM4 (+)	(Petter et al., 2008)
H5	User Satisfaction (ISSM4) positively affects Use/Intention to Use (ISSM5).	ISSM4 → ISSM5 (+)	(DeLone and McLean, 2003)
H6a	User Satisfaction (ISSM4) positively affects Net Benefit (ISSM6).	ISSM4 → ISSM6 (+)	(Petter et al., 2008)
H6b	Use/Intention to Use (ISSM5) positively affects Net Benefit (ISSM6).	ISSM5 → ISSM6 (+)	(Hasan and Bao, 2022)

Data Analysis

Partial Least Squares Structural Equation Modeling (PLS-SEM) was selected for this study because it offers a

reliable approach for analyzing complex models that involve multiple constructs and is well-suited for studies with small to medium sample sizes (Petter et al., 2008). The analytical process was carried out in two main stages.

The first stage focused on assessing the outer model, or measurement model, to ensure that the indicators used to measure each latent construct were both reliable and valid. Internal consistency reliability was evaluated using Cronbach’s Alpha (CA) and Composite Reliability (CR), with both measures expected to exceed 0.70 to demonstrate satisfactory consistency (Petter et al., 2008; Hair et al., 2021). The reliability of individual indicators was examined through their outer loadings, with 0.70 set as the recommended minimum value. Indicators with loadings between 0.40 and 0.70 could still be retained if the Average Variance Extracted (AVE) and CR remained within acceptable limits (Petter et al., 2008; Bayonne et al., 2020). Convergent validity was considered adequate when the AVE reached at least 0.50, indicating that the construct explained half or more of the variance in its indicators. Discriminant validity was assessed using the Fornell–Larcker criterion, which requires that the square root of a construct’s AVE be greater than its correlations with any other construct (Russo and Stol, 2022; Henseler et al., 2016).

The second stage involved the assessment of the inner model, or structural model, to analyze the relationships among constructs. Path coefficients (β) were tested using a bootstrapping procedure with 5,000 resamples, and a relationship was considered significant when $t \geq 1.96$ ($p \leq 0.05$) (Petter et al., 2008; Bayonne et al., 2020). The explanatory power of each endogenous construct was determined using the coefficient of determination (R^2), with thresholds of 0.25, 0.50, and 0.75 representing weak, moderate, and substantial explanatory strength, respectively (Petter et al., 2008). Effect size (f^2) values of 0.02, 0.15, and 0.35 indicated small, medium, and large effects (Petter et al., 2008). Finally, predictive relevance (Q^2) was obtained using the blindfolding procedure, and

values greater than zero confirmed that the model possessed predictive capability for its endogenous constructs (Petter et al., 2008).

Control variables such as digital literacy and socioeconomic background were not incorporated into the present structural model. This omission is acknowledged as a limitation, as these factors may influence satisfaction formation and behavioral intention. Future studies are therefore encouraged to explicitly model such variables either as controls or moderating constructs to enhance explanatory robustness and parameter stability.

Results

Respondent Demography

This study employed a non-probability purposive sampling technique to recruit participants with direct experience using the mSmart application in Labuan Bajo. A total of 119 valid responses were obtained (Nindito et al., 2025). This number meets the adequacy criteria for Partial Least Squares Structural Equation Modeling (PLSSEM). As noted by Sarstedt et al. (2022); Kock and Hadaya (2016), sample size requirements in PLS-SEM can be estimated using the “10-times rule” or more refined approaches such as the inverse square root method and the gamma-exponential method. In the present model, the construct with the highest number of indicators contains nine items, resulting in a minimum sample size threshold of 90. Therefore, the 119 responses collected are deemed sufficient for robust statistical analysis.

Understanding the demographic characteristics of the respondents is crucial for interpreting their interaction with the mSmart application in the Manggarai Barat context. These demographic profiles, which help contextualize user experiences and perceptions, are summarized in Table 3.

Table 3: Demographic Profile of Respondents

Variable	Category	Frequency (n)	Percentage (%)
Gender	Female	74	62.18
	Male	45	37.82
Age Group	15-20	85	71.43
	21-30	18	15.13
	31-40	9	7.56
	41-50	4	3.36
	>50	3	2.52
Education Level	Junior High	41	34.45
	Senior High	52	43.70
	Diploma / Bachelor’s	16	13.45
	Master’s / Doctorate	10	8.40
Occupation	Student	86	72.27
	Private Sector	9	7.56
	Civil Servant	6	5.04
	Other	12	10.08
Years Living in City	<1 Year	41	34.45
	1-5 Years	20	16.81
	6-10 Years	32	26.89
	>10 Years	26	21.85

While the sample size ($n = 119$) meets the adequacy threshold for PLS-SEM, it is acknowledged that the sample composition predominantly students aged 15–20 may limit the generalizability of findings. Thus, future studies should include broader age and occupational groups to improve external validity.

Further cross-tabulation indicated that younger respondents tend to exhibit higher levels of Use Intention (ISSM5) due to familiarity with mobile-based services, while older or occupationally active participants (farmers and MSME owners) reported stronger perceptions of Net Benefit (ISSM6), emphasizing economic and service related improvements. These demographic variations highlight how digital maturity influences the pathways from user satisfaction to perceived social impact.

Outer Model Evaluation

The measurement model was examined to verify that each construct achieved satisfactory levels of reliability and validity. This assessment focused on three main aspects: internal consistency reliability, convergent validity, and discriminant validity.

First, internal consistency reliability was measured using Cronbach’s Alpha and Composite Reliability (CR). All constructs met the accepted standards, with Cronbach’s Alpha values exceeding the 0.70 benchmark (Petter et al., 2008), ranging from 0.715 for ISSM5 to 0.920 for ISSM4. Likewise, composite reliability (ρ_c) values ranged from 0.873 to 0.950, confirming strong internal consistency across constructs, as each exceeded the recommended threshold of 0.70.

Second, convergent validity was assessed using the Average Variance Extracted (AVE). All constructions recorded AVE values above the 0.50 minimum, ranging from 0.698 (ISSM1) to 0.863 (ISSM4). These results indicate that each construct explains more than half of the variance in its corresponding indicators, providing clear evidence of adequate convergent validity. A detailed summary of these findings is presented in Table 4.

In addition, the standardized outer loadings for all indicators exceeded the recommended threshold of 0.70, with the majority surpassing 0.80. This outcome demonstrates that each observed variable makes a strong

and meaningful contribution to its corresponding latent construct, thereby reinforcing the unidimensionality and conceptual relevance of the measurement indicators (Petter et al., 2008; Hair et al., 2021). Finally, discriminant validity was evaluated using the Fornell– Larcker criterion. As presented in Table 5, the square root of each construct’s AVE was greater than its correlations with any other construct. This result confirms that each construct is empirically distinct from the others, satisfying the requirement for adequate discriminant validity.

Taken together, these findings confirm that the measurement model fulfills the necessary criteria for reliability and validity. Consequently, the model is deemed appropriate for progressing to the subsequent structural model analysis.

Inner Model Evaluation

The structural model was examined to evaluate its explanatory power, effect sizes, predictive relevance, and the statistical significance of the relationships between latent variables.

Coefficient of Determination

The coefficient of determination (R^2) values for the endogenous constructs ranged from 0.44 to 0.65, representing moderate explanatory power according to widely cited benchmarks (Hair et al., 2021). Among these, ISSM6 (Net Benefit) recorded the highest R^2 value at 0.65, indicating a stronger proportion of explained variance. Conversely, ISSM5 (Use Intention) had the lowest R^2 at 0.44, which, while approaching the lower bound of acceptability, still meets the minimum threshold for meaningful interpretation. The detailed R^2 values for each construct are provided in Table 6.

Effect Size (f^2) Analysis

The effect size (f^2) evaluation indicated that several exogenous constructs exerted substantial influence on their respective endogenous variables. Notably, the paths from WQ2 to ISSM3 ($f^2 = 1.455$) and from WQ3 to ISSM2 ($f^2 = 1.324$) demonstrated very large effects. In comparison, ISSM4 to ISSM5 ($f^2 = 0.792$) and ISSM5 to ISSM6 ($f^2 = 0.453$) represented moderate contributions within the structural model.

Table 4: Internal Consistency

	Cronbach's alpha	Composite reliability (ρ_c)	Average variance extracted (AVE)
ISSM1	0.782	0.873	0.698
ISSM2	0.915	0.946	0.854
ISSM3	0.897	0.936	0.829
ISSM4	0.92	0.95	0.863
ISSM5	0.715	0.839	0.636
ISSM6	0.834	0.9	0.751
WQ1	0.852	0.911	0.772
WQ2	0.81	0.887	0.724
WQ3	0.871	0.921	0.795

Table 5: Internal Loading

	ISSM1	ISSM2	ISSM3	ISSM4	ISSM5	ISSM6	WQ1	WQ2	WQ3
ISSM1	0.84								
ISSM2	0.73	0.92							
ISSM3	0.70	0.76	0.91						
ISSM4	0.65	0.58	0.67	0.93					
ISSM5	0.57	0.53	0.58	0.67	0.80				
ISSM6	0.60	0.64	0.69	0.70	0.76	0.87			
WQ1	0.74	0.64	0.75	0.66	0.59	0.70	0.88		
WQ2	0.75	0.66	0.77	0.53	0.58	0.60	0.73	0.85	
WQ3	0.73	0.76	0.69	0.56	0.53	0.57	0.65	0.79	0.89

Table 6: Coefficient of Determination

Construct	R ²	Interpretation
ISSM1	0.55	Moderate
ISSM2	0.57	Moderate
ISSM3	0.59	Moderate
ISSM4	0.51	Moderate
ISSM5	0.44	Moderate to Weak
ISSM6	0.65	Moderate

On the other hand, the relationship from ISSM2 to ISSM4 yielded an f^2 value of 0.000, indicating no measurable impact and suggesting that this linkage does not play a significant role in the proposed framework.

The Path Coefficients

The path coefficients provided additional evidence supporting the structural links between the model’s constructs. Significant positive relationships were found in paths such as ISSM3 → ISSM4 ($\beta = 0.41, p = 0.01$), ISSM4 → ISSM5 ($\beta = 0.67, p = 0.00$), and ISSM5 → ISSM6 ($\beta = 0.53, p = 0.00$). Together, these findings align with the theoretical expectation that satisfaction influences behavioral intention, which subsequently drives perceived benefits. Among the predictors from WebQual, WQ1 to ISSM1, WQ2 to ISSM3, and WQ3 to ISSM2 all demonstrated strong, significant impacts ($\beta > 0.74, p < 0.001$). However, the path from ISSM2 to ISSM4 ($\beta = 0.01, p = 0.94$) was statistically insignificant, indicating a weak or nonexistent relationship.

Beyond direct effects, the structural relationships indicate an indirect mechanism in which Information Quality influences Net Benefit through User Satisfaction and Use Intention. This pattern supports the mediating role of satisfaction-related constructs within the integrated WebQual–ISSM framework.

The insignificant relationship between service quality and user satisfaction ($\beta = 0.01, p = 0.94$) suggests that users prioritize system reliability and information accuracy over service response. This may reflect their primary focus on functional access rather than interpersonal service support.

Predictive Relevance

In the final phase of model evaluation, the Q^2 predict values for all constructs were found to exceed 0.30,

demonstrating that the model possesses satisfactory predictive capability, with a range from moderate to strong. The highest predictive relevance was observed for ISSM3 (0.586) and ISSM2 (0.548). In contrast, ISSM5 recorded the lowest Q^2 value at 0.308, which nonetheless meets the minimum threshold for acceptability. These results suggest that the proposed model not only accounts for variance in the endogenous constructs but also offers meaningful predictive utility, particularly in the context of community adoption and use of smart city applications.

Overall, the inner model demonstrates an acceptable level of quality, characterized by moderate to strong explanatory power, statistically significant relationships that align with theoretical expectations, and satisfactory predictive relevance across the majority of constructs. Collectively, these results support the applicability of the integrated WebQual–ISSM framework for evaluating both user perceptions and the broader societal impact of the mSmart application in the context of Labuan Bajo.

In this model, Net Benefit (ISSM6) represents perceived community welfare improvement derived from mSmart, including increased access to digital public services, better participation in local governance, and enhanced market visibility for MSMEs and farmers.

The PLS-SEM analysis confirms strong construct validity for ISSM6, with all outer loadings exceeding 0.80, an AVE of 0.751, and composite reliability of 0.900. Its R^2 value of 0.65 indicates substantial explanatory power, while $Q^2 = 0.365$ provides evidence of predictive relevance. Path analysis further reveals a significant relationship between ISSM5 (Use Intention) and ISSM6 ($\beta = 0.53, p < 0.01$), demonstrating that continued use of the application contributes meaningfully to perceived social impact.

Overall, these findings affirm that digital platforms such as mSmart can generate measurable improvements in social well-being and support the achievement of SDG 11 and SDG 8 in the context of emerging smart cities (Nations, 2023; Kaiser and Deb, 2025). Importantly, these results indicate empirical alignment with SDG 11 and SDG 8 objectives, rather than implying direct causal measurement of SDG indicators.

The linkage between the findings of this study and Sustainable Development Goals (SDG) 8 and 11 should be interpreted as evidence of alignment rather than direct

measurement of SDG indicators. The significant relationship between Use Intention (ISSM5) and Net Benefit (ISSM6) reflects perceived improvements in access to services, participation, and local economic opportunities, which conceptually correspond to inclusive urban services (SDG 11) and support for decent work and economic growth (SDG 8). Accordingly, this study demonstrates how community-based digital platforms can empirically support SDG-oriented outcomes without claiming direct causal measurement of global development targets.

Evaluation of Application Functions on Social Impact

To assess the contribution of each application module to community well-being within the smart city framework, a contribution matrix was developed. This matrix links the functional modules of the mSmart application with their corresponding success indicators, direct outputs, perceived social impacts, and levels of contribution. The latter is determined by the empirical strength of the structural relationships, as measured by path coefficients (β) and effect sizes (f^2) from the PLSSEM analysis.

The interpretation of contribution levels follows two primary criteria: The path coefficient (β) and the effect size (f^2). A high contribution level is identified when $\beta \geq 0.30$ and $f^2 \geq 0.35$, indicating a strong structural relationship and substantial influence of the predictor variable. A medium level is assigned when β falls between 0.15 and 0.29 and/or f^2 ranges from 0.15 to 0.34, suggesting a moderate effect with a supportive role in the model. A low contribution level is defined by $\beta < 0.15$ and/or $f^2 < 0.15$, reflecting a weak or statistically limited influence. These thresholds provide a practical framework for assessing the magnitude and relevance of each module's impact within the structural model.

Contribution levels were classified as High ($\beta \geq 0.30$ and $f^2 \geq 0.35$), Medium ($\beta = 0.15\text{--}0.29$ & $f^2 = 0.15\text{--}0.34$), and Low ($\beta < 0.15$ & $f^2 < 0.15$), adapted from Hair et al. (2021).

The contribution matrix indicates that most application modules achieve high contribution levels, reflecting a strong alignment between functional design and the community's perceived value. The dimensions of information quality, usability, and responsiveness (WQ1–WQ3) display strong predictive links to satisfaction related constructs (ISSM1–ISSM3), with path coefficients exceeding 0.74 and effect sizes above 0.80 evidence of robust functional effectiveness.

In addition, the structural paths from User Satisfaction (ISSM4) to Use Intention (ISSM5), and from Use Intention to Net Benefit (ISSM6), underscore the behavioral and outcome relevance of these relationships. These findings support the view that higher satisfaction levels encourage sustained application use, which, in turn, strengthens perceived social outcomes. Such outcomes

include improved access to public services, greater inclusion of marginalized groups, and enhanced support for MSMEs and farmers.

This study introduces a novel approach by integrating WebQual and ISSM to evaluate not only system success but also measurable social impact within community based smart city initiatives, a dimension often overlooked in prior models

The proposed contribution matrix further advances evaluative practices by linking application functionalities with specific dimensions of social impact awareness, inclusion, trust, engagement, literacy, and welfare, providing a replicable framework for other developing region smart city projects.

Issues of security and privacy are implicitly embedded within users' trust and interaction quality perceptions in this study. In community-based digital platforms, particularly in developing contexts, users often evaluate system trustworthiness through responsiveness, transparency, and perceived reliability rather than explicit technical safeguards. The strong influence of interaction quality (WQ3) on service-related constructs indicates that timely feedback and responsible data handling play a critical role in sustaining user confidence. As smart city applications evolve, future implementations of mSmart may incorporate explicit security and privacy mechanisms to further strengthen trust and long-term engagement.

Conclusion

This study assessed the social impact of the mSmart application, a community-oriented smart city initiative in Labuan Bajo, by integrating the Information Systems Success Model (ISSM) with the WebQual framework. Through PLS-SEM analysis, the results confirmed that system quality, information quality, and service quality significantly influence user satisfaction and use intention, both of which strongly affect perceived social benefits (Net Benefit). The measurement model met the criteria for reliability, convergent validity, and discriminant validity, while the structural model revealed meaningful and statistically significant relationships among the constructs.

These findings demonstrate the capacity of the mSmart platform to foster digital engagement, improve service accessibility, and drive community-level transformation in the context of an emerging smart city. Combining the quantitative model results with the functional contribution matrix provided a comprehensive perspective on both direct and indirect impacts of the application on local welfare. In particular, the results show that high-quality digital services, especially in terms of usability and responsiveness, enhance user satisfaction and engagement, which in turn contribute to broader social outcomes. These outcomes align with the objectives of SDG 11 and SDG 8 by supporting inclusive public services and empowering local MSMEs through

digital tools, underscoring the broader value of community-based smart city solutions for advancing social inclusion and economic resilience.

Limitations of this study include a narrow demographic scope, self-reported responses, and the absence of longitudinal data. These factors should be addressed in future research to validate the model across broader populations and timeframes.

Future studies could expand this model by incorporating longitudinal data to assess sustained impacts, or by adopting qualitative methods to capture richer insights into community perceptions and behavioral change. Comparative research across regions or platforms may also strengthen generalizability and guide the adaptation of smart city strategies to different sociocultural contexts.

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Author's Contributions

Hendro Nindito: Formal analysis, visualization, write original draft, and write review and edited.

Evaristus Didik Madyatmadja: Conceptualization, Supervision, project administration, and write review and edited.

Siti Elda Hierra and Maryani: Methodology, formal analysis, investigation, and data curation.

Ethics

The authors confirm that this manuscript has not been published elsewhere and that no ethical issues are involved.

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