COMMUNICATIONS IN SUSTAINABILITY AND DEVELOPMENT
Homepage: csd.kipmi.or.id

Bridging the divide: An empirical examination of digital factors influencing the readiness of the Bidayuh community for technological governance in Sarawak

Susan Anak Mawa, Hemaloshinee Vasudevan*, Heinko Dona Bin Madon, Noorseha Binti Ayob

Tun Razak Graduate School, Universiti Tun Abdul Razak, Wilayah Persekutuan Kuala Lumpur 50400, Malaysia

Article history:
Received: 25 March 2026 / Received in revised form: 12 May 2026 / Accepted: 28 May 2026

Abstract

Technological governance is vital as communities and governments embrace digitalization, highlighting the need to assess Indigenous communities' preparedness for these changes. The research focuses on the Bidayuh community in Sarawak, Malaysia, highlighting its unique socio-cultural context and the growing emphasis on digital governance in the region. Despite global digitization, the Bidayuh community struggles with inadequate technological infrastructure, as characterized by limited internet connectivity, unreliable power supply, and insufficient access to modern communication technologies. This present study examines the digital factors affecting the Bidayuh community's preparedness for technological governance, concentrating on two main aspects: technological infrastructure, digital literacy and attitudes. A structured survey utilizing a quantitative research methodology was conducted with a sample of 384 respondents from various Bidayuh districts, employing a cross-sectional design and stratified random sampling to ensure representativeness. The analysis employed multiple regression, correlation analysis, and MANOVA to examine the relationships between independent variables (i.e. technological infrastructure, digital literacy and attitudes) and the dependent variable (i.e. readiness for technological governance). Digital literacy has a significant impact on community competence, highlighting the significance for targeted educational programs. While acknowledging the significance of technological infrastructure, it is pivotal to emphasize the necessity of complementing it with digital skills and positive attitudes to improve readiness for technological governance. The findings indicate significant positive correlations between independent variables and technological governance readiness, being the most notable predictors. The present study offers insights into how digital factors can improve Indigenous communities' readiness for technological governance, and provides recommendations for policymakers in Sarawak and similar areas. Key elements include enhancing digital literacy, and fostering positive attitudes towards technology, which are vital for the Bidayuh community's preparedness for future governance in the digital age.

Keywords: Technological infrastructure; digital literacy and attitudes; readiness for technological governance

1. Introduction

Governments are encountering new and complex challenges in their efforts to implement digital transformation and create a digital economy [1]. In the context of Sarawak's goal to become a Digital Economy Powerhouse, the Bidayuh community finds itself at a crossroads of tradition and technology. The adoption of digital governance is vital for their progression into the digital era, necessitating a comprehensive evaluation of their readiness for technological adoption to facilitate a smooth transition into this new phase. The pace of digital development is accelerating significantly [2]. Digital Future is defined as the transformative environment influenced by the swift development and amalgamation of digital technologies across human life, impacting social, economic, political, and cultural spheres. Innovations that were once viewed as elements of science fiction, such as smartphones, global networks, and virtual reality, have become integral to daily life [3]. Societies are becoming increasingly dependent on digital technologies and their supporting infrastructure. Societies are becoming increasingly dependent on digital tools and platforms for navigation, communication, transactions, information access, and governance participation. The concept of accessibility of government services refers to ease with which the members of community are capable of utilizing digital platforms to access public services and information. E-government investments are most effective through their integration with civil service reform initiatives. Such reform includes not only technological changes but also improvements in civil service skills and culture to enhance professionalism, collaboration, accountability, and transparency. Technological infrastructure is crucial for internet connectivity and the operation of technology devices [4]. However, the Bidayuh community is confronted with challenges such as limited internet access, unreliable power, and inadequate access to modern

* Corresponding author.
Email: hemaloshinee@unirazak.edu.my
https://doi.org/10.21924/csd.1.1.2026.1948

communication technologies [5]. Digital literacy has been identified as a key factor in determining the Bidayuh community's readiness for technological governance, with a significant proportion of the population lacking the essential skills to navigate digital platforms and utilize technological tools [6]. Prevalent attitudes towards technology vary ranging from apprehension and skepticism to enthusiasm and acceptance. These attitudes influence the willingness of individuals to adopt digital practices and engage in technological governance [7]. The acquisition of new digital skills poses challenges, especially for community members with financial barriers to technical education [8,9]. The relationship between these obstacles and the community's engagement with digital governance systems is insufficiently examined in current literature. In the Bidayuh community, accessibility to government services is restricted due to inadequate digital infrastructure and varying levels of digital literacy and digital inequality [10]. This has resulted in difficulties in accessing essential services online, thereby exacerbating socioeconomic inequalities and hindering the community's preparedness for technological governance [11]. Despite technology's potential for socio-economic development, the Bidayuh community is confronted with challenges including inadequate infrastructure, low digital literacy, and limited access to government services. These issues indicate an urgent need for interventions to enhance infrastructure, improve digital literacy, increase service access, and foster active community participation in technological governance.

2. Literature Review

The present study evaluates the Bidayuh community's readiness for technological governance, examining the interaction of various factors within the context of Indigenous communities and technological integration. In Malaysia, Indigenous communities such as the Bidayuh encounter significant challenges due to geographic isolation, which restricts the development of essential digital infrastructure. Consequently, these communities frequently lack access to reliable internet services, digital devices, and supporting technology, which limits their ability to utilize digital government services, participate in online education, and engage with societal developments [12]. The conceptual framework (Fig. 1) aims to explore how independent variables, such as technological infrastructure, digital literacy and attitudes, influence government service accessibility and affect the Bidayuh community's readiness for technological governance.

Conceptual Framework

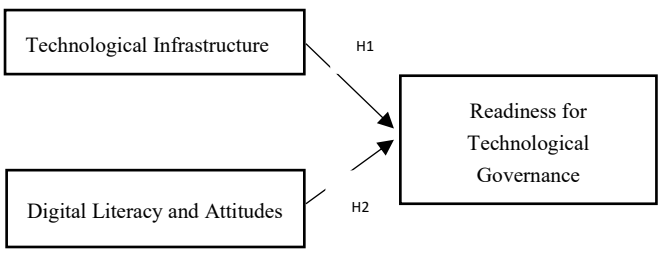

Fig. 1. Digital factors on Bidayuh community readiness for technological governance

The study adopts a multidimensional approach that integrates Diffusion of Innovations Theory, Technology Acceptance Model (TAM), and Cultural-Historical Activity Theory (CHAT) to understand the Bidayuh community's readiness for technological governance, addressing both individual and socio-cultural factors. The model suggests that DOI (Infrastructure) facilitates physical participation, while TAM (Literacy and Attitudes) fosters the willingness to engage. CHAT serves as the framework explaining the differences between the Bidayuh and urban populations due to dialect, isolation, and socio-cultural norms. The research findings indicate that Digital Literacy & Attitudes emerges as the strongest predictor of governance readiness (beta = 0.390). This indicates that the "human capital" aspect of TAM is more crucial compared to the "hardware" aspect of DOI (beta = 0.323). The H1 (Infrastructure → Readiness) postulates that according to the Diffusion of Innovations (DOI) theory, the availability and quality of technology are essential prerequisites for community innovation adoption. The adoption process cannot commence without this foundational "hardware" layer. The H2 investigates the psychological factors influencing digital system adoption, based on the theoretical framework of Technology Acceptance Model (TAM). The study posits that a positive attitude and the perceived ease of use, influenced by literacy, are key predictors of actual utilization of digital systems. Technological innovations which align with the cultural values, needs, and existing capabilities of the Bidayuh community are more likely to be adopted [13]. Digital tools that aid in preserving Bidayuh language and cultural heritage are likely to be adopted more readily due to their perceived advantages and compatibility. Conversely, technologies viewed as complex or incompatible with traditional practices may encounter resistance. The evaluation of technological infrastructure is consistent with the Diffusion of Innovations Theory, focusing on how the availability and quality of technology influence adoption rates [14,15]. For the Bidayuh community, reliable internet connectivity, access to digital devices, and supporting infrastructure are all essential for the effective diffusion of beneficial technological innovations. The theory emphasizes the need for an environment that fosters technological innovation. Investments in infrastructure and tailored community training have the potential to enhance its readiness for the adoption of digital governance systems [16,17]. The present study employs the Diffusion of Innovations Theory to explore the factors affecting the Bidayuh community's readiness for technological governance, highlighting both technological and socio-cultural dynamics that influence technology adoption. This holistic approach aims to identify successful pathways for integrating technological innovations into the lives of the Bidayuh people. The present study hypothesizes that perceived usefulness significantly influences the adoption of technological tools and digital governance systems by the Bidayuh community. When community members recognize tangible benefits, such as enhanced access to government services and improved communication, they are more inclined to embrace these technologies in their daily routines. TAM incorporates external variables impacting perceived usefulness and ease of use, subsequently influencing technology usage intent [18,19]. In the Bidayuh context, cultural beliefs, social norms, and

technological infrastructure are of significance. The reliability of internet connectivity and access to digital devices has been demonstrated to enhance the perceived ease of use and usefulness of the system. Community leaders play a crucial role in endorsing technology, affecting community perceptions and adoption [20]. This structured approach to Cultural-Historical Activity Theory highlights that technology adoption and digital governance integration in the Bidayuh community are influenced by its socio-cultural and historical context. The objective of the present study is to provide insights into the effective introduction and maintenance of technological advancements that are in alignment with the community's cultural identity and values of the community. The hypothesis has been subjected to the test and interpretation, with reference to both Fig. 1 and Table 1.

H1: Technological infrastructure is positively related to the Bidayuh communities' readiness for technological governance.

Technological infrastructure is essential for community preparedness regarding technological adoption, with studies indicating that reliable internet, hardware, and software access notably enhances communities' capacity to engage in digital governance [21]; [22]. These findings indicate that insufficient infrastructure is a significant impediment to community preparedness for technological governance due to a lack of essential tools and connectivity. Technological infrastructure positively influences readiness for governance outside of the Bidayuh community, as highlighted by [23], who observed that urban areas benefit notably in preparing for smart city initiatives. Technological infrastructure is crucial for effective technological governance, as research demonstrates that communities with strong infrastructure display greater readiness, even in the absence of other supportive factors such as digital literacy. This fundamental element significantly enhances the effectiveness of other components, as evidenced by the findings by [24] and [25]. These studies highlight the pivotal role of digital infrastructure in facilitating digital adoption and governance.

H2: Digital literacy and attitudes are positively related to the Bidayuh communities' readiness for technological governance.

Digital literacy has been demonstrated to have a significant influence on a community's capacity to adapt to technological changes. Research demonstrates that enhanced digital literacy leads to improved understanding and engagement with digital governance systems. Moreover, positive attitudes towards digital tools are associated with increased participation in governance initiatives [26]. The correlation between digital literacy and governance readiness is supported across various cultural and socio-economic contexts. [27] found that in economically diverse areas, increased levels of digital literacy resulted in a higher acceptance and utilization of digital governance platforms, irrespective of the local context. Digital literacy is frequently viewed as being of less critical in communities characterized with robust traditional governance. However, studies by [28] demonstrate its importance in integrating traditional and technological governance. Furthermore, [29] highlight that digital literacy fosters community engagement with digital governance platforms, emphasizing its vital role in enhancing technological readiness, irrespective of existing governance structures.

Table 1. Theoretical integration and variable selection

Theory	Role in Model	Variable Linkage
Diffusion of Innovations (DOI)	Adoption speed and spread are influenced by the level of environmental readiness.	Technological Infrastructure (TI) serves as the essential "enabling environment" for the diffusion of digital tools.
Technology Acceptance Model (TAM)	Individual intent is shaped by psychological perceptions, highlighting the influence of mental frameworks on decision-making and behaviour.	Perceived ease of use in digital literacy influences literacy levels, while perceived usefulness affects attitudes towards technology.
Cultural-Historical Activity (CHAT)	The Bidayuh people are confronted with numerous socio-cultural challenges, rooted in historical barriers.	Traditional values and geographic isolation influence current digital engagement, highlighting their role in the Readiness for Technological Governance (RTG).

3. Materials and Methods

This present research employs a quantitative approach to objectively examine the technological infrastructure, digital literacy, attitudes, and access to government services within the Bidayuh community. The quantitative approach utilizes structured tools, such as questionnaires, to gather data for statistical analysis. The research employs a descriptive-explanatory design to effectively outline the Bidayuh community's digital readiness, emphasizing technological infrastructure, digital literacy and attitudes toward technology. The cross-sectional design is utilized to gather data at a specific time to evaluate the community's current state of readiness. This method avoids complications associated with longitudinal studies, thereby ensuring its suitability within the research's scope and resources. The implementation of a one-time survey using structured questionnaires serves to enhance data reliability by allowing respondents to share their inputs without researcher interference. The study employs a deductive reasoning approach, starting with established theories on technological readiness, governance, and digital literacy. These theories are then tested within the Bidayuh community context, moving from general frameworks to specific hypotheses evaluated through empirical data. The deductive reasoning approach is effective for this research as it tests established theories against collected data, confirming or refuting hypotheses. The objective of this study is to identify causal relationships between variables such as digital infrastructure and community readiness, thereby producing scientifically grounded conclusions and minimizing speculative findings. The study employs a cross-sectional time horizon to capture a snapshot of the community's readiness at a specific moment, aligning with its focus on assessing the current situation rather than temporal changes. The selected statistical techniques for hypothesis testing - multiple regression analysis, regression ANOVA, beta coefficients, and multicollinearity regression - support a quantitative approach. This present study utilizes

statistical techniques with SPSS software for data analysis, involving two main phases: descriptive statistics and inferential statistics. The proposed method is appropriate for the analysis of relationships between multiple independent variables and a dependent variable. In this particular instance, the digital factors affecting the Bidayuh community's readiness for technological governance. These robust techniques ensure rigorous examination and accurate interpretation of variable relationships.

3.1. Sampling population and unit of analysis

In this study, the sampling population includes individuals from the Bidayuh community, with the objective of evaluating their level of readiness for technological governance. This evaluation involves the examination of factors such as technological infrastructure, digital literacy and attitudes, and access to government services. The estimated Bidayuh population is approximately 197,000, as per the Sarawak State Government report in year 2021. A stratified random sampling technique will be used to ensure representation of various dialect groups within this population. The distribution of the Bidayuh population will be used to guide the proportional allocation of sample size to ensure a comprehensive understanding of the community's readiness for technological governance (see Table 2).

Table 2. Estimated Bidayuh population by administrative district

District	Population
Kuching	82,400
Bau	41,900
Lundu	13,500
Serian	38,800
Samarahan	6,700
Other district	13,700
Total	197,000

3.2. Sampling techniques and sample size

This present study utilizes stratified random sampling to represent various subgroups within the Bidayuh community. This method divides the population into distinct strata, from which random samples are drawn, thus enhancing the reliability and validity of the findings. The study employs stratified random sampling to account for the diversity within the Bidayuh community, which includes various dialect groups and geographic locations in Sarawak. This approach is designed to ensure proportional representation of each subgroup, thereby enhancing the understanding of the community's readiness for technological governance. In accordance with the sample size formula $S=\chi2\times NP(1-P) \div d2\times(N-1)+\chi2P(1-P)$, it can be ascertained that S is the sample size, $\chi2$ is the chi-square value (3.841 for a 95% confidence level), N is the population size, P is the population proportion (0.5 for maximum variability), and d is the margin of error (0.05). A calculation for the Bidayuh community, estimated to have 197,000 individuals, would utilize these parameters as follows Eq. 1.

$$S=\{3.841\times197{,}000\times0.5\times(1-0.5)\}\div\{0.01\times(197{,}000-1)+3.841\times0.5\times(1-0.5)\}. \quad (1)$$

According to this formula, a sample size of approximately 384 individuals is necessary to attain a 95% confidence level with a 5% margin of error.

3.3. Research instrument

The questionnaire comprises five sections: Section A collects demographic data, while Sections B, C, and D are designed to gather relevant data for the study. The study utilized a five-point Likert scale, ranging from “strongly disagree” (1) to “strongly agree” (5), thereby enabling respondents to indicate their level of agreement or disagreement with the statements. Each section incorporates multiple items derived from literature to effectively measure each construct. All parts of the questionnaire have been thoroughly assessed for their relevance to the Bidayuh community's preparedness for technological governance. A comprehensive evaluation of the questionnaire's design, including the measured variables, items, and their adapted sources, is presented in Table 3.

Table 3. Measurement items

Constructs	Measurement Items	Likert Scale
Technological Infrastructure	TI1: I consistently have an access to the internet at home. TI2: The internet connection is stable and reliable. TI3: I have digital devices such as a smartphone, laptop, tablet, and desktop in my household. TI4: I regularly utilize the internet for various activities. TI5: Internet access is widely available in the community.	5 Likert Scale
Digital Literacy & Attitude	DL1: I am capable of operating basic computer tasks such as sending emails and utilizing word processing software. DL2: I am skilled in utilizing the internet for various activities, including information search, social media engagement, and online shopping. DL3: I am aware of online safety practices, including recognizing phishing scams and setting strong passwords. DL4: I regularly participate in online learning or training programs. DL5: I find it easy to learn and adopt new digital technologies.	5 Likert Scale
Readiness for Technological Governance	RTG1: I am familiar with the Sarawak digital government services including online bill payments and e-government portals. RTG2: I regularly utilize Sarawak digital government services. RTG3: The access of Sarawak government services online is straightforward. RTG4: I am satisfied with the Sarawak digital government services I have utilized. RTG5: I believe that Sarawak digital government services satisfy my needs effectively.	5 Likert Scale

4. Results and Discussion

The study analyzed the response rate of a survey administered within the Bidayuh community, with a focus on their level of readiness for technological governance. Of the

614 questionnaires distributed, 384 usable responses were received, resulting in an approximate response rate of 62.5%. This engagement level serves to emphasize the effectiveness of online questionnaires in data collection, particularly in cases involving specific populations, thus highlighting the importance of community involvement in research.

4.1. Profile of respondents

In this study, 384 respondents from the Bidayuh community participated, with a demographic profile indicating 53.1% male and 46.9% female representation. The age distribution of the population was as follows: 30.5% of the population were aged between 46 and 55, 23.2% were aged between 36 and 45, and 20.6% were aged above 55. In terms of educational level, 34.6% of the participants held a bachelor's degree, 26.8% had diplomas or certificates, and there were no participants without formal education. For occupation, 32.3% of the subjects were government employees, and 25.8% were employed in the private sector. The monthly household income of respondents varied, with 25.0% of respondents earning between RM 3,001 and RM 5,000. The respondents were also from diverse districts, with 24.7% from Siburan District and 21.9% from Padawan District, critical for understanding technological governance readiness in the Bidayuh community.

Table 4. Respondents profile

Demographic	Category	Frequency	Percent (%)
Gender	Male	204	53.1
	Female	180	46.9
Age	18-25	45	11.7
	26-35	54	14.1
	36-45	89	23.2
	46-55	117	30.5
	55 above	79	20.6
Education level	No formal education	0	0
	Primary education	3	0.8
	Secondary education	102	26.6
	Diploma/Certificate	103	26.8
	Bachelor's degree	133	34.6
	Master's degree or higher	43	11.2
Occupation	Farmer	17	4.4
	Government Employee	124	32.3
	Private Sector Employee	99	25.8
	Business Owner	25	6.5
	Student	19	4.9
	Unemployed	9	2.3
	Others	91	23.7
Monthly Household Income	Below RM1,000	60	15.6
	RM 1,001 – RM 3,000	94	24.5
	RM 3,001 – RM 5,000	96	25.0
	RM 5,001 – RM 7,000	49	12.8
	Above RM 7,000	85	22.1
Area of Residence	Bau District	43	11.2
	Serian District	68	17.7
	Padawan District	84	21.9
	Lundu District	23	6
	Siburan District	95	24.7
	Others	71	18.5

4.2. Reliability analysis

The present study utilized Cronbach's Alpha, a recognized measure for survey reliability, to assess the internal consistency of constructs -Technological Infrastructure, Digital Literacy and Attitudes toward technology. The findings indicated that all constructs had acceptable internal consistency, with Cronbach's Alpha values exceeding the 0.70 threshold common in social science research. As demonstrated in Table 5, the technological infrastructure construct demonstrated a Cronbach's Alpha of 0.763, indicating satisfactory internal consistency, thus suggesting that the survey items effectively measure the intended construct and subsequent other constructs.

Table 5. Reliability Test

Construct	Number of Items	Cronbach's Alpha
Technological Infrastructure	5	0.763
Digital Literacy and attitudes	5	0.790
Readiness for Technological Governance	5	0.770

4.3. Construct validity and factor analysis

Table 6. Construct validity and factor analysis

Construct	Item Code	Factor Loading	KMO Measure	Bartlett's Test (Sig.)	Average Variance Extracted (AVE)
Technological Infrastructure	TI1 - TI5	0.712 – 0.845	0.812	0.000	0.584
Digital Literacy & Attitudes	DL1 - DL5	0.698 – 0.821	0.845	0.000	0.612
Readiness for Tech Governance	RTG1 - RTG5	0.745 – 0.860	0.798	0.000	0.597

It was evident that all items for the three constructs exceeded the 0.5 loading threshold, signifying their significant contributions to their respective variables. The KMO values exceeding 0.7 indicate that the sample size of 384 is sufficient for factor analysis. The significance value of 0.000 ($p < .001$) indicates that the data is appropriate for structure detection and suggests a relationship among the variables. The Average Variance Extracted (AVE) for all constructs is above 0.5, indicating that the items in each construct account for more than half of the variance. The correlation matrix indicates that variables, such as TI and RTG ($r = 0.526$), are related but remain distinct constructs without significant overlap or multicollinearity issues. The findings indicate that the research instrument successfully measures key digital factors, thus reinforcing the notion that Digital Literacy & Attitudes serves as the main predictor of readiness, with a statistically validated measurement for reliability and accuracy (beta = 0.390).

4.4. Correlation analysis

The present study conducted a correlation analysis to

explore the relationships among key variables: The technological infrastructure (TI), digital literacy and attitudes and readiness for technological governance (RTG). Pearson's correlation coefficient (r) was employed to assess the strength and direction of these relationships, following Cohen's (1988) criteria for interpretation of correlations as small (r = 0.10 to 0.29), moderate (r = 0.30 to 0.49), or large (r = 0.50 and above). Table 7 demonstrates a positive correlation matrix among key variables, indicating a correlation between higher technological infrastructure, digital literacy, and favorable technology attitudes, correlate with increased readiness for technological governance. The correlation between Technological Infrastructure (TI) and the variables under study was found to be positive, with a particularly strong association observed between TI and government service accessibility ($r = 0.553$, $p < 0.001$). This finding suggests that enhanced quality and accessibility of TI leads to improved access to government services, aligning with the conclusion of López et al. (2021) on the importance of strong infrastructure for digital service access. Digital literacy (DL) has been demonstrated to be positively correlated with readiness for technological governance (RTG), with a significant relationship indicated by $r = 0.558$, $p < 0.001$. This finding aligns with those of Hsu & Chiu (2021), who highlighted the pivotal role of digital competence in empowering communities to prepare for digital transformation. Digital literacy and attitudes are significantly correlated with RTG ($r = 0.618$, $p < 0.001$), indicating that those with favorable views on technology are more likely to engage with technological governance. This finding supports the argument of Teo's (2020) that positive attitudes toward technology are essential for the successful adoption of digital governance. The correlation analysis highlights that the independent variables (TI, DL, ATT) are significantly associated with the dependent variable (RTG), indicating the significance of enhancement for the Bidayuh community's technological governance readiness. A notable correlation ($r = 0.618$) between ATT and RTG underscores the need for a positive technological mindset. Furthermore, the interrelated moderate-to-strong correlations among TI, DL, and ATT suggest that they collectively enhance technological readiness.

Table 7. Correlation matrix

Variables	TI	DL	T&A	RTG
Technological Infrastructure	1	0.521**	0.482**	0.526**
Digital Literacy & Attitudes	0.521**	1	0.571**	0.558**
Readiness for Technological Governance	0.526**	0.558**	0.618**	1

4.5. Multiple regression analysis

The multiple regression analysis examines the relationship between various independent variables (digital literacy and attitude, technological infrastructure) and the dependent variable of readiness for technological governance, identifying significant predictors of satisfaction. As demonstrated in the summary as presented Table 8, the regression model exhibits a high degree of significance, with an R value of 0.750. This demonstrates a significant positive correlation between independent variables, including internet infrastructure and digital literacy, and the dependent variable of satisfaction with Sarawak's digital government services. The R Square value of 0.562 suggests that 56.2% of the variance in satisfaction with Sarawak digital government services is accounted for by the model, indicating a strong influence of the predictors on satisfaction levels. The Adjusted R Square value is 0.539, which indicates satisfactory fit while adjusting for the number of predictors, thus helping to prevent the overestimation of explanatory power. The Standard Error of the Estimate is 0.720, indicating a moderate prediction error in model accuracy for satisfaction levels. The F Change of 24.573 at a significance level of 0.000 confirms the model's statistical significance, suggesting that the independent variables collectively predict satisfaction with digital services effectively. The observed change in R Square (0.562) further emphasizes that at least one predictor has a substantial impact on the model [30].

Table 8. Multiple regression model summary

Model	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	Sig. F Change
1	.562	.539	.720	.562	24.573	.000

4.6. ANOVA in multiple regression analysis

The ANOVA table in the multiple regression analysis reveals the allocation of variance between explained and unexplained amounts. This findings of this study indicate the statistical significance of the model, thereby demonstrating that the independent variables (i.e. technological infrastructure, digital literacy, attitudes towards technology, and Sarawak technological government readiness) contribute to explaining the dependent variable, which is satisfaction with Sarawak digital government services. The sum of squares for the regression is 241.901, highlighting the explained variance by the model. The residual sum of squares of 188.596 represents the unexplained variance between observed and predicted values in the model, indicating error or noise. The total sum of squares is 430.497, which indicates the total variance in the dependent variable. The regression mean square is 12.732, derived from the regression sum of squares divided by degrees of freedom, while the residual mean square is 0.518. An F-value of 24.573 indicates a favorable model fit compared to chance. The regression model demonstrates statistical significance at the 0.05 level, as indicated by a Sig. value of 0.000. This finding suggests a low probability that the relationship between independent variables and the dependent variable is due to chance. This supports the hypothesis that digital infrastructure, literacy, and attitudes towards technology significantly affect satisfaction with Sarawak's digital government services.

Table 9. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	241.901	19	12.732	24.573	.000b
Residual	188.596	364	.518		
Total	430.497	383			

4.7. Multiple regression coefficients for readiness

Table 10. Multiple regression coefficients

Predictor Model	Standardized Beta (β)	t-value	Significance (p)
(Constant)			
Technological Infrastructure	0.323	9.44	.000
Digital Literacy & Attitudes	0.390	11.51	.000

As demonstrated in Table 10, the regression model exhibited statistical significance, as indicated by the result of the F test (19, 364) = 24.573, $p < .001$. This finding indicates that the independent variables effectively predict the community's readiness for technological governance. The R^2 value of .562 indicates that 56.2% of the variance in the Bidayuh community's readiness is explained by the digital factors in the model. The model demonstrates that for each standard deviation increase in literacy and positive attitudes, there is a by 0.390 standard deviation increase in readiness, thereby supporting the conclusion that competence is critical for engagement. Although infrastructure exerts a slightly less significant influence than literacy, it is nevertheless a significant positive predictor. This finding indicates that while having the right tools is essential, it is not the sole requirement. The findings of this study provide empirical support for both H1 (Infrastructure) and H2 (Literacy/Attitudes) due to p-values being less than .05. Digital Literacy & Attitudes has been identified as the strongest predictor of engagement (beta = 0.390). A key policy recommendation is to move beyond a "one-size-fits-all" digital strategy by establishing Community Digital Hubs for the Bidayuh community. These hubs should provide tailored training in local languages, enhancing confidence and demonstrating the practical value of e-government services, rather than merely offering internet access. Another key implication involves incentivizing digital adoption. If the community has a positive attitude towards technology yet encounters difficulties with government portals, policy should focus on improving User Experience (UX). Making portals mobile-friendly and culturally relevant can facilitate active usage.

5. Conclusion

The study emphasizes the necessity for specific strategies to improve the Bidayuh community's preparedness for technological governance, accompanied by proposed recommendations. The research under discussion highlights critical implications for policy makers in advancing digital governance within indigenous communities such as the Bidayuh. It emphasizes the necessity for inclusive policies that address the needs of marginalized groups, with a focus on essential components such as digital infrastructure, literacy, and accessible government services for the successful implementation of technological governance. **A** primary recommendation emphasizes the necessity for a robust digital infrastructure strategy aimed at rural and indigenous communities in Malaysia. Despite progress facilitated by national broadband initiatives, the technological infrastructure in these areas remains inadequate for effective digital governance. Policymakers should prioritize investments to enhance broadband access and connectivity in remote regions, ensuring that these initiatives are aligned with the socio-economic conditions of indigenous groups. Programs such as Malaysia's Jendela initiative can strategically allocate resources to ensure underserved communities, such as the Bidayuh, gain reliable digital infrastructure. The focus on digital literacy and attitudes as key drivers for change has been demonstrated to empower individuals, fostering a greater confidence in their ability to overcome technical challenges, including slow internet connections. Digital literacy & attitudes (beta = 0.390), a shift budget focus from hardware to community-based digital training and awareness campaigns, prioritizing human capital. Infrastructure enhancements, such as 5G or satellite technology, must be reliable to effectively support newly acquired digital skills. A holistic strategy recognizes that, in addition to the two vital factors, other socio-cultural elements contribute to the remaining variance. The successful implementation of digital governance policies in indigenous communities necessitates a multi-faceted approach that focuses on infrastructure development, digital literacy, and inclusive government services. The establishment of robust evaluation frameworks and the cultivation of effective public-private partnerships are of significance. These findings provide a roadmap for enhancing digital governance among marginalized communities such as the Bidayuh, aiming for a more equitable and inclusive digital future.

Acknowledgements

Authors express gratitude for the support, guidance, and endorsement received during their research study.

References

1. C. Hofisi and L. E. Chigova, *Rethinking the role of local government in service delivery in South Africa: towards digital transformation,* E-J. Humanit. Arts Soc. Sci. 4 (2023) 64–76.
2. J. Zhao, X. Wang, X. Yao and X. Xi, *Digital-intelligence transformation, for better or worse? The roles of pace, scope and rhythm,* Internet Res. 35 (2025) 1465–1507.
3. T. Dufva and M. Dufva, *Grasping the future of the digital society,* Futures 107 (2019) 17–28.
4. S. Harrell and Y. Bynum, *Factors affecting technology integration in the classroom,* Ala. J. Educ. Leadersh. 5 (2018) 12–18.
5. M. O. M. Baeuo, N. Z. A. Rahim and A. A. M. Al-araibi, *Technology aspects of e-government readiness in developing countries: a review of the literature,* Comput. Inf. Sci. 9 (2016) 1–12.
6. Y. Yusof, N. A. Amirah, N. F. Haron, W. A. Mustafa, Z. M. Zin, M. Y. F. Yusoh and C. Dhavaleshwar, *Community readiness towards digitalization: a comprehensive review,* J. Adv. Res. Appl. Sci. Eng. Technol. 56 (2025) 157–179.
7. S. F. Samsuddin and M. K. Y. I. Aspura, *Understandings the reading habit and reading attitudes among students in research university library in Malaysia,* J. Acad. Libr. Manag. 1 (2021) 12–23.
8. S. A. Butt, S. Lips, R. Sharma, I. Pappel and D. Draheim, *Barriers to digital transformation of the silver economy: challenges to adopting digital skills by the silver generation,* in: Proceedings of AHFE, 2023, pp. 151–163.
9. M. E. Uduafemhe, D. R. Ewim and R. Y. Karfe, *Adapting to the new*

normal: equipping career and technical education graduates with essential digital skills for remote employment, ATBU J. Sci. Technol. Educ. 11 (2023) 51–62.

10. N. Jalli, I. K. Idris and N. E. Widjaja, *Digital Inequality and Online Learning in Rural Sarawak,* in: Inclusive Futures, CRC Press, 2026, pp. 415–437.
11. L. J. Choi, S. Bujang, N. A. H. Basmawi and A. S. W. Marzuki, *Innovating competency-based learning through digital technologies for sustainable local governance in Sarawak,* in: Developing Scientific Technology and Innovation in the New Time, 2024, p. 687.
12. S. R. Chohan and Z.H. Akhter, *Electronic government services value creation from artificial intelligence: AI-based e-government services for Pakistan,* Electron. Gov. Int. J. 17 (2021) 374–390.
13. I. A. P. Nirmani, *Barriers to digital participation in developing countries: identifying technological, social, and cultural obstacles to community involvement,* GSC Adv. Res. Rev. 23 (2025) 61–71.
14. F. E. K. Bakkabulindi, *A call for return to Rogers' innovation diffusion theory,* Makerere J. High. Educ. 6 (2014) 55–85.
15. P. C. Lai, *The literature review of technology adoption models and theories for the novelty technology,* JISTEM-J. Inf. Syst. Technol. Manage. 14 (2017) 21–38.
16. E. M. Rogers, *Diffusion of Innovations: modifications of a model for telecommunications,* in: Die diffusion von innovationen in der telekommunikation, Springer Berlin Heidelberg, Berlin, Heidelberg, 1995, pp. 25–38.
17. S. Abdullah, A. A. Mansor, N. N. L. M. Napi, W. N. W. Mansor, A. N. Ahmed, M. Ismail and Z. T. A. Ramly, *Air quality status during 2020 Malaysia Movement Control Order (MCO) due to 2019 novel coronavirus (2019-nCoV) pandemic,* Sci. Total Environ. 729 (2020) 139022.
18. S. Bujang, L. J. Choi, N. A. H. Basmawi and A. S. W. Marzuki, *Mapping Functional Competencies for Strategic Readiness in Public Utilities and Telecommunication Governance: A Case Study of Sarawak Civil Service,* Pegem J. Educ. Instruct. 15 (2025) 2531–2546.
19. P. C. Lai, *The literature review of technology adoption models and theories for the novelty technology,* JISTEM-J. Inf. Syst. Technol. Manage. 14 (2017) 21–38.
20. F. D. Davis, *Perceived usefulness, perceived ease of use, and user acceptance of information technology,* MIS Q. 13 (1989) 319–340.
21. V. Venkatesh, M. G. Morris, G. B. Davis and F. D. Davis, *User acceptance of information technology: toward a unified view,* MIS Q. 27 (2003) 425–478.
22. G. H. Djatmiko, O. Sinaga and S. Pawirosumarto, *Digital transformation and social inclusion in public services: a qualitative analysis of e-government adoption for marginalized communities in sustainable governance,* Sustainability 17 (2025) 2908.
23. F. S. Omweri, *A systematic literature review of e-government implementation in developing countries: examining urban-rural disparities, institutional capacity, and socio-cultural factors in the context of local governance and progress towards SDG 16.6,* Int. J. Res. Innov. Soc. Sci. 8 (2024) 1173–1199.
24. G. G. Ahi and N. H. M. Hashim, *The Implementation of Smart City Concepts in the Area of Greater Kuching, Sarawak,* (2023).
25. B. C. Reisdorf, G. Blank and W. H. Dutton, *Internet cultures and digital inequalities,* in: Society and the Internet: How Networks of Information and Communication Are Changing Our Lives, 2019, pp. 80–85.
26. R. H. Chowdhury, *Digital government initiatives and national resilience: how digital governance frameworks were transformed post-COVID to maintain national services,* World J. Adv. Eng. Technol. Sci. 7 (2022) 224–240.
27. A. Rajput and K. Nair, *Significance of digital literacy in e-governance,* SIJ Trans. Ind. Financ. Bus. Manage. 1 (2013).
28. A. K. AbdulKareem and K. A. Oladimeji, *Cultivating the digital citizen: trust, digital literacy and e-government adoption,* Transform. Gov. People Process Policy 18 (2024) 270–286.
29. P. DiMaggio, E. Hargittai, W. R. Neuman and J. P. Robinson, *Social implications of the Internet,* Annu. Rev. Sociol. 27 (2001) 307–336.
30. R. Ho, *Handbook of univariate and multivariate data analysis with IBM SPSS,* CRC Press, 2013.