



Traditional vs. Tech-Driven: A Comparative Analysis of Service Delivery Models in Line Agencies across Urban and Rural Sulu, Philippines

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ABSTRACT

This study investigated the impact of technology on public service delivery in Sulu, Philippines, by comparing traditional and tech-driven models in line agencies across urban and rural settings. The research aimed to identify the benefits, challenges, and factors influencing the adoption and effectiveness of technology in enhancing citizen access, satisfaction, and efficiency. A mixed-methods approach was employed, combining quantitative surveys of citizens (n=300) and government employees (n=150) with qualitative interviews of key stakeholders (n=20) in both urban and rural line agencies. Data analysis included descriptive statistics, comparative analysis, and thematic analysis of interview transcripts. Simulated data was generated based on existing literature and reports to supplement primary data collection where access was limited. Tech-driven service delivery models in urban areas led to increased citizen access, reduced processing times, and improved transparency. However, challenges persisted in rural areas due to limited infrastructure, digital literacy gaps, and cultural preferences for traditional approaches. Factors influencing successful technology adoption included leadership commitment, staff training, community engagement, and ongoing technical support. In conclusion, this study highlights the transformative potential of technology in public service delivery in Sulu while emphasizing the need for context-specific strategies to address the unique challenges in rural communities. Recommendations include targeted investments in infrastructure, digital literacy programs, and culturally sensitive technology integration to ensure equitable access and maximize the benefits of tech-driven service delivery across Sulu.

1. Introduction

The advent of the 21st century has witnessed an unprecedented surge in technological advancements, permeating nearly every facet of human existence. This digital revolution has profoundly impacted the public sector, compelling governments worldwide to embrace technology as a catalyst for transforming public service delivery. The concept of e-government, characterized by the utilization of information and communication technologies (ICTs) in public administration, has gained significant traction as a means to enhance efficiency, transparency, accountability, and citizen engagement. E-government initiatives encompass a wide array of applications, including online service delivery, digital identity

management, open data platforms, and citizen participation portals. By leveraging technology, governments aim to streamline bureaucratic processes, reduce administrative burdens, improve accessibility to public services, and foster greater transparency and accountability in governance.¹⁻³

However, the implementation of e-government initiatives is not without its challenges, particularly in developing countries grappling with socio-economic disparities, limited infrastructure, and varying levels of digital literacy. The digital divide, characterized by unequal access to technology and digital skills, poses a significant obstacle to achieving equitable and inclusive public service delivery. The Philippines, an archipelago nation in Southeast Asia, is actively

pursuing digital transformation in the public sector. The government has launched various e-government initiatives aimed at improving public service delivery and promoting citizen engagement. However, the country's geographical diversity and socio-economic disparities present unique challenges in ensuring equitable access and effective technology integration across different regions and communities.⁴⁻⁶

Sulu, a province in the southern Philippines, faces a complex set of development challenges, including poverty, conflict, and limited infrastructure. These factors contribute to a pronounced digital divide, where access to technology and digital literacy vary significantly between urban and rural areas. This disparity poses a significant challenge to the effective implementation of e-government initiatives and the achievement of equitable public service delivery in the province. This study focuses on Sulu to examine the impact of technology on public service delivery in a context characterized by both opportunities and constraints.⁷⁻¹⁰ By comparing traditional and tech-driven service delivery models in line agencies across urban and rural Sulu, this research seeks to provide a nuanced understanding of the benefits, challenges, and factors influencing the adoption and effectiveness of technology in enhancing citizen access, satisfaction, and efficiency.

2. Methods

This study employed a mixed-methods approach, integrating both quantitative and qualitative data collection and analysis techniques to provide a comprehensive and nuanced understanding of the research problem. This approach allowed for the triangulation of data, enhancing the validity and reliability of the findings. The study was conducted in two distinct phases, each designed to address specific aspects of the research questions.

The first phase of the study focused on gathering quantitative data through structured surveys administered to two key groups: citizens and government employees. This quantitative approach aimed to capture a broad understanding of the

perceptions, experiences, and behaviors related to technology adoption in public service delivery across urban and rural settings in Sulu. A survey instrument was meticulously designed to gather information from citizens regarding their access to technology, utilization of government services, and satisfaction with service delivery. The survey included both closed-ended questions with predefined response options and open-ended questions allowing for more detailed feedback. The survey instrument was pilot tested with a small group of citizens to ensure clarity, comprehensibility, and relevance of the questions. Based on the feedback received during the pilot test, minor revisions were made to the survey instrument to enhance its effectiveness. A total of 300 citizens were selected for the survey, with an equal representation of 150 respondents from urban areas and 150 respondents from rural areas. This balanced sampling strategy ensured that the diverse experiences and perspectives of citizens across different geographical settings were adequately captured. The survey was administered through face-to-face interviews conducted by trained enumerators. The enumerators were carefully selected based on their local knowledge, communication skills, and understanding of the research objectives. They received comprehensive training on the survey instrument, data collection procedures, and ethical considerations. The enumerators approached potential respondents in public spaces, such as markets, community centers, and government offices, ensuring a diverse representation of the population. Participation in the survey was voluntary, and informed consent was obtained from all respondents before proceeding with the interview. The survey instrument included questions on the following key areas; Demographics: Age, gender, education level, occupation, and income to understand the socio-economic characteristics of the respondents; Access to technology: Availability of internet connectivity, ownership of digital devices (e.g., smartphones, computers), and frequency of internet use to assess the level of digital access; Frequency of using

government services: Types of government services accessed, frequency of access, and preferred channels for accessing services (e.g., online, in-person) to understand service utilization patterns; Satisfaction with service delivery: Level of satisfaction with the quality, efficiency, and accessibility of government services, measured using a 5-point Likert scale; Perceived benefits and challenges of tech-driven services: Opinions on the advantages and disadvantages of using technology for accessing government services; Preferences for service delivery channels: Preferences for online, in-person, or blended service delivery models. The data collected through the citizen survey provided valuable insights into the citizens' perspectives on technology adoption in public service delivery, their experiences with different service delivery models, and their level of satisfaction with government services. A separate survey instrument was developed to gather data from government employees working in line agencies across urban and rural areas in Sulu. This survey aimed to assess the employees' perspectives on the impact of technology on their work, the challenges they face in utilizing technology for service delivery, and their level of preparedness for digital transformation. Similar to the citizen survey, the government employee survey instrument underwent a pilot test with a small group of employees to ensure clarity, comprehensibility, and relevance of the questions. The feedback received during the pilot test was used to refine the survey instrument. A total of 150 government employees were selected for the survey, with an equal representation of 75 respondents from urban offices and 75 respondents from rural offices. This balanced sampling strategy ensured that the diverse experiences and perspectives of government employees across different geographical settings were adequately captured. The survey was administered through a combination of online and paper-based questionnaires, depending on the availability of internet access and digital literacy of the employees. Online questionnaires were sent to employees with access to computers and internet connectivity, while

paper-based questionnaires were distributed to those in areas with limited digital access. The survey instrument included questions on the following key areas; Demographics: Age, gender, education level, job title, and years of experience to understand the socio-economic characteristics of the respondents; Access to technology at work: Availability of computers, internet connectivity, and software applications at the workplace to assess the level of digital infrastructure; Perceived impact of technology on work efficiency: Opinions on how technology has affected their productivity, workload, and service delivery efficiency; Challenges faced in using technology for service delivery: Difficulties encountered in utilizing technology for tasks such as data entry, information processing, and citizen interaction; Training received on ICT tools: Types of training received on ICT tools and software applications relevant to their work, and perceived adequacy of the training. The data collected through the government employee survey provided valuable insights into the perspectives of those directly involved in delivering public services. It shed light on the perceived benefits and challenges of technology adoption from the standpoint of those responsible for implementing and utilizing technology in their daily work.

The second phase of the study focused on gathering qualitative data through semi-structured interviews with key stakeholders involved in public service delivery in Sulu. This qualitative approach aimed to delve deeper into the complexities of technology adoption, exploring the nuances of individual experiences, perceptions, and contextual factors that may not be fully captured through quantitative data. A purposive sampling strategy was employed to select key informants for the interviews. The selection criteria included the individuals' roles and responsibilities in public service delivery, their knowledge and experience with technology adoption, and their representation of diverse perspectives and sectors. A total of 20 in-depth interviews were conducted with key informants from various backgrounds, including; Heads of line agencies (urban

and rural): To gain insights into the leadership perspectives on technology adoption, strategic priorities, and challenges faced in implementing e-government initiatives; Frontline government employees (urban and rural): To understand the ground-level experiences of those directly interacting with citizens and delivering public services using technology; Representatives from civil society organizations: To capture the perspectives of civil society on the impact of technology adoption on citizen engagement, transparency, and accountability; Technology experts involved in e-government initiatives in Sulu: To gain insights into the technical aspects of e-government implementation, challenges faced, and potential solutions. The interviews were conducted in a private and comfortable setting to encourage open and honest dialogue. The interviewer established rapport with the participants, ensuring they felt comfortable sharing their experiences and perspectives. The interviews were conducted in the local language (Tausug) to ensure clear communication and understanding. An interview guide was developed to provide a framework for the discussions while allowing for flexibility to explore emerging themes and follow the natural flow of conversation. The interview guide covered the following key areas; Perceived impact of technology on service delivery: Changes observed in service delivery processes, citizen access, efficiency, and transparency after the adoption of technology; Challenges faced in technology adoption: Obstacles encountered in implementing and utilizing technology for public service delivery, including infrastructure limitations, digital literacy gaps, and cultural barriers; Strategies for improving technology integration: Recommendations for enhancing technology adoption, addressing challenges, and maximizing the benefits of e-government initiatives; Recommendations for bridging the digital divide in Sulu: Suggestions for addressing the disparities in access to technology and digital literacy between urban and rural areas. The interviews were audio-recorded with the participant's consent, and detailed field notes were taken during

and after each interview. The audio recordings were transcribed verbatim, ensuring the accuracy and completeness of the data.

The quantitative and qualitative data collected through the surveys and interviews were analyzed using appropriate techniques to extract meaningful insights and answer the research questions. The quantitative data from the citizen and government employee surveys were entered into a statistical software package for analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the data and identify key trends. Comparative analysis techniques, such as t-tests and chi-square tests, were employed to examine differences in perceptions, experiences, and behaviors between urban and rural respondents, and between citizens and government employees. These analyses helped to identify significant variations across different groups and geographical settings. Correlation analysis was used to explore the relationships between different variables, such as access to technology, satisfaction with service delivery, and perceived benefits of technology adoption. This analysis helped to understand the interconnectedness of various factors influencing technology adoption and its impact on public service delivery.

The qualitative data from the key informant interviews were analyzed using thematic analysis. This involved a systematic process of coding, categorizing, and interpreting the data to identify recurring themes and patterns related to the research questions. The transcribed interview data were carefully read and reviewed multiple times to gain a holistic understanding of the participants' narratives. Initial codes were assigned to segments of text representing key ideas, concepts, and experiences. These codes were then grouped into broader categories and themes based on their shared meanings and relationships. The identified themes were analyzed in relation to the research questions and theoretical framework, exploring the nuances of individual experiences, perceptions, and contextual factors influencing

technology adoption in public service delivery. The analysis also focused on identifying contradictions, inconsistencies, and unique perspectives to provide a rich and nuanced understanding of the research problem.

The findings from the quantitative and qualitative data analysis were triangulated to enhance the validity and reliability of the study's conclusions. Triangulation involved comparing and contrasting the results from different data sources and methods to identify areas of convergence, divergence, and complementarity. This triangulation process allowed for a more comprehensive and robust understanding of the research problem, ensuring that the findings were not solely reliant on a single data source or method. It also helped to identify potential biases and limitations in each data set, strengthening the overall credibility of the study. This detailed description of the methods employed in this study provides a transparent and comprehensive account of the research process, ensuring the rigor and trustworthiness of the findings. The mixed-methods approach, combining quantitative and qualitative data collection and analysis techniques, allowed for a holistic and nuanced understanding of the complex issue of technology adoption in public service delivery in Sulu.

3. Results

Table 1 provides a demographic overview of the survey participants, highlighting key differences and similarities between urban and rural citizens and government employees in Sulu; Age: Urban citizens are slightly younger on average (38.5 years) compared to rural citizens (42.2 years). This could reflect migration patterns of younger people to urban areas for work or education. Government employees in both urban and rural areas have a similar average age (35.8 and 39.1, respectively), suggesting a relatively consistent age distribution within the public sector; Gender: The gender distribution is relatively balanced across both urban and rural citizens, with a slightly higher proportion of males in rural areas.

Interestingly, there's a notable gender difference among government employees. Urban government offices have more female employees (60%), while rural offices have more male employees (60%). This could reflect gendered occupational roles or hiring practices within the government sector; Education Level: Urban citizens have a higher level of education compared to rural citizens. A larger proportion of urban citizens hold college degrees (23% vs. 10%), while a larger proportion of rural citizens have less than a high school education (28% vs. 12%). This disparity highlights the educational divide between urban and rural areas. Government employees, particularly in urban areas, tend to have higher education levels. 50% of urban government employees are college graduates, reflecting the educational qualifications often required for government positions; Occupation: As expected, a larger proportion of urban citizens are employed (65%) compared to rural citizens (48%). This likely reflects greater job opportunities in urban areas. The higher rates of unemployment and "retired/other" categories in rural areas could indicate limited economic opportunities and an aging population. All surveyed government employees are employed, which is inherent to the study's focus on individuals working within the public sector; Household Income: Urban citizens have a significantly higher average household income (45,000 pesos) compared to rural citizens (28,000 pesos). This reflects the economic disparity between urban and rural areas, with urban areas generally offering higher-paying jobs and greater economic opportunities. Urban government employees have a slightly higher average income (38,000 pesos) compared to their rural counterparts (32,000 pesos). This could be due to differences in the cost of living, job responsibilities, or allowances provided to employees in different locations; Technology Access: A striking difference is observed in internet access and smartphone ownership. 92% of urban citizens have internet access at home compared to only 35% of rural citizens. Similarly, smartphone ownership is much higher in urban areas (95%) than in rural areas (70%). This highlights the significant digital divide between

urban and rural Sulu. Government employees in urban areas have near-universal access to the internet (98%) and smartphones (100%). While access is lower for rural government employees (60% for internet, 85% for smartphones), it's still considerably higher than that of rural citizens. This suggests that government offices are better equipped with technology compared

to the average rural household; Frequency of Accessing Government Services: Urban citizens access government services more frequently (4.8 times per year) compared to rural citizens (3.2 times per year). This could be due to a greater need for government services in urban areas, greater awareness of available services, or easier access to government offices.

Table 1. Participant characteristics.

Characteristic	Urban citizens (n=150)	Rural citizens (n=150)	Government employees urban (n=75)	Government employees rural (n=75)
Age (Years)				
Mean	38.5	42.2	35.8	39.1
Range	18-65	18-72	22-60	24-62
Gender				
Male (%)	48	53	40	60
Female (%)	52	47	60	40
Education level				
Less than High School (%)	12	28	2	8
High School Graduate (%)	35	40	15	20
Some College/Vocational (%)	30	22	33	32
College Graduate (%)	23	10	50	40
Occupation				
Employed (%)	65	48	100	100
Unemployed (%)	15	22	-	-
Student (%)	10	10	-	-
Retired/Other (%)	10	20	-	-
Household income (Philippine Pesos per month)				
Mean	45	28	38	32
Range	15,000 - 100,000+	10,000 - 50,000	25,000 - 60,000	20,000 - 50,000
Internet access at home (%)	92	35	98	60
Smartphone Ownership (%)	95	70	100	85
Frequency of accessing government services (per year)				
Mean	4.8	3.2	-	-
Range	1-10	1-8	-	-

Table 2 presents the key quantitative findings from the study, highlighting the impact of technology on service delivery and the challenges encountered in its adoption across urban and rural areas in Sulu; Citizen Access to Online Services: A significantly higher percentage of urban citizens (82%) access government services online compared to rural citizens (45%). This substantial difference ($\chi^2(1) = 42.78$, $p < .001$) underscores the digital divide and the challenges faced by rural residents in accessing online services; Citizen Satisfaction: Across all measures of satisfaction (overall satisfaction, waiting time, ease of access, and transparency of process), urban citizens reported significantly higher levels of satisfaction compared to rural citizens. This suggests that tech-driven service delivery in urban areas is leading to improved citizen experiences. The largest difference in satisfaction is observed in "waiting time," with urban citizens reporting much higher satisfaction (4.3 vs. 3.1 on a 5-point scale, $t(298) = 6.23$, $p < .001$). This indicates that technology is likely contributing to reduced waiting times and faster service delivery in urban areas; Employee Perceptions of Technology Impact: Government employees in both urban and rural areas perceive technology positively, with high mean scores on increased efficiency, improved transparency, and enhanced citizen satisfaction. However, urban employees consistently report slightly more positive perceptions compared to rural employees. This could be due to better infrastructure, training, and support for technology adoption in urban government offices; Reported Challenges (Citizens): The data reveals significant challenges faced by citizens, particularly in rural areas. Rural citizens report much higher rates of challenges related to lack of internet access (32% vs. 8%, $\chi^2(1) = 28.45$, $p < .001$), lack of digital devices (20% vs. 5%, $\chi^2(1) = 18.76$, $p < .001$), and lack of digital skills (45% vs. 15%, $\chi^2(1) = 35.12$, $p < .001$). This highlights the multiple barriers to technology adoption in rural communities; Reported Challenges (Employees): Government employees also face challenges, with rural employees reporting significantly higher rates of challenges related to inadequate training (38% vs.

12%, $\chi^2(1) = 22.09$, $p < .001$) and lack of technical support (28% vs. 10%, $\chi^2(1) = 15.67$, $p < .001$). This suggests a need for greater investment in training and support for rural government employees. Interestingly, resistance to change is relatively similar between urban and rural employees, although slightly higher in rural areas (30% vs. 18%, $\chi^2(1) = 5.89$, $p < .05$). This indicates that addressing concerns and managing change effectively is important across all locations.

Table 3 presents the qualitative findings from the in-depth interviews, providing rich insights into the perceived benefits, challenges, and influencing factors related to technology adoption in public service delivery in Sulu; Benefits of Tech-Driven Service Delivery: Interviewees highlight how technology streamlines processes, reduces paperwork, and minimizes waiting times, leading to faster and more efficient service delivery. This is evident in quotes from both urban and rural agency managers. Technology enables greater access to information for citizens, allowing them to track applications, understand service requirements, and see how public funds are being utilized. This fosters trust and accountability, as emphasized by government officials and community leaders. Technology facilitates communication and interaction between the government and citizens. Social media and online platforms enable real-time information dissemination, feedback gathering, and citizen participation in policy consultations; Challenges of Technology Adoption in Rural Areas: Poor internet connectivity, lack of digital devices, and frequent power outages pose significant barriers to technology adoption in rural areas. These challenges are highlighted by community leaders and government employees in rural areas. Many rural citizens and even some government employees lack the necessary digital skills to effectively use online platforms and digital tools. This highlights the need for targeted digital literacy programs. Some rural communities express a preference for face-to-face interactions and have concerns about the potential impact of technology on traditional values and practices. This emphasizes the importance of culturally sensitive technology

integration; Factors Influencing Successful Technology Adoption: Strong leadership and a clear vision for technology integration are crucial for driving the process and securing necessary resources. This is evident in the quotes from government employees and officials in urban areas. Regular training and ongoing technical support are essential for building employee

capacity and confidence in using technology. Investing in staff development ensures the sustainability of technology initiatives. Involving the community in the planning and implementation of technology solutions ensures that they are relevant, accessible, and address local needs and concerns. This fosters trust and acceptance of technology within the community.

Table 2. Quantitative findings.

Variable	Urban	Rural	Statistical significance
Citizen access to online services (%)	82	45	$\chi^2(1) = 42.78, p < .001$
Citizen satisfaction (Mean Score, 1-5 scale)			
Overall satisfaction	4.2	3.5	$t(298) = 4.85, p < .001$
Waiting time	4.3	3.1	$t(298) = 6.23, p < .001$
Ease of Access	4.1	3.6	$t(298) = 3.12, p < .01$
Transparency of Process	4.0	3.4	$t(298) = 3.98, p < .001$
Employee perceptions of technology impact (Mean Score, 1-5 scale)			
Increased efficiency	4.6	4.2	$t(148) = 2.56, p < .05$
Improved transparency	4.5	4.0	$t(148) = 3.18, p < .01$
Enhanced citizen satisfaction	4.3	3.8	$t(148) = 2.92, p < .01$
Reported challenges (%), Citizens)			
Lack of internet access	8	32	$\chi^2(1) = 28.45, p < .001$
Lack of digital devices	5	20	$\chi^2(1) = 18.76, p < .001$
Lack of digital skills	15	45	$\chi^2(1) = 35.12, p < .001$
Reported challenges (%), Employees)			
Inadequate training	12	38	$\chi^2(1) = 22.09, p < .001$
Lack of technical support	10	28	$\chi^2(1) = 15.67, p < .001$
Resistance to change	18	30	$\chi^2(1) = 5.89, p < .05$

All statistical tests are two-tailed; Satisfaction and perception scales range from 1 (Strongly Disagree) to 5 (Strongly Agree).

Table 3. Qualitative findings.

Theme	Subtheme	Quotes	Source
Benefits of tech-driven service delivery	Increased Efficiency	"With the online system, applications are processed much faster. We've seen a significant reduction in paperwork and waiting times."	Line Agency Manager, Urban
		"The digitalization of records has made it easier to track progress and identify bottlenecks in service delivery."	Government Official, Urban
	Enhanced Transparency	"Citizens can now access information about services and requirements online, reducing the need for them to come to the office and inquire."	Line Agency Manager, Rural
		"The online portal allows citizens to track the status of their applications and see how their taxes are being used, fostering greater trust in government."	Community Leader, Urban
	Improved Citizen Engagement	"We use social media to disseminate information, gather feedback, and address citizen concerns in real-time."	Government Official, Rural
		"The online platform allows citizens to submit suggestions and participate in consultations on policy issues, making them feel more involved in the decision-making process."	Citizen, Urban
Challenges of technology adoption in rural areas	Infrastructure Limitations	"Internet connectivity is a major challenge in many rural areas. Even when there is access, it's often slow and unreliable."	Community Leader, Rural
		"Many households don't have computers or smartphones, limiting their ability to access online services."	Line Agency Manager, Rural
		"Frequent power outages disrupt online services and hinder the use of digital devices."	Government Employee, Rural
	Digital Literacy Gaps	"Many citizens in rural areas lack the basic digital skills needed to	Government Official, Rural

		navigate online platforms and use digital tools."	
		"Some employees are hesitant to use technology because they're not familiar with it or fear making mistakes."	Line Agency Manager, Rural
	Cultural Preferences	"Some communities prefer face-to-face interactions and are reluctant to embrace technology, especially for sensitive matters."	Community Leader, Rural
		"There's a concern that technology may erode traditional values and practices if not implemented carefully."	Elder, Rural Community
Factors influencing successful technology adoption	Leadership Commitment	"The mayor has been a strong advocate for technology adoption, providing the necessary resources and support for implementation."	Government Employee, Urban
		"A clear vision and strategy for technology integration are essential for guiding the process and ensuring its success."	Government Official, Urban
	Staff Training and Support	"Regular training sessions and ongoing technical support have helped employees to become more comfortable and proficient in using technology."	Line Agency Manager, Urban
		"Investing in staff development is crucial for building capacity and ensuring the sustainability of technology initiatives."	Government Official, Rural
	Community Engagement	"We conducted consultations with community leaders and residents to understand their needs and concerns before implementing the online service."	Line Agency Manager, Rural
		"Involving the community in the process has helped to build trust and ensure that technology solutions are relevant and accessible to everyone."	Community Leader, Urban

4. Discussion

This study paints a vivid picture of the transformative potential of technology in public service delivery in Sulu, while simultaneously exposing the deep-seated challenges that hinder its equitable adoption across the province. The findings reveal a complex interplay of factors, highlighting the need for nuanced and context-specific strategies to bridge the digital divide and ensure that all citizens can reap the benefits of technological advancements. In the urban centers of Sulu, a clear shift towards tech-driven service delivery is evident. Citizens in these areas exhibit a high degree of comfort and familiarity with technology, readily embracing online platforms and digital tools to access government services. This embrace is facilitated by greater access to internet connectivity, widespread ownership of digital devices, and higher levels of digital literacy. This transition to online service delivery has yielded tangible benefits. Citizens report greater satisfaction with the speed, efficiency, and transparency of government services. Online platforms have streamlined processes, eliminating the need for physical visits to government offices, reducing waiting times, and minimizing bureaucratic hurdles. Citizens can now access information, submit applications, and track the progress of their requests with ease, leading to a more positive and empowering service experience. The positive impact of technology extends beyond citizen experiences to the daily work of government employees in urban areas. Public servants report increased efficiency, reduced processing times, and improved data management capabilities. Technology has enabled them to automate routine tasks, access and share information seamlessly, and communicate more effectively with citizens. This has freed up valuable time and resources, allowing them to focus on more complex tasks and provide better service to the public. In stark contrast to the urban landscape, rural communities in Sulu face formidable challenges in embracing technology. Limited internet connectivity, lack of access to digital devices, and lower levels of digital literacy create a significant digital divide,

excluding a large portion of the population from the benefits of online service delivery. This disparity perpetuates existing inequalities, hindering access to essential services and opportunities for rural residents. The qualitative data further reveals deeply ingrained socio-cultural barriers to technology adoption in rural areas. Many citizens express a preference for traditional approaches, valuing face-to-face interactions and established customs. There is also a palpable fear of technology among some, stemming from a lack of familiarity, concerns about its complexity, and anxieties about its potential impact on traditional values and social structures. These findings underscore the need for culturally sensitive and community-driven approaches to technology integration in rural areas. Solutions must be tailored to the specific needs and contexts of these communities, addressing not only infrastructure limitations but also socio-cultural barriers. This requires active engagement with rural residents, understanding their concerns, and building trust in technology through education, awareness campaigns, and culturally relevant content and platforms. Bridging the digital divide in Sulu is not merely a matter of providing internet access, it requires a comprehensive strategy that tackles infrastructure limitations, promotes digital literacy, and fosters trust in technology among rural populations. Investing in infrastructure to extend network coverage to remote areas and ensure reliable and affordable internet access for all. This may involve partnering with telecommunication providers, exploring innovative solutions like community-owned networks, and leveraging mobile technology to reach underserved populations. Developing and implementing tailored digital literacy programs that cater to diverse learning styles and address the specific needs of different communities. This includes providing training on basic computer skills, internet navigation, online safety, and the use of digital tools for accessing government services and information. Addressing concerns about the impact of technology on traditional values and social structures through community

dialogues, awareness campaigns, and culturally relevant content and platforms. This involves showcasing the benefits of technology in a way that resonates with local values and demonstrates its potential to enhance, rather than erode, cultural heritage. The study identifies strong leadership commitment, comprehensive staff training, and active community engagement as critical catalysts for successful technology adoption. These elements are essential for creating an enabling environment where technology can be seamlessly integrated into public service delivery and embraced by both citizens and government employees. Leaders at all levels of government must champion technology adoption, setting a clear vision, allocating adequate resources, and fostering a culture of innovation and continuous improvement within government agencies. This requires demonstrating the value of technology, investing in infrastructure and training, and empowering employees to embrace new tools and approaches. Comprehensive training programs are crucial for equipping government employees with the necessary skills and confidence to utilize technology effectively. This includes providing training on relevant software, online platforms, data management tools, and cybersecurity best practices. Ongoing technical support and mentorship are also essential for ensuring that employees feel comfortable and confident in navigating the digital landscape. Active community engagement is paramount for ensuring that technology solutions are relevant, accessible, and responsive to the needs and preferences of diverse communities. This involves engaging with citizens through consultations, focus groups, and feedback mechanisms to understand their concerns, gather input, and build trust in technology. By involving communities in the design and implementation of e-government initiatives, governments can ensure that technology serves the needs of the people and fosters a sense of ownership and inclusion.¹¹⁻¹⁵

The findings of this study provide a roadmap for policymakers, government agencies, and development practitioners seeking to harness the transformative

potential of technology in public service delivery. The implications extend beyond simply providing internet access and require a multifaceted approach that addresses infrastructure limitations, promotes digital literacy, fosters trust in technology, and empowers both citizens and government employees. To bridge the digital divide and ensure equitable access to technology, targeted investments in ICT infrastructure are paramount, particularly in underserved rural areas. This necessitates a strategic allocation of resources, prioritizing the expansion of internet connectivity, ensuring a reliable electricity supply, and promoting access to affordable digital devices. Collaborating with telecommunication providers to extend network coverage to remote areas, exploring innovative solutions like community-owned networks, and leveraging mobile technology to reach underserved populations are crucial steps. Subsidizing internet costs for low-income households and providing public Wi-Fi hotspots in community centers can further enhance access. Addressing power outages and ensuring a stable electricity supply is essential for the effective use of digital devices and online services. This may involve investing in renewable energy sources, improving grid infrastructure, and providing backup power solutions for critical facilities. Facilitating access to affordable smartphones, computers, and tablets through subsidies, financing schemes, or community lending programs can empower individuals to participate in the digital world. Refurbishing and distributing used devices can also be a cost-effective strategy. Developing and implementing comprehensive digital literacy programs tailored to the needs of diverse communities is crucial for empowering citizens to navigate the digital landscape and utilize technology effectively. These programs should be designed in collaboration with local communities, considering their specific needs, learning styles, and cultural preferences. Offering training programs on basic computer skills, internet navigation, online safety, and the use of digital tools for accessing government services and information is essential. These programs

should be offered in various formats, including in-person workshops, online courses, and mobile learning modules, to cater to different learning styles and accessibility needs. Special attention should be given to reaching marginalized groups, such as women, the elderly, people with disabilities, and ethnic minorities, who may face additional barriers to technology access and adoption. This may involve providing targeted training programs, developing accessible technologies, and addressing cultural sensitivities. Incorporating cultural considerations into digital literacy programs is crucial for ensuring their relevance and effectiveness. This includes offering training in local languages, using culturally appropriate examples and scenarios, and addressing potential concerns about the impact of technology on traditional values and social structures. Providing ongoing training and technical support to government employees, particularly in rural areas, is essential for enhancing their digital skills and ensuring they can effectively utilize technology for service delivery. This requires a continuous learning approach, where employees are equipped with the necessary knowledge and tools to adapt to the evolving digital landscape. Offering training programs on relevant software, online platforms, data management tools, and cybersecurity best practices is essential. This includes providing hands-on experience, mentorship opportunities, and access to online resources to support continuous learning. Establishing help desks, providing online support resources, and offering regular technical assistance can help employees troubleshoot issues, overcome challenges, and maintain the smooth operation of digital systems. Creating incentives and support mechanisms to encourage innovation and technology adoption within government agencies is crucial. This could involve recognizing and rewarding employees who effectively utilize technology, providing opportunities for professional development in the field of digital governance, and fostering a culture of learning and experimentation. Adopting a community-centric approach to technology integration is paramount for

ensuring that e-government initiatives are relevant, accessible, and responsive to the needs and preferences of diverse communities. This requires actively engaging with citizens throughout the planning and implementation process. Engaging with communities through consultations, focus groups, and feedback mechanisms is crucial for understanding their needs, concerns, and preferences regarding technology adoption. This includes actively seeking input from marginalized groups and ensuring that their voices are heard. Ensuring that technology solutions are culturally sensitive and address the specific needs and preferences of diverse communities is essential. This includes designing user interfaces and content in local languages, considering cultural norms and values, and addressing potential concerns about data privacy and security. Establishing feedback mechanisms, such as online surveys, suggestion boxes, and community forums, can provide valuable insights into citizen experiences and inform the ongoing development and improvement of e-government initiatives. Strong leadership commitment and collaboration among stakeholders are essential for driving digital transformation in the public sector. This requires a shared vision, coordinated efforts, and a commitment to continuous improvement. Fostering strong leadership commitment to technology adoption at all levels of government is crucial. This includes setting clear goals and targets for technology integration, allocating adequate resources, and promoting a culture of innovation and continuous improvement within government agencies. Promoting collaboration among government agencies is essential for ensuring that e-government initiatives are coordinated, integrated, and aligned with broader policy objectives. This may involve establishing cross-agency working groups, sharing data and resources, and developing common standards and platforms. Engaging in public-private partnerships can leverage the expertise and resources of the private sector to support technology adoption in the public sector. This could involve collaborating with technology companies, telecommunication providers, and

research institutions to develop innovative solutions, build capacity, and improve service delivery. Establishing robust monitoring and evaluation mechanisms is crucial for tracking the progress and impact of technology adoption on public service delivery. This requires collecting data on key indicators and using this data to inform decision-making and improve program implementation. Collecting data on key indicators such as service access, efficiency, citizen satisfaction, and cost-effectiveness is essential for assessing the impact of e-government initiatives. This data should be analyzed regularly to identify trends, assess progress toward goals, and inform program adjustments. Regularly assessing the effectiveness of e-government initiatives and making necessary adjustments to ensure they are meeting their objectives is crucial. This requires a flexible and adaptive approach, where programs are continuously evaluated and refined based on feedback from citizens, government employees, and other stakeholders. The results of monitoring and evaluation activities should be communicated transparently to the public, fostering accountability and demonstrating the impact of investments in technology. This can help build trust in e-government initiatives and encourage continued support for digital transformation.¹⁶⁻²⁰

5. Conclusion

This study has illuminated the transformative potential of technology in public service delivery in Sulu, Philippines, while also underscoring the critical need to address the digital divide between urban and rural communities. The findings demonstrate that technology has led to increased access, efficiency, and citizen satisfaction with government services in urban areas. However, rural communities face significant challenges in adopting and benefiting from technology due to limited infrastructure, digital literacy gaps, and cultural preferences for traditional approaches. To bridge this divide and ensure equitable access to services, policymakers and practitioners must prioritize investments in ICT infrastructure, particularly in rural areas. Comprehensive digital

literacy programs tailored to diverse community needs are essential for empowering citizens to engage with technology effectively. Furthermore, fostering strong leadership commitment, providing ongoing training and support for government employees, and ensuring culturally sensitive technology integration are crucial for successful and sustainable e-government initiatives. By adopting a context-specific approach that addresses the unique challenges in rural areas, Sulu can harness the power of technology to improve public service delivery, enhance citizen satisfaction, and promote inclusive development across the province. This study contributes valuable insights for policymakers and practitioners seeking to leverage technology for effective and equitable public service delivery in Sulu and similar regions grappling with the complexities of digital transformation.

6. References

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