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Assessment of Digitalization in Government Office with Reference to Department of Transport Management

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ABSTRACT

In the era of global Information Communication and Technology (ICT) development, governmental services are increasingly being digitized to enhance accessibility and efficiency. This shift towards digitalization, spurred by widespread smartphone and internet use, has fostered a tech-savvy populace. Nepal, in particular, has seen significant progress in its communication sector with a growing number of telephone and internet users. This study examines Nepal's digitalization status and implementation challenges and proposes strategies and policies to address these challenges. Employing analytical and descriptive research methodologies, the study utilizes both qualitative and quantitative data from secondary sources like published research articles, books, interviews, and surveys. Convenience sampling is used, and statistical techniques including descriptive statistics, correlation, and regression analyses are applied. Key findings indicate moderate levels of perceived information quality, system quality, service quality, usage intentions, user satisfaction, and net system benefits. Correlation analysis shows strong positive relationships between these variables, while regression analysis reveals their significant impact on net system benefits. Qualitative data highlights government initiatives, impacts on citizens, and challenges like employee resistance and usability issues. The study emphasizes the need for centralized data retrieval using the National ID system to streamline processes, offering valuable insights for enhancing digitalization in Nepal.

INTRODUCTION

With the global Information Communication and Technology (ICT) development, newer citizen services are being deployed to provide governmental services. The trend of ease of use of governmental operations has encouraged the use of these services. Citizens have become accustomed to using ICT in their daily lifestyles, hence making it less hesitant to use them. Smart cities are rapidly converting the citizens to get smarter in many ways. The increasing penetration of mobile phones with the usage of large number of smart phones tells how citizens are forced to get smarter with being mobile and socially connected. Mobile applications are finding a large innovative space to deliver newer exciting applications over the devices. Technology affordability has increased with the cost going down every year (Pradhan & Shakya, 2018).

Digitalization offers many benefits and advantages for the government, corporate sector and society. Digitalization facilitates better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. It simplifies internal operations and improves the performance of government departments while helping all sections of society to avail of government services at lower cost with maximum ease of use (Malodia *et al.*, 2021).

Nepal began its modern connectivity journey in 1916 with the establishment of the first telephone lines in Kathmandu and the establishment of an open-wire

trunk line from Kathmandu to Raxaul (India). This was followed by the establishment of a telegram service and the introduction of a high-frequency radio system in 1950, which increased the public's access to information. Telephone lines were then distributed to the general public in 1955. Finally, with the launch of the GSM mobile service and the internet in 1999 and 2000, the general public attained modern communication services. Nepal's communication sector has rapidly progressed from the turn of the century. Currently, Nepal has 42,001,423 telephone users among which 41,176,562 are mobile users while 821,875 used fixed telephone services. This means the penetration rate for voice telephony services is 138.94 percent. On the other side, Nepal has 36,041,106 subscribers to broadband internet with a total penetration rate of 119.49 percent (NIPoRe, 2021).

With the increasing adoption of smartphones and internet penetration during the last two decades, the digitization of key sectors has become a prime choice of policymakers for more efficient outcomes. In Nepal, GoN, along with a few key private-sector stakeholders, has taken major steps to digitize the country, especially after COVID-19 struck the country in January 2020. In this brief, we highlight Nepal's digitization journey, key sectors disrupted by COVID-19 so far, major challenges to effective digitization, and key GoN policies that support Nepal's digital goals.

Digitalization refers to the transformation of information and services into a digital format, utilizing Information and Communication Technologies (ICT) for storage,

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processing, and dissemination. In the context of Nepal, the process of digitalization has faced various challenges, hindering its progress and preventing it from reaching its full potential.

In order to traces the relevance of digitalization in Nepal and to find out whether people are benefited from the information system or not and the study undertakes the following objectives:

- To know the status of digitalization in Nepal.
- To list out the challenges to its implementation.
- To recommend possible strategies and policy towards solution of the challenges of digitalization.

LITERATURE REVIEW

Information Systems Success Model

The Information Systems Success Model is a framework designed to assess the effectiveness and success of information systems within an organization. Developed based on the concept that information systems contribute to organizational success, this model identifies key factors that influence the performance of these systems. The model typically considers several dimensions, including system quality, information quality, user satisfaction, and the impact on organizational performance (Fitriati *et al.*, 2020).

The information system success model could be represented as below:

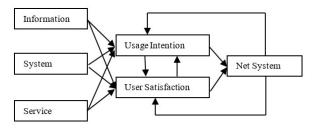


Figure 1: Information System Success Model Source: (DeLone & McLean, 1992)

Empirical Review

Okatahi et al. (2022) indicated that automation and digitalization can significantly improve the performance of public enterprises in the Kogi State.

Pisar et al. (2022) found that Slovakia achieved a higher score when examining the level of digitization of key government services to citizens compared to the Czech Republic, which confirms the results of the examined studies in their individual subareas.

Swamynathan (2022) found that the implementation of Information and Communication Technology (ICT) in the Madras High Court has been pivotal in improving the efficiency of judicial processes. The use of ICT has significantly reduced delays in case handling and judgment delivery, which were previously hindered by the limitations of manual work. By prioritizing e-governance, the court can now dispense justice more rapidly, meeting the expectations of petitioners and enhancing their trust in the judicial system. However, the author also identified

the need to further expedite the computerization efforts to maximize these benefits.

Nataliia et al. (2022) assess the level of development of e-governance of the regions of Ukraine in order to determine digital opportunities and prospects for the introduction of the latest information technologies. According to the results of the assessment of the level of development of e-government in the regions using the taxonometric method, the leading regions (the Kyiv, Dnipropetrovsk, Lviv, Odesa, and Ivano-Frankivsk regions) and the regions with the lowest level of development of e-government (the Luhansk and Cherkasy regions) were determined.

Bokayev et al. (2021) analyzed digitalization policy in the Republic of Kazakhstan within the framework of e-government services implementation. The state digitalization programs in Kazakhstan focused on automating government business processes and creating state information systems and databases, rather than addressing citizens' daily needs. Government business processes were automated, the number of required documents was reduced, and service timeframes were shortened. The full concept of digitalization optimization was not implemented.

Batool et al. (2021) stated that E-governance has emerged as a prominent trend in developed countries over the past three decades, serving as a pivotal tool for implementing effective governance practices. According to the digital state survey, the USA, Europe, and Asia have secured top positions in e-governance delivery, with rankings based on social measures such as e-democracy, e-commerce, e-revenue, and e-taxation. Information and communication technology (ICT) has revolutionized government performance globally, with applications like Government to Employee (G2E), Government to Government (G2G), Government to Business (G2B), Business to Government (B2G), and Government to Citizen (G2C) technologies. These applications enhance communication with employees, streamline recordkeeping, facilitate business operations, and improve service delivery. While governments were once reactive to e-governance, they are now proactively adopting this model to enhance social indicators and foster a corruption-free society.

Malodia *et al.* (2021) stated that the information and hyper-connectivity revolutions have caused significant disruptions in citizens' interactions with governments all over the world. The study also identified the digital divide, economic growth and political stability as moderators of e-government.

Pelse *et al.* (2021) identified and compared the level of digitalization in four national public administration institutions: the State Revenue Service, the Office of Citizenship and Migration Affairs, the State Social Insurance Agency and the State Employment Agency. The State Revenue Service has reached the highest level of maturity in digitalization, and the institution has also allocated the most funds from its budget to information



technologies and the maintenance of their systems. The level of digitalization is low in the State Employment Agency and the Office of Citizenship and Migration Affairs. The public requires public administration services to be available digitally on a 24-hour/7day basis.

Ahmad *et al.* (2021) found that the websites of local government agencies, are not transparent, ineffective, and inefficient. The role of social media is also not influential because there is no feedback provided by the government on input and questions given by the public.

Ullah *et al.* (2020) investigated the role of e-governance in combating COVID-19 by integrating the implications of the China–Pakistan Economic Corridor (CPEC). The author concluded that CPEC can help combat the COVID-19 pandemic because both countries are working together to mitigate social and economic problems.

Sovetova (2021) focused on the crucial role of digital technologies in management, social, and business processes, emphasizing their impact on the socioeconomic potential of territorial systems. The research analyzed the interdependence between rural territories' potential and digital transformation parameters, introducing concepts such as digitalization and digital potential. The tasks include selecting a methodological approach, developing a classification model for rural territories based on digital transformation susceptibility, and justifying a single digital platform for sustainable development planning.

Kusmiarto *et al.* (2021) evaluated the readiness of a land office to achieve digital transformation visions. The quality assessment results indicate a problem with completeness, conformity, consistency, accuracy, duplication, and integrity. In conclusion, the readiness level still needs improvement, especially in the indicator related to Cyber Security, Privacy, and Resilience (1.0). Even though the Leadership and Governance, User-Centered Design, and Public Administration Reforms and Change Management sections shows a reasonably high score (≥2.0), other core sections, namely Technology Infrastructure (1.7), Legislation and Regulation (1.4), Data Infrastructure, Strategies, and Governance (1.8) are mediocre, and therefore they need improvement.

Febiri & Hub (2021) found that key metrics and indicators that can be used to evaluate public sector digital progress. According to the author, policymakers need to redefine digitalization goals and areas of investments, while researchers can contribute more insights to the individual impact of these metrics and indicators on the development of a digital public sector.

Sharma (2020) stated that Digital governance or e-governance is the application of ICT for delivering government services, exchange of ICT between government and people. Government services are made available to the citizens in a convenient, efficient and transparent manner through e-governance. The outcome of the study was helpful for policy makers and leaders to formulate effective e-government policies and standard during crisis.

Dobrolyubova et al. (2019) presented that while there is statistically significant positive correlation between government digitalization and public administration performance, this relationship is stronger for government effectiveness, control of corruption, and doing business and weaker for e-participation, voice and accountability and efficiency of public spending. The finding suggested that there is direct cause and effect relationship between e-government development index and Doing Business measures. At the same time, surprisingly no direct cause and effect relationship was found between government digitalization and other governance indicators included in this study, such as government effectiveness and control of corruption.

Freeze et al. (2018) utilized the Information Systems Success (ISS) model in examining e-learning systems success. The results revealed that both system quality and information quality had significant positive impact on user satisfaction and system use. Additionally, the results showed that user satisfaction, compared to system use, had a stronger impact on system success. Implications for educators and researchers are reported

Pradhan and Shakya (2018) stated that with the digital disruption governments all over the world have envisaged into big data technology with the purpose of seeking values for the benefit of governmental activities. Governments have taken up this technology as a game changer of the e-governance. Citizen centric data over web access and activities over the smart handsets have driven large volume of data not only in structured form but largely in unstructured form. The necessity of processing and analyzing the exploding data sets has driven governments to adopt this technology. Following the global trend of digitalization and the ICT infrastructure development, Nepal e-Government services can initiate Big Data technology to resolve many of the governmental services. The paper explored some big data applications for the e-government of Nepal and further studies some challenges that Nepal could face while adopting the Big data in the e-government services.

Research Gap

In a comprehensive exploration of e-governance and digitalization, multiple studies contribute valuable insights into the global landscape. Okatahi et al. (2022) underscore the positive correlation between digitalization and enhanced performance in public enterprises, emphasizing the pivotal role of automation and digital tools. Pisar et al. (2022) provide a comparative analysis of e-government services in Slovakia and the Czech Republic, revealing varying levels of digitalization and the need for citizen-centric approaches. Meanwhile, Bokayev et al. (2021) highlight the challenges and benefits of digitalization policies in Kazakhstan, emphasizing the importance of aligning initiatives with societal needs through a citizen-centric approach. Ahmad et al. (2021) and Pelse et al. (2021) shed light on the effectiveness and efficiency of e-governance websites in Indonesia



and Latvia, respectively, offering valuable insights for improvement. Ullah et al. (2021) explore the global impact of e-governance in combating COVID-19, stressing the importance of learning from successful models. Malodia, Dhir, Mishra, and Bhatti (2021) propose an integrated conceptual framework, identifying citizen orientation as a critical factor for successful e-government projects. However, this study focuses specifically on the digitalization of Nepal's Department of Transport Management (DOTM), offering a detailed and context-specific analysis that is lacking in existing literature. Unlike broader studies, it employs a mixed-method approach, combining qualitative insights and quantitative data, to provide a comprehensive understanding of both the benefits and challenges of digitalization. This study not only addresses the successes of digitalization but also critically examines the obstacles, providing a balanced and practical contribution to the discourse on e-governance in Nepal.

MATERIALS AND METHODS

The research design of this study is both analytical and

descriptive, focusing on the challenges of digitalization in Nepal. It utilizes both qualitative and quantitative data, primarily sourced from secondary materials such as published research articles, books, and websites. Primary data was collected via a Google questionnaire distributed among Kathmandu Valley residents and interviews with various stakeholders.

Convenience sampling was used due to the large population size, specifically 25,20,695 DOTM platform users from 2019 to 2024. Data collection techniques included qualitative and quantitative methodologies, supplemented by library and online research. Data analysis involved statistical methods such as standard deviation, mean, correlation, and regression to evaluate the current net system benefits of DOTM digitalization practices, with findings reported in terms of conclusions and recommendations.

There are a total of 25,20,695 people who have used the DOTM platform for the purpose of license and adding new category within the period of 2019 to 2024, which is further shown in the table below:

Table 1: Number of People registered in DOTM website from 2019 to 2024

Year	New Entry	New License	Added Category	Renew
2019	559,483	298,931	90,120	277,098
2020	103,490	65,672	22,406	254,623
2021	427,349	192,548	60,191	354,779
2022	754,149	458,705	151,826	442,834
2023	571,648	428,461	170,037	493,716
2024	104,576	86,911	40,410	111,603
Total	2,520,695	1,531,228	534,990	1,934,653

Source: (DOTM Kathmandu)

As the total population for the study is higher than 20,000, convenience sampling method is utilized in this study because no agency maintains data on those visitors.

RESULTS AND DISCUSSION

Descriptive Statistics

Descriptive statistics are a set of techniques used to

summarize and describe the main features of a dataset. These statistics provide a concise overview of the essential characteristics of a data sample, making it easier to understand and interpret. The descriptive statistics based on the variables is shown in the table below.

The descriptive statistics table provides insights into user perceptions across six key survey variables: Information

Table 2: Descriptive Statistics

	N	Min	Max	Mean	SD
IQ	384	1.0	5.0	2.426	.6434
SQ	384	1.0	5.0	2.636	.7194
SEQ	384	1.0	5.0	2.446	.6529
UI	384	1.0	5.0	2.304	.6174
US	384	1.0	5.0	2.671	.8320
NB	384	1.0	5.0	2.305	.6461

Where IQ= Information Quality, SQ= System Quality, SEQ= Service Quality, UI= Usage Intentions, US= User Satisfaction, NB= Net System Benefits

Quality (IQ), System Quality (SQ), Service Quality (SEQ), Usage Intentions (UI), User Satisfaction (US), and Net System Benefits (NB), each scored from 1.0 (strongly

agree) to 5.0 (strongly disagree). Information Quality (IQ) has a mean score of 2.426 with a standard deviation of 0.6434, indicating moderate perceived quality and some



variability in responses. System Quality (SQ) shows a mean of 2.636 and a higher standard deviation of 0.7194, reflecting moderate quality perceptions and notable opinion diversity. Service Quality (SEQ) has a mean of 2.446 and a standard deviation of 0.6529, suggesting moderate service quality with some variability. Usage Intentions (UI) has a mean score of 2.304 and a standard deviation of 0.6174, indicating moderate usage intentions and variability.

User Satisfaction (US) has a mean of 2.671 and a higher standard deviation of 0.8320, showing moderate satisfaction with diverse opinions. Net System Benefits (NB) has a mean of 2.305 and a standard deviation of

0.6461, indicating moderate perceived benefits with varying perceptions among respondents.

Correlation

Correlation is a statistical measure that describes the degree to which two variables change together. In other words, it quantifies the extent to which a change in one variable is associated with a change in another variable. Correlation does not imply causation, but it indicates the strength and direction of a linear relationship between two variables. The most common measure of correlation is the Pearson correlation coefficient, denoted by "r." It ranges from -1 to 1.

Table 3: Correlations

	IQ	SQ	SEQ	UI	US	NB	
IQ	1						
SQ	.614**	1					
SEQ	.694**	.711**	1				
UI	.555**	.502**	.663**	1			
US	.522**	.702**	.655**	.492**	1		
NB	.579**	.550**	.641**	.633**	.435**	1	

^{**.} Correlation is significant at the 0.01 level (2-tailed)

Where IQ= Information Quality, SQ= System Quality, SEQ= Service Quality, UI= Usage Intentions, US= User Satisfaction, NB= Net System Benefits

The correlation analysis reveals significant relationships among key survey variables, highlighting the interconnected nature of user perceptions. Information Quality (IQ) shows a moderately strong positive correlation (0.614**) with System Quality (SQ), indicating that higher perceived information quality aligns with higher system quality. A strong positive correlation (0.694**) between IQ and Service Quality (SEQ) suggests that those perceiving higher information quality also view service quality favorably. IQ also correlates moderately strongly (0.555**) with Usage Intentions (UI), implying that better information quality fosters positive usage intentions. Similarly, IQ's correlation with User Satisfaction (US) (0.522**) and Net System Benefits (NB) (0.579**) indicates that higher information quality enhances satisfaction and perceived benefits. System Quality (SQ) shows strong positive correlations with SEQ (0.711**) and US (0.702**), suggesting that better system quality improves service quality and user satisfaction. Its moderately strong correlation with UI (0.502**) and

NB (0.550**) implies that better system quality enhances usage intentions and perceived benefits. Service Quality (SEQ) exhibits strong positive correlations with UI (0.663**), US (0.655**), and NB (0.641**), indicating that higher service quality boosts usage intentions, satisfaction, and perceived benefits. Usage Intentions (UI) correlate moderately strongly with US (0.492**) and strongly with NB (0.633**), suggesting that positive usage intentions enhance satisfaction and perceived benefits. Finally, User Satisfaction (US) shows a moderate positive correlation (0.435**) with NB, indicating that higher satisfaction improves perceived system benefits.

Regression Analysis

Regression analysis is a statistical technique used to examine the relationship between one dependent variable and one or more independent variables. The goal is to understand how the independent variables impact the dependent variable and to make predictions based on this relationship

Table 4: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		В	Std. Error	Beta		
1	(Constant)	.284	.105		2.70	.007
	US	080	.041	103	-1.93	.053
	UI	.361	.051	.345	7.10	<.001
	SEQ	.234	.063	.236	3.68	<.001



SQ	.161	.052	.179	3.09	.002
IQ	.168	.052	.167	3.24	.001

a. Dependent Variable: NB

Where IQ= Information Quality, SQ= System Quality, SEQ= Service Quality, UI= Usage Intentions, US= User Satisfaction, NB= Net System Benefits

The coefficients table reveals the contributions of each predictor to the model. The intercept (Constant) has a coefficient of 0.284 with a standard error of 0.105 and is statistically significant (t = 2.705, p = 0.007). The unstandardized coefficients show the change in the dependent variable (Net System Benefits, NB) for a oneunit change in the predictor, holding others constant. User Satisfaction (US) has a negative coefficient of -0.080, suggesting a decrease in NB with increased US, approaching significance (p = 0.053). Usage Intentions (UI) has a positive coefficient of 0.361, indicating a significant increase in NB with higher UI (p < 0.001). Service Quality (SEQ) has a positive coefficient of 0.234, indicating a significant increase in NB with higher SEQ (p < 0.001). System Quality (SQ) has a positive coefficient of 0.161, showing a significant increase in NB with higher SQ (p = 0.002). Information Quality (IQ) has a positive coefficient of 0.168, indicating a significant increase in NB with higher IQ (p = 0.001). The regression model, including IQ, US, UI, SQ, and SEQ, significantly predicts NB, with UI, SEQ, SQ, and IQ positively associated with NB, highlighting their importance in influencing the perceived benefits of the system.

Verification of Research Model

The findings of the reviewed studies generally align with the identified trends in the literature. Notably, studies on office automation and digitalization in public enterprises (Okatahi, Nwachukwu, & Okhuese, 2022) confirm the positive impact of these technologies on organizational performance. Similar support is observed in evaluations of e-government services in Slovakia and the Czech Republic (Pisar, Priscakova, Spacek, & Nemec, 2022), the development of e-governance in Ukraine (Natalila et al., 2022), and the citizen-centric approach in Kazakhstan's digitalization policy (Bokayev et al., 2021). The global shift towards proactive e-governance adoption (Batool, Gill, Javaid, & Khan, 2021) and the significance of citizen orientation in e-government success (Malodia et al., 2021) are reinforced by the empirical evidence. Additionally, the varying levels of digitalization in Latvian public administration (Pelse, Strazdina, & Ancans, 2021) and the challenges faced by Enrekang Regency's government website (Ahmad et al., 2021) provide context-specific insights. The role of e-governance in combating COVID-19 and the implications of the China-Pakistan Economic Corridor (CPEC) find support in Ullah et al. (2021). Studies in Ukraine (Stefanchuk et al., 2021) and territorial systems (Sovetova, 2021) further underscore the positive impact of digitalization on public services and socio-economic potential. Finally, the assessment of a land

office's readiness for digital transformation aligns with the need for improvements in specific indicators (Kusmiarto et al., 2021). The empirical findings corroborate the literature, emphasizing the pivotal role of e-governance, digitalization, and citizen-centric approaches in advancing public services and organizational performance. Hence the model fits for the analysis of net system benefit based on both literature and findings of this paper.

Analysis of Qualitative Data

The qualitative data reveals themes related to government initiatives, impacts on citizens, challenges, and user experiences. Government initiatives like Digital Nepal emphasize good governance and citizencentric digitalization, leading to reduced waiting times and increased efficiency. However, challenges include employee resistance, usability issues, and outdated UI designs. Suggestions for improvement include a userfriendly system, public awareness campaigns, and continuous updates. Despite these challenges, the digital system is appreciated for eliminating physical visits and providing time-efficient services. Contributions of Research: The paper provides policy recommendations to enhance digitalization efforts in Nepal, including capacity-building initiatives for government employees, training programs to improve digital literacy, and fostering a culture of digital innovation. The findings contribute to existing knowledge on digitalization and e-governance in Nepal and can be disseminated through academic publications, conferences, and workshops to stimulate further research in this area.

System to Address the Challenges Identified

The centralized database system for government creates a unified repository where data from various departments and agencies is collected, integrated, and securely stored with robust access controls to ensure confidentiality and compliance with regulations. This system facilitates efficient data management, analysis, and reporting, supporting informed decision-making processes across governmental functions. The system improves the net benefits for users by allowing easy data retrieval for license issuance, processing, and form filling for new licenses, category additions, and renewals. The model is built on the centralized data retrieval using the National ID, which autofills personal details and license status, simplifying user interactions. Key components include a frontend interface with HTML, CSS, and JavaScript for user interaction, backend logic with PHP for server-side processing, and MySQL for database management. Security measures involve user





authentication, access control, data validation, secure communication, and error handling. The working model includes user registration, profile management, and data retrieval modules, emphasizing ease of use and efficiency. The workflow integrates user registration, authentication, profile management, data retrieval, and security measures to ensure smooth operation, user satisfaction, and robust digital system performance.

CONCLUSION

In conclusion, the research undertaken to analyze the challenges of digitalization systems in Nepal offers a comprehensive understanding of various dimensions. The demographic profile illuminates a gender imbalance and a concentration of respondents in the younger age groups, reflecting the digital engagement trends among different segments of the population. Diverse educational backgrounds and occupational statuses provide insights into the varied perspectives contributing to the study. The descriptive statistics showcase moderate perceptions across key variables, indicating a nuanced view of Information Quality, System Quality, Service Quality, Usage Intentions, User Satisfaction, and Net System Benefits. The correlation and regression analyses reveal meaningful relationships and predictive power in understanding the factors influencing Net System Benefits. These statistical insights contribute to a more holistic understanding of the interplay between different aspects of digitalization. The qualitative data analysis enriches the findings by emphasizing the positive impact of government initiatives, improved citizen services, and the challenges faced in the digitalization process. User suggestions underscore the importance of a user-friendly digital platform, highlighting areas for improvement. The research design, combining analytical and descriptive methods, utilizes both qualitative and quantitative data from secondary sources, providing a well-rounded approach to addressing the research questions.

The study not only contributes to the specific discourse on digitalization challenges in Nepal but also offers a methodology and insights that can be applicable to similar contexts in developing countries. The findings and recommendations underscore the significance of user-centric approaches, addressing challenges systematically, and leveraging government support to enhance the overall digitalization experience.

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