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Fostering Sustainable Digital Governance: Citizen Acceptance of Web-Portal-Based Integrated Platforms in Bangladesh through A TAM-TPB Approach

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Abstract: This study explores the acceptance of web-portal-based integrated digital governance platforms in Bangladesh, emphasizing their role in fostering sustainable governance. By combining the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB), the research identifies key factors influencing user behavior, such as government policy updates, platform design, user capacity building, citizen engagement, and information security. These elements enhance perceived usefulness and ease of use, driving the adoption of digital platforms that streamline decision-making, improve operational efficiency, and promote inclusive citizen participation. This research uses 216 responses to analyze the structural model. The study highlights the potential of these platforms to reduce the digital divide, support equitable access to governance, and enable informed policy-making, aligning with long-term sustainability goals. While acknowledging minimal risks in platform adoption, it offers solutions to ensure data security and system resilience, contributing to the creation of transparent and efficient public services. By prioritizing sustainability, this research proposes a framework for designing and implementing digital governance platforms that empower citizens, modernize governance structures, and secure a sustainable future for public administration in Bangladesh.

Keywords: Sustainable Digital Governance; Citizen Engagement; Technology Acceptance Model; Information Security; Digital Transformation

1. Introduction

The Government of Bangladesh recognizes digital technology and citizen integration into governance as critical drivers of sustainable growth and innovation, key to achieving its Vision 2041 for developed nation status and middle-income status by 2031. While significant progress has been made in adopting digital governance tools to enhance public service delivery, citizen engagement, and operational efficiency, challenges persist in achieving tangible outcomes. These challenges are particularly evident in areas such as skill development, capacity building, and citizen participation in governance systems [1].

To address these issues, Bangladesh must embark on a comprehensive digital transformation journey that emphasizes user-friendly, accessible, and inclusive technologies. Such an approach requires updated governance policies, robust digital infrastructure, capacity enhancement programs, strong data protection measures, and innovative tools for fostering citizen participation in

governance processes [2, 3]. Additionally, successful digital transformation depends on effective coordination among government agencies, private sector stakeholders, and civil society to ensure the seamless and sustainable adoption of integrated solutions [4, 5].

Digital technologies play an essential role in enabling this transformation by addressing inefficiencies, minimizing human error, and enhancing transparency. Research highlights the importance of designing inclusive and accessible digital governance platforms that cater to diverse user groups, regardless of socioeconomic status or physical ability [2, 6]. Grigalashvili [3] emphasized key adoption factors, such as technology integration, information security, and citizen engagement, as foundational to improving accountability and informed decision-making. However, challenges related to security and privacy must be prioritized to foster trust and ensure widespread adoption [7, 8].

Further research indicates that factors such as subjective norms significantly influence behavioral intentions to adopt digital governance platforms [8-11]. Despite these findings, limited research has focused on the contextual challenges of Bangladesh, where unique governance structures and socio-political dynamics necessitate tailored approaches. Moreover, the reliance on digital technologies brings critical issues, including data security risks and the blurring of boundaries between professional and personal contexts, which must be addressed for long-term sustainability [4].

The Government of Bangladesh's commitment to digital governance is evident in its significant investments in digital infrastructure and services. However, governance in the 21st century must be dynamic, inclusive, and responsive, with a focus on transparency and citizen-centric solutions to meet the country's sustainable development objectives [12, 13]. Addressing barriers such as outdated governance policies, energy efficiency, insufficient citizen participation, and limited capacity-building initiatives will be critical for creating a resilient, transparent, and accountable governance system [14]. By prioritizing these efforts, Bangladesh can establish a digital governance framework that aligns with its long-term sustainability goals and ensures equitable public service delivery [4, 12, 15, 16].

Though digital governance projects are becoming more and more popular, few thorough research looking at citizen approval of web-portal-based integrated governance systems—especially in Bangladesh—exist. While ignoring behavioral, societal, and policy-related elements influencing user adoption, current studies mostly concentrate on technological infrastructure. Although the Theory of Planned Behavior (TPB) and the Technology Acceptance Model (TAM) have been extensively used in studies on technology adoption, their combined usage in the framework of digital governance is yet understudied. Furthermore, understudied are how government policies, platform architecture, user capacity building, and information security shape sustainable digital governance. By means of a TAM-TPB framework to improve transparency, inclusivity, and operational efficiency in public service delivery, this study intends to address these deficiencies and investigate the main determinant of citizen acceptability of web-portal-based integrated governance platforms in Bangladesh. The study specifically aims to evaluate the influence of perceived usefulness, ease of use, social norms, and behavioral control on adoption; assess the part government policies, platform design, user capacity building, and information security play in determining user acceptance; and offer strategic recommendations for policymakers and practitioners to promote sustainable digital governance in Bangladesh.

This study makes significant contributions to the discourse on sustainable digital governance. First, it proposes a citizen-centric, web-portal-based integrated digital governance platform tailored to the unique needs of Bangladesh, aiming to enhance transparency, accountability, and inclusivity while contributing to the nation's long-term sustainable development goals. By prioritizing user engagement and accessibility, the platform addresses critical gaps in existing governance systems, enabling efficient public service delivery. Second, the research advances theoretical understanding by combining the TAM and the TPB to explain user behavior and intentions toward adopting digital governance platforms. This integration provides a robust framework for analyzing the interplay between perceived usefulness, ease of use, social norms, and behavioral control in fostering digital adoption. Finally, the study investigates mediation effects, offering insights into how key factors such as policy updates, user capacity, and information security influence the relationship between platform design and adoption. These contributions not only enrich academic literature but also provide actionable insights for policymakers and practitioners striving to build resilient and sustainable digital governance systems in Bangladesh.

2. Literature Review

2.1. Review of Related Studies

A web portal is an online platform that fosters interaction between government entities and citizens through Information and Communications Technologies (ICTs). By providing digital interfaces for accessing information, participating in decision-making processes, and engaging with public services, web portals aim to enhance transparency, empower citizens, and strengthen collaboration between governments and the public [9]. Within the governance context, a web portal represents a structured integration of organizational resources—encompassing employees, technical systems, policies, and procedures—to manage websites effectively. This integration ensures seamless coordination of content, user access, security protocols, and adherence to organizational standards, thereby aligning digital governance platforms with strategic goals and fostering conflict-free management [13, 17].

Web portals also serve as sophisticated information systems, providing users with access to integrated applications and databases that support knowledge management and decision-making. These platforms act as knowledge hubs, facilitating the acquisition, sharing, and transfer of knowledge to optimize organizational effectiveness and enhance public engagement [18]. As single points of access, portals enable the organization and distribution of information and knowledge, benefiting both individuals and institutions by improving communication and collaboration. This is particularly critical for sustainable governance as it fosters inclusivity and partnerships among internal stakeholders and external entities, including citizens and businesses [10, 19].

The functions of web portals are essential for driving sustainable futures. These functions include: (i) user acceptability, which ensures that portals cater to diverse user requirements and preferences; (ii) integration, harmonizing data and information across organizational systems to enhance decision-making; (iii) security, providing users with reliable and secure access to resources; (iv) searchability, enabling efficient retrieval of information through advanced search engines; (v) collaboration, fostering teamwork and partnerships both internally and externally; (vi) scalability, ensuring the platform can handle increasing workloads effectively; and (vii) accessibility, offering

users the ability to engage with the portal from anywhere at any time. These features not only enhance operational efficiency but also ensure that digital governance aligns with principles of equity, resilience, and inclusivity—key tenets of sustainable development [10, 15, 19, 20].

Moreover, the success of a web portal in delivering sustainable outcomes depends on user perceptions of quality and satisfaction. User satisfaction strongly influences continued use of digital platforms, which is critical for achieving long-term governance goals [21]. Portals designed with a focus on sustainability principles—such as inclusivity, security, and adaptability—are more likely to gain user trust and drive widespread adoption [22]. By integrating these attributes, web portals can become transformative tools that contribute to a more equitable, efficient, and sustainable future for governance systems.

2.2. The Conceptual Framework

The conceptual framework presented in Fig. 1 outlines the key constructs central to this study, identifying both endogenous and exogenous variables, as well as the theoretical foundations guiding their integration. The exogenous variables, which serve as independent factors, include the Update of Governance Policy (UGP), Integrated Digital Government Platform (DGP), User Skill and Capacity Development (USD), and Information Privacy and Security (IPS). These variables are considered critical drivers of digital governance adoption and implementation. Additionally, Information Behavioral Control (IBC), Citizen Engagement (CE), and Subjective Norms (SN) are identified as influencing factors that shape user attitudes and behaviors toward digital platforms.

The endogenous variables, representing dependent factors, include Perceived Usefulness (PU) and Perceived Ease of Use (PEU), which are essential in determining users' attitudes towards the platform. Intention Towards Web Portal Use (ITU-WP) reflects users' willingness to engage with the platform, while Behavioral Intention to Use Citizen-Centric Web Portal-based Integrated Digital Governance Platform represents the ultimate factor in predicting actual usage behavior. The framework, based on the integration of the TAM and the TPB, illustrates how these variables interact to influence the adoption and successful implementation of digital governance platforms in Bangladesh, fostering transparency, efficiency, and inclusivity in governance.

The conceptual framework integrates key theories relevant to understanding user acceptance of technology, primarily the Technology Acceptance Model and the Theory of Planned Behavior [23, 24]. TAM highlights the critical role of perceived usefulness and perceived ease of use in determining users' attitudes toward adopting new technologies [24]. On the other hand, TPB expands on this by incorporating additional factors such as subjective norms, which reflect societal influence, and perceived behavioral control, which addresses users' confidence in their ability to successfully engage with the technology [23]. This combined framework provides a comprehensive approach to examining user engagement with digital government platforms, emphasizing both cognitive and social dimensions of adoption. By synthesizing these established behavioral theories, the framework offers valuable insights for researchers and practitioners aiming to analyze technology adoption processes, with a focus on enhancing user participation in digital governance and informing policy decisions that promote the successful integration of digital solutions in public service systems.

The adoption and effective use of digital governance platforms play a pivotal role in shaping a sustainable future, where efficient and transparent public service delivery is integral to societal development. Understanding the factors influencing user acceptance and behavior towards these

platforms is crucial in fostering widespread adoption and maximizing their potential. To achieve this, this study proposes a conceptual framework that integrates two foundational theories: TAM and TPB, both of which offer valuable insights into user engagement with technology.

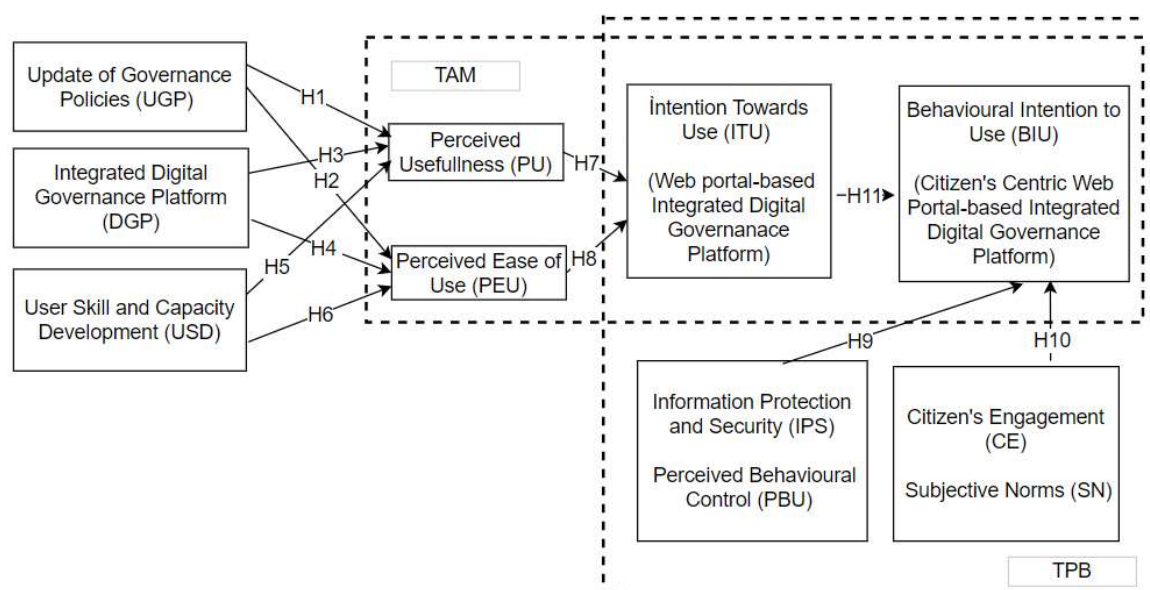


Figure 1. Conceptual framework of the research.

The TAM, introduced by Davis [24], posits that two key factors, PU and PEU, are central to determining an individual's intention to use and actual use of technology. PU refers to the degree to which an individual believes that using a particular system would enhance their performance, while PEU denotes the extent to which using the system is perceived as effortless. These factors are critical for driving user engagement and fostering the adoption of digital platforms that can improve the efficiency, transparency, and accessibility of government services, contributing to a more sustainable and accountable governance system.

The TPB, formulated by Ajzen [23], extends the predictive power of TAM by incorporating three additional determinants of intention: Attitude Towards the Behavior, Subjective Norms, and Perceived Behavioral Control. These factors consider the social and control aspects that TAM overlooks, providing a more holistic view of the drivers of technology adoption. In the context of digital governance, TPB helps explain how societal expectations and personal control over technology influence users' intentions to engage with digital platforms, further aligning with the goals of sustainability in governance.

The integration of TAM and TPB offers a more comprehensive framework for understanding user behavior towards digital governance platforms. Recent studies, such as those by Cheng (2019), highlight the advantages of combining these models, suggesting that their integration provides a more robust predictive model. Marangunić and Granić [10] emphasize the evolving application of TAM, and Hossain [12] further underscores the complementary nature of TPB and TAM, particularly in educational and governance settings. In the context of digital governance, this integrated approach is crucial in promoting the widespread adoption of platforms that enhance government accountability, efficiency, and transparency, all of which are essential for building a sustainable future.

The applicability of the combined TAM-TPB model in digital governance is further supported by Abou-Kamar et al. [20], which demonstrates its relevance in other domains, such as sustainable tourism, and highlights its potential for driving innovation in public sector technology. As digital governance continues to evolve, integrating these models will provide valuable insights for policymakers and practitioners to create user-centric platforms that not only meet citizens' needs but also contribute to long-term sustainability by fostering greater engagement, efficiency, and transparency in governance processes.

2.3. Development of Hypotheses

The TAM posits that Perceived Usefulness (PU) and Perceived Ease of Use (PEU) are critical determinants of technology acceptance and usage. In the context of web-portal-based digital services, empirical research has consistently demonstrated a strong positive correlation between PEU and users' intention to adopt these services [25]. Specifically, the ease of use of digital services plays a pivotal role in fostering their acceptance, as users are more likely to engage with platforms that are intuitive and straightforward to navigate [26]. Given the increasing adoption of web-portal-based platforms, it is hypothesized that both PU and PEU will significantly influence users' behavioral intentions to adopt such platforms. The convenience, accessibility, and user-friendly nature of these platforms are expected to drive improvements in public service delivery, promoting efficiency, transparency, and accountability [1, 13]. Furthermore, governance policies perceived as more transparent, accountable, and citizen-centric tend to be regarded as more useful by the public. Their work synthesizes governance literature, emphasizing that dimensions like accountability and transparency enhance the perceived usefulness of governance initiatives [5, 19]. Based on this, it is hypothesized that the implementation of web-portal-based governance systems will lead to a greater intention to use these platforms. Thus, the following hypotheses are proposed:

Hypothesis 1. *Update of Governance Policies (UGP) positively influence the Perceived Usefulness (PU) of web portal-based digital governance platforms.*

Hypothesis 2. *UGP positively influence the Perceived Ease of Use (PEU) of web portal-based digital governance platforms.*

Citizens place significant value on Digital Government Platforms (DGPs) because of the efficient access they offer to a wide array of government services, information, and resources. The integrated nature of DGPs allows users to interact seamlessly across multiple domains, such as tax payments, permit applications, and public records checks. As a result, users recognize the practicality and convenience of DGPs in fulfilling their specific needs. The quality of e-government from the citizens' perspective, emphasizes the importance of perceived factors, demographic variables, and the digital divide. The design and interface of DGPs play a pivotal role in facilitating user interaction. An integrated DGP presents a unified platform with consistent navigation, reducing cognitive load and confusion. Users find these systems easier to learn and use, which enhances their overall engagement. Manoharan et al. [18] evaluated digital governance practices and highlighted the crucial role of usability in encouraging user participation.

Hypothesis 3. *Integrated Digital Governance Platform (DGP) positively influences the PU of web portal-based digital governance platforms.*

Hypothesis 4. *Integrated DGP positively influences the PEU of web portal-based digital governance platforms.*

The concept of User Skill and Capacity Development (USD) involves enhancing users' skills, knowledge, and capabilities in effectively utilizing digital systems and technologies. In the context of Digital Government Platforms (DGPs), USD plays a crucial role in determining how well users can interact with and leverage these platforms for efficient public service delivery. Perceived Usefulness (PU) refers to users' subjective evaluation of how valuable and advantageous a system is in achieving their specific goals or tasks. According to the TAM proposed by Davis [24], both PU and Perceived Ease of Use (PEU) are key factors influencing users' attitudes toward the acceptance and usage of information technology. As users' skills and capacity improve—through training, education, or experience—they are more likely to perceive the system as useful [25]. Increased proficiency in using the system leads to a stronger recognition of its value in accomplishing objectives [7].

Perceived Ease of Use (PEU), on the other hand, refers to the ease with which users can learn and operate a system, encompassing factors such as simplicity, clarity, and intuitiveness (Davis, 1989). As users' skills and capacities grow, they tend to perceive the system as easier to use, as they can quickly adapt to its interface and functionalities [17, 25]. Improved skills lead to a smoother interaction with the system, fostering a more positive perception of its ease of use [7, 9]. This suggests that USD plays an integral role in shaping both PU and PEU in the context of web portal-based digital governance platforms. Based on these theoretical insights, the following hypotheses are proposed:

Hypothesis 5. *User Skill and Capacity Development (USD) positively influences the PU of web portal-based digital governance platforms.*

Hypothesis 6. *USD positively influences the PEU of web portal-based digital governance platforms.*

Perceived Usefulness (PU) refers to the extent to which a user believes that using a particular system will enhance their job performance. In the context of digital governance platforms, PU is a critical determinant of users' intention to engage with these platforms. When users perceive that the platforms offer significant benefits, such as increased efficiency, transparency, and accessibility of services, they are more likely to adopt and continue using these platforms [24]. The positive influence of PU on users' intention to use has been widely validated in various technological settings, emphasizing its essential role in driving user adoption and sustained usage [18, 25].

The relationship between Perceived Ease of Use (PEU) and PU has been well-explored in the literature. Davis [24] proposed that systems that are easier to use are more likely to be perceived as useful by users. This hypothesis has been supported by numerous studies, which confirm that PEU positively influences PU [7, 25]. In the context of digital governance platforms, when users find the system intuitive and easy to navigate, they are more likely to recognize its usefulness in performing governance tasks. The user-friendly design and features of web portal-based digital governance platforms enhance the perception of the system's utility, reinforcing the positive impact of PEU on PU [26, 27].

The impact of PU on users' Intention Towards Use (ITU) is a fundamental component of the TAM. Users' perceptions of a system's usefulness directly affect their intention to use it. Numerous studies support this relationship, indicating that a higher perceived usefulness leads to a stronger intention to use the system [1, 4, 7, 9, 10, 13, 15, 18, 21]. In digital governance, users' intention to use web portal-based platforms is strongly influenced by their belief in the platforms' usefulness. When users recognize that these platforms enhance efficiency, provide better access to information, and simplify governance processes, their intention to use the platforms increases. Based on these theoretical insights, the following hypotheses are proposed:

Hypothesis 7. *Perceived Usefulness (PU) positively influences the Intention Towards Use (ITU) of web portal-based digital governance platforms.*

Hypothesis 8. *Perceived Ease of Use (PEU) positively influences the Intention Towards Use (ITU) of web portal-based digital governance platforms.*

The literature consistently supports the positive influence of Perceived Ease of Use (PEU) on Intention to Use (ITU). Systems that are easier to use are more likely to attract users' intention to use them. This proposition has been affirmed by various studies, demonstrating that ease of use directly enhances users' intention to engage with a system [28]. In the context of web portal-based digital governance platforms, when users find the system intuitive and straightforward to navigate, they are more inclined to form a positive intention towards its use [9, 18, 29]. User-friendly interfaces and intuitive design features play a crucial role in boosting users' willingness to engage with these platforms, further confirming the positive impact of PEU on ITU.

Information Protection and Security (IPS) are crucial factors in the adoption and continued use of digital platforms. Users' concerns regarding privacy and data security significantly influence their trust and intention to use digital services [4, 22]. Effective IPS measures, such as robust encryption, secure authentication processes, and transparent privacy policies, increase users' confidence in the platform, positively affecting their behavioral intention to use the Citizen-Centric Digital Platform (CDP). Several studies have shown that users are more likely to engage with and adopt technologies that they perceive as secure and protective of their personal information [2, 9, 18, 26]. Therefore, the following hypothesis is proposed:

Hypothesis 9. *Information Protection and Security (IPS) positively influences Behavioural Intention to Use (BIU) of Citizen's Centric Web-portal based Integrated Digital Governance Platform (CDP).*

Citizen's Engagement (CE) plays a pivotal role in shaping perceptions of Information Protection and Security (IPS) on digital platforms. Active and engaged citizens, who participate regularly in digital governance, tend to develop a deeper understanding of the security measures that protect their data [30]. As they become more engaged, their trust in the platform grows, and they are more likely to appreciate the importance of robust IPS protocols. This increased engagement fosters a sense of ownership, which further reinforces the perceived security of the platform. When citizens perceive the platform to have strong security measures in place, their behavioral intention to use the Citizen-Centric Web-portal based Integrated Digital Governance Platform (CDP) is likely to increase. This creates a positive feedback loop, where heightened engagement boosts trust in the platform's security, and robust security in turn encourages further engagement [7, 19, 25]. Thus, the following hypothesis is proposed:

Hypothesis 10. *Citizen's Engagement (CE) positively influences Behavioural Intention to Use (BIU) of Citizen's Centric Web-portal based Integrated Digital Governance Platform (CDP).*

The Intention Towards Use (ITU) serves as a critical precursor to Behavioral Intention to Use (BIU) in the context of digital platforms. According to the TAM, an individual's intention to use a system is a strong predictor of their actual usage behavior [24]. In the case of Citizen-Centric Digital Platforms (CDPs), users who have formed a positive intention to use the platform, based on perceived usefulness and ease of use, are more likely to follow through with this intention and engage with the platform. This relationship highlights the importance of cultivating a favorable ITU to facilitate the BIU, which has been supported by numerous studies in the literature [7, 25].

Hypothesis 11. *Intention Towards Use (ITU) of web-portal based Integrated Digital Governance Platform (CDP) positively influences Behavioural Intention to Use (BIU) of Citizen's Centric Web-portal based Integrated Digital Governance Platform (CDP).*

3. Methodology

3.1. Data and Sample

To determine the appropriate minimum sample size for this study, Jackson's N:q ratio rule was applied, which ensures that the sample size is proportionate to the population size for accurate estimation [31]. In Bangladesh, the mobile subscriber distribution is as follows: 2G accounts for approximately 30-40% of total subscribers, 3G comprises around 50-60%, and 4G covers about 30% of the population. These statistics, along with the three functional administrative levels in the country, provide essential context for determining the study's sample. Bangladesh is divided into 52 Ministries/Divisions at the central level, 64 Districts, and 492 Upazilas (sub-districts). Among these, 345 Upazilas (approximately 70%) are equipped with the necessary internet speed, network connections, and interoperability features to facilitate digital governance initiatives.

To determine the appropriate sample size, we considered Jackson's N:q ratio rule, which suggests a sample size of at least 10 respondents for each parameter being studied (10:1 ratio), and ideally 20 respondents per parameter (20:1 ratio). Based on this, the minimum required sample size is 110 for a 10:1 ratio and 220 for a 20:1 ratio. Additionally, Krejcie and Morgan [32] table for sample size determination recommends an ideal sample size of 210 for a population of 460. For a slightly larger population of 480, the recommended sample size increases to 214. After considering these guidelines and the need to ensure statistical power and reliability, this study selects a final sample size of 216 respondents. This sample size strikes a balance between ensuring statistical robustness and adhering to the recommended practices for valid and reliable analysis.

3.2. Constructs and Measurement Indicators

The operationalization of the constructs in this study, as outlined in Table 1, involves a systematic approach to measuring the effectiveness and efficiency of a citizen-centric web portal-based digital governance system. Each construct is defined with clear explanations and corresponding measures, which are designed to assess the various facets of governance, user engagement, and technological infrastructure. A five-point Likert scale was used to measure responses for each indicator, where respondents rate their level of agreement or disagreement with the statements provided in the measures. This scale allows for nuanced responses and ensures a reliable assessment of perceptions and behaviors related to the use of the digital governance platform.

To ensure the validity and reliability of the measurement tools, pretesting and piloting were conducted. The pretesting phase involved a smaller group of respondents to identify any potential issues with the questionnaire, such as ambiguous items or wording, and to assess the clarity of the constructs. Feedback from the pretest was used to refine the measurement indicators. Following this, a piloting phase was implemented to test the finalized instrument with a broader sample, ensuring the robustness of the scales and the effectiveness of the constructs in capturing the intended variables. This process helps guarantee that the data collected is reliable and that the constructs are operationalized effectively for the study's goals.

Table 1. Construct describing the Measurement Indicators.

	Construct Explanation	Measures
UGP	Identification of areas where policy updates are required, addressing barriers/constraints towards digitalization for a citizen-centric web-portal-based government office at the Upazila level (PU and PEU).	UGP1: Poor infrastructure/Broadband facilities for a digital/web-based office (PU); UGP2: Inadequate technology (e.g., computers/software) in government offices (PU and PEU); UGP3: Dependency on technology suppliers (e.g., promoting local technology suppliers) (PU); UGP4: Low level of citizens' engagement/tools (PU and PEU).
DGP	A comprehensive platform that integrates various governmental services and enables citizens' interaction through a web-based interface.	DGP1: A user-friendly web portal integration design (PU); DGP2: Interoperability for institutional integration (vertical and horizontal) (PU and PEU); DGP3: Multiple channels for access to citizens; DGP4: Feedback/Online feedback mechanisms with citizens.
USD	Development of skills and capabilities required by users to effectively operate and manage the digital governance platform.	USD1: Skill development training for employees; USD2: Internet connectivity/web-based platform; USD3: Office equipment and technology support.
PU	The degree to which individuals believe that using the web portal will enhance their job performance, efficiency, and service delivery.	PU1: The web portal enables me to accomplish tasks more easily, saving time and reducing costs. PU2: The web portal will allow me to communicate and serve more citizens, creating efficiency and effectiveness in service delivery. PU3: The web portal enables me to engage more citizens, empowering them and enhancing satisfaction. PU4: The portal allows me to provide timely information to citizens, improving accountability. PU5: The portal ensures transparency and integrity in my work. PU6: The portal helps me work efficiently and effectively. PU7: The portal allows me to track citizens for better service delivery. PU8: The portal raises my awareness to serve citizens with technology. PU9: The portal provides links to various useful services, improving my ability to serve citizens. PU10: The portal integrates with other systems like Ministries, e-nothi, APAMS, CC, GRS, NIS, RTI for efficient operations. PU11: Knowledge of computer systems, software, hardware, and operating systems enhances my confidence. PU12: The portal integrates with a dashboard, enabling quick report submissions for MEF purposes.
Continued.		
PEU	The ease with which users can operate the web portal, learn its functionalities, and use it effectively for various tasks.	PEU1: The web portal gives me the opportunity to learn digital technology for performing my tasks. PEU2: Learning to operate the web portal increases my skills and capacity. PEU3: The portal helps me develop skills to work with software and networks. PEU4: It helps me handle weak networks and increase

Construct Explanation		Measures
		bandwidth when necessary. PEU5: It develops my skills, making me capable of handling operations and maintenance. PEU6: It helps me use digital tools to engage more citizens. PEU7: Skill training enhances my ability to work with the portal and ensure interoperability. PEU8: Knowledge and skill training on using text messages, pictures/images for illiterate people. PEU9: Knowledge and skill training on using video/digital communication for those who prefer visual channels.
ITU	The degree to which users intend to adopt and use the web portal-based digital governance system.	ITU1: Digital/web-based infrastructure available up to the Upazila level. ITU2: The web portal uses an integrated platform to access all government organizations and citizens up to the Upazila level. ITU3: The web portal is compatible with interoperability, enabling seamless communication between G2G, G2C, G2B, G2P, etc.
BIU	The likelihood that users will adopt and use the web portal, motivated by engagement and the utility it provides in their work.	BIU1: The web portal motivates me because it enhances citizen engagement, which increases access to the citizens in the web-portal-based governance system. BIU2: Users (government officials) are motivated to perform due to citizens' engagement with the portal. BIU3: Users (government officials) possess the necessary skills and knowledge to communicate effectively with citizens.
IPS	The measures taken to ensure that the information stored and exchanged through the web portal is secure, reliable, and protected.	IPS1: Information storage and preservation mechanisms are in place. IPS2: The system ensures that it is protected against security threats. IPS3: Reliable information is provided, ensuring quality and reliability. IPS4: Information confidentiality and timely availability are maintained.
CE	The degree to which the web portal promotes citizen participation, accessibility, and empowerment.	CE1: The web portal motivates me because illiterate citizens will have access to the system. CE2: The web portal motivates me because small businesses/entrepreneurs can join and serve the general public. CE3: The web portal motivates me because illiterate women and women's clubs will have access to the system. CE4: The web portal motivates me because illiterate citizens will have access to the system. CE5: The web portal motivates me because social organizations will have access to the system. CE6: The web portal provides various service links that are useful for me to serve citizens more effectively.

4. Results and Discussions

4.1. Evaluation of Measurement Model

Table 2 provides the results of the reflective measurement model, showing the factor loadings, composite reliability (CR), and average variance extracted (AVE) for each latent variable in the study.

The factor loadings reflect the strength of the relationship between each observed item and its respective latent construct. All items in the table have factor loadings above the recommended threshold of 0.70 [33], with values ranging from 0.702 to 0.875, indicating that each item strongly represents its corresponding construct. For instance, BIU1 has a factor loading of 0.826, and CE6 has a loading of 0.702, both meeting the required threshold.

Composite reliability (CR) measures the internal consistency of the constructs, showing how well the items within each construct correlate with each other. The recommended threshold for CR is 0.70 or higher [34, 35], and all constructs in the table exceed this threshold, with values ranging from 0.784 for IPS to 0.896 for ITU, indicating strong internal consistency across the constructs. Average variance extracted (AVE) assesses the amount of variance captured by each construct compared to the measurement error. The recommended threshold for AVE is 0.50 or higher [34, 36, 37]. All constructs in Table 2 meet this threshold, with the lowest AVE being 0.579 for IPS and the highest being 0.742 for ITU, suggesting that the constructs explain a significant amount of the variance in their observed items.

Table 2. Reflective Measurement Model: Factor Loadings, CR and AVE.

Latent Variable	Item	Outer Loadings	CR	AVE
BIU	BIU1	0.826	0.825	0.612
	BIU2	0.778		
	BIU3	0.739		
CE	CE1	0.843	0.902	0.606
	CE2	0.835		
	CE3	0.827		
	CE4	0.796		
	CE5	0.752		
	CE6	0.702		
DGP	DGP1	0.842	0.855	0.597
	DGP2	0.764		
	DGP3	0.722		
	DGP4	0.759		
IPS	IPS1	0.761	0.784	0.579
	IPS2	0.734		
	IPS3	0.776		
	IPS4	0.779		
ITU	ITU1	0.875	0.896	0.742
	ITU2	0.89		
	ITU3	0.817		
Continued.				
PEU	PEU1	0.761	0.702	0.590
	PEU2	0.742		
	PEU3	0.725		
	PEU4	0.801		
	PEU5	0.747		
	PEU6	0.807		

Latent Variable	Item	Outer Loadings	CR	AVE
	PEU7	0.793		
	PEU8	0.781		
	PEU9	0.713		
PU	PU1	0.721	0.886	0.595
	PU2	0.749		
	PU3	0.731		
	PU4	0.778		
	PU5	0.725		
	PU6	0.775		
	PU7	0.735		
	PU8	0.739		
	PU9	0.719		
	PU10	0.749		
	PU11	0.703		
	PU12	0.776		
UGP	UGP1	0.822	0.855	0.597
	UGP2	0.834		
	UGP3	0.762		
	UGP4	0.759		
USD	USD1	0.85	0.867	0.685
	USD2	0.865		
	USD3	0.764		

Table 3 presents the results of the Heterotrait-Monotrait (HTMT) ratio, which is a technique used to evaluate discriminant validity between constructs in the study. The HTMT ratio assesses whether different constructs are sufficiently distinct from each other by comparing the correlations between items from different constructs to the correlations between items from the same construct. To establish discriminant validity, the HTMT value should be below the threshold of 0.90 (Hair et al., 2022).

Table 3. Discriminant Validity-HTMT ratio.

	BIU	CE	DGP	IPS	ITU	PEU	PU	UGP	USD
BIU									
CE	0.253								
DGP	0.239	0.180							
IPS	0.186	0.368	0.253						
ITU	0.398	0.105	0.080	0.154					
PEU	0.293	0.213	0.292	0.250	0.307				
PU	0.161	0.349	0.303	0.272	0.210	0.281			
UGP	0.253	0.205	0.691	0.254	0.130	0.298	0.349		
USD	0.136	0.359	0.476	0.359	0.081	0.250	0.493	0.520	

In Table 3, the HTMT values for all construct pairs are well below the 0.90 threshold [34], which indicates satisfactory discriminant validity. For example, the HTMT value between BIU and CE is 0.253, the value between DGP and IPS is 0.253, and the value between UGP and USD is 0.520. These values suggest that each construct is distinct from the others, as no pair of constructs exhibits a high correlation that would imply, they are measuring the same underlying concept. Additionally, the UGP and DGP constructs show an HTMT value of 0.691, which is slightly higher than other pairs but still below the critical threshold of 0.90. This supports that these constructs, while related, are distinct enough in their theoretical definitions and are measuring different aspects of the governance and digital platform context.

4.2. Evaluation of Structural Model

To evaluate the structural model, the study first addressed the issue of collinearity since PLS-SEM relies on regression analysis to estimate path coefficients. As shown in Table 4, all the Variance Inflation Factor (VIF) values were less than 5, indicating that collinearity was not a concern and the model's results were not distorted due to multicollinearity [34]. Next, the bootstrapping technique with 10,000 subsamples was used to assess the significance of the path relationships and test the hypotheses, following the guidelines by [38]. The results confirmed the significance of several relationships, such as the positive impact of Citizens Engagement (CE) on Behavioral Intention to Use (BIU) ($\beta = 0.191$, $p = 0.001$), and the influence of Intention Towards Use (ITU) on BIU ($\beta = 0.355$, $p = 0.000$). Additionally, Perceived Usefulness (PU) was found to significantly affect ITU ($\beta = 0.188$, $p = 0.003$), and Information Protection and Security (IPS) had a positive relationship with BIU ($\beta = 0.079$, $p = 0.047$), supporting the corresponding hypotheses.

Table 4 further illustrates the structural model's performance, showing significant relationships for Update of Governance Policies (UGP) with PU ($\beta = 0.117$, $p = 0.046$), and User Skills and Capacity Development (USD) with PU ($\beta = 0.328$, $p = 0.000$), confirming the support for H1 and H5. However, the relationships between UGP and Perceived Ease of Use (PEU) ($\beta = -0.093$, $p = 0.292$), Web-portal based Integrated Digital Governance Platform (DGP) with PU ($\beta = 0.070$, $p = 0.404$), and DGP with PEU ($\beta = -0.077$, $p = 0.319$) were found to be non-significant, leading to the rejection of H2, H3, and H4. In contrast, the study found that PEU significantly influenced ITU ($\beta = 0.203$, $p = 0.049$), and PU also positively affected ITU ($\beta = 0.188$, $p = 0.003$), confirming the support for H7 and H8.

Table 4. Assessment of structural model and path analysis.

Relationships	VIF	Beta	S.E.	p-values	R2	f2	Q ² predict	Remarks
H1: UGP-> PU	1.543	0.117	0.089	0.046		0.11		Supported
H2: UGP-> PEU	1.543	-0.093	0.17	0.292		0.17		Rejected
H3: DGP-> PU	1.483	0.07	0.084	0.404	0.23	0.11	0.18	Rejected
H4: DGP-> PEU	1.483	-0.077	0.163	0.319	0.18	0.1	0.23	Rejected
H5: USD-> PU	1.253	0.328	0.093	0		0.19		Supported
H6: USD-> PEU	1.253	-0.095	0.136	0.243		0.12		Rejected
H7: PU-> ITU	1.006	0.188	0.07	0.003		0.22		Supported
H8: PEU-> ITU	1.006	0.203	0.13	0.049	0.19	0.16	0.12	Supported
H9: IPS-> BIU	1.113	0.079	0.082	0.047		0.13		Supported
H10: CE-> BIU	1.117	0.191	0.064	0.001	0.17	0.21	0.11	Supported
H11: ITU-> BIU	1.015	0.355	0.08	0		0.15		Supported

The explanatory power of the model, indicated by the R^2 values, showed that UGP, DGP, and USD together explained 18% of the variance in PEU and 23% of the variance in PU. Additionally, ITU accounted for 19% of the variance in both PEU and PU, and 17% of the variance in BIU, demonstrating that the model has a moderate explanatory capacity. Finally, the predictive relevance of the model was assessed using the PLSpredict method. The Q^2_{predict} values for PEU (0.23), PU (0.18), ITU (0.12), and BIU (0.11) were all greater than zero, suggesting that the model has strong predictive relevance and can effectively generalize to new data. This provides further support for the robustness of the structural model in predicting the outcomes of the study.

4.3. Discussions

The findings of this study offer valuable insights into the factors influencing the adoption and usage of digital governance platforms, particularly at the Upazila level, and provide a comprehensive understanding of the determinants of Behavioral Intention to Use (BIU) such platforms. The results are consistent with the framework proposed in the literature and reveal significant relationships between various constructs. Firstly, Citizens Engagement (CE) had a significant positive impact on BIU, which aligns with prior research suggesting that the level of citizen participation and interaction within governance systems can motivate officials to adopt and effectively use digital platforms (Bélanger & Carter, 2008). The findings indicate that when citizens are more engaged through accessible and interactive web portals, government employees are more likely to adopt these systems, leading to more efficient service delivery. This outcome underlines the importance of fostering an environment where digital tools can enhance citizen-government interactions and facilitate greater transparency and accountability in governance processes.

Similarly, Intention Towards Use (ITU) was positively related to Behavioral Intention to Use (BIU), as seen in the strong coefficient of 0.355 ($p = 0.000$). This supports the well-established notion that Intention Towards Use (ITU) acts as a precursor to actual system adoption and use [7]. The findings suggest that the intention to use the digital governance platform is a strong predictor of its future utilization, reinforcing the significance of awareness and familiarity in driving adoption among government officials.

Perceived Usefulness (PU) emerged as another critical factor, influencing both Intention Towards Use (ITU) and Behavioral Intention to Use (BIU). This result confirms previous studies highlighting the essential role of perceived usefulness in technology adoption [24]. The more government officials perceive the digital platform as useful in their daily tasks, the more likely they are to intend to use it and engage with it effectively. Specifically, PU had a significant effect on ITU, supporting the idea that enhancing the perceived value of the platform is key to increasing its adoption among public sector employees.

Moreover, the User Skills and Capacity Development (USD) construct demonstrated a significant impact on Perceived Usefulness (PU), further corroborating the view that providing the necessary training and capacity-building initiatives is crucial for the success of digital governance systems [18]. Government employees who are equipped with the right skills and resources are more likely to find the platform beneficial and, consequently, are more inclined to adopt it. On the other hand, the relationship between User Skills and Capacity Development (USD) and Perceived Ease of Use (PEU) was not supported, suggesting that while training enhances the perception of usefulness, it may not

always directly affect how easy or difficult the platform is to use, especially in the context of the infrastructure and support systems available.

The role of Information Protection and Security (IPS) in fostering Behavioral Intention to Use (BIU) was also significant. This underscores the importance of ensuring that digital governance systems are secure, trustworthy, and reliable, which is essential for gaining the confidence of users [5, 13, 19]. In an environment where security concerns are paramount, particularly with sensitive citizen data, assuring users about data protection can play a pivotal role in encouraging the use of such platforms.

Despite these positive findings, some of the relationships in the study were not significant. For instance, Update of Governance Policies (UGP) and Web-portal based Integrated Digital Governance Platform (DGP) did not significantly affect Perceived Ease of Use (PEU) or Perceived Usefulness (PU), which may suggest that these factors, while important, may not have as direct an impact on the initial adoption of the platform as anticipated. It is possible that issues such as inadequate infrastructure or policy barriers are more influential at the broader institutional level and may require more time to manifest in their effects on users' perceptions.

5. Conclusions

This study explored the factors influencing the adoption and use of digital governance platforms at the Upazila level, focusing on key constructs such as Citizens Engagement (CE), Perceived Usefulness (PU), Perceived Ease of Use (PEU), Intention Towards Use (ITU), Behavioral Intention to Use (BIU), User Skills and Capacity Development (USD), and Information Protection and Security (IPS). The results of the study highlight several important insights into how these factors shape the effectiveness and success of digital governance initiatives in Bangladesh. First, the study confirms that Citizens Engagement (CE) plays a pivotal role in driving the Behavioral Intention to Use (BIU) digital governance platforms. Increased citizen participation through the web-based systems motivates government officials to adopt and engage with these platforms, enhancing the overall efficiency and transparency of public service delivery. Additionally, Perceived Usefulness (PU) emerged as a strong predictor of Intention Towards Use (ITU) and BIU, reinforcing the critical role of a platform's perceived benefits in encouraging its adoption.

Moreover, the research underscores the importance of User Skills and Capacity Development (USD) in fostering a positive perception of Perceived Usefulness (PU), with the results showing that adequate training and resources are crucial for increasing the platform's perceived value. The study also found that Information Protection and Security (IPS) significantly affects Behavioral Intention to Use (BIU), highlighting the need for robust security measures to gain users' trust and promote the use of digital governance systems. Despite these positive findings, some relationships in the study, particularly those involving Update of Governance Policies (UGP) and the Web-portal based Integrated Digital Governance Platform (DGP), were not significant, suggesting that broader policy and infrastructure factors may require more time and focused interventions to impact user perceptions and adoption significantly.

This study offers important contributions to the field of sustainable digital governance, particularly in the context of Bangladesh. It proposes a citizen-centric, web-portal-based integrated digital governance platform designed to enhance transparency, accountability, and inclusivity, while addressing existing governance system gaps. The platform aims to improve public service delivery by prioritizing user engagement and accessibility, which are essential for achieving long-term

sustainable development goals. By focusing on these key elements, the study provides a practical solution to improve governance processes in Bangladesh and potentially in other similar contexts.

Additionally, this research advances theoretical knowledge by integrating the TAM and the TPB to explain user behavior and intentions regarding the adoption of digital governance platforms. The combined framework offers a comprehensive understanding of the factors influencing digital adoption, such as perceived usefulness, ease of use, social norms, and behavioral control. The study also explores mediation effects, shedding light on how factors like policy updates, user skills, and information security impact the relationship between platform design and adoption. These findings not only contribute to the academic literature but also provide valuable insights for policymakers and practitioners working to build more resilient, efficient, and sustainable digital governance systems in Bangladesh and beyond.

This study presents a few constraints that provide doors to further investigations. First, the 216 respondents' sample size could restrict the generalizability of the results, so further extensive research across several demographics is necessary. Second, the study mostly concentrates on Bangladesh; future studies should investigate cross-country comparisons to grasp digital governance adoption in several socio-economic and political environments. Third, although the TAM-TPB model captures user acceptance rather well, including other theoretical models—such as the Unified Theory of Acceptance and Use of Technology (UTAUT)—may provide more thorough understanding. Finally, this paper does not investigate long-term effects; future studies should utilize a time-series method to evaluate changing user behavior and the long-term influence of digital governance systems.

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