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Determining factors of adoption, acceptance, and use of public e-services by citizen-users: Proposal of conceptual model

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ABSTRACT: The field of electronic administration in African countries has seen significant growth, particularly during the Covid-19 lockdown. The pandemic highlighted the crucial role of information and communication technologies (ICTs) in reforming the dynamics between administration and citizens. The introduction of e-government and ICTs has the potential to transform the daily work methodologies of administrative personnel, acting as a catalyst for change and innovation in user-administration interactions. The research problem focuses on: What are the predictive factors of acceptance and usage of technological devices in public e-services?. So, the objective is to adopt a novel approach to citizen engagement, leveraging ICT to strengthen connections with citizens, rebuild trust in government and the internet, and encourage the acceptance and use of public e-services. The research follows a structured procedure: 1. Formulation of the Research Problem; 2. Literature review; 3. Selection for Inclusion; 4. Quality Evaluation; 5. Data Extraction; 6. Analysis and Synthesis of Data. Actually; the theoretical exploration delves into the landscape of electronic administration, determinants influencing ICT use, and the deployment of technological devices for public teleservices. Results highlight the intensified research on improving public services and placing citizens at the center of decision-making through ICT integration. Key dimensions influencing

public e-services adoption include individual, environmental, and technological factors, with habit and facilitating conditions playing essential roles. Citizens' trust in internet and government is crucial, and expected performance, expected effort, and social influence positively impact acceptance and use of public e-services. Theoretical review and synthesis provide a comprehensive understanding of acceptance and usage of electronic services within public administrations.

KEYWORDS: UTAUT; individual determinants, technological determinants; socio-cultural determinants; intention to use online public services; usage behavior.

1. INTRODUCTION:

The profound transformations in telecommunications and computer networks, particularly on the Internet, have had a significant impact on social interactions, business sectors, and more recently, government relations (Castells, 2002). This shift is observable through the substantial global spending on information technology (IT), projected to reach $2.16 trillion. This expenditure is largely attributed to corporate and consumer investments in devices, applications, IT outsourcing, and project-focused outsourcing.

Within the realm of public administration, the rise of electronic government, or "e-government," stands out as a major development over the last two decades (D. Brown, 2005). According to Brown, e-government encompasses four key domains: state economic and social programs, interactions with citizens, electronic democracy (rule of law), internal operations, and international relations. Simply put, e-government includes all administrative functions and activities that rely on information and communication technologies.

However, the emergence and adoption of e-government aren’t solely technological phenomena. They appear to result from a more profound reflection initiated in the early '80s on a concept known as new public management (NPM), developed in response to the crisis of the traditional bureaucratic state (Dunleavy et al., 2006; Clifton & Diaz-Fuentes, 2009). This new approach advocates for decentralization, performance-oriented management, flexibility, and a focus on the citizen, now viewed as a client of the state.

Considering these elements, our research focuses on determining and measuring the factors influencing adoption, acceptance, and effective use of technologies and information systems in the context of e-public administration. To address these concerns, we formulate the following research question:

What are the predictive factors for the acceptance and usage of technological devices in public e-services?

The hypothesis is:

Hypothesis 1: Individual factors positively influence expected performance, expected effort, facilitating conditions, and consequently, the acceptance and usage of e-public services.

Hypothesis 2: Technological factors have a positive relationship with expected performance and, consequently, the acceptance and usage of public e-administration services.

Hypothesis 3: Environmental determinants, such as tolerance for uncertainty, culture, and time, positively impact social influence and, consequently, the decision to accept and use public e-administration platforms.

Hypothesis 4: Citizens' trust, both in the government and the website, is positively related to the intention to use e-public services.

Hypothesis 5: Expected performance has a positive impact on the intention to use e-administration services.

Hypothesis 6: Expected effort has a positive impact on the intention to use public digital platforms.

Hypothesis 7: Social influence is positively related to the intention to use e-public services and, consequently, to usage behavior.
Hypothesis 8: Facilitating conditions positively influence the usage behavior of e-public services.
Hypothesis 9: Habit has a positive impact on the usage behavior of e-public services.

In the one hand, the context of existing work suffers of some issues. Essentially, models are prone to errors because they are a simplified version of reality. Mistakes are more likely in changing situations or when there's uncertainty or limited data, which is common in areas like supply chain and logistics, involving external entities. When models make errors, trust in their decisions or suggestions decreases. If mistakes accumulate, it can have a negative impact on the model's usefulness over time. In addition; there aren't enough research works treating impact of acceptance and use of ICTs within public administrations; on public e-services perceived quality and citizens satisfaction (in developing countries). Consequently; our research work comes to enrich conceptual maturity, then, give possibility to test this proposed conceptual model on different public administration contexts.

In other hand, the contributions of this research manifest in the following ways:
• Technologies have heightened research efforts aimed at enhancing public services and improving interactions with service consumers (Abramson & Morin, 2003; Cook, 2000; Fountain, 2001).
• The integration of Information and Communication Technologies (ICT) positions the citizen at the core of public administration decision-making processes (ELYACHIOUI & AOMARI, 2018; Michel, 2006; Carvalho et al., 2021).
• Key dimensions influencing the adoption, acceptance, and effective use of e-public services encompass individual, environmental, and technological factors (Venkatesh, 2022).
• Habit and facilitating conditions represent indispensable elements shaping the usage behavior of e-public services (Venkatesh et al., 2012).
• Citizens' trust in the internet and the government is pivotal for the acceptance and subsequent use of e-public services (Venkatesh, Thong, & Xu, 2016).
• Expected performance, anticipated effort, and social influence positively impact acceptance, leading to the utilization of e-public services (Venkatesh et al., 2003).

Nevertheless, this theoretical study faces certain challenges or limitations, including:
• Advances in this scientific field, particularly in developing countries, expose difficulties in the adoption and implementation of technological devices and information systems within public administrations. There is a lack of a clear understanding of their conceptualization, operation, and effects.
• Most research on the acceptance and use of e-public services in developing countries is empirical and lacks the conceptual maturity conducive to empirical advancements.

Actually, our research work is divided into five main sections. In the first tier, there's the introduction. In the second tier, we have the initial research part focusing on modeling the predictive usage of information technology and information systems. In the follow part, this section addresses the theoretical basis for adopting information technology behavior. Then, the follow section delves into the methodological procedure. Finally, in the last section, we examine the contribution to measuring information and communication technology 'ICT' acceptance and usage within public administration.

2. MODELING THE PREDICTIVE USAGE OF INFORMATION TECHNOLOGY AND INFORMATION SYSTEMS:

2.1. E-GOVERNMENT AND E-ADMINISTRATION:

E-Administration: The concept of electronic administration emerged in the 1990s-2000s and is designated by various terms such as e-administration, or e-government ((Benchenna et al., 2010); (Sauret, 2004)). Electronic administration involves providing information and public services to citizens through ICT and the Internet. (Ubaldi, 2013) argues that electronic administration stems from the New Public Management (NPM), with ICT stimulating innovation in the public sector, especially in public services.

E-Government: For example, the state of Texas defines e-government as government activities conducted through digital processes on a computer network, typically the Internet, involving electronic exchange of information for acquiring or providing products or services, placing or receiving orders, providing or obtaining information, or conducting financial transactions (ELYACHIOUI & AOMARI, 2018).

2.2. "TECHNOLOGY ACCEPTANCE MODEL" "TAM":

The technology acceptance model (TAM) by (Davis, 1985)is developed from the theory of planned behavior(Fishbein & Ajzen, 1977), and (Ajzen, 1985). It posits that behavior is determined by intention, influenced by the attitude toward the technology in question. Four main elements constitute the basis of Davis's model (1985): perceived usefulness, perceived ease of use, attitude toward the technology/system, and behavioral intention to use.

As mentioned earlier, TAM has received widespread support from numerous empirical studies, confirming its explanatory power for the usage behavior of various information technologies in diverse contexts ((Davis, 1989);(Taylor & Todd, 1995);(Venkatesh, Thong, & Xu, 2016)). It is essential to note that the overall context, marked by increased investments in information technology, has led to an abundance of studies aimed at enriching this model by examining the effect of external variables on perceived usefulness and perceived ease of use. In this regard, (Debbabi, 2014) emphasizes that TAM aligns with a user-focused research perspective, incorporating user needs and involving the user in the upstream phases of product design and development.

2.3. "UNIFIED THEORY OF ACCEPTANCE AND USE OF TECHNOLOGY" "UTAUT": UTAUT justifies the use of information technologies primarily based on four fundamental determinants of behavioral intention: expected performance, expected effort, social influence, and facilitation conditions. These four elements contribute to predicting the use of information and communication technologies (ICT) (Venkatesh et al., 2003). (See Figure 1)

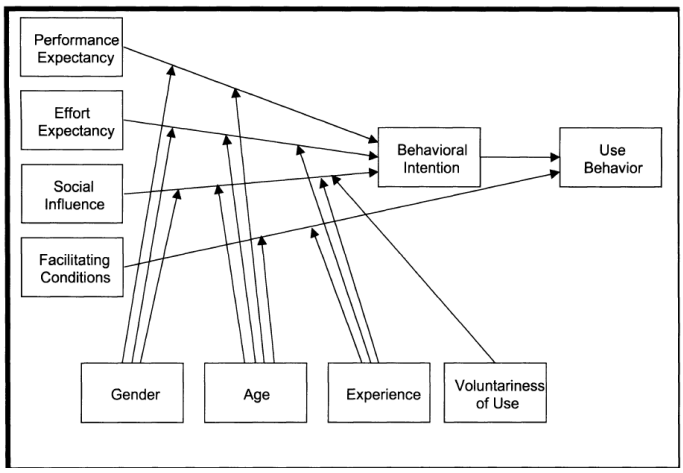

Figure 1 : UTAUT Model (Venkatesh et al., 2003)

2.4. EXTENSION OF "UTAUT" MODEL: "UTAUT"-2012 The extension of "UTAUT", called "UTAUT"-2, draws inspiration from (Johns, 2006) recommendations, emphasizing that

specific contexts can influence existing theories in different ways. "UTAUT"-2 introduces three new indicators: hedonic motivation, price value, and habit.

- Hedonic motivation is defined as the pleasure or joy resulting from the use of technology (Venkatesh et al., 2012)
- Price value refers to users' cognitive value, representing a trade-off between perceived technology benefits and the monetary cost of its use (Venkatesh et al., 2012)
- Habit is defined as individuals' propensity to automatically adopt behaviors due to learning(Venkatesh et al., 2012). Moreover, "UTAUT"-2 abandons the voluntary nature of usage, previously moderated in "UTAUT", as the use of technologies in consumption contexts is entirely voluntary. Most "UTAUT" extensions have integrated new endogenous mechanisms or new moderation modalities, followed by new exogenous mechanisms and outcome mechanisms (Daaqili, 2020). For example, in the study of consumers' use of mobile internet services, integrated hedonic motivation and price value as new predictors of behavioral intention and habit, thus enriching predictions of intention and technology use (see Figure 2).

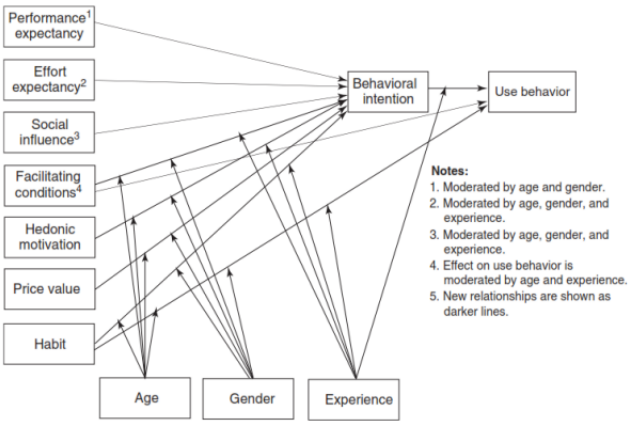

Figure 2 : UTAUT 2 Model (Venkatesh et al., 2012)

2.5. EXTENSION OF "UTAUT" MODEL: "UTAUT"-2022: (See Figure 3)

• Individual, technological, and environmental factors: Exploring "UTAUT" as a theoretical foundation proves to be an exceptionally fruitful and crucial approach, particularly when investigating antecedents and determinants customized to specific technologies. A comprehensive framework, derived from the works of (Thong, 1999), (Venkatesh et al., 2007), (Venkatesh & Bala, 2008, p. 3), and (Venkatesh, Bala, et al., 2016), encompasses individual attributes like personality, technological features such as quality, environmental factors (as perceived by employees) like the culture of innovation, and interventions like training. These elements will be further detailed in the subsequent discussion.

Individual factors: In most technology adoption and usage contexts, individual characteristics play a crucial role. Due to the likelihood of errors, uncertainty, and opacity, personality traits related to these technological aspects can be particularly relevant. Individuals inclined to seek risk, tolerate uncertainty, and are eager to learn are more likely to adopt AI tools. Traditional technology-related characteristics, such as computer self-efficacy and computer playfulness, may also play a role (Venkatesh & Davis, 2000); (Venkatesh & Davis, 1996). These individual characteristics can influence how employees approach issues related to AI tools, enabling organizations to identify individuals favorable to the technology.

Technological factors: Technological characteristics can be assessed as employee perceptions or as objective features, depending on the nature of the study. Specific attributes of AI tools, such as perception of model errors, information availability, and design features, can influence UTAUT predictors, especially performance expectancy. Examining the objective characteristics of competing options may be necessary to assess their impact on UTAUT predictors.

Environmental factors: Environmental characteristics, such as an organizational climate conducive to innovation, can influence the adoption and use of AI tools. These characteristics, perceived or objectively defined based on the study, can affect UTAUT predictors.
Interventions, such as training and gamification, can be used to study their impact on technology adoption and use (see (Venkatesh, 1999); (Venkatesh & Bala, 2008)).
• **Moderators:** The four categories of concepts can play a moderating role. For example, individual characteristics can moderate the effect of UTAUT predictors, while environmental variables can also play a moderating role. The relationships between these factors may vary depending on cultures ((Hoehle et al., 2015); (Maruping et al., 2019); (Venkatesh & Goyal, 2010); (Venkatesh, Thong, Chan, et al., 2016)) and time (Venkatesh et al., 2006). Moderating effects can be non-linear ((S. A. Brown et al., 2008), (S. A. Brown et al., 2012), (S. A. Brown et al., 2014); (Venkatesh & Goyal, 2010), and some relationships may be influenced by cultural and temporal factors.
• **New predictors:** Beyond direct effects on UTAUT predictive variables and moderating effects, these variables can also have direct effects on intention, use, or other outcomes. For example, environmental characteristics can directly influence intention, use, and outcomes of AI tool use. The evolution from UTAUT to UTAUT-2 illustrates the addition of predictors, thus adapting the model to the context of consumers using technology for personal purposes (Venkatesh et al., 2012).
• **Outcomes:** The outcomes and consequences studied in the literature on technology adoption, such as intention, behavioral expectations, and use, should be examined ((Maruping et al., 2017); (Venkatesh & Bala, 2008)). The impacts of AI tools on job characteristics also deserve attention ((Bala & Venkatesh, 2013); (Morris & Venkatesh, 2010)), covering aspects such as performance, job satisfaction, and professional stress ((Sykes et al., 2014); (Sykes & Venkatesh, 2017)).

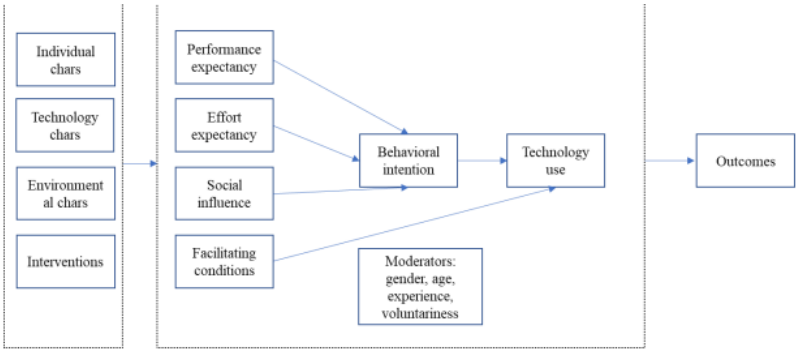

Figure 3: Extension of the UTAUT-2021 Model (Venkatesh, 2022)

2.6. "TOE" MODEL (2022):

Factors influencing information technology adoption: According to the TOE framework, contextual factors related to technology, organization, and the environment are identified as influences on information technology adoption.
• **Technological determinant:** Within the technological landscape, two key focal points emerge: Information Technology (IT) assets and capabilities. These encompass the present degree of adoption of online administrative processes, digitization proficiencies, the maturity level of organizational digitalization, and IT assets such as cloud computing capabilities (Coglianese & Lehr, 2016). Additionally, considerations extend to digital infrastructure, the alignment of existing assets with emerging information technologies ((Alshahrani et al., 2022); (Chatfield & Reddick, 2018); (Desouza et al., 2020); (Schedler et al., 2019); (van Noordt & Misuraca, 2020); (Wirtz & Müller, 2019), and the proficiency to seamlessly integrate systems and data ((Erkut, 2020); (Mikalef et al., 2019); (Rogge et al., 2017)).

Concerning data-related assets, critical considerations encompass data accessibility and quality ((Ballester, 2021); (Fatima et al., 2021); (Gao & Janssen, 2020); (Wirtz et al., 2019)), the infrastructure for database management (Gong & Janssen, 2021), ownership and collaborative sharing of data among government entities, and utilization of cloud storage. The thematic area of IT capabilities encompasses the ongoing management of IT assets, the technological proficiency of employees, particularly in information technology and big data, and fostering a data-centric organizational culture. Specialized capabilities are imperative for the development, deployment, and effective management of IT assets.

The theme of perceived benefits encompasses both direct advantages, such as cost savings, innovative solutions, and meeting user requirements, as well as indirect benefits derived from enhanced collaboration with peers and industry partners ((Alshahrani et al., 2022); (Dodd & Cordella, 2019); (Mikalef et al., 2022); (Schaefer et al., 2021)).

• **Organizational determinant:** The organizational context encompasses three key themes: organizational culture, leadership, and inertia. A culture of innovation is positively correlated with a higher willingness to embrace the adoption of information technology. Institutional configurations, such as an orientation towards new public management, bureaucratic structure, and mandates related to digital governance, exert significant influence on innovations in information technology ((Kuziemski & Misuraca, 2020); (Schaefer et al., 2021); (van Noordt & Misuraca, 2022); (Zuiderwijk et al., 2021)).

Transformational leadership assumes a critical role in steering the changes associated with the adoption of information technology ((Campion et al., 2022); (De Vries et al., 2016); (Schedler et al., 2019) . Simultaneously, organizational inertia, inherent in public administration, can impede adoption due to factors such as the inflexibility of routines, a deficit in accountability, and resistance to data sharing ((Campion et al., 2022); (Chen et al., 2019); (Fatima et al., 2021); (Pencheva et al., 2020); (Zuiderwijk et al., 2021)).

• **Environmental determinant:** Public administration mandates, sculpted by political leaders and electoral cycles, alongside pressures emanating from government agencies, citizens, private industry, and media, form integral components within the environmental context. Both vertical and horizontal pressures, encompassing political signals, directives, citizen demands, intergovernmental competition, and media attention, are acknowledged as influential factors in the adoption of information technology ((Alshahrani et al., 2022); (Clarke & Craft, 2017); (Janssen et al., 2020); (Pencheva et al., 2020); (Schaefer et al., 2021); (Wang et al., 2022).

2.7. MODELS OF ADOPTION, ACCEPTANCE, AND USAGE OF INFORMATION TECHNOLOGY IN E-ADMINISTRATION:

"VanDijk, Peters, and Ebbers' Model (2008)": Inspired by the UTAUT model, (van Dijk et al., 2008) propose an explanation for the acceptance and usage of online government services. Characterized by its multidisciplinary nature, it integrates sociodemographic factors, factors related to media use, and factors related to the offering of services by businesses or the government, in addition to the psychological core.

"Al Mansoori K. A.'s Model (2017)": Based on the UTAUT model, (Al Mansoori, 2017) presents a model for the adoption of electronic government services applied to the emirate of Abu Dhabi. Dependent variables include behavioral intention and perceived use of e-government, while independent variables encompass performance expectancy, effort expectancy, social influence, facilitating conditions, trust in e-government, and trust in the Internet. Moderating variables such as gender, age, computer experience, and education are also considered.

"Venkatesh et al. E-Government Portal Acceptance Model (2014)": To better understand the factors influencing the acceptance and usage of information technologies in developing countries, (Venkatesh et al., 2014) analyze the e-Government portal in India using a model based on sociodemographic variables (gender, education, age, income) and psychological

variables. They refer to the Big Five model, widely used in organizational behavior research, and add a sixth specific and contextual variable: PIIT (Personal Innovativeness with Information Technology), measuring the willingness to try a new IT.

"Carter and Belanger's Model (2005)": The Carter and Belanger model draws inspiration from various theoretical bodies, incorporating concepts from e-commerce adoption models, innovation diffusion theory, and trust theory. It aims to explain the adoption behavior of electronic government concisely (Carter & Bélanger, 2005).

"Chaouali, Ben Yahia, Charfeddine, and Triki's Model (2016)": In 2016, Chaouali, Ben Yahia, Charfeddine, and Triki extend the Unified Theory of Acceptance and Use of Technology (UTAUT) to study the determinants of electronic adoption in the Tunisian context. They make changes by using behavioral expectations instead of behavioral intention and by breaking down the concepts of social influence and facilitating conditions (Chaouali et al., 2016).

"Mellouli, Bentahar, and Bidan's Model (2016)": In 2016, Mellouli, Bentahar, and Bidan develop a predictive model of the determinants of the acceptance of electronic public services by businesses. They draw on the TAM model, innovation diffusion theory, social cognition theory, and reliability models. Their model, applied to online tax declarations in Tunisia, considers three categories of determinants: individual, trust-related, and technical (Mellouli et al., 2016).

"Dwivedi et al.'s Model (2017)": The authors propose the unified 'UMEGA' model, more suited to the specifics of electronic government in India. They consider attitude as a mediating variable influenced by expected performance, expected effort, social influence, and perceived risk, significantly improving the explanatory power of the UTAUT model, reaching 80% as a significant explanatory power of the UMEGA behavioral intention (Dwivedi et al., 2017).

Extension of the "TOE" Model: Toward "TOES" - Integration of the Socio-Cultural Variable - Case of e-Administration in Ghana - 2023 (see Figure 4)

a) Technological, Organizational, and External Considerations in Blockchain Adoption When adopting any technology, it is imperative not to overlook technical, organizational, and external issues, as they exert a significant influence on the success or failure of the adoption process (Singeh et al., 2020). Technological factors encompass technological complexity, benefits and compatibility of the technology, relative advantage, as well as aspects related to privacy and security associated with its use, among others. Organizational factors, according to (Baker, 2012), involve institutional characteristics and resources, including internal structures, communication channels, size, and organizational structure. They also take into account the behavior and attitude of leadership, IT experience, the organization's readiness, and its innovation capacity ((Koster & Borgman, 2020); (Chiu et al., 2017)). Regarding external factors, they encompass elements that positively impact (opportunities) or negatively impact (constraints) technological adoption within the broader scope of daily organizational activities (Leung et al., 2015)

b) Sociocultural Elements of the Ghanaian Land Tenure System: A Gap in Technological Adoption of Land Administration Services In the context of this study, sociocultural elements refer to the sociocultural and political arrangements governing land tenure systems, including the values, norms, and customs of Ghanaian society. In Ghanaian land administration, the land tenure system, forming the foundation of this administration, cannot be overlooked during technology adoption. According to (Payne, 2002), land tenure systems reflect the relationships between individuals, society, and land, being the product of historical and cultural factors (Network, 2015). The Ghanaian land tenure system is primarily customary, accounting for 80%, with 20% falling under statutory management (Ehwi & Mawuli, 2021). The customary regime strongly influences land administration policies and initiatives, whether originating from the statutory or customary sector (QUAYE, 2021). Based on the concept that land belongs collectively to the community, this regime requires specific consideration of social and cultural

elements in land administration decisions. Traditional leaders in customary land tenure systems act in the fiduciary interest of the land-owning community, being accountable to them ((Nara et al., 2014); (Aha & Ayitey, 2017)). This sociopolitical dynamic of the customary land tenure system even influences land transactions in the formal statutory sector (Quaye, 2014). Applying blockchain to land administration offers the opportunity to address sociocultural issues related to land rights in an upward manner, contrary to conventional approaches based on documentary evidence. However, Ghanaian society, attached to its traditions, requires intensive education on blockchain technology to overcome resistance related to normative attitudes. This education will facilitate the engagement of all stakeholders, especially at the customary local level, in land administration decisions. It is crucial to recognize sociocultural values in the adoption of blockchain in Ghana and similar contexts such as Uganda, Kenya, and Zimbabwe, where land administration systems share similarities ((Chiweshe et al., 2013); (Siriba & Dalyot, 2017); (Keilitz & Wiipongwii, 2017); (Ogwang & Vanclay, 2019)). These sociocultural aspects are often overlooked in many technological adoption projects.

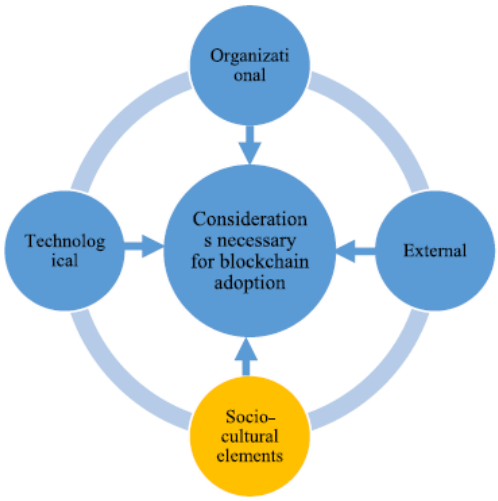

Figure 4: TOES Model (TOES framework for developing suggestions for blockchain adaptation for land administration), (Ameyaw & de Vries, 2023)

Table 1: Summary of research on the perception and usage of electronic administrative services, based on the work of Hmimid M. (2018) and enhanced through additional contributions.

AUTHORS	OBJECTIVES	CONTEXT	CONCLUSIONS
Carter and Belanger, 2005	Determine the elements influencing public receptivity to e-government services by leveraging constructs derived from the Technology Acceptance Model (TAM), Diffusion of Innovation theory, and web trust models.	Use of e-government services in the United States	The findings suggest that perceived ease of use, compatibility, and reliability are key predictors of citizens' intentions to utilize an e-government service. ***Advantage:** The model relies on various theoretical frameworks such as the theory of innovation diffusion, trust theory, and TAM (Technology Acceptance Model). ***Disadvantage:** Social influence factors are not considered.

Van Dijk, Peters and Ebbers, 2007	Delineate the factors influencing the public's acceptance of e-government services through application of the Unified Theory of Technology Acceptance and Use.	Use of e-government services in the Netherlands	The adoption and utilization of government Internet services entail a learning process, necessitating analysis as a dynamic phenomenon. In this context, the Social Cognitive Theory, with its focus on learning, habit formation, and anticipated outcomes, may have offered a more robust psychological foundation for our multidisciplinary team ***Advantage:** The ability for governments to focus their efforts on the user, utilizing benchmarking for the design of Internet service offerings and monitoring usage. ***Disadvantage:** Mental and sociodemographic factors, typically invoked to explain Internet service usage, appear to play a secondary role in this context.
Venkatesh, Tracy Ann Sykes and Venkatraman, 2014	Investigating the elements, including demographic and personality factors, that contribute to the utilization of e-government portals in a developing nation. This study posited demographic and personality factors, drawing inspiration from the Unified Theory of Acceptance and Use of Technology (UTAUT), as predictors of e-government portal usage.	India's e-government portal	The majority of variables demonstrate significance and collectively account for 40% of the variance in the utilization of the e-government portal. ***Advantage**: The authors introduce a sixth specific and contextual variable, namely PIIT (Personal Innovativeness with Information Technology). PIIT refers to an individual's willingness to try a new information technology. ***Disadvantage:** The neglect of the intention to use the e-government portal as a mediating variable
Chaouali and al., 2016	In the context of electronic filing, a conceptual framework integrates the Unified Theory of	Online tax déclaration in Tunisia.	Anticipated performance, anticipated effort, elements of social influence (excluding descriptive norms), and multidimensional confidence collectively account for 84.9% of the variance in intention. The latter,

	Acceptance and Use of Technology (UTAUT) with trust theory.		along with aspects of condition facilitation, elucidates 47.7% of the variance in behavioral expectations. ***Advantage:** Encouraging governments to target the segment of the population with low levels of skills, in order to offer specialized training sessions aimed at enhancing their perceived abilities. ***Disadvantage:** The lack of moderating variables (age, experience…).
Bidan and al., 2016.	In the electronic filing context, a conceptual framework integrates the Unified Theory of Acceptance and Use of Technology (UTAUT), the theory of trust, and the Technology-Task Fit (TTF)	Online tax déclaration in Tunisia.	The quantitative analysis results validate the hypothesis that establishes a connection between trust, technical factors, and individual determinants with the intention to use the online declaration system. ***Advantage:** The incorporation of a new theory (Technology-Task Fit). ***Disadvantage:** The neglect of considering behavioral intention
Dwivedi and al., 2017	Development of a comprehensive 'UMEGA' model tailored to the specificities of e-government.	Using e-government services in India	The inclusion of attitude as a mediating variable, positively influenced by expected performance, expected effort, and social influence, while negatively impacted by perceived risk, substantially enhanced the explanatory capability of the theoretical model. This augmentation increased the explanatory power from 34% in UTAUT to a notable 80% as a significant predictor of UMEGA behavioral intention in a professional context. ***Advantage:** The inclusion of attitude has significantly enhanced the explanatory power of the theoretical model. ***Disadvantage:** The lack of moderating variables.

Al Mansoori, 2017	model of adoption of electronic government services tailored for implementation in the Emirate of Abu Dhabi.	Use of e-government services in Emirates of Abu Dhabi	The study examines several key variables within the context of e-government adoption. Dependent variables under investigation encompass behavioral intention and perceived use of e-government, while independent variables include performance expectancy, effort expectancy, social influence, facilitating conditions, trust in e-government, and trust in the Internet. Additionally, the study explores moderating variables, such as gender, age, computer experience, and education, to gain a comprehensive understanding of their potential influence on the relationships between the aforementioned variables. ***Advantage:** The model is praised for its comprehensiveness due to the diversity of variables considered. ***Disadvantage:** Pre-adoption factors of public e-services (technological, individual, and environmental factors) are neglected.
(Ahmimid, 2018)	Analytical framework for assessing the factors influencing the acceptance and utilization of online tax declaration services in Morocco.	Using online tax declaration services in Morocco	Enhancing comprehension of the determinants impacting the decision of Moroccan users to adopt, accept, and utilize e-tax declaration services. ***Advantage**: The incorporation of two significant new variables, namely perceived risk and self-manipulation. ***Disadvantage:** -Neglect of moderating variables such as age and gender. -The results of this research don't allow us to assume validity beyond this field of study, thus limiting the generalizability of its conclusions.

(Daaqili, 2020)	Analytical framework for examining the factors influencing the adoption of Information and Communication Technology in Education (ICTE) within private higher education institutions, focusing on the case of Morocco	Use of ICTE in private higher education establishments in Morocco	Comprehending students' behavioral intention towards utilizing Information and Communication Technology in Education (ICTE) systems for academic success, as well as the sustained integration of these technologies in their educational experiences, aligning with the perspectives of professors and universities. ***Advantage:** This study provides a better understanding of the characteristics of students in private higher education institutions in Morocco. This can assist decision-makers in implementing more effective learning technologies and improving their strategic decision-making process regarding technology. ***Disadvantag**e: The current model is a basic and rudimentary design, requiring substantial refinement and improvement.
Venkatesh, V. 2022	Expansion of the Unified Theory of Acceptance and Use of Technology (UTAUT).	Adoption and use of AI tools: research agenda (UTAUT)	The Unified Theory of Acceptance and Use of Technology (UTAUT) serves as the theoretical foundation for suggesting avenues of research in individual characteristics, technology attributes, environmental factors, and interventions. These proposed research directions have the potential to significantly contribute to adoption literature, specifically in the context of AI tools. **Advantage**: This study has the potential to empower organizations to positively impact the adoption of AI tools. **Disadvantage:** The paper outlines a research agenda focused on investigating employee adoption and use of AI tools, but there's a potential to adapt it for studying the adoption and use of public e-services by users-citizens.

Ameyaw & de Vries, 2023	Development of the TOES framework for generating recommendations on the integration of blockchain in land administration.	adoption of efficient technologies in support of land administration services	An expanded Technology-Organization-Environment (TOE) framework, incorporating socio-cultural elements, is proposed as a guiding framework for the implementation of blockchain technology in Ghana and other developing land administration systems facing similar land-related challenges. ***Advantage:** The novel aspect of extending TOE (Technology-Organization-Environment) framework to incorporate socio-cultural elements, which play a significant role in development programs, is noteworthy. ***Disadvantage:** Studies based on blockchain technology in the land sector are still in the evolving stage, and therefore, conceptualizations and literature coverage, particularly in the sub-Saharan African context, are still in the early stages of development.

This table synthetically represents the results of research work already established, focusing on selected thematic axes that reflect the research orientation in relation to our research problem.

3. THE THEORETICAL BASIS FOR ADOPTING INFORMATION TECHNOLOGY BEHAVIOR: STATE OF ART

the works related to the information systems discipline emphasize abundant literature on the appreciation, adoption, and use of information technologies. Faced with the limitations of several theories, the "UTAUT" 2003 model emerged to fill these gaps.

3.1. "THEORY OF REASONED ACTION (TRA)": Recommended by (Funke & Fishbein, 1976) and reviewed by (Fishbein & Ajzen, 1977) (Ajzen, 1980), TRA is a psychosocial theory that relies on socio-psychological concepts to understand human behavior. It posits that behavior is guided by behavioral intention, where individuals act thoughtfully, taking into account available information and considering the implications of their actions.

3.2. "THE THEORY OF PLANNED BEHAVIOR (TPB)"

Building on the foundations of the Theory of Reasoned Action by (Fishbein & Ajzen, 1977), (Ajzen, 1991) later introduced the Theory of Planned Behavior (TPB) to enhance the understanding of factors influencing individuals' behavior towards information technologies (IT). This theory introduces a new concept, "perceived behavioral control," in response to critiques raised by (Ajzen & Madden, 1986). It aims to account for behaviors that are not entirely within individual will, meaning when there are constraints to adopting a certain behavior.

3.3. "THE DIFFUSION OF INNOVATIONS THEORY (DOI)" (Rogers et al., 2014) developed the Diffusion of Innovations Theory (DOI) to comprehend the process of innovation

diffusion within a social system over time. This theory seeks to explain the reasons behind the diversity in adoption rates of these innovations. It provides a conceptual framework to identify determinants of IT and information system adoption at both the individual and organizational levels.

3.4. "SOCIAL COGNITION THEORY (SCT)" Social Cognition Theory (Bandura, 1978) integrates contributions from behaviorism and social psychology, placing the individual at the center of interactions among cognitive, behavioral, and contextual factors. According to (Bandura, 1986), human behavior results from a dynamic interaction between personal and environmental influences, illustrating the concept of reciprocal determinism where the individual, the environment, and behavior interact.

3.5. "THEORY OF INTERPERSONAL BEHAVIORS (TIB)" (Triandis, 1979) Theory of Interpersonal Behaviors (TIB), drawing from various disciplines such as anthropology, psychology, and sociology, offers a theoretical perspective to understand and predict individual behavior. It introduces two sets of factors, one directly related to the individual (genetic factors, habits, attitudes, intentions) and the other related to the environment (culture, social factors, social situation, facilitating conditions). According to TIB, behavior is determined by intention, habit, and conditions facilitating adoption.

3.6. "TRUST THEORY (TT)" Over the past decade, trust has gained significance in studies on adoption of information technologies, especially with the advent of the Internet and associated technologies (Fusaro et al., 2002). Various theoretical approaches have been proposed, emphasizing the abstract and multidimensional nature of trust, explored by different scientific disciplines such as sociology, psychology, economics, and organizational behavior.

Table 2: state of art summary

AUTHORS	OBJECTIVES	CONTEXT	CONCLUSIONS
Funke & Fishbein, 1977	"THEORY OF REASONED ACTION (TRA)"	User' Reasoned Action in ICTs adoption	TRA posits that human behavior is guided by behavioral intention, where individuals act thoughtfully, taking into account available information and considering the implications of their actions.
Fishbein & Ajzen, 1977	"THE THEORY OF PLANNED BEHAVIOR (TPB)"	User' Planned Behavior in ICTs adoption	understanding of factors influencing individuals' behavior towards information technologies. This theory introduces a new concept, "perceived behavioral control,"
Rogers et al., 2014	"THE DIFFUSION OF INNOVATIONS THEORY (DOI)"	Determinants factors of ICTs and information systems	This theory provides a conceptual framework to identify determinants of IT and information system adoption at both the individual and organizational levels.
Bandura, 1978 (Bandura, 1986	"SOCIAL COGNITION THEORY (SCT)"	The interaction between personal and environmental influences have a significant impact on	human behavior results from a dynamic interaction between personal and environmental influences, illustrating the concept of reciprocal determinism where the individual, the environment, and behavior interact.

		human behavior.	
Triandis, 1979	"THEORY OF INTERPERSONAL BEHAVIORS (TIB)"	Human behavior is determined by intention, habit, and conditions facilitating adoption.	This theory introduces two sets of factors, one directly related to the individual (genetic factors, habits, attitudes, intentions) and the other related to the environment (culture, social factors, social situation, facilitating conditions). According to TIB, behavior is determined by intention, habit, and conditions facilitating adoption.
Fusaro et al., 2002	"TRUST THEORY (TT)"	User' trust in adoption of information technologies and information systems	trust has gained significance in studies on adoption of information technologies, especially with the advent of the Internet and associated technologies.

4. METHODOLOGICAL PROCEDURE:

The methodological approach employed for our theoretical study is implemented through the following steps:

i. **Formulation of the Research Problem:** After conducting a preliminary review through titles and abstracts of various research works, we identified our research problem. This was achieved by extracting relevant research perspectives observed in these works.

ii. **Literature Search:** Following the identification of our research problem, we conducted an extensive literature search. This involved the curation of a literature review that encompassed research works directly or indirectly related to our research question.

iii. **Selection for Inclusion:** To ensure a pertinent selection of research works that would contribute to the value of our theoretical study, we applied a set of inclusion/exclusion criteria. These criteria served as guidelines for determining the relevance and suitability of each research work.

Tableau 3 : inclusion criteria /exclusion criteria

INCLUSION CRITERIA
* scientific databases: google scholar; web of science; SCOPUS… *Keywords: e-administration; use behavior OF ICT; use intention of ICT; e-Public services * writing language: selection of research papers written in both English and French *Study context: private sector (Business) and public sector (public administration) *Type of studies: theoretical studies (bibliometric analyses, systematic reviews) and empirical studies (case studies…etc.) *study approach: management approach * years of research publication: 1974-2022
EXCLUSION CRITERIA
*Study approach: eliminate researches that addresses the research question using legal or technical approach

iv. **Quality Evaluation:** Thoroughly reviewing articles to identify and select the most suitable ones.

v. **Data Extraction:** Extracting relevant data aligned with the research question.

vi. **Analysis and Synthesis of Data:** After scrutinizing the collected data, formulating a comprehensive synthesis and proposing a conceptual model

5. CONTRIBUTION TO MEASURING THE ACCEPTANCE AND USAGE OF INFORMATION TECHNOLOGY IN PUBLIC ADMINISTRATION: TOWARD A CONCEPTUAL MODEL OF ACCEPTANCE AND USAGE OF PUBLIC E-SERVICES-RESULTS AND DISCUSSION

Leveraging the aforementioned elements, we aim to create a neologism by merging various abovementioned models to contribute to the measurement of acceptance and usage of information and communication technologies in the context of e-administration. To achieve this, we observe the presence of a diversity of variables (independent, dependent, mediating, and moderating) that will contribute to the development of our proposed conceptual model.

Individual Factors: General personality traits may be relevant, influencing UTAUT predictors such as performance expectancy, effort expectancy, and facilitating conditions. These individual characteristics play a crucial role in citizens managing issues related to the use of e-administration services (Venkatesh, 2022).

Hypothesis 1: Individual factors positively influence expected performance, expected effort, facilitating conditions, and consequently, the acceptance and usage of e-public services.

Technological Factors: Technological characteristics, whether perceived by citizens or objective, can play a significant role in the acceptance and usage of e-public services. For example, citizens' perception of errors on the e-government portal or website could influence UTAUT predictors, especially expected performance ((Madan & Ashok, 2023); (Ameyaw & de Vries, 2023); (Venkatesh, 2022)) .

Hypothesis 2: Technological factors have a positive relationship with expected performance and, consequently, the acceptance and usage of public e-administration services.

Environmental Factors: High tolerance for uncertainty can mitigate the negative impact of low expected performance on usage intention. Moreover, these relationships may vary across cultures and time (Venkatesh, 2022).

Hypothesis 3: Environmental determinants, such as tolerance for uncertainty, culture, and time, positively impact social influence and, consequently, the decision to accept and use public e-administration platforms.

Citizens' Trust: Trust theory is linked to electronic filing, split into trust in the Internet and disposition to trust, determining trust in the government website (Venkatesh, Thong, Chan, et al., 2016).

Hypothesis 4: Citizens' trust, both in the government and the website, is positively related to the intention to use e-public services.

Expected Performance: Performance expectancy, defined as the degree of conviction that using the system will lead to positive outcomes, is a strong predictor of the intention to use public digital platforms (Venkatesh et al., 2003) (Venkatesh et al., 2014).

Hypothesis 5: Expected performance has a positive impact on the intention to use e-administration services.

Expected Effort: Effort expectancy, defined as the degree of ease associated with using the system, is significant in both voluntary and mandatory usage contexts, especially during the initial period ((Venkatesh et al., 2003) (S. A. Brown et al., 2012)).

Hypothesis 6: Expected effort has a positive impact on the intention to use public digital platforms.

Social Influence: Social influence, defined as the degree to which an individual perceives that other important people think he or she should use the new system, is a direct determinant of behavioral intention ((Venkatesh et al., 2003); (Venkatesh, Thong, & Xu, 2016)).

Hypothesis 7: Social influence is positively related to the intention to use e-public services and, consequently, to usage behavior.

Facilitating Conditions: Facilitating conditions, defined as the degree to which a person believes there is organizational and technical infrastructure to support the use of the information system or digital platform, positively influences the usage behavior of e-public services ((Venkatesh et al., 2003) (Venkatesh et al., 2012)).

Hypothesis 8: Facilitating conditions positively influence the usage behavior of e-public services.

Habit: Future use of technology can be strongly predicted by the concept of habit, as suggested by (Raman & Don, 2013). Habit can be defined as the extent to which individuals tend to adopt behaviors regularly due to learning, as indicated by (Kang et al., 2015) and (Venkatesh et al., 2012).

Hypothesis 9: Habit has a positive impact on the usage behavior of e-public services.

Based on the above, our contribution has resulted in the proposal of a conceptual model for measuring the acceptance and usage of e-public services by citizens (see Figure 5).

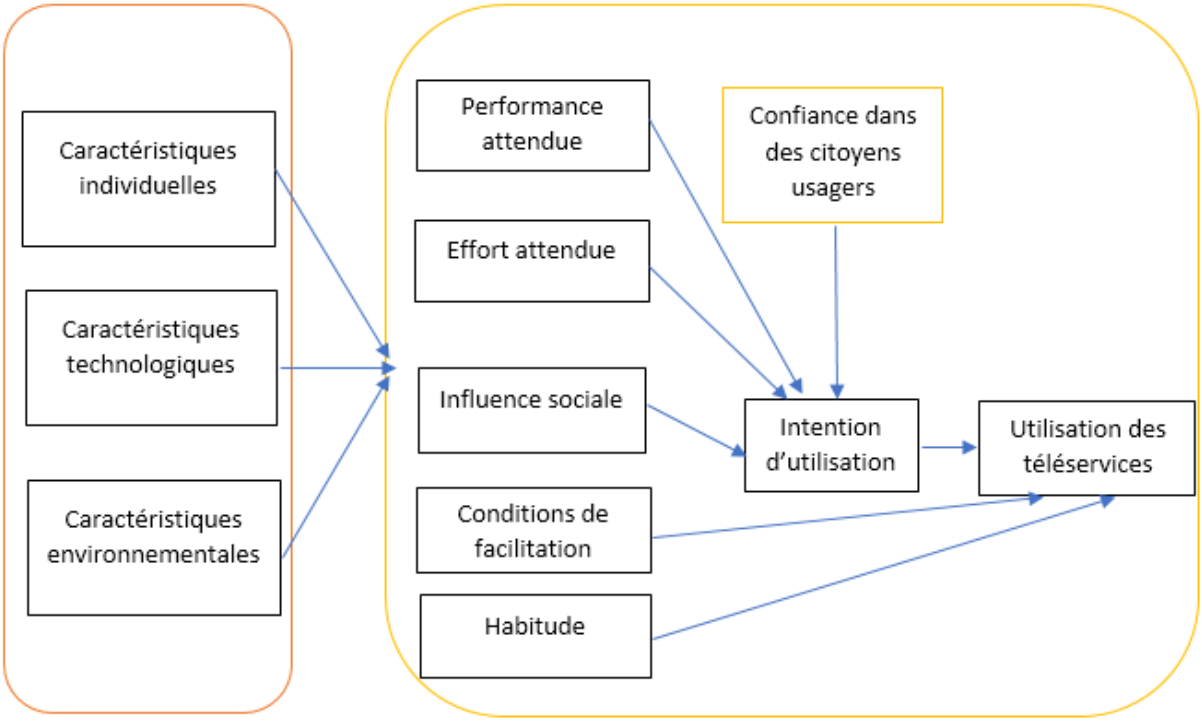

Figure 5: Conceptual Model for Measuring the Acceptance and Usage of Public E-Services by Citizen-Users; proposed by authors

Actually, this theoretical study has some limitations, including:

- Advances in this scientific field, especially in developing countries, reveal difficulties in the adoption and implementation of technological devices and information systems within public administrations, lacking a clear understanding of their conceptualization, operation, and effects.
- Most research on the acceptance and use of public e-services; specially in developing countries; is empirical and lacks conceptual maturity conducive to empirical developments.

- There aren't enough research works highlighting the impact of acceptance and use of public e-services on their perceived quality and citizens' satisfaction (specially in developing countries).

Finally, we propose some recommendations as:

*Establishing a secure website to ensure the safety of personal information.

*Ensuring the accompaniment of citizen users in benefiting from public e-services to facilitate their use.

*Free dissemination of the internet network to facilitate access to electronic public services.

*Sensitizing through the use of electronic public services via television and radio programs.

*Ensuring free training on the use of electronic public services; in favor of citizen users.

CONCLUSION AND PERSPECTIVES:

Our theoretical study, based on the referenced literature, has enabled us to formulate a comprehensive synthesis regarding the acceptance and utilization of electronic devices by citizens within public administrations.

The managerial implications of our research are instrumental in guiding public administrations in their digital strategies. This involves effectively managing their interactions with citizen-users, fostering trust, enhancing citizen satisfaction, and encouraging the adoption and usage of e-public services.

Moreover, our research contributes in various ways. Firstly, it sheds light on how technologies have spurred efforts to enhance public services, focusing on the relationship with service consumers (Abramson & Morin, 2003; Cook, 2000; Fountain, 2001). Secondly, the integration of Information and Communication Technologies (ICT) positions the citizen at the core of public administration decision-making processes (ELYACHIOUI & AOMARI, 2018; Michel, 2006; Carvalho et al., 2021).

Additionally, our study emphasizes key dimensions affecting the adoption, acceptance, and effective use of e-public services, encompassing individual, environmental, and technological factors (Venkatesh, 2022). Furthermore, we underscore the significance of habit and facilitating conditions as pivotal elements influencing the usage behavior of e-public services (Venkatesh et al., 2012).

Indeed, the trust that citizens place in both the internet and the government plays a pivotal role in the acceptance and subsequent utilization of e-public services (Venkatesh, Thong, & Xu, 2016). Additionally, anticipated performance, expected effort, and social influence exert a positive influence on acceptance, leading to the usage of e-public services (Venkatesh et al., 2003).

There are numerous practical benefits, particularly for public administration, such as facilitating the assessment of acceptance and usage of public services within these entities. Moreover, it allows for the measurement of the impact of technological, environmental, and socio-cultural factors on the acceptance and use of public e-services.

Nevertheless, this theoretical study encounters certain limitations. Notably, advancements in this scientific field, particularly in developing countries, reveal challenges in the adoption and implementation of technological devices and information systems within public administrations. There exists a lack of a clear understanding of their conceptualization, operation, and effects. Additionally, most research on the acceptance and use of e-public services in developing countries is empirical and lacks the conceptual maturity necessary for empirical advancements. Lastly, there is a dearth of research highlighting the influence of the acceptance and use of public e-services on their perceived quality and citizen satisfaction, especially in developing countries.

Furthermore, Moreover, as research perspectives, it is suggested that:

- Subsequent studies prioritize empirical investigations across diverse contexts. This includes delving into the acceptance and efficient utilization of e-services within public administrations in developing countries, with a particular focus on Morocco. These contexts might encompass educational administration, tax administration, local communities, and beyond.
- Incorporating additional factors influencing the acceptance and use of e-public services, such as hedonic experience and operational costs.
- Assessing the repercussions of acceptance and utilization of public e-services on their perceived quality and citizen satisfaction.

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