Article

Exploring Factors Affecting Mobile Government Services Adoption in the Egyptian Context

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Abstract: This research intends to identify factors in the adoption of mobile government services, recognizing the main mobile government acceptance factors through different models, namely, the theory of reasoned action (TRA), the theory of planned behavior (TPB), the technology acceptance model (TAM), the technology readiness index (TRI), and the unified theory of acceptance and use of technology (UTAUT). Reviewing prior studies on factors that influence mobile government acceptance in Egypt and addressing local challenges help in the development of effective strategies for successful implementation, considering opportunities and challenges in value-added services (VAS). Therefore, the main objectives of this paper are as follows: we critically review prior studies to identify the main mobile government acceptance factors, explore the identified dimensions of mobile government acceptance, and recognize further insights into the challenges that exist in the Egyptian context. Data are gathered through interviews with technology experts and customers with technological experience in Egypt. The findings of the study show that the factors affecting mobile government adoption in the Egyptian context are identified as follows: facilitating conditions, opportunities and challenges, technology and information systems, perceived usefulness, challenges like a lack of trust, cost, privacy, age, and several other obstacles. This research assists scholars and practitioners with insights into how to create and promote an application that is deemed attractive for the adoption of m-government services.

Keywords: TPB; UTAUT; TRI; attitude and behavioral intention

1. Introduction

Technology has had a substantial influence on consumers, businesses, governments, and other entities in the market—specifically, the mobile industry has changed practices worldwide [1]. Mobile devices have expanded their use beyond simply connecting people with each other. Customers are increasingly using mobile devices to locate merchants, conduct product research, make purchases, and manage their accounts. Mobile value-added services (VAS) is a term for services that are not included in standard phone plans and that must be purchased or downloaded separately by the end user [2]. VAS have become very popular among consumers when it comes to services related to shopping, entertainment, health, education, and the weather [3]. Nevertheless, their popularity among government services has been slow [4], despite their potential benefits. This could be attributed to various factors, such as concerns over data security and privacy, the need for extensive integration with existing government systems, and resistance to change within bureaucratic structures [5]. Therefore, many researchers and practitioners have questioned why this is the case [6].

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M-government has enabled anyone with a mobile phone to access government services, obviating the need for internet access. Given the current state of m-government in most regions of the country, most users are likely to appreciate the new innovation while further advancements are made [7]. However, in developing nations, m-government applications are not a commonly downloaded [8].

According to [9], various components from several user acceptability models have been coined by various scholars to help explain the dynamics that influence the usage of new technologies. The variables in multiple models show valid consistency and correlations with why people use certain technology; these constructs vary from technology to technology. The purpose of this research is to determine the main factors that encourage the use of government VAS. This study seeks to explore the impacts of various government, mobile, personal, and societal factors on behavioral intentions. Various theories are explored in this study to understand their relevance among e-government applications. The study will reveal tactics that may be used to promote the full implementation of government services by displaying the elements that influence the implementation of mobile government in Egypt. The main objective of this study is to explore the main mobile government acceptance factors in the Egyptian context, the identification of which could, in turn, enhance the behavioral intention towards a mobile government application.

2. Theoretical Background

Technology acceptance is a common topic of study that is popular among researchers, as the current market is dynamic, and new inventions surface as advanced technology introduces innovative solutions for individuals to become more efficient in their lives. The literature on various theories and models of technology acceptance, highlighting the primary motivators for adoption, is introduced in this section.

2.1. Theory of Reasoned Action (TRA)

The earliest theory to clarify the prediction of individuals' behavioral intentions is called TRA [10]. According to the theory of reasoned action, an individual's attitude (beliefs and emotions) towards something motivates their behavior. Additionally, an individual's behaviors are driven by social influence, often known as subjective norms; pressure from influential people is a common concern that can make people change the way they think and act [11]. Regarding the adoption of technology, ref. [12] highlights the fact that individuals are comfortable in forming opinions that are impacted by family members and friends. Nonetheless, TRA skeptics have long argued that individual choice must be acknowledged before any meaningful change in behavior can occur [13]. As a direct result of this, the theory of reasoned action (TRA) was revised to become the theory of planned behavior (TPB) [14].

2.2. Theory of Planned Behavior (TPB)

According to TPB, which merges TRA with perceived behavior control, a person's actions are influenced by how much willpower, personality, and passion they believe they have [15]. Previous research has found that the theory of planned behavior falls short in explaining human behavior, because other elements, such as fear, mood, and past experiences, are thought to be more important in elucidating motives [16]. The theory of planned behavior takes normative impacts into concern but ignores environmental, emotional, or financial aspects that might have an impact on actual behavior [17,18]. Although the theory of planned behavior places importance on perceived behavioral control, it says nothing about real behavioral control [9]. The research has formed this idea and produced more branching theories [14]. In addition, the research has shown that there is a deficit in the existing literature about the usefulness of the theory of planned behavior in relation to people's behaviors towards technologies. This was discovered by the researchers of [19].

2.3. Technology Acceptance Model (TAM)

Researchers have created a technology acceptance model to fill the gap between the theory of reasoned action and the theory of planned behavior in understanding people's behavior towards technology [16]. The objective of the technology acceptance model (TAM) is to provide explanations of the elements that influence customer adoption that can be applied to a variety of advancements and improvements [13]. Perceived usefulness, which indicates the feeling that using a technology would boost one's performance, and perceived ease of use, which declares that one believes that utilizing the technology will be free of effort, are the two beliefs that, according to TAM, shape attitudes towards technology usage [16]. The technology acceptance model's limitations have been mentioned as a subject of contention. The technology acceptance model ignores the effects of human variances and contextual influences on how successfully a technology is embraced [20,21]. Moreover, previous studies on the technology acceptance model have concentrated on reasoning, information, and rationality rather than emotions (understanding through feelings and attitudes). According to recent studies, placing a strong emphasis on understanding may be acceptable for forced and constrained consumer technology acceptance. This is not a good explanation, because customers can decide whether to embrace new technology based on their feelings and beliefs [22]. To understand more about how customers adopt technology, the research has revised and improved the TAM because of its lack of clarity [9,23,24]. The research still believes that amendments to the technology acceptance model (TAM) can only partially account for technological adoption [9]. Ref. [24] states that intrinsic motivation, such as enjoyment, has a large effect on how people accept technology when combined with the technology acceptance model. Ref. [25] states that emotions play a large role in how people use technology, and that both hedonic and utilitarian incentives can affect how people use technology. In order to understand consumers' technological behaviors, further research has included emotional responses in the technology acceptance model, bridging some of the gaps and overcoming some of the challenges [22].

2.4. Technology Readiness Index (TRI)

According to the research, customers evaluate various mental readiness indicators and emotions before using a technology; these emotions might include contentment, courage, and self-assurance as well as resentment, doubt, and worry [13]. A technology readiness index theory was developed by [26] to demonstrate the dichotomy of feelings that users have when thinking about utilizing new technologies (either positive or negative technology-related attitudes). How likely a person is to use a new technology depends on these ideas. The four facets forming these beliefs are: optimism, inventiveness, discomfort, and insecurity. Optimism is the idea that technology boosts workplace productivity; innovativeness is the belief that consumers plan to utilize a new technology; discomfort is the belief that technology is confusing because it is challenging to control; and insecurity indicates mistrust and suspicion towards technology's ability to function as intended [27]. The technology readiness index fills a further gap in the technology adoption paradigm by displaying individual mental attributes as forerunners of the cognitive components [27]. According to [28], consumers build positive values as a result of the dimensions of optimism and inventiveness, whereas consumers develop negative values as a result of the dimensions of discomfort and insecurity. According to [13], customers might quickly decide to embrace or decline a technology based on their personal beliefs; this can be used to explain m-government adoption in Egypt.

2.5. Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT was developed by the authors of [9]. This theory states that performance expectancy, effort expectancy, facilitating conditions, and social influence all have a significant impact on predicting behavioral intentions to use a technology. This is a unified model that combines past theories related to technology acceptance [9]. Ref. [29] tried to clarify the UTAUT model's elements, in which the authors examine the connection

between students' opinions regarding computerized placement exams and their desire to utilize e-placement tests. The study examines four factors that affect students' attitudes: performance expectations, effort expectations, social influence, and enabling circumstances. College students in Taiwan were given legitimate survey questionnaires to complete in order to gather information. Out of the four main components, performance expectation, effort expectancy, and social influence were revealed to have a significantly favorable impact on attitude. Additionally, ref. [30] examined the connection between behavioral intention and the UTAUT model (performance expectancy, effort expectancy, social influence, and facilitating conditions), employing attitude as a mediator. Structural equation modeling was used to examine the data, which was collected from 169 university students in Saudi Arabia via an online survey. Only attitude, it was discovered, affected behavioral intention. Expectations of performance, expectations of effort, social influence, and enabling environment all had an impact on attitude.

The authors of [31] tried to assess academics' acceptance of electronic media using the qualitative analysis software NVivo and came up with the result that e-learning platforms are not extensively utilized by academicians. Another study [32] attempted to assess teachers' perceptions using the qualitative analysis tool Nvivo. The authors used qualitative methods to investigate the perspectives of 12 higher education teachers who had used Google Classroom for at least one semester and found that Google Classroom is merely a document management tool with no significant impact on teaching methodology. Ref. [33] examined university staff acceptance of Moodle and the perceptions of nine faculty staff members with the interview method and came up with the results that performance expectancy, effort expectancy, social influence, and facilitating conditions had a significant and direct effect on behavioral intention.

2.6. Attitude and Behavioural Intention

As part of the technology acceptance model (TAM) framework, attitude is often defined as someone's positive or negative feelings towards the execution of a target behavior (e.g., using technology) [16]. Meanwhile, behavioral intention is defined as the intention of a customer to approve of and utilize a particular tool in the future [9,15]. Ref. [34] also sought to examine how behavioral intent to embrace technology affected expectations for effort, performance, social influence, and enabling circumstances. Data were collected from 192 aid professionals who had participated in various crises. Behavioral intention to use technology was positively influenced by performance anticipation, effort expectancy, social influence, and enabling situations, according to the findings.

Additionally, ref. [35] intended to look at how social influence, performance expectations, and effort expectations influence behavior when it comes to using social networking apps (Facebook, WhatsApp, WeChat, Twitter, Instagram, YouTube, Snapchat, and others). The data collected from the surveys conducted among users of social networking apps included responses from 384 valid participants. These participants were students from six different colleges in Malaysia. The results showed that behavioral intention toward social networking applications was impacted favorably by performance expectation, effort expectancy, and social influence.

2.7. Openness and Transparency of Government and Behavioral Intention

Openness and transparency are seen as phenomena that provide important knowledge and relevant information about citizens' expectations [36,37]. Currently, openness and transparency are advancing as public interactions with the government increase and conflicts decrease [38]. Openness and transparency in government refer to the evaluations and comprehension of as well as the significance placed upon public service to implement ongoing enhancements and produce outcomes [39].

Good governance must adhere to the principles of openness and transparency in order to successfully regulate and manage public resources [40]. As a result, active public engagement in decision making, community compliance, and a rise in public trust in government

are all influenced by openness and transparency in the supply of government information [40,41]. In times of national and international emergencies, the public is expected to receive information that is open, transparent, and free from political manipulation and distortion. That is, information and communication intended for the general public should be truthful, open, and free from political content [42].

According to a survey across different EU fields, the application of ICT with social media integration skills might promote openness and transparency in the government sector [43]. IT experts used an e-government survey to conduct a number of ICT-based studies and came to the conclusion that e-government is not only a reality but also a requirement for people to meet their needs in a more open, transparent, and responsible way [44].

Transparency and openness in government services refer to the extent to which government agencies provide accessible and reliable information to the public [45]. These principles are crucial in enhancing trust and accountability, as they allow citizens to hold their governments accountable for their actions and decisions. Furthermore, transparency and openness empower citizens by enabling them to make informed choices and participate actively in the democratic process [46]. Ultimately, these principles foster a more responsive and responsible government that prioritizes the needs and interests of its citizens [45].

2.8. Technology Usage Depends on Demographic Factors

Product usage varies depending on consumers' personal factors. According to the research, each segment of the population holds their own personal preference or attitude towards technology usage [11]. Therefore, when it comes to technology, not all segments of the population hold similar opinions [9,11]. This section investigates the role of demographics in enhancing users' behavioral intentions. Ref. [47] used attitude towards using technology as a moderator to examine the association between performance expectation, a UTAUT component, and behavioral intention. The results showed that age influenced the association between behavioral intention and performance expectations. Ref. [48] examined the impact of UTAUT variables (performance expectancy, effort expectancy, social influence, and facilitating conditions) on behavioral intention utilizing gender, age, and experience as moderators. The results showed that the association between behavioral intention and performance expectancy, effort expectancy, social influence, and facilitating conditions did not depend on age, gender, or experience as moderators.

Accordingly, this paper presents significant theories with different constructs, but it is crucial to recognize that these theories may not be mutually exclusive and can complement each other in understanding complex phenomena. This study seeks to identify which of these constructs are fitting to government service applications. The research aims to explore the influential factors of government mobile application acceptance. Such factors might include mobile elements, personal factors, and social factors that might affect behavioral intentions, using attitude as a mediator. Therefore, the following section illustrates how the research proceeds with an exploratory purpose.

2.9. Current Situation of m-Government in Egypt

Egypt started investing in communication and IT infrastructure in 1985, while it was still undergoing economic transition and development. The Egyptian e-government initiative was formally established in 2001, with the purpose of offering innovative and value-added technology to citizens and companies in order to provide high-quality public services [2]. Egyptians are presently provided with more than 100 transactional services. This extensive range of services in dual languages (English and Arabic) will be supported by the e-government platform's framework, which will eventually be expanded to include up to 700 services. The e-government has provided quite a restricted number of services through phones and tablets, such as sending SMS voting information [49]. Egypt is currently struggling to overcome a variety of challenges that have prevented it from fully

implementing m-government applications. In contrast to other nations across the world, Egypt is still in the early stages of m-government development [50].

Ref. [51] discusses some of the challenges that the Egyptian government is experiencing. Among these difficulties are the lack of an e-signature mechanism, privacy and security issues, e-payment transaction obstacles (credit card penetration is low, and there appears to be a paucity of payment tools for ordinary citizens), delivery mechanism inconvenience and its impacts on the reputation of e-services' quality, low internet penetration rates, as well as a lack of computer literacy. These concerns have been raised regarding a lack of citizen awareness and engagement; reluctance towards and mistrust of automation; and rigidity towards change.

The Ministry of Communications and Information Technology (MCIT) has begun constructing Digital Egypt as part of Egypt's digital transformation strategy and in line with Egypt Vision 2030. The goal of Digital Egypt is to turn Egypt into a digital society, and the strategy is comprehensive. "Digital Egypt" rests on many crucial pillars to facilitate this shift towards a digital society and to create a robust digital economy, as shown in Figure 1. Yet, a beginning has been made, for instance, with IDSC and smart electricity services [52].
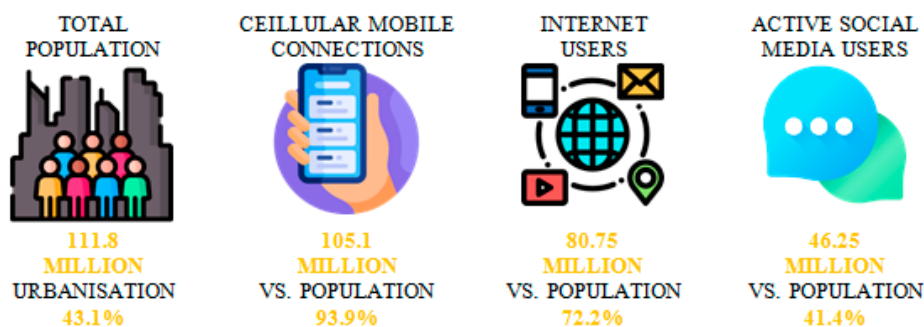

Figure 1. Essential digital statistics [52].

To deliver public services more quickly and easily, Egypt has been implementing a solid plan and a strong course of action to transition the current community ecosystem and government services into a totally digital and data-driven ecosystem. MCIT aims to create public benefit by making it easier for people to access government services and information and by making it more efficient for the government to operate [52].

The MCIT collaborates with all parts of the government to make digital change happen. This is achieved through two pillars: providing services to people and making the government work better. All public services will be offered online, all over the country, to all citizens. Regardless of where they reside in the country, Egyptians will have access to these services in digital format. Several online payment options for service fees have been established [53].

3. Research Design

To achieve the research aim, the inductive approach with qualitative design was followed, where a semi-structured interview was designed. A number of 13 questions covering the factors affecting the implementation of a mobile application were developed. Table 1 shows the interview questions posed to a targeted sample of technology experts and customers with technological experience in Egypt. The questions were posed to a number of experts until redundancy of data occurred. This indicates that the sample was abundant, with no need to continue with more interviewees. NVivo (version 12) software was used to analyze the interviewees' responses. NVivo is a software package used for qualitative analysis. NVivo has a user-friendly interface and a variety of capabilities that allow for in-depth study and comprehension of data from qualitative studies [54,55]. Researchers may use the flexible coding system to analyze data at the granular level, detect trends, and reveal important insights [56,57]. In order to obtain better knowledge of their study material, users

may code certain segments, transcribe audio and video recordings, and analyze visual data using the software, which also facilitates the analysis of multimodal information [58,59]. Ref. [60] found, in a recent study, that NVivo software is frequently regarded as a helpful tool for streamlining qualitative analysis. NVivo is a tool that was created especially for examining and classifying text-based data. It has a number of functions, including the ability to code and extract data for thematic analysis. The software also has features that allow researchers to link different codes or categories of data, making it easier to develop conceptual frameworks and even hypotheses based on the data.

Table 1. Interview questions.

Questions
1. In your opinion, what are the existing strategies and good practices for creating mobile applications?
2. What barriers to the use of mobile applications can be identified?
3. Do you see that internet usage could predict technology satisfaction?
4. Do you see that technology satisfaction could predict internet usage?
5. Do you see that technology satisfaction could predict technology resistance?
6. Do users consider easy access to mobile applications to be a satisfactory service that is provided?
7. Do users consider high-quality mobile application content to be a satisfactory service?
8. Is there a difference in perceptions of mobile prices, usage time, program contents, and services among different age groups?
9. Will the perceived ease of use or utility of the mobile application's UI influence its utilization?
10. Will interface language interfere with the strength of the perceived usefulness of the mobile application interface and affect its usage?
11. How does the characteristic of personal values toward information technology influence the intent to adopt a mobile application?
12. What are the reported experiences in creating mobile applications from existing information systems?
13. Would you like to add any further information about the challenges facing mobile application development in Egypt and how this affects users' behavioral intentions?

The analysis was conducted using content analysis, which shows the relative importance of each theme raised from the analysis. The analysis includes the initial coding using a word cloud and a word frequency table, through which the codes were identified. Accordingly, the categories and themes were classified, and a mind map showing the final factors developed as those that influence government mobile application is illustrated.

4. Results

In this section, we present the research findings and results obtained from the interviews. The interview data were analyzed and interpreted to draw meaningful conclusions. The results highlight the key observations and outcomes of the study, providing valuable insights into the research objectives. Software was used to analyze the qualitative data obtained from interviews. The word cloud visually represents the most frequently mentioned themes and concepts in the data, allowing for a quick overview of the main findings. This analysis helped to identify recurring patterns and trends, aiding in the interpretation of the interview results.

Research Findings and Results

A number of 13 interviewees, including technology experts and customers with technological experience in Egypt, answered the interview questions. A lack of expertise in mobile government in Egypt meant that only four of the thirteen were experts in m-government; nevertheless, the field of expertise and the level of experience of these four assured the data collection was sufficient. The results of the study were discovered, and each result is depicted in a different section based on the replies from the sample and the

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13 interviews conducted with 13 participants who represent mobile users and technology experts in Egypt.

Once the interviews were conducted and transcribed, the analysis was conducted, considering how links form between codes and themes, as well as across different layers of existing themes. The researchers carefully examined the data after compiling the responses. An image of a word cloud of the 200 most frequent words (as shown in Figure 2), appearing at least three times, was created to evaluate this data in relation to the study's research questions and text search (word tree).

Figure 2. Word cloud extracted from NVivo-12.

The information gathered from the interviews was then organized and transcribed for each company. Thematic analysis was used by the researcher to determine the research interview results and findings. The codes were extracted from the interviews using content analysis. As a result, codes were determined by looking for similar nodes and grouping them together under different codes. Similarly, themes were determined by comparing similar codes and grouping them into distinct themes. The researcher followed some procedures in order for this process to occur. The first step was to carefully read the transcripts for the number of interviews at hand, which is an important step in extracting emerging codes from the text in the transcripts. The researcher then grouped similar codes together while keeping different ones apart. This step is useful for interpreting codes and relating them to one another under one theme if they are similar and under separate themes if they are not.

Following this, the researcher counted the frequency of the codes to sum them up for emerging themes, which is useful for determining the relative importance of each emerging theme of the study. In this case, if a respondent mentioned a code several times, it was counted by the number of times it was mentioned rather than the number of interviews that mentioned the specific code. The researcher was able to identify the emerging themes and their relative weight in relation to other themes at this stage. This enabled the researcher to proceed to thematic analysis and identify relevant quotes by relating evidence-based quotes to each theme extracted from the study. This step of the thematic analysis was helpful in observing the various patterns and figures.

At this point, the research questions were mixed in with the initial four themes to include users, mobile, app, easy, technology, and application. The researchers chose five themes from the research objectives to answer the research questions, including perceived usefulness, facilitating conditions, obstacles to mobile app usage, technology and information system usage, and opportunities and challenges.

The researchers were able to conduct data analysis within each subject by defining and revising existing themes to be displayed in the final analysis. Identifying the essences of the themes at this stage refers to how each individual theme fits into the overall picture of the data. Analysis was defined at this level by determining which parts of the data were being collected, what is fascinating about the themes, and how the themes fit together to provide a cohesive and engaging story about the data. To better understand the research questions, these five major themes were divided into different sub-themes, as shown in Table 2.

Table 2. Main themes.

Major Themes	Sub-Themes	Reference	Total
Perceived usefulness	Mobile applications	[17]	
	Ease of use	[18]	
	Satisfaction	[8]	
	Usability	[3]	61
	Needs and demand	[11]	
	Added value	[2]	
	Good	[2]	
Obstacles to mobile app usage	Lack of trust	[4]	
	Age group	[15]	
	Cost and prices	[4]	38
	Social and personal values	[10]	
	Privacy and security	[5]	
Facilitating conditions	Language	[6]	
	Navigation	[3]	
	Interfaces	[4]	21
	Storage	[3]	
	Functionality	[5]	
Technology and information system usage	Internet and data usage	[7]	
	Information systems'	[4]	
	quality	[4]	27
	Technology resistance	[9]	
	Marketing and advertising	[3]	
Opportunities and challenges	Opportunities	[5]	
	Challenges	[6]	
	Bugs	[6]	17
	Simplicity	[3]	

The collected interviews were analyzed by theme, and the responses of the respondents were investigated. The researchers evaluated the respondents' responses to each topic presented in the interview at this stage to determine the primary themes that could be retrieved for this research. These interviews allowed the researchers to assess the current state and future prospects of dairy product companies. The interviews focused primarily on the problems that the companies face, the systems that the companies use to measure their performance, and the companies' thoughts on the developed framework and how it can be used in dairy product companies.

Five themes emerged from the participants:

1. Theme of perceived usefulness;
2. Theme of obstacles to mobile app usage;
3. Theme of facilitating conditions;
4. Theme of technology and information system usage;
5. Theme of opportunities and challenges.

First, the **theme of perceived usefulness** appeared as a result of the merging of seven codes, which included: mobile applications, ease of use, satisfaction, usability, needs and demand, added value, and good. These codes are represented as follows:

-      The first code, which is the mobile application one, will be discussed, as participants considered it an important issue within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. A mobile application or application is a computer program or software application designed to run on a mobile device such as a phone, tablet, or watch. Mobile applications are often contrasted with desktop applications, which are designed to run on desktop computers, and web applications that run in mobile web browsers rather than directly on a mobile device.

-      The second code, which is the ease of use, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. This code appeared as a result of some interview transcripts.

-      The third code, which is satisfaction, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. Satisfaction with apps, users' intention to continue using an app, and hedonic benefits obtained from using apps are the direct antecedents of a user's intention to recommend an app.

-      The fourth code, which is usability, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. Usability contributes directly to how a user feels about an app as they consider the ease of use and the value, utility, and efficiency of the overall experience. Usability is what will help convert users into loyal, long-term customers, in turn generating more revenue for an app.

-      The fifth code, which is needs and demand, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. This code appeared as a result of some interview transcripts.

-      The sixth code, which is the added value one, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. This code appeared as a result of some interview transcripts.

-      The seventh code, which is the good, will be discussed, as the participants considered it an important part that should be discussed within the theme of perceived usefulness. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. This code appeared as a result of some interview transcripts.

Second, the **theme of obstacles to mobile app usage** appeared as a result of the merging of five codes, which included: lack of trust, age group, cost and prices, social and personal values, and privacy and security. These codes will be represented as follows:

-      The first code, which is a lack of trust, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of obstacles to mobile app usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. This code appeared as a result of some interview transcripts.

-      The second code, which is the age group, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of obstacles to

mobile app usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The third code, which is cost and prices, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of obstacles to mobile app usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fourth code, which is social and personal values, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of obstacles to mobile app usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fifth code, which is privacy and security, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of obstacles to mobile app usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

Third, the **theme of facilitating conditions** appeared as a result of the merging of five codes, which included: language, navigation, interface, storage, and functionality. These codes will be represented as follows:

- The first code, which is language, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of facilitating conditions. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study. This code appeared as a result of some interview transcripts.

- The second code, which is navigation, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of facilitating conditions. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The third code, which is the interface, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of facilitating condition. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fourth code, which is storage, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of facilitating conditions. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fifth code, which is functionality, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of facilitating conditions. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

Fourth, the **theme of technology and information systems** appeared as a result of the merging of five codes, which included: internet and data usage, information systems, quality, technology resistance, and marketing and advertising. These codes will be represented as follows:

- The first code, which is internet and data usage, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of technology and information system usage. This was evident in the interviews from

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the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The second code, which is information systems, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of technology and information system usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The third code, which is quality, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of technology and information system usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fourth code, which is technology resistance, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of technology and information system usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fifth code, which is marketing and advertising, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of technology and information system usage. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

Fifth, the **theme of opportunities and challenges** appeared as a result of the merging of four codes, which included: opportunities, challenges, bugs, and simplicity. These codes will be represented as follows:

- The first code, which is opportunities, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of opportunities and challenges. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The second code, which is challenges, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of opportunities and challenges. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The third code, which is bugs, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of opportunities and challenges. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

- The fourth code, which is simplicity, will be discussed, as the participants considered it an important aspect that should be discussed within the theme of opportunities and challenges. This was evident in the interviews from the discussions that were conducted and the answers to the questions that were prepared in order to answer the objectives of the study.

Therefore, based on the interviews, some opinions and results were presented about the obstacles and challenges facing the adoption of mobile government in Egypt, as well as its benefits and impact when discussed from the point of view of the participants in the interviews. The participants presented the perceived usefulness of the mobile government, as well as the obstacles that could face mobile government adoption in Egypt. In addition to discussing how the mobile government will facilitate many things, the participants also talked about the technology and information systems required to adopt the mobile government system. Finally, they gave their opinions about the opportunities and challenges of adopting a mobile government system in Egypt.

5. Research Implications

The outcomes of this research hold various theoretical and managerial implications. To begin, we are aware of just a few studies in which the UTAUT paradigm has been used for mobile government. Our study differs from others in that it is more generalizable. This survey does not discriminate between clients who use a traditional system and those who utilize a mobile government app. Second, the UTAUT model originally featured four constructs: performance and effort expectations represent the technology context, enabling conditions and social influence represent the implementation context, and individual context is ignored. Because the study's key stakeholders are technological professionals, contextual elements must be considered. As a result, attitude is included in this study to establish the individual situation.

Second, in terms of practical relevance, the findings of the current study provide us with better knowledge of the major elements that drive m-government utilization. As a result, as mentioned more below, these traits have substantial practical implications for m-government developers and technology experts. To begin, it was revealed in this study that attitude has a direct and considerable influence on behavioral intentions. Students who believe in m-government are more inclined to use it. As a result, IT workers should focus on traits that generate a positive attitude toward m-government.

Third, people's perceptions about m-government are influenced by performance expectations. When consumers evaluate the benefits of m-government on utilization performance, they have a favorable perspective regarding its use, according to these data. As a result, technology experts should promote and explain such user performance benefits, and consumers should engage in m-government initiatives that provide beneficial features to help customers improve their usage performance.

Fourth, the concept that effort is required shapes not just attitudes toward m-government but also performance expectations. According to this research, if m-government is combined with user-friendly interfaces, consumers would acquire a positive attitude about m-government and find the interface valuable in enhancing their utilization efficiency. As a result, m-government developers and technology specialists are being urged to focus on customer demands, such as lowering the effort necessary for consumers to utilize such apps, simplifying them, and creating a user-friendly system.

Fifth, social influence has a direct impact on attitude. This implies that experts and developers will boost the image of m-government by pushing people to utilize it. As a result, IT professionals should encourage citizens to adopt m-government applications. Furthermore, m-government professionals and developers should include social spaces within m-government apps such as discussion forums and accounts on social media sites such as Twitter and Facebook. Customers can connect with professionals and other consumers using social elements in m-government.

Finally, the physical qualities of a building have a direct influence on the behavioral intent to utilize m-government apps. As a consequence, by offering fundamental services such as free internet connection and technical help, the government may be able to successfully stimulate consumer adoption of m-government.

6. Research Conclusions

The current research develops insights into understanding the factors affecting the implementation of mobile government in Egypt. The study unveils the strategies that could be used to advance the quest for a full implementation of mobile government, which future studies should take into consideration, assessing their significance. The study's findings are consistent with previous research, indicating that factors such as perceived usefulness, obstacles to mobile app usage, facilitating conditions, technology and information systems, and opportunities and challenges are important factors for individuals to consider when deciding to use government applications and ensuring their sustainability in the future [61,62]. The purpose of this study was to investigate the many elements that impact the acceptance and utilization of government services in Egypt,

specifically from the perspective of the end users. The extent of research on the adoption of m-government has been more comprehensive in developed countries in comparison to developing countries [63].

Egypt is still in the early stages of m-government services; thus, the government should concentrate on enhancing IT infrastructure. The findings further demonstrate that there is a lack of public awareness about m-government services, with primary concerns revolving around facilitating conditions such as the availability of competent assistance and the absence of necessary infrastructure. The findings of this study have significance for academic researchers as well as practitioners in the field. The implementation of policies and initiatives by the Egyptian government should prioritize the promotion of utility, efficiency, awareness, infrastructure development; the provision of adequate assistance and advice; the resolution of user privacy concerns; and the facilitation of easy access to government services. Furthermore, there is a need to enhance promotional initiatives that highlight the significance of using the Internet and m-government services in the everyday lives of citizens. Furthermore, in order to enhance the utilization of m-government services, it is essential for the government to implement operational excellence strategies and to enhance the overall quality of these services. The findings of the study can assist government officials in reaching a bigger audience in order to promote the adoption of m-government services. The outcomes of the study may help individuals to persuade others to take advantage of the benefits of m-government. The insights might be utilized to educate users and provide local support through websites. Most significantly, these discoveries have the potential to boost public trust in government leaders. By creating trust among stakeholders, the government can create and sustain long-term partnerships with citizens. Figure 3 illustrates the conclusion of all the themes that emerged. People who trust others more are more inclined to use m-government services. M-government services may assist government officials in improving transparency, eliminating corruption, increasing system efficiency, increasing user confidence, and connecting people, with long-term growth based on continual improvement, in turn based on user feedback. M-government services help the government to fulfil long-term goals (such as appropriate employment and economic goals, as well as peace, justice, and strong institutions), which increases long-term confidence. Transparency and habits as modifiers should be investigated further in future studies.

Additionally, the government can also enhance citizen adoption of m-government by ensuring the security and privacy of user data. Implementing robust security measures and transparent data handling practices can instill trust in users and encourage them to utilize m-government apps. It is recommended that the government enact cyber policies in order to foster trust in services, hence facilitating the uptake of m-government services. In light of this matter, it may be inferred that for the effective dissemination of government services, it is necessary for governments to possess a comprehensive understanding of the requirements and preferences of its citizens. Moreover, actively promoting the benefits and convenience of m-government through awareness campaigns can further encourage widespread adoption among the population, and providing user-friendly interfaces can also enhance consumer confidence in using m-government apps. Furthermore, partnering with mobile network operators to offer free access to m-government apps can remove barriers to entry for individuals who may have limited internet connectivity.

Moreover, conducting regular user satisfaction surveys and incorporating user feedback into app development can help to improve the overall user experience and increase satisfaction. Lastly, collaborating with other government agencies and departments to integrate various services into a single app can streamline the user experience and make it more convenient for citizens to access different government services in one place. Overall, it is crucial for government agencies to prioritize accessibility and user satisfaction when developing mobile apps. The findings of this research also suggest that the facilitating conditions pose a significant challenge to the use and acceptance of m-government services. Citizens in Egypt have challenges in accessing essential services as a result of inadequate infrastructure and incomplete awareness of the existence and benefits of m-government

services. By providing alternative ways to access information and services, such as offline functionality, individuals with limited internet connectivity can still benefit from the app's features.
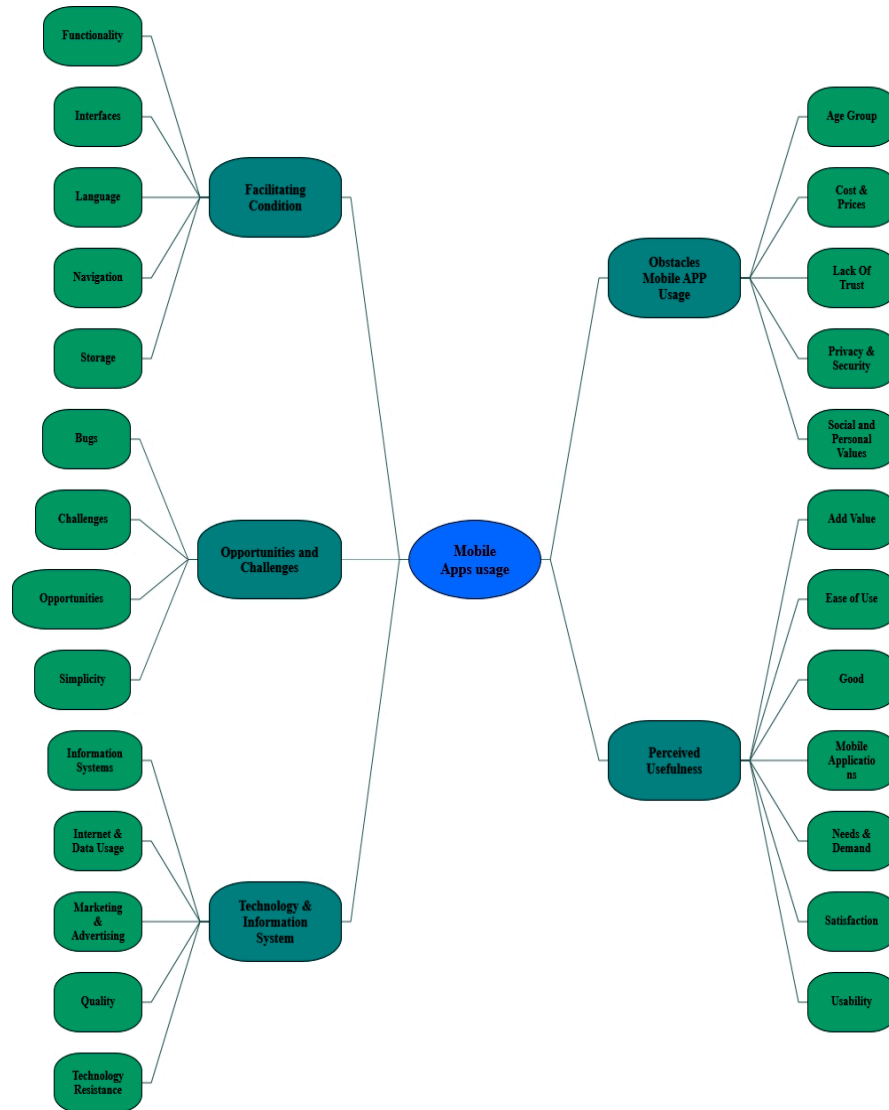

Figure 3. Word tree extracted from NVivo-12.

Theoretical implications suggest that this approach may facilitate an alignment between theoretical government planning and practical implementation. This analysis offers valuable perspectives on the factors that impact the efficient operation of the government, with a specific focus on the context of Egypt. The outcomes of this study should provide valuable insights to scholars and practitioners, including government policy decision makers. This study will facilitate the development and execution of policies and initiatives aimed at enhancing the accessibility of m-government services in Egypt and other developing countries. In summary, this research has the potential to assist developing countries such as Egypt in harnessing the advantages of m-government services to revolutionize their governance practices and foster economic growth. The design and delivery of m-government services are accompanied by several impediments and problems. Different countries may encounter distinct and idiosyncratic obstacles. In conclusion, it is essential for policymakers to exercise caution in making assumptions about the existence of universal m-government difficulties across all countries.

7. Research Limitations

The current study, like any other academic study, has limitations that must be addressed, and further research is required to generalize the findings. First, in the future, the model should be developed to include more components such as system quality satisfaction and confirmation. Furthermore, the current study has focused on a restricted number of variables and hypotheses, which is a disadvantage. As a result, future studies should incorporate more variables and theories that may impact behavioral intentions, as well as investigate additional variables that may mediate the association between theory components (TRA, TPB, TAM, TRI, and UTAUT) and behavioral intentions. Second, it is important to note that analyzing the qualitative data for experts and users should be undertaken separately in future studies. This will allow researchers to gain a comprehensive understanding of their perspectives, to identify common themes, patterns, and insights in each group's responses, and to employ various approaches such as thematic analysis, content analysis, or narrative analysis. These methods will uncover valuable insights that can inform the decision-making process. Third, participants in this study were drawn at random from a pool of Egyptian mobile users and technology experts; future research should look into the impact of these moderators on the model using different samples from different regions. In terms of future directions, since this research's framework was only confirmed by thirteen in-depth interviews, its generalizability remains restricted. As a consequence, an improved model will be tested using a large-scale quantitative survey in the future. Similarly, this research may be replicated in other developing nations to uncover similarities and differences in order to create a uniform m-government adoption model in such countries.

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