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A Theoretical Framework of Knowledge Management in M-Government

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Abstract: M-government is one of the new and important developments in e-government. The promise of m-government to provide greater access to government information is progressing in many developed and developing countries. Current m-government does not exploit the full potential of available technology. M-government presents some challenges such as technical challenges, usability challenges, handset-limitations, social and legal issues, and so on. Also, knowledge management (KM) has changed from one generation to the next through constant improvements and perspectives. In this paper, we deal with the security issues in different forms of government using some technology-based KM and propose some ways to eradicate using latest technologies. In this context, this paper aims to present a conceptual analysis of process-based KM approach in m-government to which researchers must pay attention and describe a suitable knowledge model to achieve real-time, ubiquitous government.

Keywords: m-government; data protection; knowledge management (KM); framework

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1 Introduction

In the 21st century, communication and computing advances mean that many new business opportunities are appearing and promising us new services that could improve our lives. The citizens, visitors, business partners, employees are no longer physically moving to get some work done from the other side with these developments. Similarly, government is also advancing from the conventional state to e-government and present state of m-government. The vision of government is an order of magnitude improvement in its value to the citizen. This is becoming possible with the latest technological advances being implemented in both private and public sectors. [1] Presented a
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taxonomy which classifies KM initiatives as technology-, culture-or information-based. Using technology-based KM initiatives, some specific problems such as data protection, security, and trust-worthiness will be solved. The small leakage in a particular government information leads to an uncontrollable disaster. So, these issues are needed to be taken into account. So, with the help of latest technologies, we are trying to eradicate them.

On the other hand, research has shown that the application of knowledge management is very efficient in many domains. The importance of knowledge management is increasingly recognized in many government departments. It is experiencing incremental but significant growth, because in the growing knowledge economy, knowledge itself is becoming paramount. Knowledge is now perceived as an asset that can enhance any organization, whether it is private or public sector domains. The latter is particularly affected by actively practicing KM since it deals with information and knowledge on citizens, businesses, the market, laws, and politics [2]. Many public organizations are chiefly 'intelligence organizations' where human actors co-operate in order to store and process information and to produce information output for further use. Not all parts of a public organization or even citizens can necessarily benefit from that knowledge. As, the trend is moving from e-government to m-government due to higher mobile penetration than PC or internet penetration [3], as well as governments and citizens around the world are experimenting with the new information technologies; this is good opportunity to apply KM techniques to the domain of m-government. In this paper, after recognizing the importance of m-government and KM, present a conceptual analysis of the application of process-based KM approach in m-government. The remaining part of the paper is structured as follows.

The paper begins with an overview of e-government, the predecessor of m-government, as well as m-government itself. Next, a brief overview of Knowledge and Knowledge Management is presented. Next, the classification of the government into three classes, solutions of some critical problems with the help of latest technologies are presented. Lastly, the conceptual analysis of the application of process-based KM approach in m-government is presented. Finally, conclusion and the lessons drawn for m-government are discussed.

2 Overview

2.1 E-Government

Whilst a government is considered the dynamic mixture of goals, structures and functions by which a community is ruled [2], it is also defined as an organization that has the power to make and enforce laws for a certain territory. The Legal System of India defines government as the structure set up by the constitution for regulating the society. Hence a government is an organization that has the power to enforce law for a certain territory implementing certain policies and strategies in order to achieve certain goals and functions.

2.2 E-government

The proliferation of electronic commerce business models and technologies encouraged their application to the activities of government. E-government refers to the use of Information Communication Technology (ICT) to transform government operations so that government services are provided electronically any time [4][5]. The rapid development of ICT in the governmental sector created e-Government with specific initiatives to create new dimensions of economic and social progress rendering its services to citizens, business and other government departments and employees. E-government may focus on:

- Internal activities (within government)
- External business relations (with suppliers, other businesses and other governments at the same or different levels), and
- External relations with consumers of services (with citizens and visitors to its jurisdiction).

The resulting benefits can include less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions. In general, the fundamental point is the following: E-government is about transforming government to be more citizen-centered. It involves in automation or computerization of existing paper-based procedures that will prompt new styles of leadership, new ways of debating and deciding strategies, new ways of transacting business, new ways of listening to citizens and communities, and new ways of organizing and delivering information [17].

3 M-government

M-Government is not meant to be a replacement for e-government but a complement to e-government. M-government stands for the use of mobile wireless communication technology within the government administration and in its delivery of services and information to citizens and firms [6]. There are 1.7 billion of mobile phone users in the world presently [7], over a quarter of the world's population, which means the same number of potential users. Mobile technology allows developing countries to leapfrog in adopting new technologies. This is very important to the development in developing countries. M-government becomes a better option in developing countries where the internet penetration is low and mobile phone and mobile internet penetration is high. Total number of mobile phones has already surpassed the total number of fixed lines according to 49 middle income and 36 low income countries [3].

From the employee's perspective, m-government provides a seamless environment for employees enabling them to communicate, go into a meeting to another office or on the road without the need to plug into a network interface, in addition to accessing their emails, calendars, maps and tasks. For example field workers, customs inspectors, immigration agents, medical, law enforcement and military personnel can all benefit from access to current data to make better and faster decisions [8].

From the citizen's perspective, m-government facilitates accessibility to government services and public information at anytime, anywhere; saving time, effort and money. Generally, computers do not travel with citizens, but information and public services can, as m-government provides for instant availability of services and information, helping frequent travellers and people on the move to access government. For example, in Malaysia the citizen can use Short Message Service (SMS) to verify his voting information, such as state and parliamentary constituencies, from wherever he is; the state government in California established a webpage for citizens in order to let them register if they desire receiving 'cell notification services' for traffic updates, energy alerts, lottery results and even papers from the Governor's press room. Citizens are also involved in the fight against crime and illegal drugs by using SMS [5].

3.1 Knowledge and Knowledge Management (KM)

Knowledge can be defined as including all factors that have the potential to influence human thought and behaviour and that sometimes allow the explanation, prediction and control of physical phenomena [8]. This is a very broad definition and includes factors such as skills, intuition, organizational culture, reputation, and codified theory. Knowledge is typically classified as either tacit (un-codified) at one extreme or explicit (codified) knowledge at the other.

Knowledge can be converted from tacit to explicit forms and vice versa. The social interaction between these two types of knowledge leads to the creation of new knowledge and innovation. Knowledge Management (KM) works to leverage both types of knowledge. KM is the ability to leverage intellectual capital (knowledge) for achieving organizational goals. KM is a set of professional practices that improves an organization's human resource capabilities and enhances the organization's ability to share what employees know [9]. It is a conscious strategy of getting the right knowledge to the right people at the right time and helping people share and put information into

action in ways that strive to improve organizational performance. Finally, knowledge management can also be a powerful tool for addressing the 'graying of government' and other factors contributing to the loss of expertise in government organizations [10].

The key objectives and purpose of KM from the business process perspective are:

1. The externalization of knowledge of individuals or groups, and consequently the spreading, sharing and reusing of knowledge; and
2. Providing access to the desired knowledge to support the productivity and competency of all employees performing business activities.

Process-oriented knowledge management aims to provide employees with task-related knowledge of the organization's operative business processes. In this environment, knowledge can be offered to an employee in a much more targeted way. The process-oriented view offers several advantages for KM initiatives: a value chain orientation; context relevance; widely accepted management methods; improvement in the handling of knowledge; process benchmarking; and support for process-oriented KM.

Here, we try to apply KM techniques to the governmental activities. The next section deals with the application of technology-based KM to eradicate some critical issues in data protection and security in all forms of government. Next, a conceptual analysis of process-based KM approach is presented.

3.2 Knowledge Management (KM) in Government

Today's private and public organizations face a vast volume of knowledge and information. The necessity of an efficient knowledge management is not only derived from this fact but as well from the high knowledge intensity of products and services, the high fluctuation, and the special requirements and constraints of the public sector. The public sector or government can be classified into three ways, viz.

- Normal Government Procedures (conventional)
- E-Government (through internet)
- M-Government (through Mobiles)

Here, we shall discuss knowledge management issues in government sectors regarding data protection and security. One primarily shared issue among the three sectors is trust and confidence, part of which security is, but which focuses on the user acceptance of technical and organizational security architectures. The handling, creation, and delivery of trustworthy information are a major challenge, and in fact, rather generic technical solutions are possible in that respect for all three sectors. Still a lot of further research work is needed on such issues. Similarly the research should be done on 'after transferring' the information to citizens to track the documents physically, electronically as the knowledge or information in those documents is critical for any future problems [10].

Nowadays, it is quite clear that the traditional bureaucratic model of government is no longer functional. A citizen-as-customer approach, which advocates a departure from the traditional, bureaucrat-centered model, and a move to establish a closer interaction between government employees and citizens, provide specific benefits to both government and client/citizen. At the same time, the specific problems of public administration and governance (e.g. data protection, security, trustworthiness and so on) need to be taken care. Some critical problems are identified within each of three sectors listed above. These can be controlled with the help of advanced technologies and by good organizational skills of government employees.

In the conventional government procedures, there are many problems due to obvious reasons like top-down control of government [11] [12], working culture [11], bureaucracy [11] and so on. The most critical problem here is not being able to track the documents issued to citizens/customers when they visit these government organizations. The documents are regarded as knowledge 'containers' which

can be used to reproduce and to generate knowledge. The documents issued at offices are certified with respect to their signatures [11], detailed passport checking [12], still there exist some serious problems like the duplication of the documents to other foreign hands. The other problem here is 'privacy' where the information should not be leaked out to other agencies where they should not use this information for the personal benefit or for other business purpose.

In order to track these documents issued to citizens when they visit the government offices, the Radio Frequency Identification (RFID) tag should be embedded into the important documents with which the document can be traceable regarding the movement of the document and prevent from Xeroxing and so on. This is the 'smart use of know-how' which can be possible with perfect cooperation and collaboration of the employees in different government offices collectively. So, efficient Knowledge Management is necessary here.

In terms of justification, the whole world is being threatened and facing the problem of 'terrorism,' where the information in the documents may be regarding some crucial movements of political leaders, sensitive information about the country, and so on which may lead to disaster. So, using RFID tags can be embedded in important documents which can be traceable. RFID tags are being used in different industries for monetary purposes such as cost reduction, improved Supply Chain Management, apparel industry, and so on.

Simultaneously, 'sensor networks' are being used for controlling the natural disasters like Tsunami, Katrina which caused so many unexpected consequences. Placing sensors under the water level to know the disturbances caused to the waves, earth frequency and so on which can help in predicting the disaster and can be broadcasted using electronic and mobile technologies to reach the public faster. The planning can be done effectively if the technology and organization are well-set and well-used. This helps a lot as the flow of information and its dissemination plays a critical role on the firms' strategies as well as the security to public life. This can be done by effectively implemented with time and change management techniques. The knowledge of government regulations also should be reached to higher numbers of public at right time as the 'decision-making' is the core process as decisions are made along the flow of the information value chain [2]. The knowledge management plays a vital role with the help of advanced technologies.

In e-government procedures, there lies the same problem which is regarding the document tracking, security, privacy and so on. Presently, some certification is being done with respect to signatures [11], documents like passport IDs [11], passwords [11] [12], Social Security Numbers (SSNs) [11], and so on. But there are some problems such as duplication of documents online. The information leakage causes uncontrollable disasters. Digital Rights Management (DRM) can be used to track the documents and other data in the network. Watermarking techniques help in avoiding the duplication & modifications of data. Here, smart use of knowledge and technologies can be used to avoid or control these problems.

In m-government procedures, similar duplication and data protection can be done using RFID+SIM (Subscriber Identity Module) + PKI (Public Key Information) embedded in the mobile handset. This will avoid or control these duplication and security issues to a large extent.

These technologies can only be identified after the strategy and programs for implementation are written. This sequence will be paramount in ensuring the success of KM program.

4 Conceptual Analysis of Knowledge Management (KM) in M-government

M-government can contribute to better functioning of democracy by mobile technological provision of reports and other government information (ubiquitous government), which would be otherwise difficult to obtain or unavailable, and through online debates. It can bring efficiency through providing citizens with relatively inexpensive, real-time access to consistent, up-to-date information, and transaction facilities, and in parallel can enable governments to disseminate information at lower costs

than ever before.

Simultaneously, modernization and re-organization of governmental work and responsibilities imply significant changes to knowledge resources. Most 'products' of public administration's and governance's work are delivered in the shape of information monitoring of society, market, and environment. KM concepts and tools can really provide great support to exploit the huge knowledge and information resources and assist m-government introduction into a modern public administration in an effective way. In order to understand the specific significance of KM for the public sector, typical situations can be presented [13]:

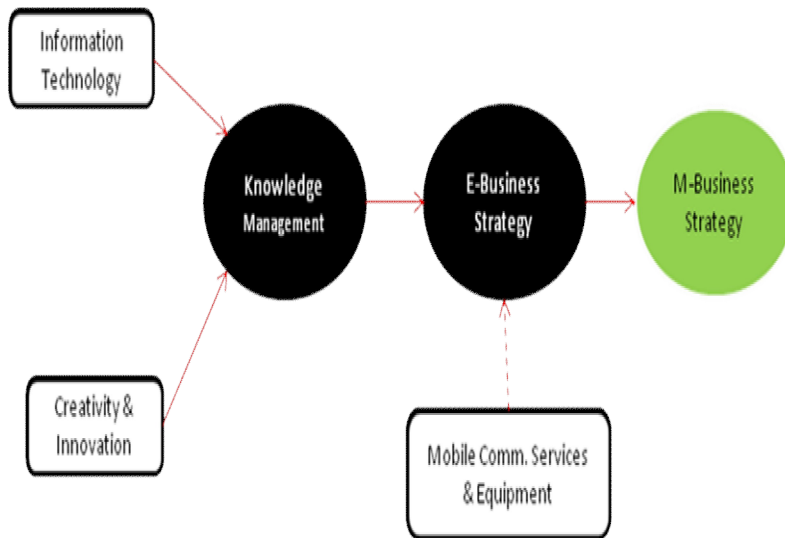
- Clerical and professional work concerning individual cases to be decided upon
- Individual services to citizens
- Pursuit, by citizens or enterprises, of business or personal affairs involving public bodies
- Management of administrative work and organizations
- Policy formulation by ministerial departments and other public bodies
- Parliamentary work.

Knowledge management in m-government environment can be powerful tool for reformers, inside and outside government [13]. KM is today the subject of much literature, discussion, planning, and some action [14]. Effectively implementing a sound KM strategy and becoming a knowledge-based entity is seen as a mandatory condition of success for organizations as they enter the era of the knowledge economy. [10] has stressed that a new perspective of KM is to be effectively deployed in the world of e-business. According to [10] "Knowledge management caters to the critical issues of organizational adaptation, survival and competence in face of increasingly discontinuous environmental change. Essentially, it embodies organizational processes that seek synergistic combination of data and information-processing capacity of information technologies, and the creative and innovative capacity of human beings."

In this context of m-business strategy (m-government, in our case) from e-business strategy, mKM (mobile Knowledge Management) is introduced. mKM is dynamizing the new mobile knowledge economy (mKe) and is contributing to the expansion of the knowledge society for all, based on: mobility, learning, creativity, innovation, efficiency, performances, competitiveness, growth and welfare. mKM is an intelligent administration activity of the POCC: Planning-Organizing-Command-Control process. mKM is based on the well known organization's internal and external, rational and affective functioning elements. The knowledge is needed for quick, permanent, effective, efficient and easy adoption of the government's structures to the permanent internal and environmental changes. The relative conceptualization of mKM is depicted in Figure 1.

Nowadays it is widely recognized [19] that in order to efficiently manage m-government evolution, it is fundamental to transform the public administration into a learning organization, characterized by a high sharing, reuse, and strategic application of the acquired knowledge and lessons learnt. A learning organization is an organization that facilitates the learning of all its members and continuously transforms itself. The main aspects of mKM's mLearning process is permanently refreshed and refers to the micro and macro new economy, the 'management of managements', ICT and eTools, mobile communication services and equipments. The basic idea behind this is to create a knowledge chain (collection, production, customization, and delivery), suitable to support and improve whole organization functioning.

Figure 1 Knowledge Management and M-Business Strategy



Due to the fact that public administrations – and their organizational environment – are characterized by the presence of very diverse kinds of actors (e.g., citizens, employees, businesses, politicians, and decision makers), the critical point for applying process-based KM concept to m-government is principally to build a suitable knowledge model and then to find the materials appropriate to feed the knowledge chain:

- To identify the fragments of knowledge that could be accepted and effectively reused
- To represent such fragments so as to be tractable.
- The process-based KM can be applied to the m-government phases as shown below in the Table 1.

Table1 Application of KM in M-Government

M-government Phases	Application of KM
<p><i>Collection (gathering, transcription)</i></p> <p>The phase of biggest value is definitely collection. In order to publish, the data-gathering should be done first and then, transcription of data into the form of statistics and analysis purposes which help to expand access government information, so that citizens and businesses do not have to travel to governmental offices and stand in long lines. This phase serves as the leading edge of m-government.</p>	<p>Knowledge is required on how to present information clearly in mobiles, how to manage its publication, and how customers are likely to use the information. Knowledge is also required and can be transferred concerning the design, completion, and processing of forms and other documents</p>
<p><i>Integration & Interaction</i></p> <p>M-government has its undisputable role of integrator. The knowledge by integrating based on the above phases is of more use to the citizen. The objective of these actions is to broaden civic participation in government (e.g. communication among government officials and citizens about various issues, creation of citizen/government forums, and so on to interact).</p>	<p>Knowledge is required on how to react ‘through mobile’ to requests from ‘customers’. This may include knowledge on how government officials or citizens search for information and like to receive it; or how to accept and maintain ‘customer’ information. Issues of security are also important.</p>

<p><i>Transaction & Reusability</i></p> <p>The objective of these actions is to make government services available through mobile. By automating specific procedures and processes, governments can achieve to stem corruption and increase citizen's trust in government. These actions increase productivity of government resources.</p>	<p>The knowledge required is concerned with the security and efficiency of the transactions. Efficiency is achieved by smoothly interfacing the system to mobiles. Issues of trust are very important.</p>
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4.1 *M-government Phases*

Collection (gathering, transcription)

The phase of biggest value is definitely collection. In Knowledge is required on how to present order to publish, the data-gathering should be done first information clearly in mobiles, how to manage its and ten, transcription of data into the form of statistics publication, and how customers are likely to use and analysis purposes which help to expand access the information. Knowledge is also required and government information, so that citizens and businesses can be transferred concerning the design, do not have to travel to governmental offices and stand completion, and processing of forms and other in long lines. This phase serves as the leading edge of documents m-government.

Integration & Interaction

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Transaction & Reusability

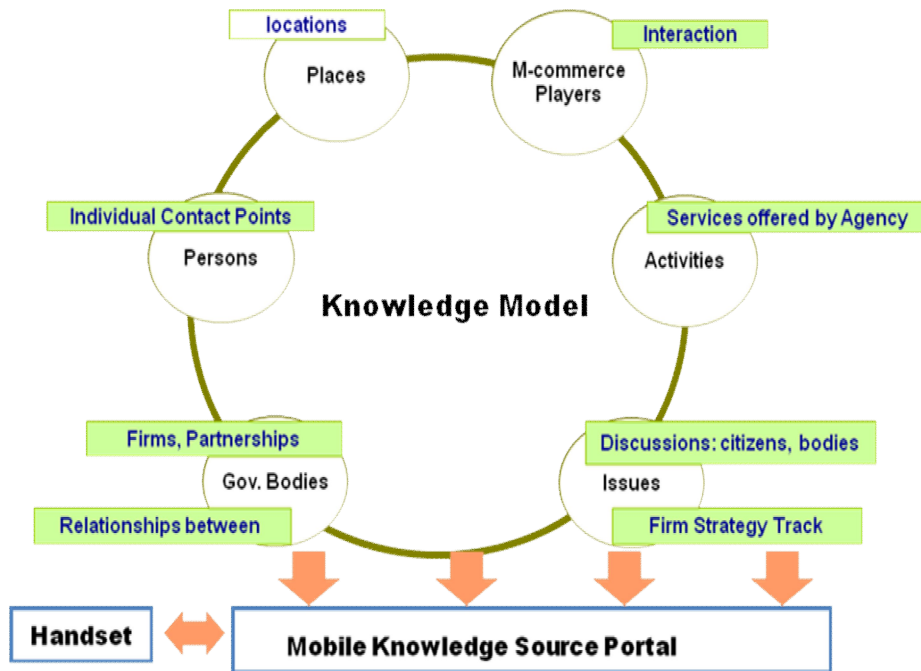
The objective of these actions is to make government. The knowledge required is concerned with the services available through mobile. By automating security and efficiency of the transactions, specific procedures and processes, government can Efficiency is achieved by smoothly interfacing achieve to stem corruption and increase citizen's trust in the system to mobiles. These actions increase productivity of important.

5 **The Proposed Knowledge Model**

Being able to clearly identify the set of involved actors, their objectives and the way they depend on each other in order to achieve such goals, most likely by exploiting possible synergies or trying to avoid potential conflicts, is of vital importance to achieve a clear and comprehend organizational setting into which a KM system has to be introduced.

Due to the high complexity in m-government applications, the modeling of knowledge is a very difficult task that should be combined with traditional business process management actions. The proposed knowledge model of ours is presented in Figure 2.

Figure 2 Proposed Knowledge Model



Our model identifies six main classes:

Places are entities with a geographical location, either areas or premises (e.g. office buildings, schools, hospitals, and so on). Slots are used to describe the geographical relationship between locations *Government Bodies* are the various public organizations and businesses that have a role in the city. This class also includes the various partnerships among these individual agencies. Slots are used to describe the hierarchy of agency structures and the relationships to areas served and premises occupied. *M-commerce players* are the different players in the mobile-commerce value web which help in the smooth interaction and coordination among other classes. *Activities* describe either the provision of a service by an agency or the contribution of an agency to a partnership. Slots are used to establish these relationships to agencies. *Issues* are broad topics that may be raised in discussion and consultation with citizens and other bodies. These may not relate in a simple way to the structures or services of organizations. Slots are used to identify the links among issues, services, and organizations. *Persons* are individual contact points. Slots are used to relate them to the activities for which they are the appropriate contact.

The advantage of m-government over e-government is that they have more advanced mobile penetration and mobile infrastructure than internet use. However, the accessibility doesn't mean actual use of services. Citizens can mistrust m-government services and transactions until their privacy and security issues are ensured to certain extent. To implement this model, various knowledge management tools can be used; the integration of this model with business process models will support the overall management view with consistent analysis. But, before implementing this model, the acceptance by citizens is almost a prerequisite.

6 Conclusion

The paper discusses regarding

- Importance of M-government as a complement to e-government.
- The different forms of government, their challenges and respective solutions using latest technologies and Knowledge Management.
- To make M-government an everyday reality, an integrated approach of all the actors using

knowledge management is discussed.

KM is the mental, behavioral and cultural shift from the old aged 'Knowledge is power' to the new mindset of 'Knowledge-sharing is power'. Perhaps more than any other type of organization, governments are facing challenges of scale and scope for which knowledge management provides effective solution.

KM initiative in a public organization is a long-term activity. KM is not a quick, overnight fix to roll out knowledge to further the goals of a government department.

The biggest challenge ahead is devising wise choices to ensure effective application. When senior executives and managers in organizations, large and small, see results in KM applications, the subject itself will gain wide acceptance. Essentially, in this time of change within governments, with the implementation of e-government and m-government programs and moves towards engaging the citizen in online consultations, KM experts have opportunities to become agents of significant change by demonstrating their abilities to capture and apply knowledge effectively in workable and useable ways.

Lastly, we should stress once more that m-Government really offers the possibility of bringing government closer to citizens, making it more convenient and more cost effective. Knowledge management is a promising way to enlarge the scope of m-government and improve the modernization and re-organization of governmental work.

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