

Effectiveness of transformation from e-Governance to m-Governance of a HEI on its communication services to the stakeholders

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Abstract: As technology has made an unprecedented change in world economy and professional preparation, India is rapidly advancing in the technological space. With the growing population and increasing Smartphone penetration, it is going mobile and digital. Smartphone and internet is not just for the rich and wealthy but more users are becoming informed by getting access of mobile internet. e-Governance is trying its level best to provide e-government services to citizens. But still there is need to reach these services to individual at their doorstep. So the looking at the current mobile age there is need for transforming e-governance services to m-Governance, which promises to bring the “anywhere-anytime-anybody” e-government service vision one step closer. It is in this way that this research intends to address variables that would facilitate the migration to m-governance model in a Higher Education Institution experiencing a very high growth and adoption of mobile communication technology. By conducting an exhaustive literature review and brainstorming sessions with experts, 15 enablers were identified that would positively affect m-governance initiatives of the institution. On the basis of the aspects of communication services to be extended to affiliating institutions, a mobile app was created in which affiliated institutions could avail the services. The app was created and made accessed by 20 academic cum administrators for their communication services from the University and they were made to respond to the 15 enablers. The findings revealed that the administrators were for transformation from e-governance to m-governance. This research would help the University to focus on key elements and develop suitable strategies expediting the adoption and development of m-governance framework with suitable architecture.

Keywords: e-Governance; m-Governance, enabler and communication service.

I. Introduction

M-Governance solution in the field of educational sector has changed the total policy of administration, which is designed to make the system easy accessible, time saving and economic. It is an integrated solution in the education sector that facilitates the processing and maintenance of large volumes of information such as: student's registration, admission, personal information, fees, classes, time table, transport, attendance, library, examinations, performance, grades, hostels, security, reports, management, expenses, staff details, salary etc. among various departments in an institution. m-government is a better option compared to e-Government in delivering services and public information to citizens due to its nature of being available anywhere, anytime and from any internet enabled device. Mobile Government addresses the mobility of Government itself. M-Government is not meant to be a replacement for e-government but a complement to e-government. M-Governance can be defined as a strategy for the implementation of Governance and its implementation involves the utilization of all kinds of wireless and mobile technologies, services, applications, and devices.

Mobile government (m-government) can be understood as “a subset of e-government that stands for the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms” (Amailef and Lu, 2011). The characteristic feature of m-government is the flexibility of time and location in the provision of government services to citizens (Liu et al., 2014). M-government should be considered as complementing the existing e-government models and should not be viewed as an alternative to e-government. Broadly, m-government can be regarded as the development of policies and managing the operational aspects of the processes that facilitate access to government information and provision of services using a mobile device (Ishmatova and Obi, 2009). Fast developments in mobile technology are changing the digital government landscape in emerging economies as observed in a study by the United Nations. Online government services are seen as the model that improves the interaction and communication between governments and multiple stakeholders facilitated by web-enabled computer technologies. Countries around the world are now adopting strategies that demand implementation of

technologies that would result in better efficiency, improved transparency, higher service quality, and more engaged citizen participation (Sandoval-Almazan and Gil-Garcia, 2012). Improved features, faster devices, and accessibility of new generation mobile devices directly support development needs and provide a service delivery channel to even the most disadvantaged groups in the society resulting in the fast pace of growth of m-government. Any affiliating university shall have its affiliated institutions and it has to be at educational services of its affiliated institutions such as admission, affiliation, curriculum development, Examinations, result etc. In fact all the universities have their e-governance to their possible way. As the penetration stands at cent percent in the era of mobile revolution, the stakeholders of any university are likely to leverage mobile governance in which they can avail the communication services from the university at ease anytime and anywhere. As almost all the Principals of affiliated institutions of a university possess atleast an android mobile phone to keep them connected with the services of the university. Thus m-governance has the potential to meet the needs of the stakeholders of the university through mobile applications. Hence a successful mobile governance framework is the need of the hour to facilitate the stakeholders of higher education institutions to avail the services without any hurdles when they are in mobility at any time. This paper attempts to determine the effectiveness of m-governance from e-governance on communication services by developing a mobile framework.

II. Insights Gained From Literature Review

The following enablers of M-Governance have been identified with the research supports as review of literature and studies:

1. Perceived ease of use

Perceived ease of use (PEU) is one of the important components in TAM and influences the users' intention to use the technology. In the context of this study, PEU is defined as the extent to which users believe that m-Government services are easy to use and effortless. The complexity of use of technology has an impact on user's attitude towards using mobile governance services. From another side, when m-Governance services are easy to use, then users will be aware of the benefits of using them; so, users time and effort will be saved, which usually affect their attitude towards the service provided.

2. Perceived usefulness

Theory of reasoned action (TRA) suggests that a person's attitude and subjective norms guide the intention to perform a particular behaviour. Further, using technology acceptance model (TAM) it can be argued that the individual's attitude and intention towards m-government services are influenced mainly by perceived usefulness and perceived ease of use. Smartphones available today are ranked much better on perceived usefulness and perceived ease of use as compared to desktop systems, resulting in more positive attitude towards m-government services.

3. Perceived Access

The Perceived access is operated as how fast the users access the educational information of the institution through mobile phones. Through mobile phones, a government is able to deliver information to users regardless of distance, time, place, and adverse natural conditions (Goncalves et al., 2014; Ntaliani et al., 2008). Mobile phones can offer real-time and fast access to certified information (Ntaliani et al., 2008).

4. Interpersonal Influence

Previous research indicates that interpersonal influence is a major factor that affects service communication. Thus, it is expected that a positive attitude towards m-governance services could be developed through more external and interpersonal mobile communication, external influence, and interpersonal influence.

5. Perceived Trustworthiness

User trust is defined as a factor that determines the behavioral intention of users in environments containing some degree of transactional risk such as in e-Commerce (Gefen, D, 2003).

6. Perceived mobility

Mobility is the ability of the device to easily manage access to the relevant information and communication followed by pertinent transactions without the constraints of place or time. Mobility facilitates collaboration and interaction among citizens. Research by Hung, Chang and Kuo (2013), and Li and He (2015) indicates that citizens' migration to mobile models is facilitated by mobile communication efficiency and quality, which in turn improves positive perception of users.

7. Transparency of Governance

Transparency implies that citizens have access to data and documents that are related to actions and decisions taken by a university. Further, mobile technology with the convenience of flexibility of time and location provides more opportunities for citizens to be a part of online discussions that relate to the transparency and accountability of the institution and have a chance to receive more customised services (Hung, Chang and Kuo, 2013).

8. Compatibility

The level of consistency between the use of innovation and users' value system, beliefs, and experiences is correlated with perceived compatibility. The challenge is to manage technological incompatibility that may be due to an old and heterogeneous system and may lead to an increase in complexity (Eom and Kim, 2014).

9. Flexibility

Flexibility provides multiple access, greater adaptability and real time monitoring system in which enterprises can get a real gain in flexibility, number of options and easiness of contact with the administration.

10. Perceived security

Security concerns form a serious problem pertaining to public applications (Eom and Kim 2014). Moreover, extending application to mobile devices adds to these concerns and thus mobile applications should address the issue of security effectively to improve the users' confidence (Cao et al., 2015). Perceived security reflects users' recognition of reliability and privacy of m-governance situation, and acts as an important element for users to trust their service providers and systems, thus conducting the behaviour of continuance use.

11. Perceived Enjoyment

Perceived Enjoyment, which is 'the extent to which the activity of using a certain technology is perceived as being enjoyable in its own right, apart from any performance consequences that may be anticipated' (Davis, Bagozzi & Warshaw, 1992, p.435).

12. Network Provider service

Users may get frustrated with an e-service, if the interface of the service is poorly designed and difficult to comprehend. It entails a sense of fun and satisfaction, improved user engagement, and subsequent performance quality. There exists a positive correlation between the quality of network work provider service and the information acceptance and intention of return to the website by the users (Jensen et al., 2014).

13. Completeness of service

One important measure of online government services is the completeness of services which implies that a service can be performed entirely online (Sandoval-Almazan and Gil-Garcia, 2012). Relative advantage has a substantial influence on citizens' intention to use e-services provided by Higher Education Institutions.

14. Location Influence Service

The popularization of smartphones has led to greater use of various location-based services (LBS). In earlier mobile phones with fewer functions, also known as feature phones, LBS were confined to simple location-tracking services.

15. Emergency management

In recent decades, the frequency and impact of catastrophic disasters have dramatically increased. Although it is impossible to eliminate such events, higher education institutions can reduce their impact through early warning systems where social media plays an important role. Thus, in disaster situations, timely information with a well-defined plan is crucial for both disaster-response agencies and affected communities to develop a suitable response strategy (Chatfield, Scholl and Brajawidagda, 2013).

III. Structural Self-Interaction Matrix (Ssim)

As per the reviews, the contextual relationship for each m-governance enabler, the existence of a relationship between any two enablers and associated directions of the relation is questioned (Talib and Faisal, 2016). In this context, a pair wise contextual relationship was developed for all the 15 m-governance enablers as depicted in table-1, and the majority (more than 90 %) of the experts agreed to a specific relationship between any two enablers.

The summary of the questionnaire survey is depicted in table 1 wherein the 10 experts in the field of computer science and M-Governance were asked to answer a total of 50 questions , besides requesting them to respond the number of pairwise comparison which can be determined by $[p \times (p-1)/2]$, where p is the number of enablers. Four symbols used to represent the relationship direction among the enablers (i, j):

- v → enabler i may help achieve enabler j
- a → enabler j may help achieve enabler i
- x → enablers i& j help each other
- o → enablers i& j may be unrelated

Table 1: Structural Self-Interaction Matrix (SSIM)

Enabler No	Enablers Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
E1	Perceived ease of use	x	x	x	o	v	v	o	o	v	o	v	v	v	v	v
E2	Perceived Usefulness	x	x	x	o	v	v	o	o	v	o	v	v	v	v	v
E3	Perceived Access	x	x	x	v	v	v	o	v	v	v	v	v	v	v	v
E4	Perceived Trustworthiness	o	a	o	x	a	o	o	o	v	o	v	o	o	o	o
E5	Interpersonal Influence	o	o	o	a	x	o	o	o	v	o	v	o	o	o	o
E6	Perceived Mobility	a	a	a	a	a	x	o	v	v	v	v	o	o	v	v
E7	Transparency of governance	o	o	o	a	a	o	x	o	o	o	v	o	o	o	o
E8	Compatibility	a	a	a	a	a	a	a	x	v	v	v	v	v	o	v
E9	Flexibility	a	a	a	a	a	o	o	a	x	o	v	v	v	o	v
E10	Perceived Security	o	o	o	o	o	a	o	o	o	x	v	o	o	o	o
E11	Perceived Enjoyment	a	a	a	a	a	o	o	o	o	o	x	o	v	o	o
E12	Network Provider Service	a	a	a	a	a	a	o	a	a	o	a	x	v	v	v
E13	Completeness of Service	o	o	o	a	a	o	o	o	o	o	a	o	x	o	o
E14	Location Influence in the service	o	o	o	o	o	a	a	o	o	o	a	o	a	x	v
E15	Emergency Management	o	o	o	a	a	o	a	o	o	o	o	o	o	o	x

IV. Research Design Of The Study

The primary focus area of research is to help HEI to utilize mobile enabled services to improve delivery of their services and information to the stakeholders and affiliated institutions by introducing m-governance. High profiled institutions have already moved towards m-governance adoption over the last decade, while other HEI^s show a keen interest in the adoption of m-governance. The purpose of the study is:

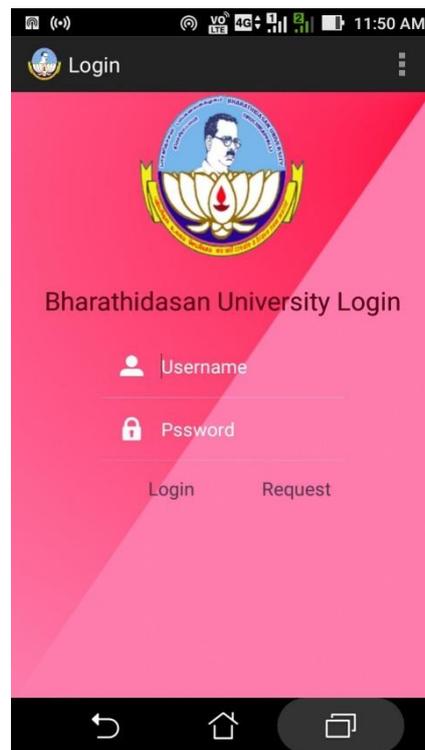
- to identify enablers of m-governance through extant literature review and opinions of experts.
- to determine contextual relationship between enablers for improved mobile services.
- to determine the effectiveness of m-governance of a university on communication services of its affiliated services.

The Interpretive Structural Modelling (ISM) is adopted to fulfill some of the objectives mentioned above and to develop the structural and interpretative model based on the secondary data. In addition, a mobile app has been created to enhance the communication services offered by the university to its affiliated institutions pertinent to Admission, Affiliation, Curriculum, Examinations, Result and General enquiry with the following description:

- » Front End
 - > Eclipse IDE
 - > XML Handler
 - > MySQL UI
- » Back-End
 - > Apache http
 - > IIS
 - > SQLite
- » Server Side
 - > PHP
 - > MySQL
- » Client Side
 - > SQLite
 - > JSON

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On the basis of the aspects of communication services to be extended to affiliating institutions, the mobile app was created in which affiliated institutions could avail the services on the aspects mentioned for whom user id and password could be created.



The screen shot of the app is as follows:



V, Interpretive Structural Modelling

ISM is an advanced planning used to identify and summarize various relationships among variables, which define a problem or issue. It also develops the ways through which researchers can expose an order and formulate models with the help of the factors of a system by introducing the complexity of relationships among them (Talib and Faizal,2016).The method is imperative in the sense that the researchers and experts decide whether and how factors are related. It is ‘structural’ as based on proposed relationships and over all structure is extracted from a complex set of features, and is a modeling technique as the specific relationship.

Steps of ISM

Questionnaire Development

The survey questionnaire was developed after the concept of e-governance framework, objectives and the purpose of research study was explained to 10 experts cum academics in the field of m-governance. The study considered 15 m-governance enablers from the available literature review and from discussion with the experts. All the experts were approached in this regard personally. Based on their opinion, the items of the questionnaire was modified by rephrasing or rewording, deleting and adding the terms. The Questionnaire consists of 50 items touching upon all the 15 enablers with the semantic rating type of scale from 1 to 10 (Poor to Excellent). Hence the content and technical validity have been established for the survey questionnaire.

Data Collection

The ISM approach utilizes the experts’ opinions based on support of different management techniques such as brain storming, nominal techniques, etc. in obtaining the contextual relationship among the factors. After questionnaire development, the 10 experts in the field of computer science with m-governance were approached in person for obtaining their responses. The experts after thoroughly studying the mobile the app responded the items of the survey questionnaire touching upon 15 enablers. Also the app was made available to 20 academic cum administrators of the affiliated institutions of Bharathidasn University for their communication services in admission, affiliation, curriculum, examinations, results and general enquiry. They were made use of the app for a week time and then the survey instrument was administered to them for data collection.

V. Result And Discussion

Having obtained data for the survey instruments from the 10 experts in Computer science and M-Governance and 20 academic cum administrators of the affiliated institutions, the significant difference in their opinions about the M-governance using the mobile app towards communication services from the University was calculated using ‘t’ test for all the factors of TAM such as Perceived ease of use, Perceived Usefulness, Attitude towards using M-Gov, Intention to use M-Gov and User’s satisfaction which reflect upon the 15 identified enablers of the M-Governance. Hence the effectiveness of M-Governance in enhancing the communication services of the users was found out through the significance.

Table2: Significant difference between the responses of Experts in M-Gov and Academics on M-Gov adoption for communication services from the University using the mobile app

Factors of TAM	Experts in M-Gov.			Academic cum Administrator			‘t’ value	Sig.
	N	Mean	Std. Dev.	N	Mean	Std. Dev.		
Perceived ease of use	10	26.0000	1.05409	20	25.4500	1.57196	0.996	0.328
Perceived Usefulness	10	38.0000	1.24722	20	41.6000	2.11262	4.948	0.000
Attitude towards using M-Gov.	10	52.0000	1.72345	20	51.9567	1.67453	0.767	0.248
Intention to use M-Gov	10	48.6500	1.20785	20	50.2500	2.22162	0.879	0.308
User’s satisfaction	10	44.2502	1.10352	20	45.0000	1.82162	1.002	0.456

It can be seen from the table that responses of the Experts and Academic cum administrators on M-Governance adoption for communication services in the university with regard to admission, affiliation, curriculum, examination, result and general enquiry do not differ significantly in the components of TAM(Technology Assisted Model) except the factor “Perceived usefulness”. In fact the components of TAM are linked with the 15 enablers of M-Gov. It is inferred that the Mobile governance has its impact on the users for enhancing their communication services from the varsity. It is imperative to have noted that there exists a significant difference in the factor perceived usefulness as only the users had got to use the app for accomplishing tasks pertinent to admission, affiliation, curriculum, examination, result and general enquiry from the university. However the findings will open up possibilities to develop a feedback and evaluation mechanism for further development of the M-governance so as to make it more dynamic for the users.

VI. Recommendations: A Model Generation

Based on the findings of the study, a model has been developed to evolve feedback mechanism to improve the communication services availed by the users which has been detailed in the figure 1:

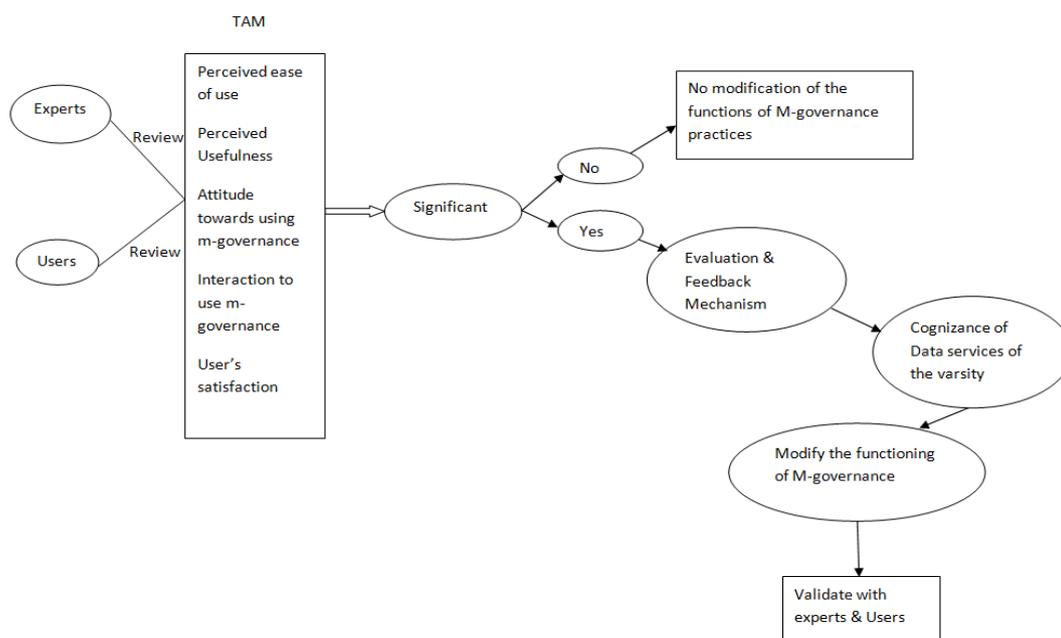


Figure 1: Feedback model on M-Governance

VII. Conclusion

The mobile arena is no exception. A framework may be built out of higher education collaborative efforts to address the overall mobility needs of a university. The products are mainly open-source efforts and emphasize integration into current campus systems. Their installations must typically include common university mobile tools like maps, directories, news, calendars, and courses but can often be extended to support standard data feeds. The advantage to this approach is that you can leapfrog the design and development of many of the common functionality by simply plugging standard data feeds into an existing infrastructure. An effective framework takes advantage of a university's strengths—through variables such as in-house development expertise, data infrastructures, and finances—and leverages them to form a sensible mobile framework. Hence the modest efforts taken in the study may pave the way for the university to establish architectures to have a paradigm shift from e-governance to m-governance for facilitating its stakeholders for effective and efficient anywhere and anytime services.

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