Predict the Potential Users of E-government Using Communication Capabilities Model (CCM)

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Abstract: Government should know what can be done to activate sufficient number of citizens to participate in and use e-government. The main aim of this work is to develop an approach using communication capabilities models (CCM) to measure the three components - access, competence, and motivation in the context of e-government - and predict the level of interest in e-government among the internet users. The main idea of this work is to develop an approach to discover the communication based variables that prevent the adoption of e-government and improve these variables to raise the level of adoption. This can be done by using CCM to categorize and put the users under different sectors based on the variables under each sector. The approach can help discover which variables are missing. Thus, to better understand potential demand for e-government, this work will try to show the need for evidence-based information on access, competence and motivation and their effect on the adoption of e-government.

Keywords: e-government, online services, skill, communication capabilities models, adoption

I. INTRODUCTION

E-government is considered as a new technological solution to enhance the level of communication between government and citizens and it gives an equal opportunity for citizens to interact with government. Therefore, the government should realize that the community have different abilities, interests and needs. They should know what can be done to activate sufficient number of citizens to participate in or use e-government. Building e-government tool required tremendous efforts and involved the citizens in all development stages. The development of tools without knowing the citizens' needs is a futile task 4. To build any citizens-oriented model, it is important to have deep understanding of the target audience. Thus, to make e-government successful, decision makers should understand the citizens' abilities, interests and needs for better citizen's involvement in e-government.

Whatever people's opinions on the ideals and ideology of information technology, the developing of these aspects into a new, well-functioning part of the societal system will require that a large number of the members of society possess the necessary communication skills 8. Haan 1 stated that several authors have pointed out that for information and communication technology (ICT), to be used effectively three components should be considered: access (possession), competence (digital skills) and motivation 27563. By taking these components into consideration during the designing of e-government, decision makers should find an approaches and tools to measure and evaluate these components.

The main aim of this work is to develop an approach that has been inspired by the ideas of Vihera 7 and Dijk 2 communication models to measure the three components - Access, Competence and Motivation - in the context of e-government and predict the level of interest in e-government among the internet users. In order to apply the notion of

communication capabilities to usage of online government services, it is important to understand what access, competence and motivation mean in the context of e-government.

Keskinen 4 and Haan 1 defined these three components as:

Access refers to the possession of physical access as having a personal computer or other device and a network connection at home, at school or at work. Citizens must have access to information and communications means. They also should have the time to access.

Competence: Because of the growing amount of information on the Internet and people's increasing dependence on information, the importance of digital skills or information competence has also increased 6. Citizens must possess the adequate know-how to use ICT and awareness to participate in the public affairs.

Motivation refers to attitudes towards ICT: the interest in it, the will to use it and the lack of fear of new technology. Without motivation citizens will not participate in the common affairs. To be motivated citizens must feel that this new tool will help them to save time, money and effort. Moreover, citizens must feel reassured about security and privacy. They should also be able to feel that they have been part of the social community by preparing and agreeing with the decisions. Fig. *1*, shows Vihera 7 and Dijk 2 communication models. The circles in the figure below describe the sum of all persons having certain characteristics 9.
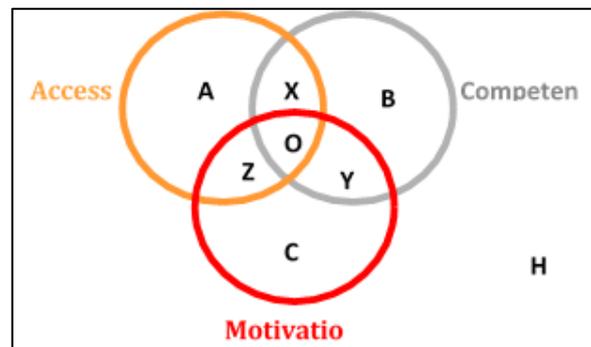

Fig. 1 Elements of communication capability model

The developing of people's communication abilities thus occupies an important position in shaping the information society 8. Therefore, the other objectives of this work are to shed more light on types of users and their specific characteristics, requirements and preferences and to clarify the interrelationship between access, motivation and competency (skill). The reasons why it is important to know the various aspects of communication components are to understand the citizens' capabilities and to establish the policy required for different social groups.

Moreover, it is possible to control any component by enhancing the variables to activate more citizens to become e-government users and reach the goal. Fig. *2* visualizes how the enhancement can be reflected to empower all the citizen towards using e-government. The enhancement will be done by recognizing the variables that prevent the citizen from using e-government.
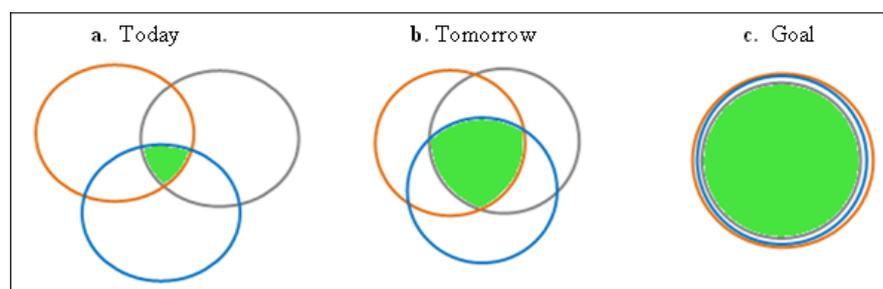

Fig. 2 Enhancement of the elements of communication capability

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II. METHODOLOGY

The first step of this work is started by selecting the relevant variables related to internet users and considered important for e-government adoption. Moreover, these variables should concord with the components of communication model. The data and variables were selected from the proposed dimensions of user profile of the potential users of e-government in our previous work 11. The selection was done based on experts' opinions and literature review. The selected variables under the same component are correlated to each other. Based on set theory, a Venn diagram was drawn to visualize the solution. Let's call the sets as Access, Competency, and Motivation. Under each set there is one variable. For access component, "availability of internet connection (ACC1)" was selected. The reasons to select these variable are that the communication with e-government cannot be done if there is no physical connection to internet. Under competence component, the variable "ability (COM1)" was selected. To properly use online public services, citizens still need to have considerable computer and Internet skills. Endowment with these skills is highly correlated with usage experience, which means that skills are obtained mainly by doing rather than by upfront methods of learning 10. Under motivation component, "expectation of e-government to save time, effort and money (MOT1)" was selected. Motivation can be understood as expectation of getting benefits out of using government online services. The sign *"+" was used to mean that the variable is present (available)* and the sign "-" *means the variable is not present (not available).*

Access (ACC1), Competency (COM1), and Motivation (MOT1). The number of combinations that can be formed using 3 variables = 2^3 = 8 combinations. Four levels (L0, L1, L2 and L3) were proposed to represent the sectors based on the number of variables. Let us see how to find people based on number and type of variable they have

Level 0: Number of people in *outside* the sets (they don't have any variable in any set): **H.**

Level 1: Number of people in *exactly* one set (they have only one variable in one set): (**A, B,** and **C**).

Level 2: Number of people in *exactly* two of the sets (they have two variables in two different sets): (**X, Y,** and **Z**).

Level 3: Number of people in *exactly* three of the sets (they have all the variables in all the sets): **O.Error! Reference source not found.** shows exactly one combination belonging to each sector and the results of implementing this approach using one variable under each component.

Table I the Possible Combinations under Each Sector

Sector	Variables		
H	- MOT1	- ACC1	- COM1
A	- MOT1	+ ACC1	- COM1
C	+ MOT1	- ACC1	- COM1
Z	+ MOT1	+ ACC1	- COM1
B	- MOT1	- ACC1	+ COM1
X	- MOT1	+ ACC1	+ COM1
Y	+ MOT1	- ACC1	+ COM1
O	+ MOT1	+ ACC1	+ COM1

III. RESULTS

The results of distributing the results in each sector based on selected variables of each component is shown in Table II. The results will be calculated based on each one variable in each component.

Table II Distribution of Results in Each Sector Based On the Variables of Each Group

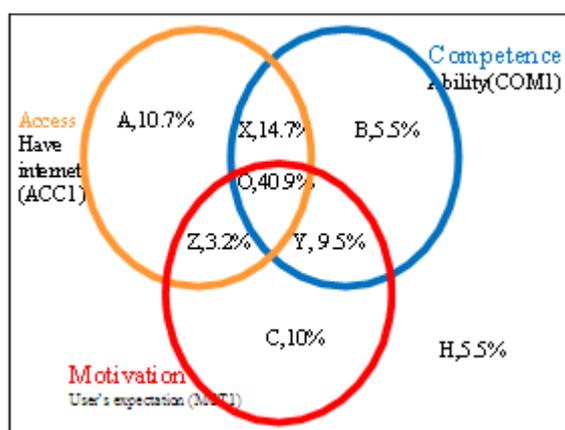| Sector	Group
A	10.7%
B	5.5%
C	10.0%
H	5.5%
O	40.9%
X	14.7%
Y	9.5%
Z	3.2%
Total	100.0%

Fig. 3 Distribution of the elements of communication capability

The distributions of the elements of communication capability based on selected variables are shown in Fig. *3*. It shows the extent of respondents to be potential users of e-government in case of only one variables in each component. It is easy to distinguish between potential users and non-potential users of e-government. The circles in the Fig. *3* shall describe here the sum of all persons having certain characteristics. Based on the levels the distribution can be presented as follow:

Level 0: Number of people in *outside* the sets (they don't have any variable in any set): **H = 5.5%**

Level 1: Number of people in *exactly* one set (they have only one variable in one set): (**A, B,** and **C**) = **26.2%**

Level 2: Number of people in *exactly* two of the sets (they have two variables in two different sets): (**X, Y,** and **Z**) = **27.4%**

Level 3: Number of people in *exactly* three of the sets (they have all the variables in all the sets): **O = 40.9%**

The systematic patterns in these variations

To recognize the missing variables we can use table to illustrate the patterns of citizens according to online communication capabilities. This method helps in addressing the missing variables and make the right strategy to improve this variables.

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TABLE III Patterns of citizens according to online communication capabilities

Type	Group 1	Description
O	40.8%	Potential users of online e-government services
X	14.7%	Lack of motivation (user's expectation to save time and money) but access (have internet connection), and competence (skill) are available. This group needs to enhance the motivation among citizens to use e-government.
Y	9.5%	Only access is missing. The bottleneck here is infrastructural equipment, which may need to be provided by government as in the case of free public Internet access points.
Z	3.2%	Access and motivation are available, but lack of skill. Traditional target for training measures, high probability of success of such measures. This group needs training to use ICT.
A	10.7%	Only access is available. Severe barriers exist before E-government online services will be used. This group needs more effort to enhance the skill and motivation among citizens to use e-government.
B	5.5%	Only competence given, most likely from basic education. Motivation and access are required.
C	10.0%	Only motivation exists. Applies for parts of the poor population who show a strong commitment to society, but lack the means to gain competence and access to the Net.
H	5.5%	None of the three conditions exist. Likely to apply to significant parts of low qualified, low-income population, including poorly integrated communities.

IV. DISCUSSION

The proposed approach measures the three components - access, competence, and motivation - in the context of e-government and to predict the level of interest in e-government among the internet users. To discover the variables that prevent the adoption of e-government and improve the level of adoption.

This approach introduces two methods to present the results to decision makers. First method used Venn diagram. It helps in reporting the data to the higher authority who care about abstract conclusion and not the details. Method 2 is presenting the data in variables level. It addresses each component separately and recognizes the missing variables. It is lengthy but more accurate with reference to presenting the data in variables level. Based on the requirements of presenting the data, one or two methods of the previous method can be used to present the results to decision makers.

V. CONCLUSION

This work showed how some factors can affect the communication between the citizens and e-government. The proposed approach can help the decision makers to discover the factors that negatively affect the communication process and put the proper strategy to enhance these factors. The proposed approach introduced different methods to improve the accuracy of presenting the results and make it easy to understand for the decision makers.

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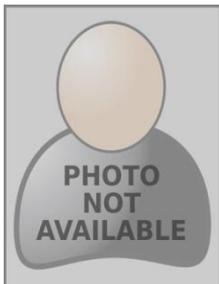
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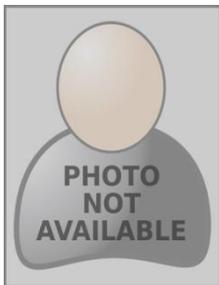
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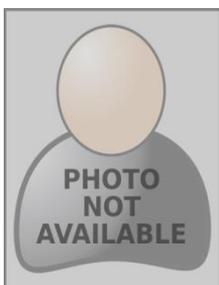
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