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## THE EFFECTIVE USE OF CROWDSOURCING IN E-GOVERNANCE

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### ABSTRACT

The rise of Web 2.0 paradigm has empowered the Internet users to share information and generate content on social networking and media sharing platforms such as wikis and blogs. The trend of harnessing the wisdom of public using Web 2.0 distributed networks through open calls is termed as 'Crowdsourcing'. In addition to businesses, this powerful idea of using collective intelligence or the 'wisdom of crowd' applies to different situations, such as in governments and non-profit organizations which have started utilizing crowdsourcing as an essential problem-solving tool. In addition, the widespread and easy access to technologies such as the Internet, mobile phones and other communication devices has resulted in an exponential growth in the use of crowdsourcing for government policy advocacy, e-democracy and e-governance during the past decade. However, utilizing collective intelligence and efforts of public to find solutions to real life problems using web 2.0 tools does come with its share of associated challenges and limitations. This paper aims at identifying and examining the value-adding strategies which contribute to the success of crowdsourcing in e-governance. The qualitative case study analysis and emphatic design methodology are employed to evaluate the effectiveness of the identified strategic and functional components, by analyzing the characteristics of some of the notable cases of crowdsourcing in e-governance and the findings are tabulated and discussed. The paper concludes with the limitations and the implications for future research.

**Keywords:** Crowdsourcing, E-Governance, Strategic and Functional Components.

### INTRODUCTION

The rise of Web 2.0 paradigm has empowered the Internet users to share information and generate content on social networking and media sharing platforms such as wikis and blogs. Web 2.0, as broadly defined by Weinberg and Pehlivan (2011), consists of computer network-based platforms on top of which social media tools and applications operate. Thus the capabilities of web 2.0 such as increased pervasiveness and empowered users are playing a major role in shaping up the new business scenario wherein businesses are typically built based on the wisdom harnessed from the crowd through open calls. This trend of harnessing the wisdom of public using Web 2.0 distributed networks through open calls was observed and which in turn led to the coining of the new term 'Crowdsourcing'.

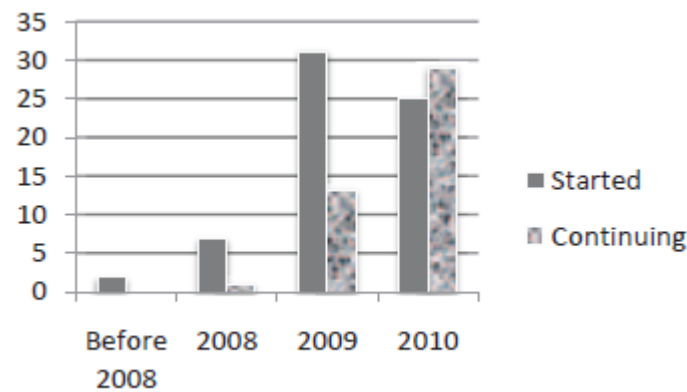
By simple definition, 'Crowdsourcing' represents "the act of a company or institution taking a function, once performed by employees, and outsourcing it to an undefined (and generally large) network of people in the form of an open call" (Howe, 2006). This can take up the form of peer-production in which the job is performed collaboratively or it can be undertaken by sole individuals. However, the most important requirement is to make use of the open call format and ensuring the existence of a large network of potential laborers (Howe, 2006). Thus, by outsourcing tasks, which were generally done by a limited group of people such as an organization's employees or specialists, to the general public, the collective wisdom and efforts of the crowd can be utilized.

Though the term 'Crowdsourcing' was recently coined by Jeff Howe in the 2006 issue of Wired magazine, the concept is relatively old and has been in practice since the 1990s (Roth 2009). The power of crowd has been effectively utilized in the past to find creative and intuitive solutions for complicated problems. One such early example of crowdsourcing is the 'Longitude Prize'; in which the British Government of 1714 announced a reward of £20,000 to the general public to come up with a solution to an issue related to navigation, known as the 'Longitude Problem'.

According to the Economist Intelligence Unit (Economist, 2007), Web 2.0 was observed to have had significantly impacted a wide range of businesses and was predicted that Web 2.0 would be progressing further into the mainstream. In addition to businesses, this powerful idea of using collective intelligence or the 'wisdom of crowd' applies to different situations, such as in governments and non-profit organizations which have started utilizing crowdsourcing as an essential problem-solving tool (Brabham, 2009). As rightly pointed out by him, "The crowdsourcing model which is a successful, web-based, distributed problem solving and production model for business, is an appropriate model for enabling the citizen participation process in public planning projects" (Brabham, 2009).

Nowadays, crowdsourcing is being widely used for creating and enhancing collective knowledge and innovation, community building, civic engagement and crowd funding (Esposti, 2011). In addition, the widespread and easy access to technologies such as the Internet, mobile phones and other communication devices has resulted in an exponential growth in the use of crowdsourcing for government policy advocacy, e-democracy and e-governance during the past decade (Shirky, 2008).

In recent years, there has been an increase in the number of crowdsourcing initiatives in the e-governance sector as governments are also embracing and welcoming the idea of public participation and collaboration in governance. This is achieved with the help of tools such as social media networking platforms, blogs and discussion boards. For instance, Figure 1 shows the number of e-government initiatives undertaken by the US government till 2010 (Warner, 2011).



**Figure 1: Number of US E-Government Crowdsourcing Initiatives**

Source: Next Steps in E-Government Crowdsourcing by Warner (2011).

Although utilizing collective intelligence and efforts of public to find solutions to real life problems using web 2.0 tools is an emerging trend, it does come with its share of associated challenges and limitations. There are many crowdsourcing examples that failed to deliver accurate, reliable and good quality results. One such example is Wikipedia. The use of crowdsourcing in e-governance might also bring in new problems and challenges which may question its effectiveness and practicality. This paper aims at identifying and examining the value-adding strategies which are specific to the concept of crowdsourcing in e-governance.

The key objectives of this paper are as follows:

1. To understand the opportunities and the impact of crowdsourcing in e-governance.
2. To identify and analyze the factors, both at the strategic and functional levels, which contribute to the success of crowdsourcing technique in e-governance.
3. To evaluate the effectiveness of the identified strategic and functional components by analyzing the characteristics of some of the notable cases of crowdsourcing in e-governance.

The rest of the paper is organized as follows. Section 2 contains the literature review on the crowdsourcing concept including its essential components and opportunities, followed by which a theoretical framework 'Crowdsourcing in E-Governance – Critical Factors Model' is established which contains both the strategic and the functional web 2.0 components that had been identified. Section 3 proposes the methodology adopted in this paper for carrying out the qualitative research. Section 4 elaborates the background of the cases and analyzes them using the proposed theoretical framework. Section 5 contains the analysis report based on the emphatic design method adopted to carry out the empirical research. Section 6 includes the discussion and findings of the research. In conclusion, we provide the limitations of the study as well as implications for future research.

## LITERATURE REVIEW

The concept of drawing intelligence from the crowd has been gaining increasing scholarly attention. Crowdsourcing, which has become a major phenomenon in recent years, is proving to be instrumental in promoting collaboration and innovation in business, research and government alike. Networking platforms provide the active web users with two-way communication capabilities which assist them in generating content and in contributing creative ideas in the form of fragmented input or in the form of feedback (Levy, 1997). Schenk & Guittard (2011) points out that there are three different players in crowdsourcing:

1. Individuals who form the crowd and are responsible for generating the content.
  2. Organizations which benefit, directly or indirectly, from the crowd's wisdom.
  3. Crowd-sourcing enablers who serve as the intermediary platform, building a link between the crowd and the organizations.
- Crowdsourcing, as already mentioned, has been setting a trend in businesses and governments alike. Open-source governance has empowered the otherwise ordinary citizens with ways to be involved in government policy-making activities. Theoretically, open-source governance is found to be more influential in affecting changes than what the periodic election does ("Open-source Governance", 2013). Crowdsourcing is, therefore, increasingly being viewed as a core mechanism of the new systematic approaches to governance focussing on addressing the highly complex and dynamic challenges of poverty, armed conflict and other similar crises (Bott & Young, 2012).

However, it has to be admitted that there are cognitive limits to interactivity and unless the reasons are strong enough to directly touch the emotions of the people and thereby tap their creativity, it is quite improbable to grab their attention and make them stay involved for long enough to create an impact (Bott et al., 2012). But this is not so easily achievable as there are several issues worldwide, competing among themselves to draw people's attention, and making them focus on a specific issue and motivating them to contribute is becoming more difficult. This is where rewards play their roles and as observed in an empirical investigation conducted by Zheng et al (2011), in general, people consider recognition as a more valuable and motivating factor to participate in crowdsourcing activities rather than monetary allowances. Also, the significance of crowdsourcing will continue to grow if it is coupled with the real-life interests and requirements of the users.

Thus, in this paper, we adopt a theoretical framework to analyze a set of case studies to understand the effectiveness of crowdsourcing in e-governance and the extent to which web 2.0 components enable the successful implementation of crowdsourcing technique for governance purposes. This framework includes the strategic (i.e., objectives or goals) and functional (i.e., web 2.0 features) components mainly drawn from the “Crowd-sourcing Critical Success Factors Model” of Sharma (2010) and the “Web 2.0 – 4 Factors Model” of Wirtz, Schilke and Ullrich (2010). A critical factor is defined as one which is considered as a significant driver of a system’s success (Ngwenyama, 1991). Based on the views of Heeks & Nicholson (2004), Carmel (2003), Farrell (2006) and Balasubramanyam & Balasubramanyam (1997), Sharma (2010) had proposed a set of critical strategic factors which have the potential to create a positive impact when considered in crowdsourcing initiatives in general, out of factors such as ‘Vision and Strategy’ and ‘Infrastructure and Interoperability’ are adopted in the theoretical framework. The other critical strategic factors adopted include ‘Citizen-centric approach’ and ‘Information Management’ (Fink, 2011), Financial Capital and Reward for Participation (Bott et al., 2012). On the other hand, Wirtz et al. (2010) had proposed the four fundamental Web 2.0 factors such as social networking, interaction orientation, customization and personalization and user-added value, which are considered vital for the successful implementation of crowd-sourcing initiatives. Thus a unified framework has been derived by combining the strategic factors drawn from various research papers and the web 2.0 functional components of Wirtz et al. (2010), to investigate the combination of factors which influence the success of crowdsourcing initiatives in e-governance.

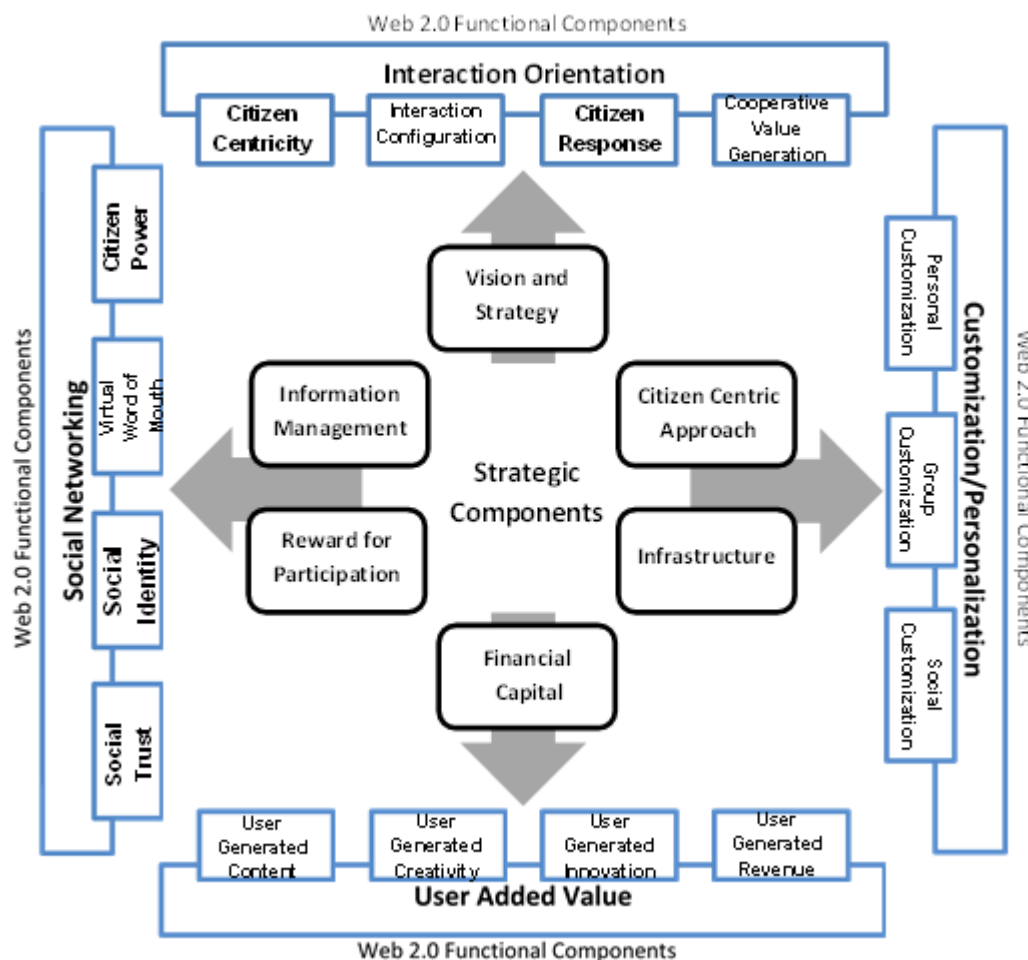


Figure 2. Crowdsourcing in E-Governance – Critical Factors Model.

Source: Adapted from Crowdsourcing Critical Success Factor Model by Sharma (2010) and the Web 2.0 – 4 Factors Model by Wirtz, Schilke & Ullrich (2010).

The specific dimensions of the strategic and functional components of the theoretical framework illustrated in fig. 2, with respect to their relevance and importance in the success of crowdsourcing initiatives in e-governance, is explained as follows:

**Vision and Strategy:** Clarity in ‘Vision’ is vital and imperative to the success of crowdsourcing initiatives (Brabham, 2009). Government organizations need to develop a coherent and well-defined set of goals and objectives so that it is perceived by the crowd as a valuable and a well-intentioned initiative. In addition, it is important for the vision and strategy adopted to be harmonious with the dynamic nature of the digital environment in order to ensure success over a longer term.

**Citizen-centric Approach:** This is viewed as a core component of e-governance. Government organizations should take a citizen’s view of what e-governance will look like and adopt technology accordingly, to enhance government – citizen interaction (Fink, 2011).

**Infrastructure and Inter-operability:** Accessibility and reliability of communication technologies and infrastructure is a necessary prerequisite for ensuring maximum crowd participation, as almost all the crowdsourcing initiatives require robust and cheap internet access for effective communication (Donner, 2009).

**Reward for Participation:** Performance expectancy refers to the degree to which a person believes that using a particular system will help him in gaining profits, in terms of recognition as well as monetary benefits (Bott, 2012). However, as observed in an empirical investigation conducted by Zheng et al (2011), in general, people consider recognition as a more valuable and motivating factor to participate in crowdsourcing activities than monetary allowances.

**Financial Capital:** This refers to the overall monetary investment required to ensure crowdsourcing success in e-governance (Bott, 2012). However, if the crowdsourcing initiative is built on existing infrastructure and telecommunication technologies, it makes the initiative less capital intensive.

**Information Management:** This refers to the way in which acquired data and information from the crowd are processed and shared among the government entities in a timely and secure manner. This again is considered as a key facilitator of crowdsourcing success.

Further, the four web 2.0 functional components proposed by Wirtz, Schilke and Ullrich (2010) is explained with respect to their significance and specificity in e-governance related crowdsourcing initiatives.

**Social Networking** represents the functionality that promotes government-to-citizen and citizen-to-citizen relationships.

This functionality further comprises of:

- **Social Trust:** refers to the level of confidence and security with which citizens can exchange data on the website. Seen as a valuable component which facilitates healthy interaction among peers or others.
- **Social Identity:** represents the online image of citizens which relates to the way in which they are projected among the other members of an online community platform.
- **Virtual Word-of-Mouth:** refers to the informal transfer of information among members of the online community by means of reviews, ratings, blogs and social sharing.
- **Citizen Power:** refers to the extent to which citizens are given the freedom to have a control over how to share and what to share thereby motivating increased citizen participation and more meaningful inputs.
- **Interaction Orientation** refers to the ability to manage and support the crowd participation to create value to the government by providing supportive interaction infrastructure capabilities. It further comprises of the following sub components:
  - **Citizen Centricity:** represents the act of placing the citizen at the heart of the governance activities and using them as the focal point of services.
  - **Interaction Configuration:** refers to how well the interaction interfaces are structured to ensure citizen centricity and citizen power.
  - **Citizen Response:** refers to the government's ability to manage the responses provided by the citizens and provide feedbacks and solutions for further improvement based on the information acquired.
  - **Cooperative Value Generation:** relates to the way in which government manages to generate value using its citizens' responses and its ability to integrate citizens into the governance-related activities.
- **The Customization / Personalization component** refers to the capability of the Web 2.0 platform to support the users' needs at the personal, group and social levels.
  - **Personal Customization:** relates to the extent to which the service platforms allow the citizens to alter the look and feel of their profile to suit their preferences, at the individual level.
  - **Group Customization:** refers to the extent to which customization at a group level is supported to facilitate the information dissemination to a specific user group thereby avoiding the information overloading from a broad user base.
  - **Social Customization:** refers to the ability of the government to provide specially customized services to different citizen groups.
- And finally, the **User-Added Value** functional component refers to the value generated by tapping the intelligence of the crowd through meaningful crowd participation. This component can be further classified as:
  - **User-generated Content:** encompasses the wide range of user input gathered from the profiles created by users which can serve as potential information resources.
  - **User-generated Creativity:** refers to the generation of new ideas by the citizens which can turn out to be a highly valuable input for the governments to adapt in their governance activities.
  - **User-generated Innovation:** It is closely in relation with the 'user-generated creativity' component and it refers to the actual step taken to involve the citizens in innovating the ways in which the government functions.
  - **User-generated Revenue:** refers to the value generated by the users which has directly or indirectly been beneficial to the government in financial terms.

## METHODOLOGY

A combination of qualitative and empirical method was used to study the effective use of crowdsourcing in e-governance. Combination of methods is necessary for improving the accuracy of results as suggested by Jick (1979). He suggests that, "according to basic geometry principles, greater accuracy can be achieved if measurements are available from multiple viewpoints; likewise the accuracy and reliability of results can also be approved for organizational researchers judgements if

different kinds of data collecting methods are applied on the same phenomenon" (Jick 1979).

As part of the qualitative study, the descriptive case study approach was adopted. According to Denzin (2005), "qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter. Qualitative research involves the studied use and collection of a variety of empirical materials—case study, personal experience, introspective, life story, interview, observational, historical, interactional, and visual texts—that describe routine and problematic moments and meanings in individuals' lives." To further improve the understanding and accuracy of the results, multiple case studies were conducted, by selecting 5 different e-governance websites based on governance model. Researcher Robert K. Yin (1984) defines the case study research method as "an empirical inquiry that investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used."

For empirical research, emphatic design approach was employed. Emphatic design is a process of collecting user's views towards a product. This design was first proposed by Leonard & Rayport (1997) as a low cost and low risk solution to identify critical needs of customers. To carry out emphatic design test a team of end users and designers observe a product and then documents these observations.

As part of the emphatic design research method, we conducted a focus group experiment in 5 sessions with 7 graduate students in each session. Students were first briefed about the objective of study and important concepts and then they were asked to evaluate one of the five websites later they were asked to fill an online questionnaire. Section 5 discusses about the methodology of focus group experiment in detail.

The concepts and theories presented in this paper are extracted from scholarly papers. There was no attempt to validate the proposed hypothesis or generalize the data gathered from the Emphatic Design method or the case study analysis method. Emphasis was given on gaining a better understanding of strategic and functional components of crowdsourcing e-governance model, providing narratives and testing hypothesis through falsification method.

## CASE DESCRIPTION AND ANALYSIS

This section provides a description of the 5 selected e-governance websites under analysis. Each of these websites is examined with the help of the proposed theoretical framework. All the 5 chosen websites have an innovative concept and are moderately successful.

### 4.1 SeeClickFix

SeeClickFix ([www.seeclickfix.com](http://www.seeclickfix.com)) is an interactive e-governance website that allows the citizens to report any neighbourhood issue, which in turn is communicated to the local government for a quick resolution. According to the SeeClickFix co-founder, Jeff Blasius, SeeClickFix is a "toolbox for social civic engagement." (Pleasants, 2010). This website which was founded in September 2008, has its base in New Haven, Connecticut and presently covers more than 25,000 towns and 8,000 neighbourhoods in United States as well as abroad. While the site is undergoing continual expansion, it has established its strongest networks in New Haven ("New Haven", 2013) and Philadelphia ("Philadelphia", 2013). Ben Berkowitz who is one of the founders of the site, stated that "We hope to get citizens participating in government rather than just consuming it." (Bradford, 2010).

The vision and strategy of SeeClickFix is citizen-centric, enabling the empowerment and engagement of citizens in reporting social issues via the internet. This also has a free mobile phone application associated with it. As in computer terminology, where distributed sensing is considered to be more powerful and efficient in recognizing patterns, several citizens being involved in reporting issues and getting them fixed is a more effective way of governance than relying solely on the government. This site also permits anonymity while reporting in order to encourage citizens to boldly report even in case of sensitive issues. In addition to that, SeeClickFix also recognizes the top contributors of the site by appreciating them online in a public platform. Thus the strategic factors of SeeClickFix, aimed at facilitating crowd participation are summarized in the table below (table 1).

<b>Vision &amp; Strategy</b>	Offers empowerment and engagement of citizens in reporting public issues; user-friendly platform; enables collaboration while reporting public issues; made available in both web and mobile platforms; governments and elected officials publicly propose solutions.
<b>Citizen-Centric Approach</b>	Enables citizens to effectively report neighbourhood issues and get them resolved by the government officials in-charge; allows users to decide the extent to which their identity should be exposed.
<b>Infrastructure &amp; Interoperability</b>	Virtual network established to look into the social issues primarily in the cities of US, as well as abroad; facilitates reporting of issues via web and mobile platforms, thus providing users with flexibility.

<b>Reward for Participation</b>	Top users are recognized based on their level of efforts to improve their city.
<b>Financial Capital</b>	Less capital intensive; however funds may be required for building efficient interfaces to further enhance information management.
<b>Information Management</b>	Issues reported are publicly broadcasted which in turn are directed to authorities in-charge to propose solutions.

Table 1. Strategic Components of SeeClickFix.

The relevant web 2.0 characteristics of SeeClickFix which align with its strategic factors are summarized in table 2. SeeClickFix incorporates the social networking functionality which empowers the users to maintain their social identity and to communicate effectively with the government as well as among their peers. However, the 'social trust' component is questionable to an extent because of the anonymity of reporting which is allowed. Interaction process is configured in ways to facilitate interaction among citizens as well as with the concerned authorities. Issues reported by users are considered as major value adds. However, the content generated from users' profile is not being effectively mined and utilized for any customization purpose.

<b>Social Networking</b>	Social identity is offered by facilitating user profile creation during registration. Citizens are allowed to rate and comment on other issues reported. Two way communication is enabled. Virtual world of mouth is implemented through social networking platforms such as Facebook and Twitter. However, anonymity maintained by certain users, questions social trust to an extent.
<b>Interaction Orientation</b>	Interaction process is configured in ways to facilitate interaction among citizens as well as with the concerned authorities.
<b>Personalization/Customization</b>	No personal or group customization provided.
<b>User-Added Value</b>	Issues reported by users are value adds; however, the content generated from users' profile is not being effectively utilized for any customization purpose.

Table 2. Functional Components of SeeClickFix.

#### 4.2 FixMyStreet

FixMyStreet ([www.fixmystreet.com](http://www.fixmystreet.com)), developed by 'mySociety' in collaboration with the Young Foundation, enables citizens of England, Scotland and Wales to report problems with streets and roads in their locality to the local council or the related government authorities. In 2008, a FixMyStreet mobile app was developed to enable iPhone users to report issues using their phones. Since then, similar apps had been developed and launched for nokia and android phones as well. Also the success of FixMyStreet has inspired the launch of similar sites in other countries.

The vision and strategy of FixMyStreet includes providing an intuitive user interface which enables the citizens to easily report issues and get it resolved. The site is map-based, in which the citizens are expected to locate the problem on the area map displayed. The details of the problem, which are then entered on the provided space, are sent to the respective council for processing. FixMyStreet adopts a citizen-centric approach in which the citizen empowerment and engagement are considered as the prime factors for achieving its objective. It has a well-established virtual infrastructure and it is supported on web as well as mobile platforms. Motivation is provided in the form of quick resolution of the issues reported which gives the citizens a sense of satisfaction and achievement. Public appreciation is however not implemented. Further, the site welcomes contributions from developers who help in leveraging the functionalities of the site. The table 3 below summarizes the strategic measures adopted by 'FixMyStreet'.



<b>Vision &amp; Strategy</b>	To enable citizens to locate, view and discuss on the local problems in UK. provides interactive maps to locate issues in a particular area, interface to engage citizens in reporting details of the issue, interface to direct the issues to the respective council.
<b>Citizen-Centric Approach</b>	Offers citizen empowerment and provides constant updates to citizens on the status of the reported issue.
<b>Infrastructure &amp; Interoperability</b>	Well established virtual infrastructure. Site availability is high. New android and iPhone apps are going to be launched soon.
<b>Reward for Participation</b>	Motivation is provided in the form of quick resolution of the issues reported. Public appreciation is however not carried out.
<b>Financial Capital</b>	More capital investment ensures better participation from the crowd and better interfacing capabilities.
<b>Information Management</b>	Quick resolution of issues reported. Also, developers' contribution to the improvement of the site is well utilized to leverage the functioning of the site operation.

Table 3. Strategic Components of FixMyStreet.

The web 2.0 characteristics which are in alignment with its strategic components are summarized in table 4. The social networking component complements the vision of this site by creating a platform for discussion among the citizens as well as with the government authorities. It also provides the users with the freedom to decide on the level of exposure of their identity. However, social trust is not supported in the case of anonymous users. Further, the interface configured facilitates discussion among citizens. Also the concerned authorities provide feedbacks and solutions to the reported issues via the interface. The site's interaction infrastructure ensures transparency of the whole reporting and resolution process by broadcasting the updates on the site. With respect to the user-added value, issues reported by users are definite value-adds; however, the users' profile data are not being effectively mined and utilized for any customization purpose.

<b>Social Networking</b>	Allows users to decide on the level of exposure of their identity. Social trust is not supported in the case of anonymous users.
<b>Interaction Orientation</b>	The interface configured facilitates discussion among citizens. Also the concerned authorities provide feedbacks and solutions to the issues reported via the interface. The site's interaction infrastructure ensures transparency of the whole reporting and resolution process by broadcasting the updates on the site.
<b>Personalization/Customization</b>	Customization is not supported.
<b>User-Added Value</b>	Issues reported by users are value adds; however, the content generated from users' profile is not being effectively utilized for any customization purpose.

Table 4. Functional Components of FixMyStreet.

#### 4.3 BlueServo

BlueServo is a free service that allows real time surveillance of Texas-Mexico border through the website [www.blueservo.com](http://www.blueservo.com). This surveillance program was designed to empower and allow citizens to participate proactively in fighting border crime. The innovative idea, of crowdsourcing border patrolling to citizens via website, was first proposed by Texas Governor Rick Perry and endorsed by Texas Border Sheriffs' Coalition in 2006. In 2007 Texas State Government launched the program with



an initial setup of 200 web cameras installed along the Texas-Mexico border.

BlueServo allows online monitoring of border via network feed of live streaming video to users. Users can register free for an account and can monitor the live feed from border cameras 24/7. Users can also report if they detect suspicious activity. These reports are later investigated by local county sheriffs. The vision of the BlueServo is to allow citizens to participate in border patrolling. The idea of participating in fighting border crimes is a motivating factor for citizens but since this web site lacks social identity and social profile features therefore there is no public recognition to motivate its users. Physical infrastructure for BlueServo consists of 200 web cameras installed at border and virtual infrastructure is web service that allows worldwide users to access the live video stream from border. Although the site is available 24/7 but the streaming is slow. The program is quite capital intensive and investment is required for physical infrastructure. Table 5 summarizes the strategic components for BlueServo.

<b>Vision &amp; Strategy</b>	To empower and allow citizens to participate proactively in fighting border crime through free online service. 24/7 live video feed with a simple and easy to use interface. Installation of cameras at border.
<b>Citizen-Centric Approach</b>	Citizen is engaged in border watching.
<b>Infrastructure &amp; Interoperability</b>	Virtual infrastructure enables worldwide users to monitor Texas-Mexico border. Physical infrastructure includes installation of web cameras installation. Site availability is high but live streaming is slow. No supported on mobile devices.
<b>Reward for Participation</b>	No public recognition. Users are notified about the investigation through email.
<b>Financial Capital</b>	Quite capital intensive. Crowd participation can be enhanced by investing on physical and virtual infrastructure.
<b>Information Management</b>	Reported issues are directed to local authorities for investigation.

Table 5. Strategic Components of BlueServo.

Since BlueServo does not allow users to create and maintain an online profile therefore no social identity is established and no social trust is available between users. There is also no interaction between users through which they can comment or verify reports of other users. No personalization or customization features are provided. Table 6 summarizes the functional components for BlueServo.

<b>Social Networking</b>	Social identity is not established. Social trust is not supported because there is no interaction between citizens. Citizens cannot comment on other reported issues. Low citizen power because it lacks two way communications.
<b>Interaction orientation</b>	Lacks a discussion board thereby limiting interaction b/w citizens. The site lack two way communication facility however the feedback is provided via email.
<b>Customization/ personalization</b>	No personal or group customization provided.
<b>User-added value</b>	User's profiles are created through registration process. User contributions are high in terms of reported issues.

Table 6. Functional Components of BlueServo.

#### 4.4 State of the Union Speech Response

State of the Union Speech Response page ([www.whitehouse.gov/sotu-response](http://www.whitehouse.gov/sotu-response)) on White House official website allows citizens to read, comment and share U.S. President Barack Obama's, speech to a joint session of the United States Congress. The vision behind this service is to engage citizens in policy making by listening to their opinions about the current policies. This is achieved with an easy to use web page which allows users to comment on the speech by clicking the segment of speech they want to comment about and entering name email address and zip code. The idea is centred on citizens to make them participate in policy making. Virtual infrastructure for this service is a simple web service with very limited functionalities with a large amount of data collection. The idea of participation in policy making is a motivation factor for citizen although no public recognition is present since the website does not allows users profile. It is less capital intensive as existing infrastructure is used. Table 7 summarizes the strategic components for this service.

<b>Vision &amp; Strategy</b>	Engaging citizens in policy making. Provides an easy to use platform to collected citizen opinion about any part of President's speech; synthesizing the information gathered to make changes in policies.
<b>Citizen-Centric Approach</b>	Empower citizens to project their views on any issues addressed in the speech.
<b>Infrastructure &amp; Interoperability</b>	Virtual infrastructure supports limited amount of functionality and large amount of data collection.
<b>Reward for Participation</b>	Involvement in influencing government's policy making.
<b>Financial Capital</b>	Less capital intensive and functionality incorporated in existing infrastructure funds to ensure that the news reaches everyone will impact crowd participation.
<b>Information Management</b>	Registered opinions are filtered and processed.

Table 7. Strategic Components of State of the Union Response.

The website does not allow users to create and maintain online profile and lacks in social identification and social trust features. There is no interaction between users as they cannot view and comment on posts by other users and interaction between government and user is only limited to the acknowledgment of successful receipt of the response. Website does not allow any customization features for any level. Only user added value for website is the response from citizen about the speech. Table 8 summarizes the web 2.0 functional components for this service.

<b>Social Networking</b>	Social ID is not established. However, citizens are empowered to share their posts on other social networking platform, such as facebook. Two way communications is not provided.
<b>Interaction orientation</b>	Acknowledgement on successful receipt of citizen response is provided. No features such as discussion board to facilitate interaction b/w citizens.
<b>Customization/ personalization</b>	No personal or group customization provided.
<b>User-added value</b>	User generated content helps in innovating the way in which government functions.

Table 8. Functional Components of State of the Union Response.

#### 4.5 FixMyTransport

FixMyTransport ([www.fixmytransport.com](http://www.fixmytransport.com)) is a free web service that allows citizens to report common problems about public transport system such as poor facilities, overcrowding, late buses or trains, fare and ticket problems, etc. and helps them bring it to the notice of local public transport authorities.

FixMyTransport is designed by mySociety which is a project of UK Citizen Online Democracy (UKCOD) which is a registered charity organisation in England and Wales. Currently this service is only available for UK.

Vision behind this service is to allow citizens to report and track small problems related to local transport system which is achieved with the help of web and mobile service. This service is also integrated with social networking platforms such as Facebook and Twitter and is less capital intensive as many of the features such as virtual word of mouth are also achieved through integration with social media platforms. The information about the local transport system has been collected through various local transport databases such as the National Public Transport Access Nodes (NaPTAN), the National Public Transport Gazetteer (NPTG) and the National Public Transport Data Repository (NPTDR). Reports collected from users are forwarded to local authorities and users are notified about the progress online. Table 9 summarizes strategic components for FixMyTransport.

<b>Vision &amp; Strategy</b>	To allow citizens to report transport issues which are brought to notice of public and authorities for resolution.
<b>Citizen-Centric Approach</b>	Allows citizens to report and track local transport issues.
<b>Infrastructure &amp; Interoperability</b>	Service is available for web and all mobile platforms and also integrated with social networking platforms such as Facebook and Twitter.
<b>Reward for Participation</b>	No specific measures are to citizens' participation. However, the reported issue being noticed and resolved by the government officials can serve as a motivational factor.
<b>Financial Capital</b>	Less capital intensive as many of the features such as virtual word of mouth are achieved from integration with currently available social networking platforms. Capital is also collected from crowd funding.
<b>Information Management</b>	Information about the transport systems is collected through several public transport databases. Reported issues are forwarded to local authorities and tracked. Users are also provided with feedback about their problems.

Table 9. Strategic Components of FixMyTransport.

The users are allowed to register for free and can also use their existing Facebook account to be used for identification. Virtual word of mouth is achieved through presence on social media platforms such as Facebook, Twitter and BlogSpot. Feature for interaction and collaboration between users are provided. Users can report a problem, track their problem and also rate and comment on problems reported by other users. Integration with Facebook also helps in enhancing social trust level. Rating and commenting on problems reported by others is also possible which enhances the interaction between users. No personal or group level customization or personalization features are provided. Table 10 summarizes the functional components for FixMyTransport.

<b>Social Networking</b>	Users are allowed to establish social ID with profile creation. Users are also allowed to use their existing Facebook ID. Virtual word of mouth is enabled through social platforms such as Facebook, Twitter and BlogSpot. Since the platform is integrated with social platforms, it enhances social trust.
<b>Interaction orientation</b>	Features are provided for interaction between users to allow users to view, rate and comment about issues reported by other users.
<b>Customization/ personalization</b>	No personal or group customization provided.
<b>User-added value</b>	User reported problems and rate and comment about other reports add value. User – generated revenue in the form of crowd funding.

Table 10. Functional Components of FixMyTransport.

### CASE RESEARCH METHOD

For emphatic design we started with conducting a focus group experiment to assess the influence of strategic and functional components of crowdsourcing framework discussed earlier on the success of five e-governance website based on crowdsourcing model. These were: BlueServo, FixMyStreet, FixMyTransport, SeeClickFix and White House Response. Each of these websites crowd source a specific governance related task to citizens.

The focus group was carried out in five sessions (both online as well as in lab). Each session comprised of seven participants who were graduate students of NTU, most of them from an IT background. In each session the students were first given a brief introduction on the important concepts for about 10 minutes. Later they were assigned with one of the five cases/websites for evaluation. They were given about 10 minutes to explore and evaluate the functionalities of the website such as login, fault reporting, and so on. In order to save time they were given with a pre-registered user name and password. After the evaluation, the students were asked to fill an online questionnaire. This questionnaire consisted of about 39 questions including demographic questions. The intent of the questionnaire was to collect the data about the strategic and functional components of the crowdsourcing framework based on the evaluation by 35 students of 5 websites. The questionnaire was uploaded on SOGOSurvey online tool. A copy of the complete questionnaire is can be accessed online from [www.sogosurvey.com/survey.aspx?k=SsXWUXsRsPsP&lang=0&data=](http://www.sogosurvey.com/survey.aspx?k=SsXWUXsRsPsP&lang=0&data=). The questions involve rating the influence of each of the sub category of the web2.0 functional components and the strategic components of the crowdsourcing framework on the success of crowdsourcing in the evaluated e-governance website. Sample questions are shown in Figure 3(a) and Figure 3(b). Later students were allowed to give comments about the strengths and weaknesses of the evaluated website with respect to the crowdsourcing and e-governance features, and in general about the idea of involving citizen in e-governance through crowdsourcing. The questionnaire and comments part was completed in about 15 minutes.

To what extent does the SOCIAL TRUST of users determine the success of crowdsourcing in the e-Governance website you evaluated?

☐ Not at all  
 ☐ Slightly  
 ☐ Moderately  
 ☐ Fairly  
 ☐ Greatly

Figure 3(a): Assessment Scores for sub-categories of Web2.0 functional components.

To what extent do the INTERACTION ORIENTATION functionalities favorably impact the KNOWLEDGE SHARING of the e-Governance website you evaluated?

☐ Not at all  
 ☐ Slightly  
 ☐ Moderately  
 ☐ Fairly  
 ☐ Greatly

Figure 3(b): Assessment Scores for sub-categories of strategic components.

Measurement	Description	Value
Greatly	The functionality to a great extent determines the success of crowd sourcing for that website	5
Fairly	The functionality to a considerable extent determines the success of crowd sourcing for that website	4
Moderately	The functionality to a lesser extent determines the success of crowd sourcing for that website	3
Slightly	The functionality to a very little extent determines the success of crowd sourcing for that website	2
Not at all	The functionality does not determine the success of crowd sourcing for that website	1

Table 11: Normalization of Functionality Assessment Scores.

Table 11 shows numeric score assignments for the levels given in questionnaire. In order to measure the agreement between the 35 responses Fleiss Kappa coefficient was calculated. Usually Cohen Kappa method is used to find the degree of agreement between responses but Cohen Kappa model assumes that raters are same for fix number of items and since in our case each item was rated by 7 different sets of raters therefore Fleiss Kappa model is more applicable which allows different items rated by different raters (Fleiss, 1971, p.378).

$$\text{Fleiss' Kappa} = \frac{\text{Degree of agreement achieved}}{\text{Degree of agreement attainable}}$$

Fleiss Kappa indicates the level of agreement between raters from -1 to 1. Where -1 indicates complete disagreement below chance, 0 indicates agreement equal to chance and 1 indicates complete agreement above chance.

	BlueServo	FixMyStreet	FixMyTransport	SeeClickFix	SOTU Response	Mean
<b>Vision &amp; Strategy</b>	3.32 (0.88, 0.05)	3.68 (0.77, 0.04)	3.79 (0.91, 0.03)	3.46 (0.9, 0.03)	3.43 (0.97, 0.05)	3.54 (0.88, 0.04)
<b>Citizen-Centric Approach</b>	3.39 (1.02, 0.03)	3.57 (0.87, 0.06)	3.18 (0.97, 0.04)	3.64 (1.06, 0.04)	3.46 (0.93, 0.04)	3.45 (0.97, 0.04)

<b>Infrastructure &amp; Interoperability</b>	4 (0.93, 0.05)	3.86 (0.64, 0.05)	3.29 (0.7, 0.04)	3.14 (1.12, 0.03)	4.14 (1.46, 0.07)	3.69 (0.97, 0.05)
<b>Reward for Participation</b>	4 (1.41, 0.04)	3.71 (1.28, 0.05)	3.29 (0.45, 0.08)	3.29 (1.48, 0.05)	3.43 (1.4, 0.01)	3.54 (1.21, 0.05)
<b>Financial Capital</b>	3.36 (0.97, 0.04)	3.64 (0.69, 0.05)	3.36 (1.15, 0.02)	2.57 (1.24, 0.03)	3.14 (1.41, 0.02)	3.21 (1.09, 0.03)
<b>Information Management</b>	4.43 (0.49, 0.07)	4.14 (0.64, 0.07)	3.43 (0.9, 0.03)	4 (0.76, 0.03)	4.43 (0.73, 0.05)	4.09 (0.7, 0.05)

Table 12: Assessment Scores for Strategic Components.

Table 12 summarizes the mean assessment results with their standard deviation and Fleiss Kappa coefficient in brackets for the web 2.0 functional components. Since all the Fleiss Kappa values are positive it is inferred that the agreement between raters was above chance. Also the assessment scores are uniformly high for the strategic and functional components. Table 3 shows the scores for strategic components.

	<b>BlueServo</b>	<b>FixMyStreet</b>	<b>FixMyTransport</b>	<b>SeeClickFix</b>	<b>SOTU Response</b>	<b>Mean</b>
<b>Social Networking</b>	3.27 (0.92, 0.05)	3.65 (0.76, 0.05)	3.92 (0.89, 0.05)	3.82 (0.92, 0.03)	3.98 (0.81, 0.04)	3.73 (0.86, 0.04)
<b>Interaction Orientation</b>	3.94 (0.83, 0.04)	4.12 (0.68, 0.07)	3.61 (1.11, 0.03)	3.76 (0.83, 0.04)	3.92 (0.96, 0.04)	3.87 (0.88, 0.04)
<b>Personalization/Customization</b>	2.9 (1.13, 0.03)	2.86 (1.31, 0.02)	2.86 (1.01, 0.03)	3.02 (1.12, 0.02)	2.17 (1.33, 0.04)	2.76 (1.18, 0.03)
<b>User-Added Value</b>	3.61 (0.99, 0.04)	3.73 (0.8, 0.05)	3.35 (0.98, 0.03)	3.43 (0.99, 0.03)	4.02 (0.91, 0.04)	3.63 (0.93, 0.04)

Table 13: Assessment Scores for Web 2.0 Functional Components.

It is apparent from the results in Table 13 that there is a clear consensus within the focus group responses about the influence of functional components on the success of the e-governance based on the crowdsourcing model. Vision and strategy for all the 5 cases was clear and focused on citizens participation in respective area. Various level of investment was done on infrastructure from low investment in case of State of the Union Response to medium investment in SeeClickFix, FixMyTransport and FixMyStreet. Infrastructure for BlueServo was most capital intensive project.

Among the web 2.0 functional components, 'Personalization/Customization' seems to have the minimal score and this is in line with the findings of the qualitative case analysis where it was observed that none of the 5 cases provided any significant customization features for this purpose. Interaction orientation and social networking features seem to have a great importance in crowdsourcing model because it allows collaboration between users. These features were not present in State of the Union Response other websites provided these features with various levels. Figure 3(a) and Figure 3(b) shows kiviatt graphs of assessment scores for comparative analysis. Figure 3(c) shows mean values for strategic and functional component scores.

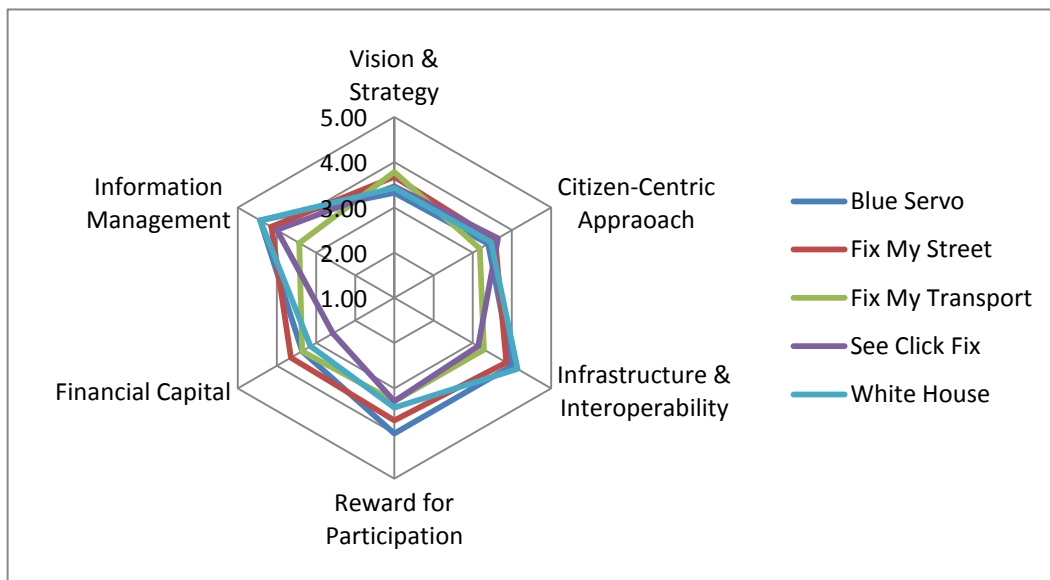


Figure 3(a): Kiviatt Graph of Strategic Components for Comparative Analysis.

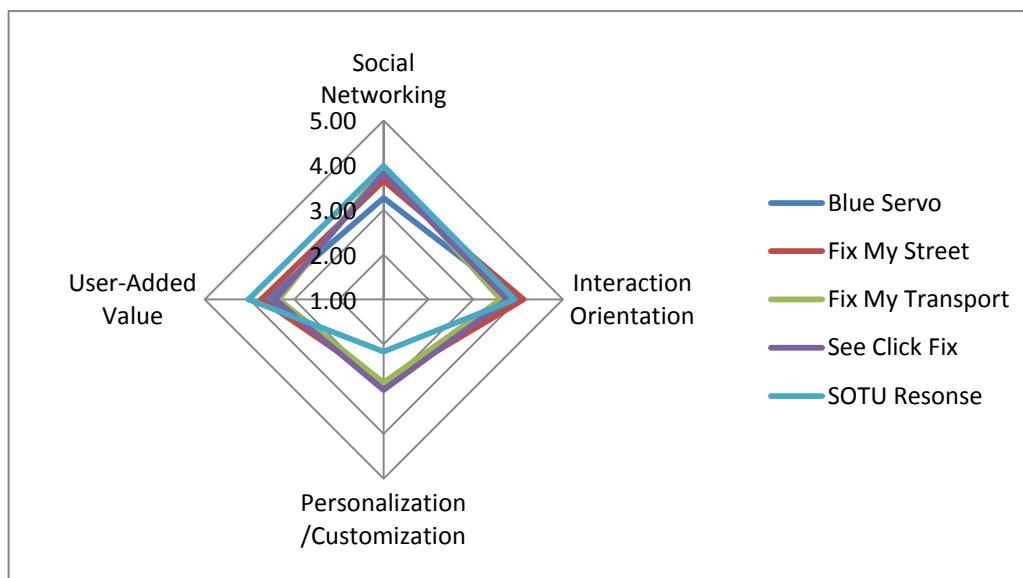


Figure 3(b): Kiviatt Graph of Web 2.0 Functional Components for Comparative Analysis.

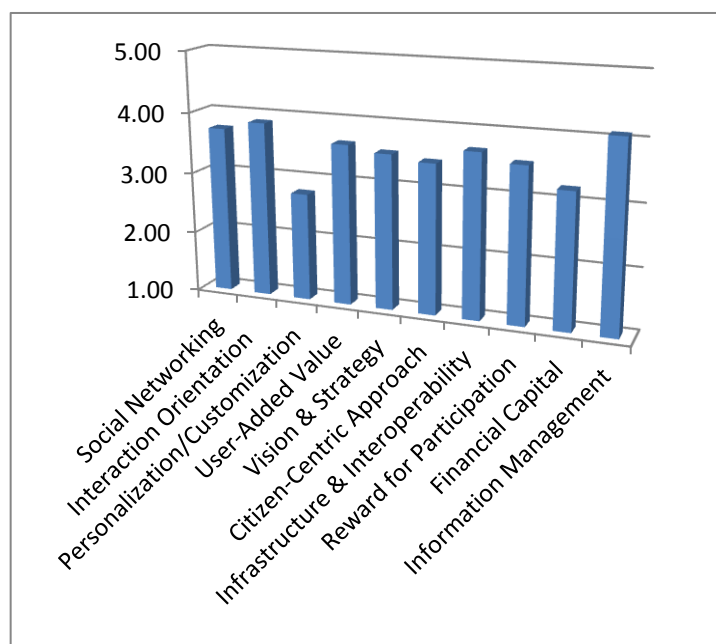


Figure 3(c): Mean of Strategic and Web 2.0 Functional Component Scores.

## DISCUSSION AND FINDINGS

On comparing the impact of the strategic components on the five e-governance websites, based on the results obtained from the emphatic design method and the observations documented during the case study analysis, it is observed that all the five cases have a clear and precise vision and strategy in terms of involving the citizens in governance-related activities and encouraging maximum crowd participation to achieve the same. Also, the results reveal that the citizen-centric approach, infrastructure and the information management capabilities of these sites had been above average, showing that the acquired information has been efficiently processed and managed to obtain optimum results in minimum time. For instance, the transfer of issues reported to the concerned government councils and the feedbacks and resolutions provided them, denotes the presence of an efficient infrastructure and an information management system.

On the other hand, it is observed that the 'financial capital' has a relatively lesser impact on the successful functioning of these sites, which is quite contrary to the established hypotheses. Further, regarding the 'reward for participation' strategic factor, it is observed that the different sites offer different levels of motivation and there is no way of generalization which can be arrived at. For instance, SeeClickFix website publicly recognizes the top contributors to the society whereas in the case of the White house website, being involved in government policy-making itself is a motivation to the users to contribute frequently. Further moving on to the comparison of the web 2.0 functional components of the five websites under analysis, it observed that the social networking component is quite well supported in almost all the cases, thereby highlighting its importance and relevance in encouraging citizen participation in e-governance environment. However its sub component 'social trust' is not presented in all the sites at all times because of the anonymity offered while reporting the issues. However, this is attributed to the inherent nature of the e-governance sites, where sensitive issues might be discussed unlike the other e-commerce websites in which disclosing the identity would hardly have any negative impact on the user.

Also it is noticeable that, all the five cases offer a certain level of interaction orientation although its implementation is customized to suit the needs and motives of each of these sites. For example, sites such as SeeClickFix, FixMyStreet and FixMyTransport have interaction process configured in ways to facilitate interaction among citizens as well as with the concerned authorities. Whereas websites such as Whitehouse and BlueServo does not support interaction among the citizens. However, they facilitate interaction between the citizens and the government authorities to an extent.

Another concept which is observed to contradict the earlier established hypotheses is the 'Personalization/Customization' component. Unlike in e-commerce websites, it is observed from the results of the analysis that this component has the least impact in influencing maximum crowd participation in the sites evaluated. It is quite clearly noticeable that this component is given the least importance in the sites evaluated.

It is further observed that all the five websites focus on encouraging maximum crowd participation and thereby generate and capture the user-added value. The user-generated innovation was utilized by the government to make significant changes to the ways in which government functioned, for instance, in the case of White house website, the opinions of the public registered through the site, had an impact on the government's policy-making agenda. However, the user-generated content through user profile creation is not being effectively mined or utilized for any customization purpose.

## CONCLUSION

Thus in this paper, we have identified and analyzed the critical factors, both at the strategic and the functional levels, which have the potential to positively impact the success of crowdsourcing initiatives in e-governance. These factors are presented in the form of a theoretical framework. Further the effectiveness of the proposed theoretical framework is evaluated by analyzing the characteristics of some of the notable cases of crowdsourcing in e-governance, using the case study analysis method and the emphatic design method and the discussion and findings are documented. In addition, it has been observed that there is an alignment required between the strategic and functional web 2.0 components in order to ensure the success of crowdsourcing initiatives in e-governance.

This research study had a few limitations. The emphatic design method conducted had limitations in terms of the number of respondents. A total of only 35 responses were collected to study the five cases. This limitation attributes to the time and financial constraints. Thus as an implication for future research in this path, the accuracy and robustness of the results obtained can be improved by conducting a similar study with a larger sampling size.

Also, all the respondents were students of NTU with most of them having an IT background and advanced internet knowledge and experience with web2.0 functionalities. However, their level of understanding of the concepts varies based on their grasping power in the given time. Nevertheless, given their level of education, we assume that they were able to articulate to the concepts to which they were introduced to through the hand-outs and their dialogues with us during the evaluation.

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**WKWSCI Institutional Review Board Approval - Critical Inquiry**

Nithiyah d/o Muthukrishnan [NITHIYAH@ntu.edu.sg] on behalf of MSc (IS) Programme [MSc\_IS@ntu.edu.sg]

Sent: Friday, March 22, 2013 10:05 AM

To: Ravi S. Sharma (Dr) [rsharma@pmail.ntu.edu.sg]

Cc: Na Jin Cheon (Assoc Prof); MSc (IS) Programme; #JAYAKUMAR SOWMYA#; #HUSSAIN SHAFIQ PYARALI#

Project ID & IRB No.: RSS-07 (Semester 2 AY2012-2013)

Dear A/P Ravi Sharma

**WKWSCI Institutional Review Board Approval**

**Project Title: The Effective Use of Crowdsourcing in e-Governance**

I refer to your application for ethics approval with respect to the above project.

The school board has deliberated on your application and noted from your application that your research involves administering survey/interview on subjects.

You have also confirmed that informed consent will be obtained from the participants and you have guaranteed the confidentiality of your participants' biodata obtained from them.

The board is therefore satisfied with the bioethical considerations for the project and approves the ethics application under Exempt Review.

Regards

Nithiyah *on behalf of*

Assoc Prof Na Jin Cheon

School-IRB Committee Member for Critical Inquiry

Wee Kim Wee School of Communication & Information

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