

Quality Of E-Governance In Smart Cities: A Qualitative Review Of Literature

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Abstract: The objective of this Paper is to consolidate the state of research regarding quality of E-Governance in Smart Cities. This review covers works spanning across 2014 to 2021 and a synthesis of various research perspectives in the three broad sectors of a) Smart Cities, b) E-Governance and c) Total Quality Management has been done. In the end, the analysis of the future scopes in the field has been presented.

Indexterms: Smart City, e-governance, quality, information systems, Total Quality Management.

I. INTRODUCTION

The world is at the crossroads. The onset of the new millennia has witnessed a revolution in the field of Information Systems, whereby the same are no longer contained within the hallowed halls of the research laboratories or advanced production centers but are now an essential part of the daily lives of the ordinary people. Modern Cities are complex organizations while aspiring to be Smart and worldwide studies are being undertaken on how to effectively utilize and leverage Information Systems to increase the quality of governance and hence, lives of the citizens. A good quality Information System can therefore establish a better communication between the stake holders and can also afford them to be a part of the decision-making process and is a major driver for significant lifestyle changes.

Therefore, the challenge before the researchers and policy makers is how to develop, use and apply Information Systems to the Urban lives, with their often chaotic appearances and a mosaic of stakeholders and how to achieve an integration between these. This is more challenging in the context of a developing country like India, where there is a risk of addition and accentuation of Digital Divide to the already existing list of various sorts of Socio-Economic divisions. A cohesive and an integrated approach is therefore necessary to build up a quality framework for the purpose in order to ensure a judicious distribution and usage of E-Resources by all sections of the society.

II. METHODOLOGY

The goal of the study was a conceptual consolidation across an otherwise extremely fragmented field.

In the overall work, the basic structure of a systematic review involving a) Planning b) Conducting & c) Reporting and dissemination has largely been followed.

An extensive review of publications from various literature available in peer reviewed journals was undertaken which mainly spanned across the themes around a) Smart cities b) e-Governance and c) Total Quality Management. The time frame under consideration has been mostly from 2014-2020. The search platform used was google scholar. In the search the keywords used were Smart Governance, Quality in E-Governance & E-Governance in Smart Cities to find out available integrated works on the theme of the study.

III. CITIZENS & GOVERNANCE- AT THE CORE OF SMART CITIES.

The ultimate objective of all Smart City projects is to increase the Quality of Life of its citizens. Also, it is about the empowerment of its citizens to contribute towards the collective urban life as Smart Citizens. The Governance and associated institutions like the Local bodies, play a crucial role in this respect. In his study Julio Arauz [1] analyzed the ongoing research on Smart Cities technologies & standards and how the developments in Smart city technologies could be leveraged to address the dynamic needs and challenges of the urban local bodies like the municipalities etc. The analysis showed that there remains a substantial scope for an interdisciplinary approach to help the Urban Local Bodies to meet the challenges of urbanization and to fill up the existing gap between the needs of such urban local bodies and the studies in this field. Nallapaneni Manoj Kumar et al [2] have discussed the features and policies pertaining to Smart Cities in India and its definition and have proposed a 3C (Competence, Convenience and Cleverness) based definition whereby, a city in order to attain a higher Quality of Life, seeks to integrate technologies for Environmental, Economic and Social aspects of city life, leveraging the 3Cs. In his work, Nuno Vasco Lopes [3] has studied and discussed the governance models implemented in some cities and found that for successful implementation of a Smart City, a mix of open collaborative and participatory Smart governance is necessary, along with advanced technologies and innovation. Nripendra. P. Rana Et al. [4] have listed and prioritised in their research, the barriers towards successful implementation of Smart Cities in the Indian context and found that of all the barrier categories, Governance was the most significant category, followed by Economic, Technological, Social, Environmental and Legal & Ethical. The study conducted by Ayca Kirimat et al [5] undertook a detailed literature review of all smart city themes across different publications in order to analyse the concept and to understand the current and future trends in this regard. It was found that of all the keywords, "Citizen" was the one with the most numbers of occurrences and links and amongst all major themes in the studies, "Smart Governance" was the most prominent one. In order to measure the smart city readiness factor from the perspective of a citizen, Eko Setijadi et al. [6], successfully tested a model of smart city readiness factor, integrating TRI, TAM and Delone and Mclean models. The model established a relational matrix of the factors that determine the success of smart city readiness of the local citizenry. Aawatif Hayar Et Al [7] in their study discussed and constructed a new model "Frugal Social Sustainable Collaborative" for smart cities, wherein the Citizen was accorded the centre stage in the scheme of Smart City initiatives, working upon a cost effective, step by step bottom up approach with initial emphasis upon low hanging fruits for a better RoI and optimizing local resources and innovation, while capitalizing upon existing infrastructure and investing in human capital and thus gradually moving towards an inter-connected collaborative ecosystem. The model focused mainly upon Smart citizens while technology was considered as an enabler.

IV. SMART E-GOVERNANCE- A SINE QUA NON FOR QUALITY OF LIFE.

As the cities are developed enabling the latest technologies, Governments across the planet are leveraging the e-Governance component to strengthen democracy, public welfare and citizen participation in decision making processes which leads towards more transparency and more informed citizens. An evaluation of the maturity of the extant regulations with respect to Smart City Components and the associated factors to quantify the readiness to adopt smart city concept was done by Adnane Founoun & Aawatif Hayar [8]. The researchers assessed the factor of direct and indirect involvement of citizens in the transition process to a Smart City and have constructed and presented an evaluation matrix to test the level of maturity of the local regulation vis a vis the requirements of a smart city. OJO John Sunday [9] in his work made a strong case for application of E-Governance at the grass root levels in an underdeveloped nation like Nigeria for achieving Sustainable Development Goals and prescribed that grass root development can be ensured leveraging E-Governance by ensuring effective and efficient public service delivery and citizens' participation. A critical analysis of the effects of e-Governance on different aspects of Government services in India was undertaken by Monika Pathak et al [10] and the four required criteria for its success namely connectivity, knowledge,

data content and expenses were summarised. Under the overall context of the United Nations framework for measurement of E-Gov Development Index (EGDI), HarekrishnaMisra [11] in his work constructed a framework to measure Rural-E Governance Development Index(R-EGDI) and validated the same in a use case of AMUL under a premise that in order to meet the objectives of SDGs it is important to assess the Rural Urban digital divide.

Ganim et al [12] in a work on e-governance constructed a model for a social networking site for direct communication between government to citizens and vice versa, in order to facilitate a stronger participation of citizens in governance and for the government to come in direct touch with its citizens. In their research, Nagarathna R et al [13] proposed the utilization of social networks for implementing e-governance and as a test case, a framework for pollution control that utilizes social networks was constructed along with an intelligent framework to utilize social networks for e-educating people and for collective ameliorating action. In another work Prabhat Manocha et al [14] have analysed and prioritised the social media and e-governance success parameters in Indian context so as to bring an alignment between each other and to leverage social media platforms for delivery of e-governance. Syed Javed Ahmed [15] in his work proposed integrating multiple inter departmental systems under one common central database accessible to all authorized departments, instead of maintaining multiple incompatible databases.

Innovations in Governance technologies have swept the public sector since the last few decades. The fast-moving changes in technologies are also accompanied by changes in citizen aspirations and expectations. A successful digital society is the one which accords every section equal ground to access the latest in technology, while taking care of the impediments. Leontine Loeber [16] in his study regarding the E-Voting Readiness Index, examined based on secondary data, the readiness of the Dutch voters to accept the e-Voting system. From the data analyzed it was inferred that the majority still preferred the paper ballot-based system. Also, the trust level was much higher on paper ballot systems, and it was the older age group which comparatively preferred more for voting computers than the 18-24 age group. In a study by V.Balaji et al [17] the accessibility to m-governance with respect to physically challenged users and elderlies were analyzed and the current accessibility status of the current e-gov apps were measured to provide an alternative solution. A survey regarding the usage and the pattern of adaptation of various ICDS amongst the senior citizens was undertaken by Stephen FASTER et al [18] and a higher level of proficiency than expected initially was found. In a study on digital information access for older persons, Carvalho et al [19] analyzed the results of UISEL (Ubiquitous Information for Senior Citizens Learning), a European initiative to assess the needs of Senior Citizens and how they could be satisfied through digital technologies, mainly mobile devices. The work spanning across many European countries found that in different countries different modules were preferred most.

In a study on the Digital Super Divide, K.K Minocha [20] discussed the types of digital divides emerging due to a fast-evolving digital world, concluding that the senior citizens are the second most affected lot in the usability divide.

V. QUALITY: HANDSHAKING OF QUALITY OF INFORMATION SYSTEMS WITH E-GOV SERVICE DELIVERY.

Acceptance of the principles of Total Quality Management requires commitment on the part of management to the principles that require change to a more participative form of management, adoption of a continuous process of self-evaluation and improvement and a new emphasis on customer satisfaction. TQM requires willingness and ability to change on the part of the manager and the organization undertaking it. Sreesankar R.S Et al [21] made a case for implementation of TQM in the local self-government levels. In a study on Impact of System Quality, Information Quality and Service Quality, Ameen et al [22] took a page out of the Delone & Mclean model and tested the impact of Systems Quality, Information Quality and Service Quality on the actual usage of Smart Governance amongst the employees in a Government Organization. It was found that all three quality dimensions had a positive impact on the dependent variable of actual usage of Smart Governance. Vinay Singh et al [23] constructed a model for assessment of e-governance quality from the perspective of a citizen, to prove the relationship between quality of e-governance and citizens satisfaction. In a similar study, Olusegun Agbabiaka et al [24] validated the updated Delone & McLean Model for IS in the context of E-Governance and found that information and service quality have significant impacts upon citizen satisfaction, Information and system quality have significant impacts upon citizen trust in egov and Citizen satisfaction has a significant impact upon net benefits (public value).

In another study A. OJO [25] deployed the updated D&M model to study and analyze the Hospital Information System, in Nigeria. The study validated the updated D&M IS model in the context of Nigerian HIS. It was found that the quality dimensions had significant effects over use and user satisfaction. Naajma Intiaz Ali et al [26] in a study on success of e-commerce have proposed a modified Delone & McLean model for E-Commerce, including the indicators of Trust and Privacy as additional independent variables along with System Quality & Service Quality, with User satisfaction as a mediator and Net Benefits as the dependent one in the model. Erma Nindiaswari et al [27] in a study on implementation of Updated DeLone & McLean Information System Success Model, Kano Model and QFD to analyze Electronic Disposition & Mailing Systems (EDMS) in the Ministry of State Secretariat, Indonesia have proposed an integration of the Delone & McLean Model, Kano Model And QFD, to measure the

success of an Information System and to analyse further windows of opportunities to increase user satisfaction. Ronggang Zhou et al [28] in a study on Measuring e-service quality and its importance to customer satisfaction and loyalty in a telecom setting, discussed e-service quality from the perspective of User Experience or Ux. It was found that there is a positive relationship between e-SQ, Customer Satisfaction and Customer Loyalty and that Customer Loyalty is functional upon Customer satisfaction. The study concluded that E-service qualities related to Ux are the core predictors for customer satisfaction and customer loyalty. In a study of Jakarta Government Official Portal Acceptance based on Technology Acceptance model, CahyonoBudy Santoso et al [29] have assessed the public acceptance of the Jakarta Government official portal deploying TAM. It was found that a) ease of use factor had a positive and significant effect over the benefit factor b) the benefit factor had a positive and significant effect over the attitudinal factor and behavioral tendency factor & c) behavioral intention to use factor had a positive and significant effect over the actual system usage. In a work Saleh et al [30] have disputed the validity of the TAM model as it exists against the current context of technological advancement. In this study they have argued that keeping into consideration the advancement in technology today, the variable Ease of use is no longer a significant predictor for adoption of a technology since ease of use is given and the researchers replaced the same with more outcome-oriented variables. An IT use Motivation hierarchy in parallel with Maslow's hierarchy of needs was also proposed in the study. Ibrahim Mohamed Yossier et al [31] in their work have deployed the TRI 2.0 index to analyse the technology readiness index for e-health in some of the conflict regions in Libya and found that only Insecurity, an inhibitor dimension in TRI 2.0 had a significant influence upon the dependent variable of E-Health Technology Readiness.

An Wun Lee [32] in an application of Quality Function Deployment to Smart watches, explored and analysed the key design and commensurate technical attributes for Smart Watches, while applying Quality Function Deployment method represented by House of Quality matrix diagram so as to point out and minimize insignificant functionalities and to improve quality of the product and thus creating clarity for consumers regarding benefits of using Smart Watches. In a study for Developing University Competitiveness Xenia L. Pavlova et al [33] successfully applied the Quality Function Deployment (QFD) tool to the problem of a university's competitiveness. Wan-Li Wei and Shao-Wei [34] in their work on QFD based service design on horticulture therapy for the elderly, examined application of QFD model for re- designing a healing garden in a long term old age centre.

In a study on Modification of the Quality House method Dimitri Kritsy et al [35] have proposed some modifications in HoQ based on a process approach. The researchers proposed a quantitative approach to measure the outcomes of TQM. In a study by O.A.L Zawati et al [36] on Application of Quality Function Deployment to improve Smart Services applications, the application of QFD by a public sector entity to design and enhance characteristics of smart services applications for Dubai was undertaken. A QFD model was deployed based on a re-engineered VoC method which was supplemented by various sorts of quality tools and has been called as Voice of All. Caüter et al [37] in a study tested the explanatory power of Delone& McLean Model for success of Information Systems. It was found that the D & M model had a certain power to explain the success or failures of the three Information systems put to test in the study. Also, the researchers in their study had added certain background variables like gender, age etc. to examine their effect on the perceptions. In a somewhat similar moderated study Yudha et al [38], deployed the D&M model to understand the impact of e-filing system performance on tax compliance. In the study, a fourth independent and exogenous variable named trust in e-government was used to measure its impact upon Use and User Satisfaction, along with three other D&M variables of Information Quality, Systems Quality and Service Quality. Also, the moderating impact of gender towards system use on tax compliance and user satisfaction on tax compliance was done. Amongst other conclusions, it was found that gender had no moderating effect on either.

VI. FINDINGS

- From the Literature reviewed, it appears that most of the studies are context specific, having spatial restrictions and thus there is a challenge for universalization. Cities are diverse, so are the issues and therefore the results achieved against the variables can differ from one city to another.
- From the review, it appears that in many studies there was an emphasis upon expert opinion while building up the constructs and testing the same, which opens a new dimension to be explored from the point of the end user who may not be an expert, to analyze the factors that play important role in shaping up their attitudes towards Information Systems.
- It also appears that with respect to all the issues discussed, the factor of Digital Divide is the one that has the most potential to negatively affect the outcomes of all developments in the field and thus obstruct the fructification of net public benefits out of such developments. This is particularly important in the Indian context since many of such studies undertaken are yet to be validated against the Indian background. Thus, an extensive and holistic approach is required to deal with the factor of inclusivity and hence attracts a focused effort on an extensive study in India context.

- Most of the studies regarding quality, comfort, and ease of use of information systems have not discriminated amongst the various demographic sections of a population and the indices that have been used need to be moderated by various socio-demographic factors like, gender, age, language, socio-cultural background, economic strata etc to observe the effects that such factors could yield.

VII. CONCLUSION

Our review may have missed out some relevant research in the field since the filtering process had been based on certain specific keywords and this may have omitted some studies which may have added to the knowledge. This is more so since the three themes are broadly divergent, and the objective was to achieve an idea about the previous research upon the integrated trio. However, we believe that there is an immense potential for researchers to work upon this in future and we are hopeful that our findings will provide an idea about the scope to fill up the existing gaps in knowledge.

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