

A Systematic Performance for Emerging Smart City Development – A Review

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Abstract - The smart cities concept is recently one of the “hottest topics” in urban development, especially in India. Implementation of infrastructure projects is highly prone to the uncertainties that may encounter at any period throughout the life cycle of project with different likelihoods and impacts. These uncertainties revoked during the construction process generates more or less severe consequences for an organization. Mainly in smart cities the recent years, world has faced some of the most serious economic, environmental, social and technological issues. However, more specific studies are needed from a project management perspective. In effect, several approaches and mechanisms can be adapted to smart city projects management in different project lifecycle in order to increase success for these projects. This research aims to define the limitations of smart cities research from a managerial angle and to fill some of the practical and theoretical gaps by analyzing the relevant literature to identify common and different management characteristics in smart cities projects and highlight the success factors and challenges smart cities projects. Also, it proposes a conceptual framework setting out a holistic view of smart city projects management.

Keywords — *Infrastructure, Smart City, Urban Development, Smart City, Challenges, Management*

I. INTRODUCTION

Construction Industries is one of the largest industries worldwide which plays vital role in the economic as well social growth of the country. In India, the growth of the industry is expected reach growth up to 5.6% during 2016-2020 [2]. The activities that register the highest growth are highway construction, power generation & urban infrastructure. India has the budget of almost 45,000 Cr. on infrastructure development during financial year plan. Out of which 70% of the funds are utilized for construction of roads, urban infrastructure & power sector. As such a fast growth of construction industry in India is expected to emerge as the third largest global by 2020. 100 Smart City, 5 Industrial Corridor, 25 Railway Stations, 3500 Km new Railway Line, 6 Mega Ports are under construction [7] From the above scenario, it is understood that building of infrastructure needs investment of huge capital and utilization of such huge capital solely depends on successful completion of the projects.

Mainly in smart cities the recent years, world has faced some of the most serious economic, environmental, social and technological issues. Since cities are a focal point for these profound issues; the smart city concept has emerged to represent the opportunities and challenges facing cities as they respond to these changes and the

problems generated by the urban population growth and rapid urbanization. More than ever before, technology companies realized the big and growing market of smart cities and acted accordingly [3] As a result, there are still limited insights on the barriers and the success factors for effective and efficient management of smart city projects and how can the appropriate practices affect or contribute to the success of smart city projects. Moreover, there is a lack of an integrated smart framework for smart city projects management in different contexts.

This research aims to define the boundaries of smart cities research from a managerial angle and to fill some of the theoretical and practical gaps by analyzing the relevant literature to identify common and different management characteristics in smart cities projects and highlight the success factors and challenges smart cities projects.

II. PROBLEM STATEMENT

Smart city projects require collaboration among private organizations, public institutions, NGOs, citizens, etc. which increase the complexity of these projects. The main challenges are poor communication and coordination among these participants, the leadership style, lack of policies for open data that enables sharing across departments and organizations, lack of support from both local government

and city administration, the time taken by organizations involved in the project to make decisions and breaking down silos that hinder the success of the project. However, implementing digital infrastructure is challenging because of the lack of knowledge about ICT systems and compatible software, the security and privacy problems where systems may get hacked or infected by viruses etc., the high cost of installing, operating and maintaining IT systems and the cost of training and hiring IT specialists. The main challenges are finding who can fund the project, choosing the right investment that will create long-term efficiencies, benefits, and return, the tendency to avoid huge investments that generate long-term benefits and focusing on short-term, and the need for innovative business, operating and finance models in order to transition from pilot projects into full-scale projects. smart city projects is their size and scope where two types of projects can be having multiple goals that do not align with the project vision can be challenging, also, miscommunication of the projects objectives to the local community.

III. LITERATURE REVIEW

The “Smart city” is a simple label for the complex forces shaping urban life in the 21st century. Even though miscellaneous efforts have been made to academically identify the smart city there is no universally accepted definition of it and the term is still fuzzy, as it means different things to different people with no unified concept or a single template of framing the smart city.

Joshi et al., (2016) Effective communication and mutual trust can solve conflicts and resistance to change. Another crucial factor is to have a strong legal department to deal with any legal or political challenges. Moreover, analyzing the project and forecasting its budget to get budgetary approval before the project starts. Finally, managers should control the project’s resources and budget to ensure sustainable development of the project [6].

Woods et al., (2016) The essence of smart city movement is to address these challenges and deliver better solutions by focusing on sustainability, innovative working life, citizen well-being and economic development. Furthermore, smart cities initiatives aim to improve city efficiency and implement infrastructure management and solutions that can lead to cost-saving and increased revenues [13].

Albino et al. (2015) The term “Smart city” was first used in the 1990’s where it only focused on the significance of new ICT regarding modern infrastructures within cities. Years later, the number of publications referring to the smart city has distinctly grown and started to associate with other aspects after it was too technically oriented especially with the emergence of smart city projects and endorsement by the European Union [7].

Dameri and Ricciardi (2015) point out key issues for

smart city success. These factors include selecting smart city projects based on higher-level smart city programs and according to an effective strategic vision, effectively coordinate smart city projects in order to avoid conflicts between projects and Continues assessments for project portfolios. [9].

Fleischmann and Heuser (2015) The smart city projects as the ones that are driven by institutions which develop the project objectives according to the challenges and key performance indicators (KPIs) of the smart city vision with the involvement of citizens. Two approaches can be identified; the top-down approach (the project is initiated by government or institutions) or the bottom-up approach (the project is initiated by citizens) [10].

Monzon, (2015) Many scholars have set out the smart city main dimensions which are economy, people, governance, environment, mobility and living. Each dimension represents a particular aspect of the city where a smart project aims to achieve smart city goals in efficiency, sustainability and high quality of life. A project is considered smarter when it’s associated with a higher number of dimensions [11]

Neirotti, (2013) Smart cities create a new market and new revenue opportunities for firms. Lastly, economic development (growth of GDP, employment, exports, foreign direct investment), quality of life, environmental and social sustainability, and less negative externalities are the created value for the public sector and city [12]

Leydesdorff and Deakin (2011) Each stakeholder plays a key role in delivering the vision of the smart city. For instance, governments set policies, provide funds and bring other stakeholders together in innovation programs where city administration and associations act as regulators, set benchmarking and collaboration mechanisms, and engage citizens in smart city projects. Also, investors and financial institutions provide funding to smart city projects where academia provides R&D and knowledge that supports smart city projects [16]

IV. SCOPE OF WORK

Based on many literature studies identify success factors for the smart city in a broad view, other studies focus on the factors affecting smart city strategy development. Therefore, they share most of the success factors. However, more specific studies are needed from a project management perspective. In effect, several approaches and mechanisms can be adapted to smart city projects management in different project lifecycle in order to increase success for these projects. For example, leadership models, risk management mechanisms and innovation management. Also, it’s necessary to formulate clear organizations policies that support cross-department/organization working and open-data policies to

ensure the success of smart city projects.

V. AIM

This research to define the limitations of smart cities research from a realistic angle and to fill some of the theoretical and practical gaps by analyzing the relevant literature to identify common and different management characteristics in smart.

VI. RESEARCH FRAMEWORK

The study conceptual framework was built on the literature review/analysis. This framework evaluates the impact of smart management practices on project success and identifies the relationships between smart project management practices and project success. Also, it will consider the effect of the project size and context (city, industry, partnership) (Moderated variables) on the relationships between smart planning practices, smart organizing practices, smart leading practices and smart controlling practices (dependent variables) and project success (independent variables). critical smart city practices will identify and categorized according to the management functions.

The project success is estimated according to cost, quality, time, sustainability (the project is sustainable in terms of people, profit and planet or what's called TBL[9] and the created value (benefits to all stakeholders and generated new knowledge).

Research Hypothesis:

- H1-4: There is a statistically significant positive relationship between smart management practices (planning, organizing, leading and controlling) and project success.
- H5-8: The impact of smart practices (planning, organizing, leading and controlling) [11] on project success is moderated by project size and project context.

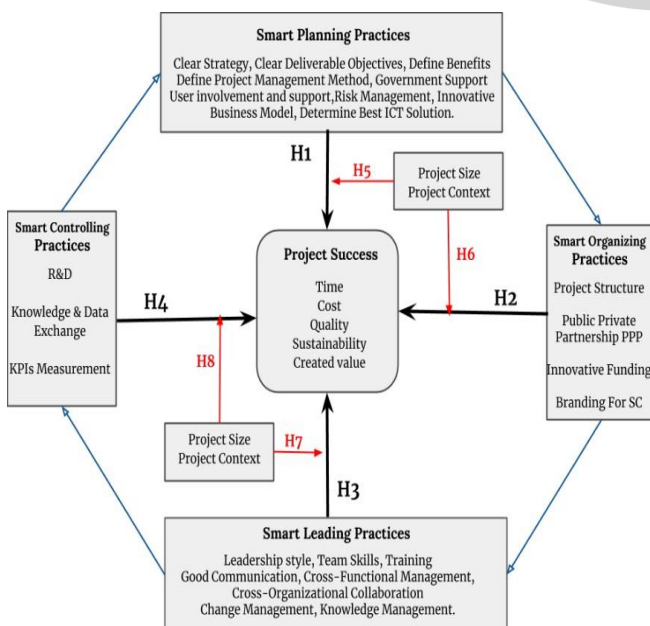


FIGURE 1 – RESEARCH HYPOTHESIS

VII. DATA ANALYSIS

- A Likert scale of 1 to 5 has been used for analysis of attributes for smart practices & Smart success criteria. A Likert scale is a type of psychometric response scale is named after Rensis Likert, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement. The scale is named after,

- The mean values of each risk factor will be calculated by average sum formula
- Relative importance index (RII) is obtained by using below given formula:

$$RII = \frac{\sum w}{A \times N} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + n_1}{(A \times N)}$$

- RII ranges from zero to one (0 ≤ index ≤ 1).

“w” is weighting given to each criterion by the respondents it ranges from 1 to 5 where 1 is very less and 5 is very high;

“A” is highest weight;

“N” is total number of respondents;

n1, n2, n3, n4, and n5 are number of respondents for each factor affecting labour productivity.

VIII. CONCLUSION

Smart city projects sound really attractive for a city, yet they can bring a lot of challenges to their development and management. The main research questions of this study were “How to run smart city projects efficiently and effectively in India?” and “How smart project management practices influence the project success in India?”. To answer these questions, a combination of the theoretical and empirical study will be conducted. First, the theoretical section outlined the relevant literature about the smart city concept, the approaches for defining the smart city projects and identified the challenges and the success factors for smart city projects management. It's important to note that the lack of available studies approaching the smart city concept from a managerial perspective justifies this study objective.

Second, a framework for Smart management practices and projects success criteria was built on the literature's findings. This framework consists of two parts. The first one includes the management functions which are planning, organizing, leading and controlling. Each function includes smart practices which can affect the project success.

The second part of the framework includes the smart success criteria for projects. In other words, indicators for smart city projects success. The above-mentioned practices and criteria will be identified from the combination of classical project management studies and the smart city

research.

Subsequently, to test the framework and the research hypotheses survey data will be used in the empirical section to explore the critical smart success on project success using quantitative methods. The questionnaire will be sent to managers, leaders and professionals who work in smart city projects in different sectors in India.

The quantitative study findings will be backed up the research hypotheses and elucidated that a significant positive relationship does exist between Smart project practices and project success.

Finally, based on the analysis, the proposed conceptual framework will be generalized in the Indian context setting out a holistic view of smart city projects management.

The study framework is a combination between the project management perspective and the smart city concept which provides a fresh view for smart city projects and defines new various factors that can potentially influence the success of smart city projects. Moreover, the study framework integrates the available knowledge on smart city projects and the research new findings which will provide guidance to organizations and professionals who work in smart city projects.

This study seeks to know the relative importance of barriers in smart city development. This research work offers an in-depth understanding of barriers, with a focus on smart city development, for devising both the plan of action and the suggestive measures in dealing smart city barriers effectively.

In expected outcome, Smart cities around the world need to develop new operating models that drive innovation and collaboration across the vertical silos. This study will contribute a small step to a deeper understanding of smart city projects management.

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