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A STUDY ON MULTI STAKEHOLDERS' PERCEPTION TOWARDS BENGALURU AS A SMART CITY

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Abstract:

The idea of smart cities and their productiveness has taken place in many countries. India, being one among them, has also initiated the scheme to establish smart cities. The purpose of this study is to explore the awareness, opinion and acceptance of the Bengaluru as a smart city, from its stakeholders' perspective. Using four major factors; urban, administrative, social and technological infrastructure, the level of preparedness and challenges have been identified. This paper has used simple random sampling method. Questionnaires were the mode of data collection using a 5 point Likert scale. A total of 970 samples were taken from various places in Bangalore which includes government, private and public for the study and statistical tools like SPSS and PLS were used to analyse the survey results. The survey has been taken from students, working professionals both private and public, Entrepreneurs and homemakers. The result shows that the 3/4th of the stakeholders from Bangalore has less relationship with awareness, acceptance and opinion also preparedness of smart city which includes urban, technology, administration and social were the impact are low among the stakeholders of Bangalore only quarter part of the stakeholders are prepared, so 3/4th of stakeholders have to be much more cautious in order to adapt on various factors which involves in smart city process in Bangalore and quarter part of the people were little bit knowledge regarding technological infrastructure and significantly less knowledge with regards to administrative, urban and social infrastructure. Helps identify areas where knowledge gap is high; can educate people in those areas.

Key Words: Smart City, Urban Infrastructure, Administrative Infrastructure, Social Infrastructure, Technological Infrastructure, Acceptance, Awareness, Opinion & Preparedness

1. Introduction:

Tracing the genealogy of the word smartin the label smart city can contribute to an understanding of how the term smartis being loaded. Cities in our days and especially in the upcoming decades have a tendency to be developing and emerging in the extent humankind would have never thought about before. Over half of all human population currently lives in cities or close around them. In a populated country like India, it is all the more required to come up with smart solutions in order to ensure ease of living and also to maintain a sustainable environment for the future generations to come [1]. The significance of citizens in a Smart city is huge, although the local governmental bodies need to be responsible for educating the society and involvement in development of Smart Cities, therefore, the new ways of effective communication need to be set [6].

There has always existed the need to use the limited quantity of resources that we have in the most efficient and effective way. Moreover, now, due to the social awareness about environmental protection, we also have to do it in the most ecologic way. Furthermore, in the process of implementation of a Smart City, citizens have a very high importance because at the end of the day, the entire concept of a smart city is to help benefit to citizens as well as to boost the economic and ecological status of the country [9]. Due to the ever growing need to bring smart cities into play, this paper aims to understand the perception level of Bangalore's citizens with regards to their level of preparedness for their city becoming a smart city and also the challenges they might face.

2. Literature Review:

Smart City: Smart city is an explicit emphasison the use of smart computing technologies. Their point of view was that the current urban crisis served as an imperative for the initiative of a smart city [22]. The performance of smart city in economy, people, governance, mobility, environment, technologies, living and infrastructures [21]. An architectural lens approach that shows smart city as a city that gives inspiration, shares culture, knowledge, and life, and motivates its inhabitants to create and flourish in their own lives [11]. In large, smart city is generally viewed as a large organic system, a system in which all the parts operate as a whole. A smart city should be treated as a linked system [20].

Bengaluru: Bangalore, officially the Bengaluru, is the capital of the Indian state Karnataka. Bangalore is located in the south eastern region on the state on the Deccan Plateau and it is the third most populous city and the 5th most populous urban area. Also known as the Silicon Valley of India, Bangalore has an estimated 2014 population of 10,178,000 in the metro area. Smart Cities Mission is an urban renewal and retrofitting program

by the Government of India with a mission to develop 100 cities all over the country making them citizen friendly and sustainable. The Union Ministry of Urban Development is responsible for implementing the mission in collaboration with the state governments of the respective cities. Bangalore made it into the smart city list in the 4th round. India's Silicon Valley finally made it to the Smart City list announced by the Centre on Friday, after missing the cut twice. The BBMP [Bruhat Bengaluru Mahanagara Palike] plans to spend INR 1,700 crore to improve infrastructure in the city. Bengaluru is among 10 state capitals selected by the Centre to be developed as smart cities. The application for the coveted title was jointly made by the BBMP and Jana Urban Space Foundation. The competition ended in March 2017 and gave BBMP 45 days to prepare a solid proposal on sectors it wants to revive, using the INR 1,000crore project fund over a five-year period. The BBMP proposed INR 1,700 crore for all these projects to be taken up, using Smart City funds, of which INR 500 crore will be sanctioned by the ministry of urban development and the remaining INR 1,200 crore will come from the state. Sources: [Demography, Smart city and Smart city proposal].

Smart Governance: Smart Governance is the section which aims at quality, effectiveness, efficiency and good course of the acts of the government. Taking in account that citizens are important at the time of take governmental decisions, when this element is described we include factors such as civic participation, the involvement of the business leaders, and the implementation of government projects [13]. Moreover, nowadays it's important for the government to take consider citizens' opinions in their decision making process. In this way, they ensure that their decisions reflect the values of their citizens, therefore avoiding dissatisfactions and misunderstandings [12]. To know what the citizens think there are a series of direct channels of communication like the website of the public administration or the digital suggestion box, but the creation of virtual communities or a profile on the social networks is also very beneficial because it encourages the participation of the citizens and generates common interest groups [5].

Smart Environment: The objectives of the Smart Environment are to satisfy the needs of the citizens without harming the development and satisfaction of the needs of the future generations. Hence the importance to care for the environment by limiting pollution, green building, alternative energy use, the use of eco-friendly transports, optimal use water, and any other measure to help combat climate change and its effects [15]. However, cities tend to require every time more energy consumption and building materials, causing over time more unsustainable and damage to the environment. Therefore it is of vital importance to perform efficient and sustainable urban planning, with the support and participation of their inhabitants. Some of the most common services related to smart environment are smart energy grid, waste management, water management, etc., [8].

Smart Living: Smart Living comprises of the incorporation of policies and services that enhance the quality of life of the citizens, improving their health, safety, and social cohesion [4]. With regards to security, new technologies make cities much safer thanks to better security system that gives a good response capacity to any anomaly, since the level of risk can be higher in those areas open to terrorism, crime and natural disasters [2]. It is to incorporate a number of services to improve the quality of life of the citizens, either by offering an improvement in their health by remote medical devices, or more security by providing an immediate response [10].

Smart Mobility: It refers to the ability to move around the city and access public services via the Internet [3]. The major factor of consideration would be road infrastructure or public transportation, which influences the quality of life of citizens, also favouring labour mobility and the output of goods and services produced [17]. Improving traffic makes travels easier, plus they are reduced the travel time since there are less traffic jams, reducing environmental and noise pollution [18]. If we want to extend the use of public transport, it's not only necessary build the necessary infrastructure, but also to convince public to use it [16]. For this reason it's advisable to take certain actions to encourage its use, such as the government have to aware the inhabitants of the advantages of the use of the public transport, provide discounts for people who have a limited budget, emphasize its quality and access for disabled people, etc. [23].

Smart People: Human capital is one of the most important features of a Smart City, because without Smart People there can't be Smart Cities [8]. Therefore it's important to both attract talent from outside and also to retain existing talent in our own city, paving way to create projects that are necessary to improve education, creativity and research [19]. The inhabitants of a city should have the right to participate and give their opinion on the development of public projects [7].

Smart Economy: Smart Economy is all those factors that promote the economic development of a city, among which may include the promotion of local businesses, transition plans, industrial plans, generation of clusters, and promotion of innovation and support all the entrepreneurial initiatives [11]. Another possibility is the specialization of a specific sector which can bring great benefits to attract international headquarters. Smart Economy has the objective to promote economic development of the city by easing financial transactions, supporting entrepreneurship, and attract foreign investors and tourists through internationalization policies [14]

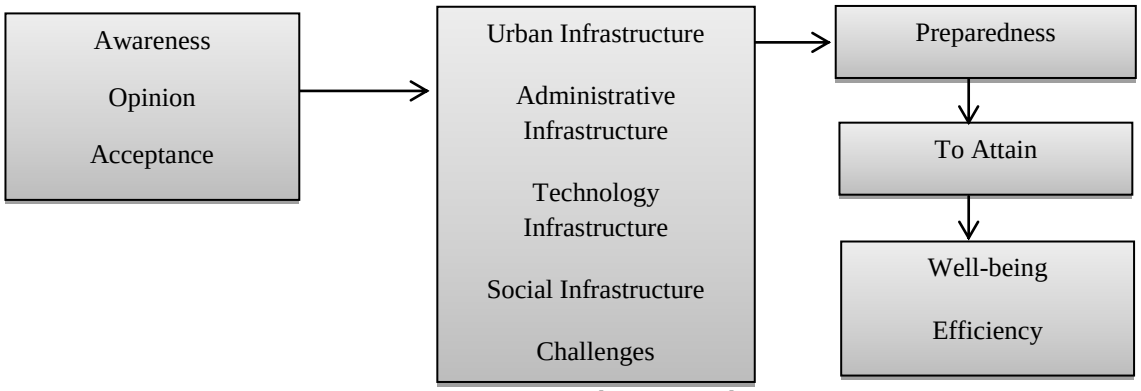

Figure 1: Research Framework

Objectives:

- ✓ Exploring the awareness, opinion and acceptance of stakeholders of Bengaluru as smart city.
- ✓ Identifying factors on urbanization, administrative, technology and social infrastructure for smart city preparedness.

3. Methodology:

This is a descriptive study. Data collection was through surveys, where questionnaires were used. The questionnaires were personally administered to all the samples. A total of 970 samples were taken for the purpose of this study and the sampling technique used was simple random sampling. In simple random sampling we took around 970 samples from various places of Bangalore like electronic city, koramangala (forum mall), mahadevpura (phoenix mall) and malleshwaram (mantri mall) from the stakeholders who are professionals in private, government, entrepreneurs, homemakers etc., The information for this study was brought together by using four variables; urban infrastructure, administrative infrastructure, technological infrastructure and social infrastructure. The questions were asked on a five point likert scale. On completion of data collection, the survey results were entered into an excel sheet, and then imported into various statistical tools like SPSS [Statistical Package for the Social Sciences] and PLS for analysing the results. In SPSS we used frequency and descriptive statistics to check the mean value and demographic profile of the survey respondents for each variable under a particular construct and in PLS we have Cronbach Alpha and T-Statistic. Cronbach Alpha is to check the input and output variables are reliable and T-Statistic is a bootstrap process which is used to give results whether our objective is supported or not.

4. Results and Analysis:

The below graphs show the demographic profile of the survey respondent's data gathered from spss-:

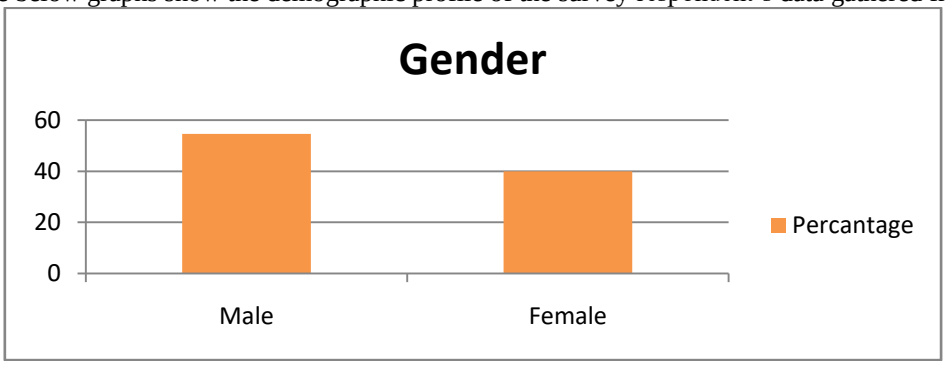

Figure 2: Gender

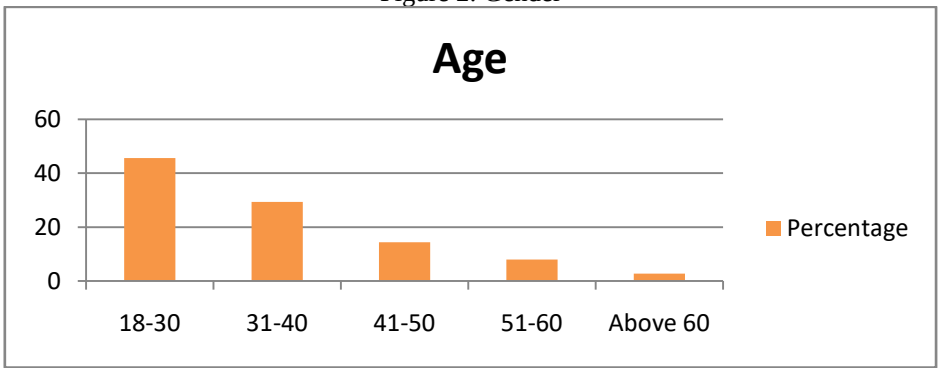

Figure 3: Age

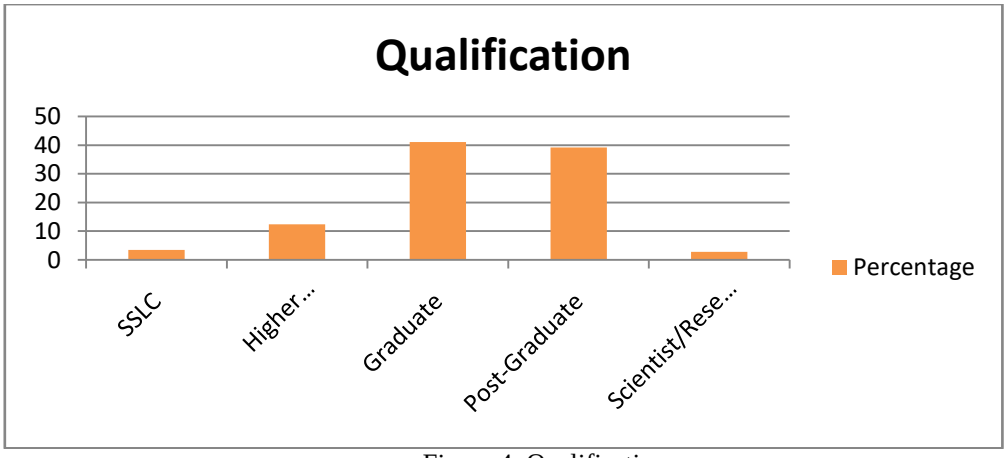

Figure 4: Qualification

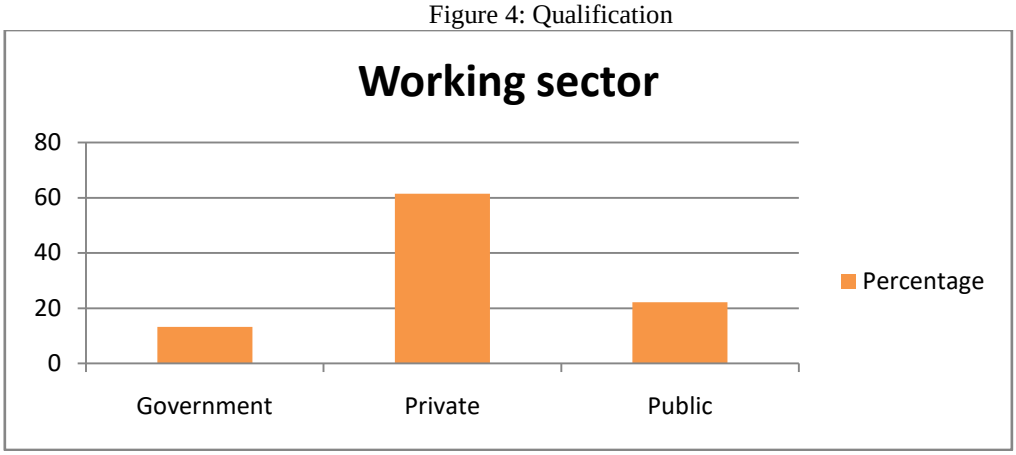

Figure 5: Working sector

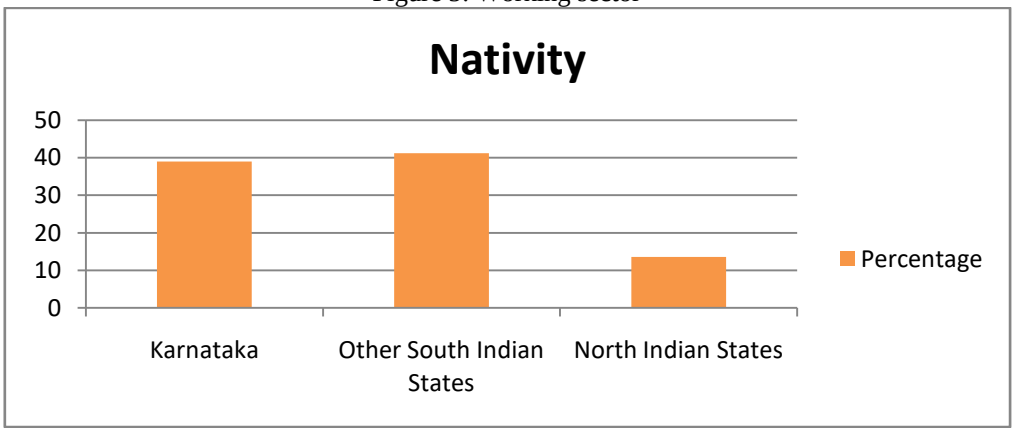

Figure 6: Nativity

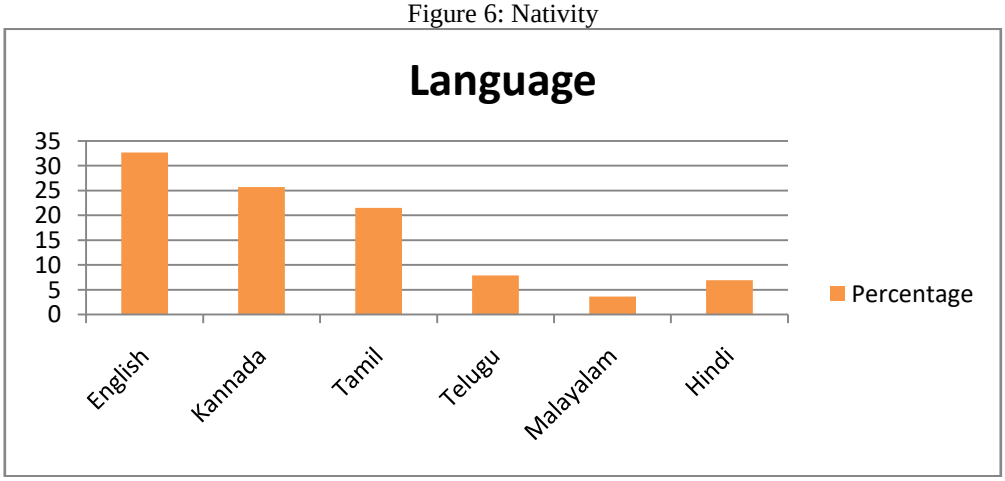

Figure 7: Language

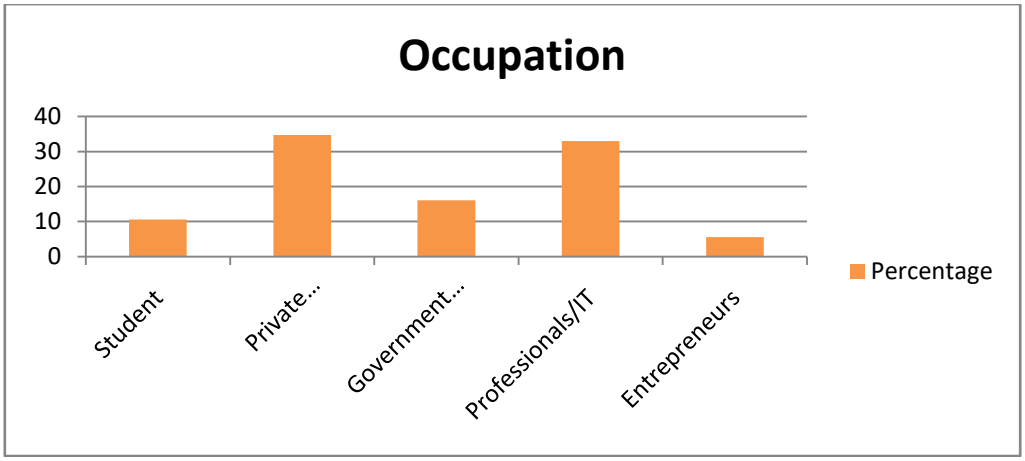

Figure 8: Occupation

The above seven constructs were the demographic profile which was measured with the help of variables which are identified and then tested to measure whether the stakeholders are prepared for Bangalore as a Smart City.

Table 1: Descriptive Statistics of Questionnaire Items:

Construct	Items	Mean	Standard Deviation
Awareness	Aware about smart city project in Bangalore	2.7351	1.22534
	Discussion about smart city among family, friends and work groups	3.0495	1.32048
	Cooperation and participation of citizen	3.1485	1.04325
	I am technology savvy	3.0526	1.30898
	IT Parks enhances standard of living economically	3.7113	1.08616
	Awareness helps in preparedness of smart city?	3.7031	1.17617
Acceptance	I understand the smart city concept	3.4206	.99658
	Convenience for younger generations	3.5577	.92286
	I am committed to the smart city project	3.2732	1.59741
	I am willing to adapt to the resulting changes	3.6010	.98942
	Acceptance helps in preparedness of smart city?	3.4062	1.17944
Opinion	Smart cities are worth the economic cost	3.1546	1.17631
	Maximize urban life quality	3.3052	.97739
	Will have a positive impact on our lives	3.0536	1.32032
	It is essential to the future of the city	3.3835	1.01044
	smart city project will help all classes of society	3.0062	1.28978
	It improves safety measures	3.4536	1.09338
	It will help restore historic places	3.2577	1.33677
	Positive impact on health conditions	3.5309	1.19146
	Increases government revenue	3.8557	1.17147
	It should include water processing system	3.8804	1.12580
	Green avenues enhances quality of health	3.5340	1.34440
	Your opinion helps in preparedness of smart city?	3.4876	1.29233
Urban Infrastructure	Metros, flyovers and subways will reduce traffic	3.1402	1.25777
	Need for electric charging points for E – Vehicles	3.5186	1.04401
	Separate lanes for cyclists, private and public transport will help ease traffic	3.5289	.99207
	Separate lanes for pedestrians	3.7196	1.18458
	Need for solar plants for Institutions	3.8866	1.08347
	Development of storm water drainage system for the safety	3.8021	1.70472
	Digital accessibility at Inter-state bus station	3.4619	1.06985
	Smart modes of transportation will be very useful for the public	3.7000	.96251
	Renewable energy plants should be implemented	3.7247	.93742
	Traffic signals should be automated for peak traffic hours	3.7897	1.01947
	Sewage Treatment Plant for healthy environment	3.8412	.99304

	Urban infrastructure helps in building smart city	3.7227	1.09902
Administration Infrastructure	Involvement of stakeholders for the lake recovery	3.0495	1.06333
	Stakeholders participation in decision making	3.4598	.86613
	Smart city community involved in programs driven by government	3.5082	.93903
	E-filing of property tax	3.5175	.95848
	Approval of building plans online	3.4794	.99435
	Administration infrastructure helps in building smart city	3.4629	1.11151
Technology Infrastructure	Intelligent parking management system	3.3680	1.07960
	Information should be available to the public through government apps	3.6485	1.02150
	Public parks should be equipped with free Wi-Fi hubs	3.1371	1.33337
	Free electrical charging points should be available across the city	3.6052	1.00554
	Cctv cameras should be installed to ensure over speeding of vehicles and safety	3.8866	1.07679
	Technology infrastructure helps in building smart city	3.7845	1.16093
Social Infrastructure	Renewable energy plants for slum areas	3.3340	1.23910
	Maintenance of the city's historical sites	3.6670	.98881
	Emergency aid should be available to ensure women's safety	3.8392	1.68736
	Enabled for differently abled	3.8392	.92980
	Smart city enables Bangalore as a tourist destination	3.6959	.93066
	Social infrastructure helps in building smart city	3.6959	1.07859

From the above table we obtained the mean value and mostly the mean value for all the variables is 3.0 and we can understand that the most of public from Bangalore were not aware and not prepared about the smart city and value 3.0 denotes that neither or nor.

5. Hypothesis:

Hypothesis are framed based on the constructs and all the constructs are put into exploration using PLS and illuminated as follows

- ✓ There is a positive relation between awareness, opinion and acceptance to attain Smart city status
- ✓ Does preparedness of urban, administrative , technology and social infrastructure are responsible for achieving preparedness for smart city

Causal Model and Hypothesis Testing:

The conceptual model is then tested through PLS and it showed the results as follows.

1. Exploring the awareness, opinion and acceptance of stakeholders of Bengaluru as smart city and Identifying factors on urbanization, administrative , technology and social infrastructure for smart city preparedness

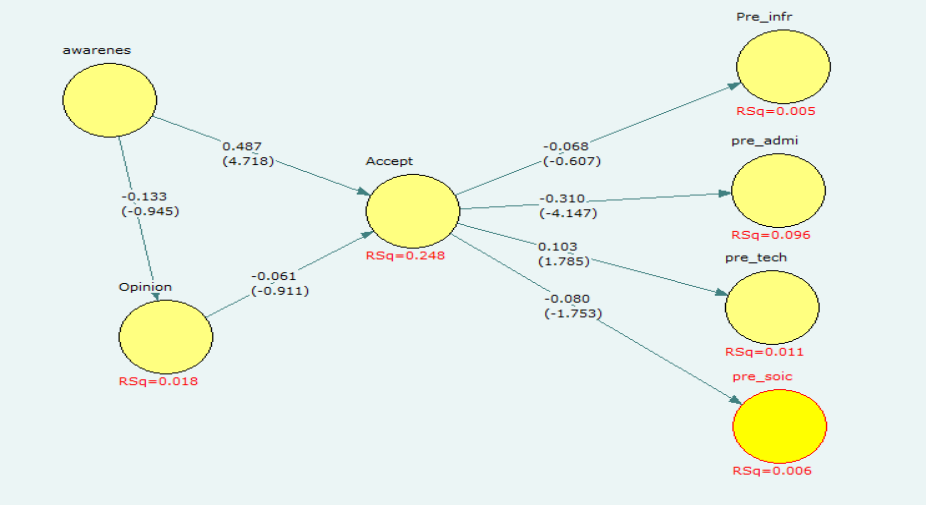

Figure 9: Conceptual model using PLS

Table 2: Reliability of Constructs using PLS

Reliability and Ave				
Construct	Composite Reliability	Ave	Cronbach Alpha	Result
Awareness	-0.001209	13.443586	0.624582	Reliable
Acceptance	5.153248	5.992117	0.734584	Reliable
Opinion	-0.044653	5.619245	0.679446	Reliable
Urban Infrastructure	4.614528	5.854089	0.886385	Reliable
Administrative Infrastructure	-2.750220	2.629741	0.720265	Reliable
Technology Infrastructure	0.006543	0.010862	0.658527	Reliable
Social Infrastructure	-6.528518	10.375580	0.787811	Reliable

Table 3: Bootstrap Summary

Structural Model – Bootstrap					
Construct	Entire Sample Estimate	Mean of Samples	Standard Error	T-Static	Result
Awareness-> Acceptance	0.4870	0.1328	0.1032	4.7179	Significant
Opinion-> Acceptance	-0.0610	-0.1076	0.0670	-0.9105	Insignificant
Awareness->Opinion	-0.1330	-0.2105	0.1408	-0.9446	Insignificant
Acceptance->Urban	-0.0680	-0.1464	0.1120	-0.6071	Insignificant
Acceptance>Administration	-0.3100	-0.0896	0.0748	-4.1468	Insignificant
Acceptance-> Technology	0.1030	0.0740	0.0577	1.7845	Significant
Acceptance->social	-0.0800	-0.0623	0.0456	-1.7529	Insignificant

From table 2 we found that all the variables under each construct are reliable since the values are greater than 0.6. Hence awareness, acceptance, opinion, urban infrastructure, social infrastructure, administrative infrastructure are reliable. Cronbach alpha is used to check input and output variables are reliable or not and from table 3 it has been found that technology infrastructure are significant since their T–statistic value is greater than two remaining all other variables insignificant since the T-statistic value is less than two.

6. Findings:

Stakeholder's had a positive relationship about the awareness and acceptance in technology infrastructure of Bangalore smart city. But when it comes to social infrastructure, urban infrastructure and administration infrastructure the stakeholder's of Bangalore are not accepting the changes in these constructs and also not aware in these constructs but ready to accept a technological change.

7. Suggestions:

Thus we are in modern culture it is important that stakeholders has to be aware and accept the changes for the betterment of a city and they should not focus or narrow down to one factor like technology instead the stakeholders has to be involved in various factors also like urban, administrative and social infrastructure. If the stakeholders follow all the factors and even if they aware about the changes and ready to adapt to it then it will be easy to become Bangalore as a smart city.

8. Conclusion:

Smart Cities are urban spaces with a complex system of services that turn around its inhabitants, satisfying their needs with a more efficient and effective management using the new technologies. It's not only important that fact that the deployed services will be useful to citizens, but also the citizens will have the necessary competences to use them properly. Moreover, it is also important to check the preparedness level of the citizens whose city is going to become a smart city. This study has managed to identify how the multi-stakeholders of Bangalore perceive the concept of a smart city. In summary the stakeholders or public has to be much more cautious in order to adapt on various factors which involves in smart city process in Bangalore.

9. Limitations and Directions for Future Research:

The study, although with an absolute 970 samples, might not be able to give an accurate result of the perception of all the citizens of the city. This study has analysed the preparedness of citizens of Bangalore with respect to their city becoming a smart city. The results and analysis of this paper could be used for various cities. Similar research could be conducted in other cities, thereby giving the scope to do a cross-regional research and how the responses vary from one place to another.

10. Managerial Summary:

The main focus of our project is to understand the multi stakeholder's perception of Bangalore smart city. We started our research by collecting information (insights) from various websites and some of the journals from Proquest, Google scholar regarding Bangalore and smart city then in order to take survey we prepared questionnaire based on our objective and we took sampling of about 970 samples in Bangalore from various places of Bangalore city. From that we entered the survey data in excel sheet which has been incorporated in SPSS and PLS software for our study. Through SPSS we obtained the mean value and demographic data and

from PLS we got whether the input and output variables are reliable or not as well as stakeholder's preparedness of smart city.

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