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## Impact of Smart City on Tourism Industry: A Case Study of Udaipur City

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**Abstract** The purpose of Smart City concepts is to maximize urban life quality and to increase energy efficiency, to reduce harmful emissions and to enhance the quality of urban services utilizing the possibilities provided by the available ICT-devices (Information Communication Technology). A set of the common multidimensional components underlying the smart city concept and the core factors for a successful smart city initiative is identified by exploring current working definitions of smart city and a diversity of various conceptual relatives similar to smart city. Paper studied citizen perception for strategic principles aligning to the technology, people, and institutions of smart city. It focused on strengthening human infrastructure, and governance for institutional improvement and citizen engagement. The study revealed that sanitation, including solid waste management, Telecom services, Promoting mixed land use in area based developments, Good governance (especially e-Governance), and Well Connected by road, air & railway are important facilities for a development of Smart City and have significant impact on promoting smart city tourism.

**Keywords** Smart City, citizen, perception, strategy

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### Introduction

Assuming that there is a possibility for end-users to reject some of the Smart City principles and, consequently, to jeopardize its perennality, we argue that studying how citizens perceive some of the Smart City concepts is a prerequisite for the assessment of the Smart City sustainability scheme. In this paper, we test the acceptability of the Smart City by confronting the theoretical concepts generally mobilized in the literature with the people's actual perceptions. To this end, a short survey was distributed on the occasion of three Smart City events. It also identifies the main dimensions and elements characterizing a smart city. The different metrics of urban smartness are reviewed to show the need for a shared definition of what constitutes a smart city, what are its features, and how it performs in comparison to traditional cities. Furthermore, performance measures and initiatives in a few smart cities are identified.

The conceptualisation of Smart City, therefore, varies from city to city and country to country, depending on the level of development, willingness to change and reform, resources and aspirations of the city residents. A smart city would have a different connotation in India than, say, Europe. Even in India, there is no one way of defining a smart city.

Some definitional boundaries are required to guide cities in the Mission. In the imagination of any city dweller in India, the picture of a smart city contains a wish list of infrastructure and services that describes his or her level of aspiration. To provide for the aspirations and needs of the citizens, urban planners ideally aim at developing the entire urban eco-system, which is represented by the four pillars of comprehensive development-institutional, physical, social and economic infrastructure. This can be a long term goal and cities can work towards developing such comprehensive infrastructure incrementally, adding on layers of 'smartness'.



The question of urban sustainability has come to the front of research in the past decade. It is resulting from the fact that the proportion of urban population continuously increase, according to the estimations 70% of the population will be urban citizen by 2050. On the other hand cities play a significant role in sustainability, climate protection and the reduction of harmful emissions. Several innovative initiatives were performed on the area of the establishment of carbon-neutral cities of zero energy consumption and sustainable municipalities.

The purpose of Smart City concepts is to maximize urban life quality and to increase energy efficiency, to reduce harmful emissions and to enhance the quality of urban services utilizing the possibilities provided by the available ICT-devices (Info Communication Technology). Nowadays the condition of the urban environment, the urban problems can be constantly measured and monitored by means of instruments and with the help of data analysis and process forecasts we can offer up-to-date solutions for them. Intelligent devices have come to the focus when researching city organizations.

The worldwide population nowadays keeps increasing, resulting in faster urbanization and larger energy consumptions. The stability of the Smart City over time and thus its sustainability, is consequently heavily dependent on the citizens' perceptions. Their acceptability is crucial: citizens have a decisive influence on the potential success/failure of the Smart City global model, as they have the power to decide which concepts or technologies they accept/reject, this way either enhancing or endangering the sustainability of the model.

### Literature Review

As the term "smart city" gains wider and wider currency, there is still confusion about what a smart city is, especially since several similar terms are often used interchangeably. Some typical features of comprehensive development in Smart Cities are described (source: <http://smartcities.gov.in>)

1. Promoting mixed land use in area based developments
2. Housing and inclusiveness
3. Creating walkable localities
4. Preserving and developing open spaces
5. Promoting a variety of transport options
6. Making governance citizen-friendly and cost effective
7. Forming e-groups to listen to people and obtain feedback and use online monitoring of programs and activities with the aid of cyber tour of worksites;
8. Giving an identity to the city

Applying Smart Solutions to infrastructure and services in area

The core infrastructure elements in a smart city would include (source: <http://smartcities.gov.in>):

1. Adequate water supply,
2. Assured electricity supply,
3. Sanitation, including solid waste management,
4. Efficient urban mobility and public transport,
5. Affordable housing, especially for the poor
6. Robust IT connectivity and digitalization,
7. Good governance, especially e-Governance and citizen participation, viii. sustainable environment,
8. Safety and security of citizens, particularly women, children and the elderly, and Health and education.

### Definition of Smart Cities

**Table 1:** Smart city definition

<b>Hardware centered definition</b>	Emphasis on ITC infrastructures and apps	(Cairney and Speaks, 2000; Washburn and Sindhu 2010)
<b>Social centred definition</b>	Human Capital as core Factor	(Partridge, 2004; Berry and Glaeser, 2005);
<b>Technological capabilities and social innovation are combined each other</b>	Smarter communities support the well-being of all citizens	Kanter, R. M., & Litow, S. S. (2009).



		Campbell, T. (2012), Beyond Smart City: How cities network, learn and innovate, Earthscan, NY.
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### *The Innovative City*

Andrejevic and Burdon (2015) revealed that the smart city is based on the identification of millions of elementary occurrences from recording traffic hotspot, evaluating individual's energy consumption to measuring air pollution. Smart tourism is becoming a big contributor and benefactor of the "sensor society" that is characterized by ubiquitous, always-on data capture. La Rocca (2013) revealed that during all travel-related activities, customers leave electronic traces like searching a trip, planning, booking, giving feedbacks, etc. As a result it multiplies the sources of data, the channels of communications and the interactions. Yet, despite the abundance of data, few cities are able to interpret and integrate these data inside their urban system. One key question is the role of governments in these cities: do governments have to take the leading role in coordinating smart city initiatives despite their own short term engagement?

Coe et, al, (2001) said that smart city governance should encapsulate collaboration, cooperation, partnership, citizen engagement and participation". Anne Hidalgo (2016) revealed that tourists need to break down their current practice of working in silos and act as a network of multiple systems. Moon and Welch (2005) revealed that the Cities that can shift from the traditional bureaucratic approach to using ICT to support e-governance can achieve greater smart city objectives". Mulligan (2013) expressed that the Future Space Foundation believes that "making data more readily available improves travel experiences for everyone, whether they are a commuter, a tourist or a resident exploring everything the city has to offer." Therefore cities need to "open-up" to their citizens by offering their data in an easily accessible and reusable format. Moreover, open data policies can also foster a culture of innovation as well as create jobs.

Accordingly, the purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes. Area- based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving liveability of the whole City. New areas (greenfield) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities.



Figure 1: List of Smart Solutions



From the discussion of conceptual variants of smart city in the preceding section, Nam (2011) identified and clarify key conceptual components of smart city, and re-categorize and simplify them into three categories of core factors: technology (infrastructures of hardware and software), people (creativity, diversity, and education), and institution (governance and policy). Given the connection between the factors, a city is smart when investments in human/social capital and IT infrastructure fuel sustainable growth and enhance a quality of life, through participatory governance.

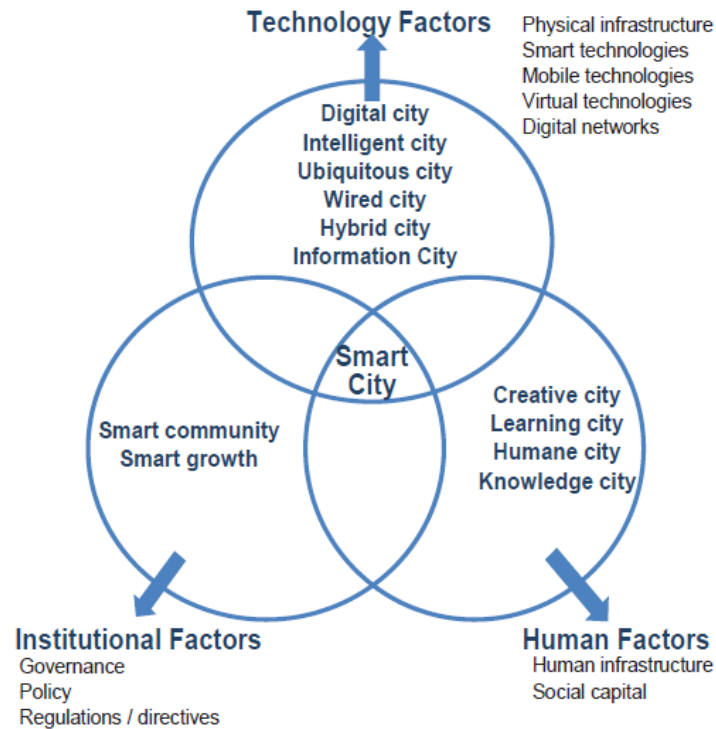


Figure 2: Fundamental components of Smart city, source: Nam (2011)

The literature covering sustainable development and the different documents dealing with development policy consider the question of the sustainable urban development, climate protection and the provision of economic sustainability as serious challenge (Lukovich et al., 2013). The Smart City model envisions a city made more sustainable particularly through technology deployment (Dameri, R. P., & Cocchia, 2013). Although higher connectivity might indeed help addressing a wide range of issues, researchers largely agree that such technocentric model mainly depends on citizens' adoption of these technologies on a daily basis (Ben Letaifa, 2015 and Monfaredzadeh Krueger, 2015).

Literature investigations prove that the human being, living quality and sustainability are in the centre of smart city approaches and concepts, for this the reasonable utilization of urban resources, the management of urban problems and acutally the organization of urban life are performed with the assistance of ICT devices and the data available through them (Angelidou, 2015). Upon examination of the success of Smart City concepts it can be stated that a critical urban mass of extent is required (Belanche et al., 2015), which uses the infrastructure of the city, participates in the data provision and lay down the directions of urban processes and developments. The instrumentation, the establishment of ICT-conditions are fairly expensive, the return period is generally long, so smaller cities can be hardly integrated into the row of big cities applying real smart solutions.

The Smart Cities Mission requires smart people who actively participate in governance and reforms. Citizen involvement is much more than a ceremonial participation in governance. Smart people involve themselves in the definition of the Smart City, decisions on deploying Smart Solutions, implementing reforms, doing more with less and oversight during implementing and designing post-project structures in order to make the Smart City developments sustainable.



### ***Understanding the change in the tourist experience***

Travel experience is defined by all the interactions and emotions felt by the traveler at each step of his trip. Considering the dynamic nature of the tourism industry, experiences are subject to constant change. With fierce competition in the domain of tourism experiences, the two significant paths for improvement have to do with the integration of ICTs and the increasing co-creation of experiences. Further the Role of stay facility (Hotel) is also important. The new current chains in Udaipur like Oyo.

### ***Information and communication technologies***

Sigala (2012) revealed that ICTs have represented a catalyst of change that has opened unprecedented possibilities for tourist experience creation and enhancement". As per Zhang et al (2012) The 4 forms of ICTs vital to enable the collection of information in a bland and cost-effective way. Picolli et al. (2003) explained that when strategically implemented, companies can use ICTs to collect and analyze consumer needs to maximize both tourist satisfaction and the destination competitiveness.

### ***Co-creation***

Neuhofer & Buhalis (2013) explained that Empowered experiences incorporate major technological solution to allow the tourist "to become highly concerned, actively contribute and co-create with numerous toursits throughout all stages of travel". Pine & Gilmore (1999) revealed that it also plan to provide customers with empowered and unique experiences and thereby creating added value for them was proposed as a the key competitive advantage. As a result, Pine & Gilmore (1999) further emphasize that "companies do not actually compete in terms of market price but rather in terms of the distinctive value of an experience provided".

### ***Upgrading the experience***

Technological advancements have been central in building up platforms of interaction where dialogues occur, fostering personalization and creating meaningful experiences (Buhalis, 2002). In operating such possibilities, tourists are integrated in the value chain and can customize their experience according to the background, their needs and preferences. Such change in touristic behavior has brought the tourism industry to a challenging situation and has led to the development of "smart destinations."

### ***Methodology***

In order to test the acceptability towards the Smart City main concepts, we built a short questionnaire distributed in the context of Smart City. The research methodology accounts for this research work includes the following points:

**Data Source:** The data for the current research paper was collected by using primary source as questionnaire and secondary source as data from ministry of tourism, Government of India (GoI) to measure the arrivals of tourists before and after declaring the smart city and responses from the tourists travelled at Udaipur.

**Universe of study:** The total numbers of visitors travelled to Udaipur city.

**Sample size:** For the purpose of current study a sample of 100 tourists were selected on the basis of the convenient sampling method.

**Data analysis Tools:** The statistical tools & techniques used during the study include one sample and Paired t test and multiple regressions for calculating differences and the significant variables regarding perception for their interest and expectation while their visits to Udaipur city.

**Geographic Scope:** Udaipur is known as the City of Lakes and is a popular tourism site due to its Rajput palaces, and scenic nature. It is also known for its handicrafts and rich mineral sector. The city lies 415 km from state capital Jaipur, but 250 km from regional hub Ahmedabad.

The demographic profile of the respondents was shown in table-2 as under:

**Table 2:** Demographic of respondents

<b>Criteria</b>	<b>Values</b>	<b>Percent</b>
<b>Age</b>	20 to 30 years	29
	30 to 40 years	30
	40 to 50years	31





	51 and above	10
<b>Education</b>	School level	9
	Graduate	42
	Post Graduate	49
<b>Gender</b>	Male	58
	Female	42
<b>Occupation</b>	Agriculture	16
	Service	43
	Business	41

### Data Analysis

To analyse the data of the tourists visiting the Udaipur city is checked with the help of the total data of tourists visiting Udaipur. The monthly data is shown in the table-2 with the percentage for all India basis. The data of the tourists were

**Table 3:** Location wise number of Domestic and foreign Overnight Visitors (2014)

A. Domestic Tourists													
	April	May	June	July	August	September	October	November	December	January	February	March	Total
Udaipur	97342	250036	159282	85722	61217	70199	89120	154615	164825	50036	38477	43108	1263979
India Total	516647	957716	977380	666854	715734	866750	981642	1137466	1131352	357153	447727	474711	9231132
Percent	18.8411	26.10753	16.29683	12.85469	8.553038	8.099106	9.078666	13.59293	14.56885	14.00968	8.593853	9.080893	13.69257
B. Foreign Tourists													
	April	May	June	July	August	September	October	November	December	January	February	March	Total
Udaipur	18902	36355	5193	6496	11454	6137	11341	19654	23719	11162	12592	21533	184538
India Total	110203	108015	51954	30378	38570	40962	120348	139235	145827	80532	68248	76632	1010904
Percent	17.15198	33.65736	9.995381	21.3839	29.69666	14.98218	9.423505	14.1157	16.26516	13.86033	18.45036	28.09923	18.25475

Source: Collection of Domestic Tourism Statistics for the State of Rajasthan (Reference Period April 2014 to March 2015).

Further the current data revealed that in Udaipur tourist data (2016) broke the record of 2015 by witnessing a growth of almost 55000 tourists. As per the stats available, December 2016 saw 7 lakh 62 thousand Indian tourists and 1 lakh 83 thousand foreign tourists. Indian tourists outnumbered all in 2016. (Udaipur times, 2017, <http://udaipurtimes.com/udaipur-tourism-at-its-peak-in-2016/>)

AS Udaipur has declared as smart city in the year 2015, the data related with projected demand of the hotels before and after the smart city declaration.

**Table 4:** Projected demand of rooms in 2015 Udaipur

	Luxury	Budget	Total Classified	Others	Grand Total
2016	7332	8989	16321	8648	24970
2014	3445	3414	6860	2625	9485

Source: Ministry of Tourism (India)

The data are compared with the help of paired sample t test to find out that whether there is any difference in the condition before and after for the various types of the hotel. The following hypothesis was developed:

H<sub>1</sub>: There is no difference in the demand estimated for hotel before and after the declaration of the smart city.

The data are analyses with paired sample t test by using SPSS-19 software and the results are presented in table 5 as under:

**Table 5: Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	before	4639.8333	6	2908.97407	1187.58369
	after	11379.1667	6	8079.25505	3298.34206
Paired Samples Correlations					
		N	Correlation	Sig.	
Pair 1	before & after	6	.976	.001	
Paired Samples Test					
		Paired Differences	t	df	



**Table 5: Paired Samples Statistics**

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	before	4639.8333	6	2908.97407	1187.58369
	after	11379.1667	6	8079.25505	3298.34206

**Paired Samples Correlations**

		N	Correlation	Sig.
95% Confidence Interval of				
the Difference				
		Std. Error	Lower	Upper
Pair 1	before - after	-6739.33	2154.45	-12277.53
		5277.31	-1201.14	-3.128
				5
				.026

The result of the paired sample t test revealed that the above hypothesis is rejected as difference in the situation before and after the declaration of smart city is significant on  $t=-3.128$  and  $P=.026 < 0.05$ . and as per the mean value we can further revealed that after declaration of smart city the demand estimated for hotel after the declaration of the smart city.

Further, to know the variable showing the impact of smart city on the tourists the variable of Facilities available in Udaipur city, Smart city variables and Impact of smart city over tourists, following hypothesis were developed:

$H_{1(c)}$ : The attributes configuring Facilities available in Udaipur city, Smart city variables and Impact of smart city over tourists significantly influence tourism

To identify key variables in multivariate regression analysis has been used with SPSS-19 software and results were shown in table 5 as under:

**Table 5: Multiple Regression (Dependent Variable: Impact)**

Dimensions	Variable	Constant/beta Value	Adjusted r square	ANOVA	Sig.
Facilities available in Udaipur city	(Constant)	.726	0.574	45.467	.000c
	Facil_avai_11	.783			
	Facil_avai_1	-.200			
	Facil_avai_13	.241			
Smart city variables	(Constant)	.745	.430	75.694	.000a
	Smart_City_1	.780			
Impact of smart city over tourists	(Constant)	3.513	.029	3.965	.049a
	Impact_1	-.262			

## Result

The final Regression model with 3 independent variables (Facil\_avai\_11, Facil\_avai\_1 and Facil\_avai\_13) explains almost 57.4% of the variance of Facilities available in Udaipur city. The final Regression model with 1 independent variable (Smart\_City\_1) explains almost 43% of the variance of Smart city variables and with 1 independent variable (Impact\_1) explains almost 2.9% of the variance of Impact of smart city over tourists. Also, the standard errors of the estimate has been reduced significantly, the margin of errors for any predicted value of Facilities available in Udaipur city, Smart city variables and Impact of smart city over tourists. The regression coefficients, plus the constraints are significant at 0.05 levels.

The ANOVA analysis provides the statistical test for overall model fit in terms of F Ratio. Using the values of selected variables this errors can be reduced significantly. With the above analysis it can be conclude that only three variables i.e., Facil\_avai\_11 (Sanitation, including solid waste management), Facil\_avai\_1 (Telecom facility), Facil\_avai\_13 (Good governance, especially e-Governance and citizen participation & sustainable environment), Smart\_City\_1 (Promoting mixed land use in area based developments) and Impact\_1 (Well Connected by road, air & railway) explains Facilities available in Udaipur city, Smart city variables and Impact of smart city over tourists.



## Conclusion

Accordingly, the purpose of the Smart Cities Mission is to drive economic growth and improve the quality of life of people by enabling local area development and harnessing technology, especially technology that leads to Smart outcomes. Area-based development will transform existing areas (retrofit and redevelop), including slums, into better planned ones, thereby improving liveability of the whole City. New areas (greenfield) will be developed around cities in order to accommodate the expanding population in urban areas. Application of Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Comprehensive development in this way will improve quality of life, create employment and enhance incomes for all, especially the poor and the disadvantaged, leading to inclusive Cities.

The criterion of sustainable city is to ensure the well-being of the inhabitants in a manner, which does not degrade the natural resources of the present and future. For sustainability the cities attempt to rationally utilize their resources and to reduce harmful emissions. For sustainability and to improve liveability of cities and the life quality of urban citizens nowadays urban planning and management can promptly react to urban problems thanks to the available ICT-devices and utilize their resources in a more efficient way. The variables selected for Facilities available in Udaipur city (Facil\_avai\_11, Facil\_avai\_1, Facil\_avai\_13), Smart city variables (Smart\_City\_1) and Impact of smart city over tourists (Impact\_1) are the variables revealed under this study.

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<b>Appendix-1: Dimensions on satisfaction towards medical treatment</b>	
<b>Facilities available in Udaipur city:</b>	<b>Variable</b>
1. Telecom facility	
2. efficient urban mobility and public transport,	
3. Real time connected and provide for network infrastructures	
4. Health and education	
5. Robust Utilities & IT connectivity with digitalization	
6. Public Safety	
7. Natural Beauty and culture.	
8. Creation of tourists attractions	
9. Adequate water supply	
10. Assured electricity supply	
11. Sanitation, including solid waste management,	
12. Affordable housing, especially for the poor	
13. Good governance, especially e-Governance and citizen participation & sustainable environment,	
14. Safety and security of citizens, particularly women, children and the elderly.	
<b>Smart city</b>	<b>Variable</b>
1. Promoting mixed land use in area based developments	
2. Housing and inclusiveness	
3. Creating walkable localities	
4. Preserving and developing open spaces	
5. Promoting a variety of transport options	
6. Making governance citizen-friendly and cost effective	
7. Forming e-groups to listen to people and obtain feedback and use online monitoring of programs and activities with the aid of cyber tour of worksites;	
8. Giving an identity to the city	
9. Applying Smart Solutions to infrastructure and services in area	
<b>Impact of smart city over tourists</b>	<b>Variable</b>
1. <b>Well Connected by road, air &amp; railway</b>	
2. <b>Demands high quality level of personalized services</b>	
3. Reduction of social conflicts	
4. Multisensory in promoting urban culture and Careful about energy consumptions	
5. Balance between integrating information for the common good and protecting privacy	
6. <b>Contributes to create personal tourist experience and satisfaction</b>	
7. <b>Utilizes the end-user devices in multiple modes</b>	



8. <b>Prosumer (promoter + consumer)</b>	
9. Capability of create sustainable solutions that reduce costs	

**Appendix-2: Profile of Udaipur city: (source: <http://smartcities.gov.in>)**

<b>Demographic Profile Indicator</b>	<b>City (Municipal Council)</b>	<b>State (Urban)</b>	<b>India (Urban)</b>
Total Population	451100	17048085	377,106,125
Population Growth Rate (AEGR) 2001-11	1.47	2.55	2.76
Literacy Rate (%)	89.66	79.68	84.11
Schedule Caste (%)	10.49	15.75	12.60
Schedule Tribes (%)	5.02	3.2	2.77
Youth, 15 -24 years (%)	19.43	20.89	19.68
Slum Population (%)	14.36	5.35	17.36
Working Age Group, 15-59 years (%)	66.93	62.84	65.27

