Identification of Significant Factors Affecting the design of Smart Village

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Abstract

Priority must be given to the development of 'smart villages' instead of 'smart cities' for root level development. Preserve the sustainability of villages will positively impact cities in the long run. Residents of villages have to suffer more than that of residents of urbanites for livelihood. The difficulties of livelihood may be forcing rural population to migrate to the urban areas. The migration is also unidirectional as they continue to live in cities in the hope of landing better jobs. In the long term, this leads to desertion from villages, dilution of village culture, reduced land under cultivation and, consequently, farm output. Human society is developing with rapid acceleration and achieved various successes for making its livelihood better. This paper deals with study and development of village as a smart village by delivering all required services to its residence and businesses in each possible manner. Irrespective of Indian priorities being different, there is need to understand these development paradigms from bottom. In this context the Smart village concept needs to be looked from different perspectives. This concept will play crucial role in minimizing the gap between urban and rural development, which ultimately helps in reducing migration from one place to another place as residents themselves see and get opportunities at their places for betterment and development.

Keywords: *Urbanisation, Migration, Rural development, Quality Life, Health, Hygienic Environment*

INTRODUCTION

Villages are the empathy of the nation. Hence, for the development from the bottom level, focal point must be the progress of villages and so there is a need for designing and building the village as a smart village. It is budding fact that the rural population is suffering more consequences for livelihood as compared to urban areas. In India there are around 6,00,000 villages out of them 1,25,000 villages are underprivileged. It is estimated that by the year 2050, the number of people living in Indian cities will touch 843 million.

Creation of smart city has to begin with a conversion of surrounding and neighboring villages to smart villages. These smart villages have to have sustainable housing, health, sanitation, education, electricity, drainage and allied facilities. Urbanization is not only related with economic development but over the time it started aspiring people due to better quality of life. Urban areas have been seen as resolution for most of the village problems. Most of the 'unsolvable' troubles in today's metro cities stem from a single root cause – the massive inflow of people, which congests the cities. The big metros have become a kind of big slums. India is trying to cope up with this dynamics and complexities of city and urban-rural development in country. For this every village has to become a self-reliant republic which requires planned, corporate and intelligent work.

This concept will play essential role in maintaining the balance between the development of rural and urban areas and help to reduce migration of rural population in urban areas to provide better living. The India Smart Village Challenge is designed to encourage greater vision of municipal officials and their partners, more involvement and inspiration from villagers, and the development of proposals that will produce concrete benefits in people's lives.

AIM

The aim of this research is to analyze the chief designing factors of smart villages in context with Gujarat. And to provide t he required framework surroundings necessary for the provision of energy services to villages to enable the livelihood opportunities (healthcare, education, clean water, and sanitation) and empowerment embodied in villages.

OBJECTIVES

The aim of this research can be broken down into the following objectives:

1. To find out factors affecting project of smart village.
2. To identify critical factors for designing smart village by suitable ranking methods.

STUDY JUSTIFICATION

Indian constitution provides freedom to move to any part of the country, right to reside and earn as per choice. And this is causing the threat to the cities, choking the cities. The villagers in the hope of prospects and employment have been migrating to cities which are leaving our villages crippled. As soul of India resides in villages, today's scenario has been such that soul of our country is in distress and losing the significance of its existence. To address challenges of urbanization and urban growth, Government of India has initiated Smart Village program. This initiative is directed at how the respective villages can transform themselves in different policy areas.

GUJARAT SCENARIO

Fig. 1: *Urban-Rural Population of Gujarat*

Gujarat is experiencing unprecedented movement of population towards the cities. The major rural to urban migration stream to/within Gujarat is its gradually increasing development. Migrant workers have contributed significantly to rapid economic growth in Gujarat. But they also pose threat to the cities in other aspects and arises challenges to prevail over these rural-urban problems. About 10% of Gujarat households do not have any electricity connection. According to ASER report, 23.4% students enrolled in class 8 could not correctly read a paragraph in their mother tongue, Gujarati. These makes villages deprived. Gujarat Population Data shows that it has Total Population of 6.03 crore which is approximately 4.99% of total Indian Population. Urban population of the state is 42.6% which used to be at 37.4% in 2001. Rural population of the state in 2011 fell to 57.4% from 62.6% in 2001.

In Gujarat at state level there are two major actors; a) Commissionerate of Rural Development and b) Department of Panchayat Rural Housing and Rural Development. The office of the Commissionerate of rural development is mainly responsible for implementing the programmes of National Ministry of Rural Development along with its own few initiatives it is being assisted by DRDAs at district level for implementation of its programme. While the Department of Panchayat Rural Housing and Rural Development deals with strengthening rural local governance by promoting and strengthening gram sabha mobilization. It requires excellence workshops and training for the villagers parallel with a appropriate infrastructure. It will set up model smart villages and will help us in converting our existing cities into smart zones.

SMART VILLAGE

There is no universally accepted definition of a Smart Village. It means different things to different people. The conceptualization of Smart Village, 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 residents. There is neither a single template of framing a Smart Village identically.

A village which has foresight for the development and good planning to keep the village hygienic, healthy, green and crime free with synchronization of various community development and welfare schemes of Government. Wikipedia defines Smart villages as "Smart Village is a concept adopted by national, state and local governments of India, as an initiative focused on holistic rural development, derived from Mahatma Gandhi's vision of Ideal Village and Self Reliance". A village which is aware to increase facilities for the citizen by taking decisions democratically. A village in which the youth, women, farmers, village artisans, backward and deprived people may get equal opportunity for development.

EXPECTATIONS FROM SMART VILLAGE

1. **Quality of Life:** Safety and security, inclusiveness, entertainment, ease of seeking and obtaining public services, cost efficient healthcare, quality education, transparency, accountability.
2. **Sustainability:** Social, environmental and financial sustainability.
3. **Competitiveness:** A village's ability to create employment opportunities and attract investments, experts, professionals and people.
4. **Physical attribute:** Some of the physical infrastructure such as transportation, availability of houses, energy system, water supply system, sewerage system, sanitation facilities, solid waste management system, drainage system.

VISION OF SMART VILLAGE

Besides infrastructural development, one must have a target to make the village-life self-sufficient, socially harmonious and healthy. Work must be done with a vision to provide equal opportunities to the youth, women, farmers, artisans, backward and deprived people.

NEED FOR RURAL DEVELOPMENT

- To raises the quality of life & environment in rural area
- To reduce urbanization
- For the improvement of economy
- For the proper management of natural resources like land, water for agricultural production
- To produce variety of food products through agriculture
- To improve profits for farmers
- Improving the literacy rate of the villages
- To use the potential of IT to maximize the benefits for the rural community
- Web-based Career Counselling for the rural community by providing information on various courses
- Compulsory door to door solid waste disposal
- Providing databases to the manufacturing organizations dealing in Agro-based products and implements like Tractors, Fertilizers etc
- Remove encroachments on public roads
- To update revenue/ Gram Panchayat records.
- Road side plantation in the village

RESEARCH METHODOLOGY

Research methodology is a way to systematically solve the research problem.

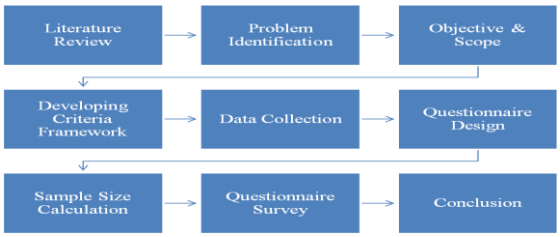

Fig. 2: *Research Hierarchy*

DESIGNING QUESTIONNAIRE

The questionnaire was designed based on the research method to be used after the thorough investigation of the literatures and identification of various factors affecting Smart village. It contain some factors affecting Smart village categorized into sub groups and respondents have simply shared their perspective regarding that factor based on their understanding, knowledge and experience by choosing only one choice.

DATA COLLECTION

The survey had been carried out within the scope of the study and the questionnaires were distributed to respondents and data was collected through these filled questionnaires. As per requirement people who have been working or those who have worked as town planner, in village development cells, non-governmental organizations and somehow connected with village environment are weighed down for their views. For calculating sample size of unknown population, Cochran's (1977) following formula has been used and result came was total 44 numbers.

$$S = \frac{z^2 * p * (1-p)}{M^2} \quad \ldots(1)$$

Where, S= Sample size for infinite population, z = Z score, p = Population proportion, M = Margin of error
The 46 respondents consist of 14 town planners, 20 NGO workers and 12 persons working in village development cells. The NGO workers have taken much interest in the survey i.e. 44% to a more extend to get a clear view of the result as they are much familiar with the uncertainties of slum area or people living in rural areas. The repetition of the respondents as different identities is shown in fig. 3.

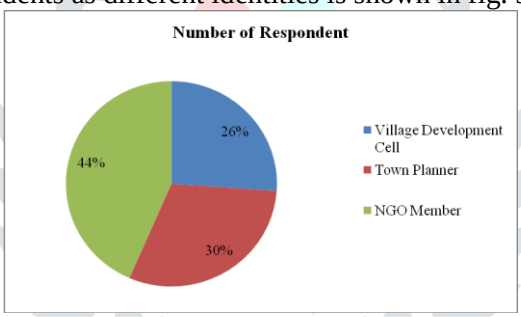

Fig. 3: *Number of Respondents*

ANALYSIS BY SIGNIFICANCE INDEX (SI) METHOD

Collected data from the questionnaire survey have been analyzed using Significance Index method. It is to be done to assign ranks from the viewpoint of all respondents. The following formula is used to convert linearly the 1–5 scale used in the questionnaire survey to a 20–100 scale with 20 representing the lowest and 100 the highest significance. This means that "5," "4," "3," "2," and "1" have significance indexes of 100, 80, 60, 40 and 20 respectively.

$$Si = \frac{20*Ri1 + 40*Ri2 + 60*Ri3 + 80*Ri4 + 100*Ri5}{Ri1 + Ri2 + Ri3 + Ri4 + Ri5} \quad \ldots(2)$$

Where, Si = significance index for the *i*th factor;
Ri(n) = number of responses as "n" for the *i*th factor;
The Significance index, SI is computed for each factor to identify the most significant factor.
Educational factor is the most significant factor as per perception of respondents of all three categories.

Table 1: *Extremely Significant Factors*

Classifications	Factors	SI	Rank
Educational	Primary Education	88.70	2
	Secondary Education	89.57	1
Physical	Water supply system	85.22	3

Factors	Tree plantation	82.17	6
	Power supply	85.22	3
Social Factor	Healthcare facilities	81.74	7
	Safety & Security	81.30	8
E-Gram	Kisan Vikas Kendra	81.30	8
Others	Beti Padhao, Beti Bachao Scheme	84.35	5

The results in table 1 show the overall ranking of top factors based on SI value. Total 9 factors have been identified as "Extremely Significant" for smart village design as their Significance Index is more than 80.

CONCLUSIONS

The prominent conclusions from this research work are summarised here. Smart villages will not only reduce this migration but also irrigate the population flow from urban to rural area, if proper attempts are made to make villages self-sufficient. From the interpretation of results of analyzed data, appropriate conclusions and recommendations are made, which will state the various factors which are critical factors for the Smart village in the concerned region. It gives an idea about which factors to be controlled to achieve desired performance of the smart village.

1. It is predicted that "about 25-30 people will migrate every minute to major Indian cities from rural areas in search of better livelihood and better lifestyles". Hence it is necessary to identify what is to be prepared to make a village smart for betterment of village itself. In table 2, identified designing factors which can significantly affect are shown in 10 different groups.

Table 2: *Design factors affecting smart village project*

Classification	Name
Environmental Factors	Availability of natural resources
	Consumption of energy from renewable sources
	Sustainable resource management
	Biogas Plant
Educational Factors	Admission Rate
	Primary Education
	Secondary Education
	Literacy Rate
Economical Factors	Income of individual
	Pradhan Mantri Jan-Dhan Yojana (PMJDY)
	Self Help Groups (SHGs)
	Government involvement
	Indira Gandhi Aavash Yojana (IAY)
Physical Factors	Water supply system
	Sanitation
	Storm water management/Rain water harvesting
	Solid waste management
	Public Organizations
	Pradhan Mantri Adarsh Gram Yojana (PMAGY)
	Tree plantation
	Fire fighting system
	Unused land development (Pature)
	Power supply
Social	Recreational & Cultural facilities

Factor	Healthcare facilities
	Safety & Security
	Mahatma Gandhi National Rural Employment Gurantee Act 2005
	Legislation Acts
	National Policy for Women 2016
Mobility Factors	Public transport
	Pradhan Mantri Gram Sadak Yojana (PMGSY)
	Availability of private vehicles
Learning Factors	Innovative spirit to make a change
	Kaushal Vikas Yojana (KVY)
Political Factors	Transparent governance
	Political interference
	Political strategies & perspective
E-Gram	Web-base career counselling for rural community
	Advanced agriculture and agro-based products
	E-citizenship
	Digital India Programme
	E-connectivity
	Kisan Vikas Kendra
Others	Bhagini-Mandals
	Integrated Child Development Services
	Mahila e-Haat (Haat-bazars)
	Beti Padhao, Beti Bachao Scheme

2. Designing parameters of smart villages will bring changes in:
- Social deeds: Improving the well-being of every resident in society, increases self sufficiency and reducing poverty
- Economical: Due to various businesses economical status and standard of living increases
- Environmental: Use of natural resources reduce the pollution and plantation brings the eco-friendly environment
- Cultural activities
- Educational: E-learning, training and other modern techniques increases the level of thinking and personal development
- Contribution to global environment: Use of renewable sources of energy lead to reduction of green house gases and energy consumption optimization which will save 25-30% energy.

3. There can be a chance of reduction in the existing rate of urbanisation because of rural transformation and its increased potential for attracting investment on its own.

REFERENCES

1. Albino V., Berardi U., Dangelico R., "Smart Cities: Definitions, Dimensions, Performance, and Initiatives", Journal of Urban Technology, Febuary 2015, 1-19
2. Aoun C., "The Smart City Cornerstone: Urban Efficiency", Schneider Electric, ISBN: 998-2095-01-30-13, 2013, 1-13
3. Azim A., AghaJani R., "Designing Smart Cities", Indian Journal of Fundamental and Applied Life Sciences, ISSN: 2231– 6345 (Online), Volume 4, 2014, 146-153
4. Chavda Nihalsinh K. Patel Utsav C. Vaghela Raghuvirsinh P. Patel Dhavalkumar M.,Vishwakarma Yojana an Approach Towards Rurbanization PANSAR, IJIRST –International Journal for Innovative Research in Science & Technology| Volume 2 | Issue 11 | April 2016

5. David fresh water 2000, Direct and indirect rural development policy in a neo conservative, North America
6. Debnath A, Chin H, Haque M, Yuen B., "A methodological framework for benchmarking smart transport cities", Cities-The International Journal of Urban Policy and Planning, ISSN: 0264-2751, Volume 37, 2014, 47-56
7. Dr. Milind Kulkarni 2010, International Journal of Research in Engineering, Science & Technology
8. Dr. Pritesh Y Shukla , "The Indian smart village: Foundation for growing India" International Journal of Applied Research 2016; 2(3): 72-74
9. Dr. S P Shahi,, Technology and Development: Rural Women in Focus, PG Dept of Political Science, A N College, Patna Magadh University, Bodh Gaya Bihar
10. Esther W. Dungumaro, "Availability Of Domestic Water And Sanitation In Households", 2009, Committee for International Cooperation in National Research in Demography (CICRED), 107-125
11. Gill H., "Smart Cities and Affordable Housing in India", The International Journal Of Business & Management, ISSN: 2321 – 8916, Volume 2, Issue 8, August 2014, 67-73.
12. Jadhav Aditya A, Dhavan Gaurav R., Nikole Pritesh P., Ghutukade Manisha R., Jadhav Anil B., Sherkar Vitthal A., "Case Study And Planning Of Smart Village", 5th International Conference on Recent Trends in Science, Engineering and Management (ICRTSEM-16), ISBN: 978-93-86171-12-2, December 2016, 929-938
13. Kothari C. R., "Research Methodology – Methods & Techniques", 2nd Revised Edition, New Age International Publishers, 2004.
14. Moulik T K & Mehta Swati, 1990. "Migration: A Case of Gujarat," IIMA Working PapersWP1990-09-01_00974, Indian Institute of Management Ahmedabad, Research and Publication Department
15. N. Viswanadham, Sowmya Vedula, "Design of Smart Villages", Indian School of Business, Hyderabad 500032, India, September-2010
16. Rupapara Savan 2Khambhadiya Ronak 3Sheladiya Dharti 4Parmar Ashwini, Modernization of Villages Through Vishvakarma Yojana: A Case of Pipodara Village surat, GRD Journals, Recent Advances in Civil Engineering for Global Sustainability |, | March 2016 e-ISSN: 2455-5703
17. Rutuja Somwanshi, Utkarsha Shindepatil, Deepali Tule, Archana Mankar, Namdev Ingle, "Study and development of village as a smart village", International Journal of Scientific & Engineering Research (IJSER-16), ISSN 2229-5518, Volume 7, Issue 6, June-2016, 395-408
18. S.Sesha Talpa Sai, "Smart Villages – Need Of Emerging India", International Journal of Innovative Research in Information Security (IJIRIS), ISSN: 2349-7009(P), Issue 09, Volume 3, December 2016, 51-54
19. Zhao Whiffing 2009, International Journal of Research in Engineering, Science & Technology, Importance of the size of sample and its determination in the context of data related to the schools of Guwahati", the Gauhati University Mathematics Association Vol. 12, 2012
20. "India Village Directory @VList.in". vlist.in. Retrieved 2016-06-04
21. Smart Villages - A Community Driven Initiative Reconstructing Rural India, smartvillages.org
22. Smart Village Project, National Informatics Centre: http://smartvillage.nic.in/
23. N. Viswanadham, "Design of Smart Villages" Indian Institute of Science, Bangalore, February 2014.
24. Smart Village Scheme Guideline - Panchayat, Rural Housing & Rural Development
25. Regional pattern of urbanization and urban employment