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Application of Total Quality Management (TQM) Techniques in Village Development

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Abstract: ***In India, most of the villages are undeveloped and lacks in basic facilities. The actual condition of facilities in the villages as well as required facilities needs to be studies and assessed. TQM is a management tool of decision making for successfully delivering quality products to the consumers by continuously improving. One of the tool in TQM i.e. Pareto analysis is used in this study to evaluate the factors and to decide factors that are crucial in the growth for the overall growth of the village. Ministry of urban development have introduced liveability index parameter for cities to rank them based on available facilities. Those liveability indices were used to survey two villages, one smart village and other undeveloped village. Using pareto analysis 5 principal facilities required by Bhandarwadi village (Undeveloped) were identified and compared with Hiware Bazar (Smart Village). With proper planning of available funds in Bhandarwadi village, principal facilities can be improved leading to improvement in physical liveablity parameter of the village.***
Keywords: Liveability index, Pareto Analysis, smart villages

I. INTRODUCTION

Nowadays as per census 2011 India's 69% population living in rural part. Until now ministry of urban development have given liveability index to only cities but now there is requirement to develop rural India as a smart village. We need to focus more on villages. If we focus only on cities then in future we have to face many problems. Therefore, on the basis of liveability index of cities we have to give or we have to develop villages on the basis of liveability index. The last few decades have seen the world becoming more urbanised. With more than half of the world's population living in urban areas in 2011 from about 30% in 1950. 'Liveability' is one key characteristic that attract a disproportionate amount of the globally-mobile resources (investors, innovators, entrepreneurs, and capital) that are recognised to make positive contributions towards economic growth, economic resilience, global political influence, world agenda-setting power, socio-cultural innovation. To attract more people towards village we have to develop them. Investors will only attract towards villages if they getting some special facilities in village. Livability index will do this work. Liveability is nothing but more qualitative construct representing a set of characteristics that relate to the attractiveness of an area and become a desirable place to live, work, invest, and conduct business. We cannot apply all parameters of cities to village; we have to do some minor changes in that. There can be a number of factors that affects the overall growth of the village as a smart village. Total Quality Management (TQM) which is a management tool of decision making for successfully delivering quality products to the consumers by continuously improving. One of the tool in TQM i.e. Pareto analysis is used in this study to evaluate the factors and to decide factors that are crucial in the growth for the overall growth of the village.

A. Tools and Techniques for Improvement

Over a last few years, 'Village development' in developing countries like India has become an integral part for overall development of nation. India contains a lot of undeveloped villages so there is a lack of development in the rural zones of India. The concept of smart village in the today's life looks more valuable as there is a faster development of cities occurred which leading to formation of urban jungles, where the population ratio per km of land is way above the desired norms. A smart village is one which will automatically link local production with local procurement and local distribution. So that local business opportunities can be available to local village people.

Following are some development plans conducted in hiware bazar:

1) Watershed Management Plan
2) The Drought Prone Area Program
3) Rural Sanitation Program
4) Women's Welfare

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Smart villages are the need of the development for rural areas to have standard life style in village and technology will offer effective solution. Technological development already exists at the urban area and at the same time lack of modern technologies in rural area. Taking education, skill for development to villages can well guide the energies of the youth as a powerful tool for the nation, and at most the overall development of the country can be possible with the development of the villages only.

B. Case Study

First of all we have to select village for our project. Hence we selected two villages one which is smart and another one which is under development or non-developed. So it will be easy to compare between them and again easy to give marks according to that. For this purpose a questionnaire survey of 16 villages were done and 1 village from those 16 villages were taken for actual survey. Actual survey was conducted in order to get an idea about the current situation of the village, facilities that are to be provided in the village for overall development. Bhandarwadi village Tal-Renapur, Dist-Latur was selected from that 16 villages and the smart village selected was Hiware bazaar. Then we have to compare those villages on same environmental condition, same available amenities, same cultural zone, under same economic zone, same seasons, same water availability. The Actual location of the Bhandarwadi village is shown in Figure 1 below.

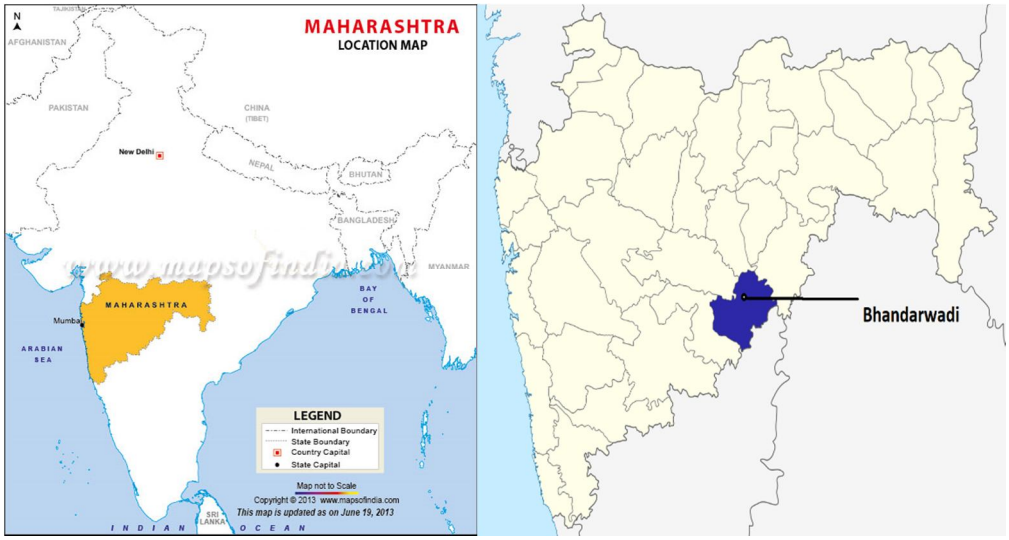


Figure 1 Google map image of Bhandarwadi village, Tal-Renapur, Dist-Latur

The survey has been started with the permission of Sarpanch of village. For comparison purpose the smart village selected was village Hiware Bazar, Tal & Dist-Ahmednagar. The location of the village is shown below in figure 2.

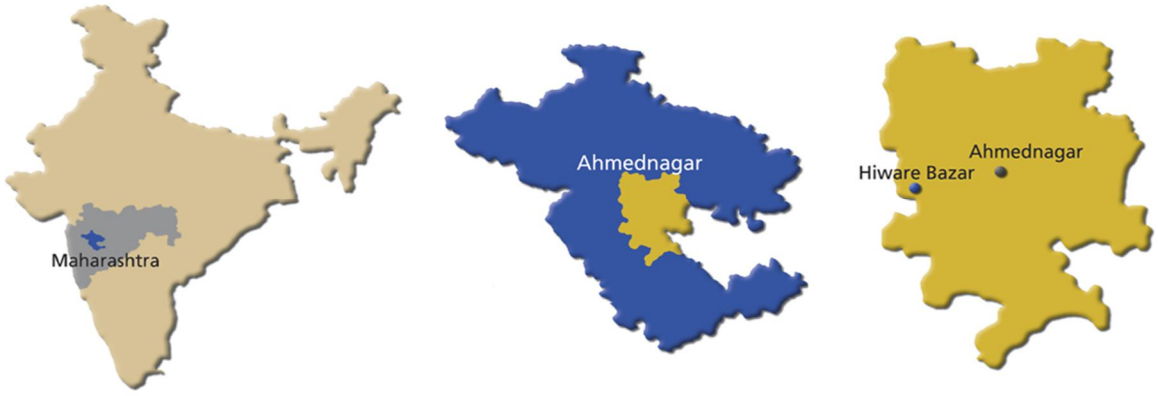


Figure 2 Google map image of Hiware Bazar, Tal & Dist-Ahmednagar

The current study considers the Smart Village as an innovative means of improving rural people's life and it includes a case study of village Hiware Bazar which has successfully implemented a s

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C. Liveability Index

On the basis of survey, we will gather all data required to prepare livability index parameter. On the basis of information we can give ranking to villages and compare village. Also we can give some suggestions to the villagers to meet their qualities with livability index. Livability index of cities is already developed by government of India and available facilities in the city can be known based on these index. But livability index for villages is yet to be developed. After studying present situation of villages and requirement of smart villages, we will be able to suggest parameters for livability index of villages.The actual work is done step by step. Primary survey of various villages is done for comparison purpose.

D. Formulas For Calculation Of Liveability Index Parameters

According to the data obtained from survey liveability index was defined. 9 Physical parameters of liveability index were considered for the study, They are as follows.

1) Housing and Inclusiveness:
2) Public open spaces
3) Mixed Land Use and Compactness
4) Power Supply
5) Transportation and Mobility
6) Assured Water Supply
7) Waste Water Management
8) Solid Waste Management
9) Reduced Pollution

E. Gap Analysis

The gap analysis was also conducted between the villages for those 9 physical parameters for liveability index. The gap analysis for various factors between two villages Hiware bazar and Bhandarwadi are given in Table 1 below. The benchmark used for the comparison was taken from Ministry of Urban development Government of India.

Table No 1 Gap analysis of Hiware bazar and Bhandarwadi

Sr.No	Facilities	Bhandarwadi	Hiware Bazaar	Benchmark	Unit	Gap Analysis
1	Housing and Inclusiveness					
1.1	Percentage of slum/EWS households covered through affordable housing	4.47	100	100	%	95.53
1.2	Percentage of slum areas covered through basic services	51.47	100	100	%	48.53
2	Public open space					
2.1	Per capita availability of public and recreational places	0.022	0.094	village with highest per capita availability	sq.m.	0.072
3	Mixed land use and compactness					
3.1	Share of mixed land use area in overall village land use	0.0021	0.0032	village with highest percentage of mixed use	%	0.0011
3.2	Net Density	357.33	378.421	village with highest net density	Persons per hectare	21.091
4	Power Supply					
4.1	Percentage of village population with authorized electrical service	82.91	100	100	%	17.09
4.2	Percentage of electrical connections covered through smart meters	82.91	100	100	%	17.09
4.3	Percentage of total energy derived from renewable sources	18.18	46.15	10	%	27.97

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4.4	Energy consumption per unit - street lighting	60	57.16	village with lowest per unit consumption	kwh per light installation	2.84
4.5	Total energy consumption per Capita	6.74	10.441	village with lowest per capita consumption	kwh per capita	3.701
5	Transportation and Mobility					
5.1	Geographical coverage of public transport	0.3	0.358	>=1	Road kms per square km	0.058
5.2	Availability of public transport	8.57	6.43	>=0.6	Number per 1000 person	-2.14
6	Assured Water Supply					
6.1	Household level coverage of direct water supply connections	56.84	100	100	%	43.16
6.2	Per capita supply of water	61.23	104.41	135	lpcd	43.18
6.3	Percentage of plots with rainwater harvesting facility	0	0	100	%	0
7	Waste Water Mnagement					
7.1	Coverage of Toilets	72.65	100	100	%	27.35
7.2	Coverage of sewerage network and septage	57.26	100	100	%	42.74
7.3	Collection efficiency of sewerage network	0	0	100	%	0
8	Solid Waste Management					
8.1	Household level coverage of Municipal solid waste collection	0	100	100	%	100
9	Reduced Pollution					
9.1	Quality of water in public surface water bodies	100	100	100	%	0

F. Pareto Analysis

Pareto Analysis is a tool in Total Quality Management (TQM). It is a statistical technique in decision-making used for the selection of a limited number of tasks that produce significant overall effect. It uses the Pareto Principle (also known as the 80/20 rule). Which assumes that the large majority of problems (80%) are determined by a few important causes (20%).

Here are steps to identifying the principal facilities one should focus on, using Pareto Analysis:

1) A bar chart with problems on the x-axis and count on the y-axis is prepared. Here the required facilities are enlisted on x axis and weightage factor on y axis. This weightage factors were taken from the gap analysis.
2) Bar chart is arranged in descending order of weightage factor so that required facilities with highest count came first.
3) Cumulative count for each cause is calculated and kept in descending order.
4) Cumulative count percentage for each facilities is calculated and placed in descending order.
5) The cumulative count percentage of each cause were plotted on the x-axis and points joined to form a curve.
6) Line at 80% on the y-axis running parallel to the x-axis were drawn.

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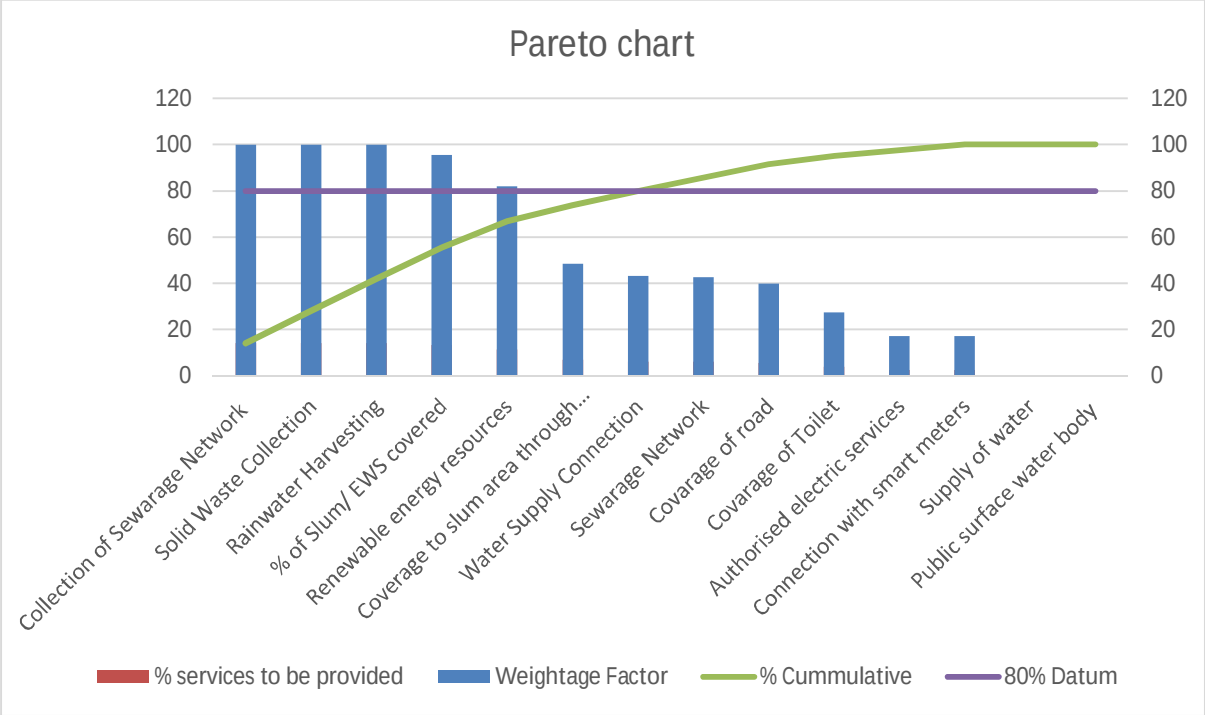


Figure 3 Parato Chart

From the figure we can conclude that the principal required facilities for the village are

1) Provision of facility for collection of sewerage network.
2) Solid waste collection facility.
3) Rain water harvesting.
4) Coverage to the slum? EWS area
5) Use of renewable energy resources.

G. Cash flow for Bhandarwadi Village

In 2018 Bhandarwadi received Rs.7,54,446 from Government of India, Also Rs.1,59,600 nalpatti was received from villagers. Out of this amount Rs.4,74,854 was spent on development in education, Disabled, women empowerment, backward class, operator. Thus remaining amount for this village is Rs.4,39,192. Thus we can say than about Rs.4,39,192 amount remains in hands of sarpanch for each year. The funds which has not been utilized by the Sarpanch can use the funds for the development of facilities which are obtained above by Pareto analysis. Figure 4 shows the generation of cash flow in Bhandarwadi is shown below.



Figure 4 Cash Flow Diagram

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II. CONCLUSION

A. By the comparison of parameters between Bhandarwadi village and Hiware bazar by Pareto analysis, it was concluded that 5 principal parameters are required by Bhandarwadi village for the development as smart village.

B. Provision of facility for collection of sewerage network, Solid waste collection facility, Rain water harvesting, Coverage to the slum? EWS area, Use of renewable energy resources were the 5 parameters that was obtained through Pareto analysis.

C. Pareto analysis is a Total Quality Management (TQM) tool can used for finding principal parameters/ facilities that are to be required for a village for further development as smart village.

D. With proper planning of available funds in Bhandarwadi village (Undeveloped), principal facilities can be improved leading to improvement in physical liveablity parameter of the village.

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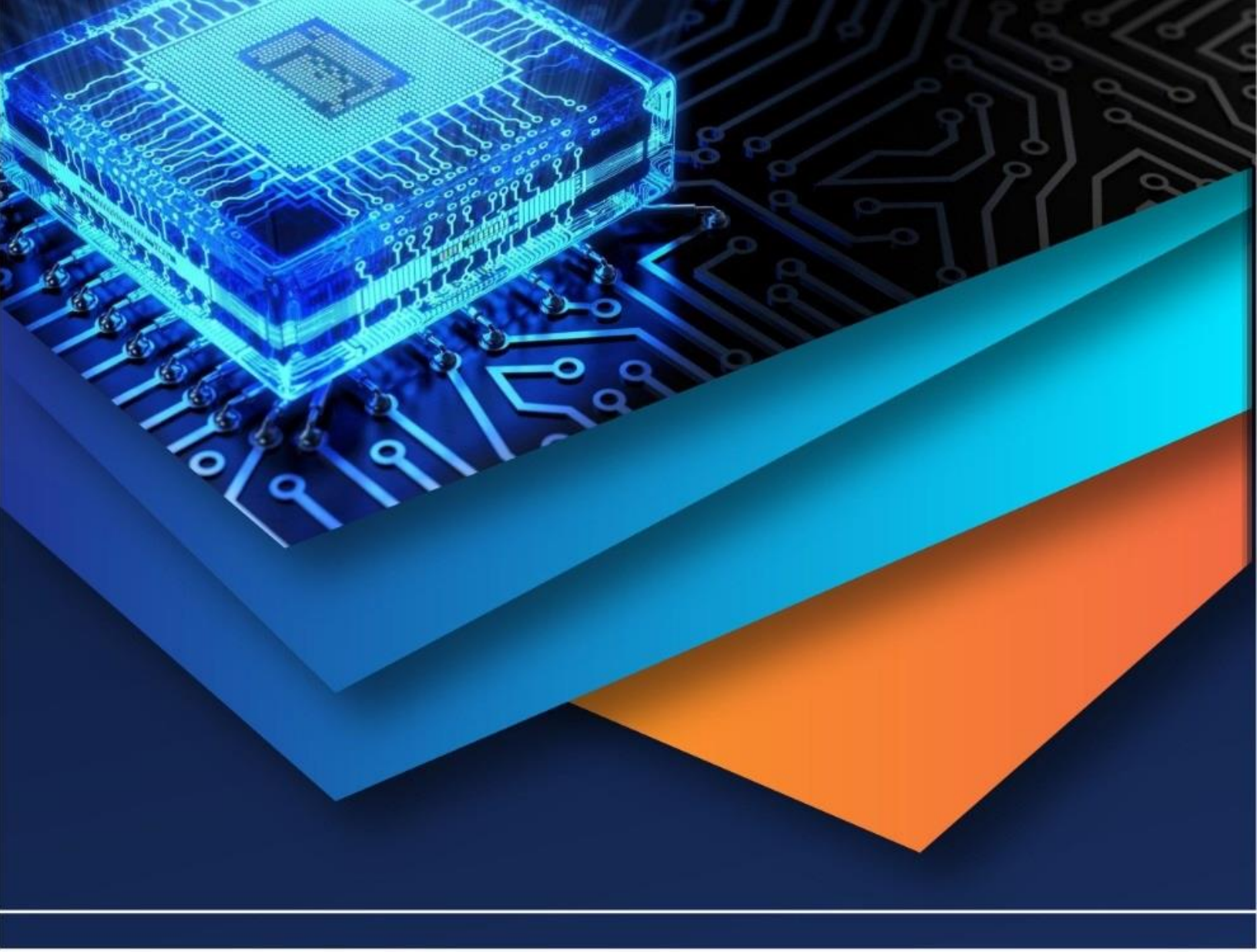
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