PRELIMINARY SURVEY AND SHARED VISION PLANNING FOR A SMART VILLAGE

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Abstract *This paper deals with study and development of existing village as a smart village. Smart village is a bundle of services which are delivered to its residence and businesses in an effective and efficient manner. Smart Village is that modern energy access which acts as a catalyst for development in education, health, security, productive enterprise, environment that in turns support further improvement in energy access. By doing the preliminary survey in the villages, the problems in village were identified. Smart decisions using smart technologies and services is the key requirement for making existing village as a smart villages. This paper discusses the preliminary survey and data collection system including interaction with the stakeholders and identifying the priority of the problems for which technical solution is sought.*

Introduction

Village is main criteria for development of nation, so development of a village which is self-dependent in providing the services, employment and well connected to the rest of world and new technology that is smart village. The smart village basically aimed for sustainable family relationships without disturbing the existing lifestyle of different generation. Initially the concept of development of village was of Mahatma Gandhi that is "Swaraj and Suraj village". Vision for a smart village is that modern energy access can act as catalyst of development in education, health, clean water, sanitation, and environmental sustainability. This paper aims at making shared vision planning as a core for identifying basic problems of the stakeholders and taking a small step towards to make India as developed nation through the progress of village and rural development using engineering and technology as the medium to achieve self-sustainability. The basic concept of smart village is access to sustainable energy services to boost the income and enhanced security. There is imbalance between the growth rate of urban and rural development. This has resulted in migration of rural population and burdening the urban infrastructure. The major reason identified for migration of population to urban pockets is basically for the job security and better living standards. Smart village concept may play crucial role in maintaining the balance between the development of rural and urban areas and may help to reduce migration of rural population in urban areas. Urban population density is increasing in uncontrolled manner, while the numbers of cities are still inadequate to accommodate the migrating population from villages. This needs to be suitably managed to improve quality of life. The concept of "Smart Village" will also address the multiple challenges such as unplanned urbanization, under-development of villages, migration for economic pursuits, better standard of living etc.

Literature Review

A brief overview of the literature studied and stated in this section. Chavan et al. (2018) discusses making the village as a smart village by providing facilities such as health, water supply, sanitation, education, social development, economic development and security in an efficient manner. The study focuses mainly on the strategy or planning to remove major problems in Kandalgaon village. Author has suggested that a smart village will encompass a sustainable and inclusive development of all sections of the village community so that they can enjoy a high standard of living.

Bhagya et al. (2017) have taken a case study of the Gujarat State and discussed community and welfare schemes of rural development. Authors have mainly suggested that the Gram Panchayats can perform their duties and responsibilities by more programmes and self-governance, work as per their expectations with certain goal and with foresight for social, human, economic and personal development and become committed to increase citizen services, create atmosphere of healthy competition.

Our integrated study is a way forward to be deal with the demographic deficit and achieve the goals of inclusive growth through shared vision planning. Primary questionnaires was prepared and it was discussed in the three villages (Figure 1) Dahagaon, Poi, and Antade in the Thane District of Maharashtra and from the survey it was identified that the main problem faced by the villages in the all three villages was mainly related to agriculture as availability of water is sufficient but no proper way to provide the water to the farm lands. The overall survey of the area and using village survey forms, main problem identified in the villages was provision of available water from the river to the farm lands. Designing a complete lift irrigation system for all the three villages is the need of hour.

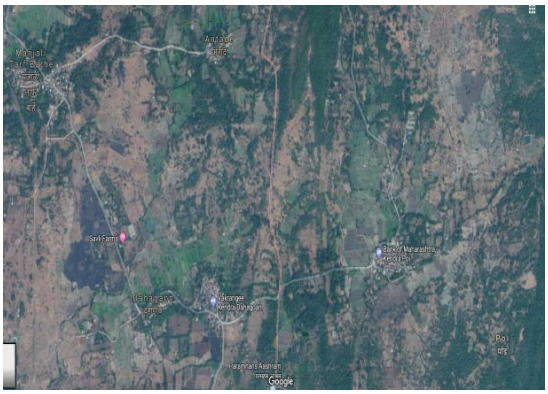

Figure 1. Location of villages (https://www.google.com/maps)

Design of irrigation system

Based on the household survey in all three villages, it was observed that the irrigation is carried out by the bore wells. For the village Dahagaon, the river Barvi flows through the village but due to the insufficient and improper irrigation system in all three villages, around 95% population having occupation as agriculture cultivates rice mainly and seasonal vegetables during rainy season only. For rest of the year the villagers cultivate or irrigate their lands. As per the opinion based on the shared vision planning it was concluded that the designing an irrigation system would prove beneficial for the economic growth of the villages it may enhance the agricultural productivity of the village.

Steps to carry out the design of irrigation system are mentioned below

Description of the study area

Location and General Description: as shown in Figure 1, Barvi river flow in the southern part of Dahagaon village. Therefore irrigation system needs to be developed such that it can provide water to all parts of village specifically in northern part. Then only villagers can cultivate land all months using river water.

Climate and soils: These villages are in Kokan region of Maharashtra hence average temperature is around 30 degrees C range throughout the year and can go up to 40 degrees C in the month of May and October. The whole region is Humid and there is heavy Rainfall from June to September.

Land use pattern: According to survey, most of the farmers have average of 2-3 acres of land and hence they do cultivation into whole irrigated land.

Crops and cropping pattern: Crops in these villages are generally taken in both Rabi and Kharif season. Crops taken in Kharif season is Rice and vegetable Bhendi in Rabi season.

Sources of irrigation: For the village Antade and Poi, bore well is main source of water for irrigation as well as for drinking water purpose, whereas in Dahagaon village river water is the source for irrigation purpose. It has been observed that all these three villages arew dependent on the rain water for the irrigation.

Sampling technique: Selection of sample villages: Sample villages chosen in our project are Dahagaon, Antade and Poi.

Selection of sample farmers: Sample farmers were selected based on their interest in the participation the feedback survey. Data is collected by visiting these villages in the form of primary data; this primary data was collected by reconnaissance of villages in first visit. Primary data includes location of river and fields of farmers and distance between river and fields. Secondary data was collected in second visit, in which specific question were raised including their number of family members, family income, knowledge about government schemes, various subsidies from the government, land use and land pattern, issues related to their income source and so on using questionnaire based feedback system during the household survey. Once survey was carried out completely for that village, it was decided to finalize the scheme for which we as the technical service provider which scheme is to be designed. As stated earlier, as the villagers are more interested in the irrigation scheme; we have undertaken the task of design of irrigation system.

Construction aspects

As per the survey and feedback of the villages, it was decided to provide technical solution including consideration on construction aspects of the project undertaken with shared vision planning.

Construction of intake structure:

The basic function of the intake structure is to help in safely withdrawing water from the source over predetermined pool levels and then to discharge this water into the withdrawal conduit. Intake structure needs to be developed at Barvi river from where water is to be lifted for irrigation.

Selection of pump for lifting water:

Based on principle of operation, pumps may be classified as follows:

- Displacement pumps (reciprocating, rotary)
- Velocity pumps (centrifugal, turbine and jet pumps)
- Buoyancy pumps (air lift pumps)
- Impulse pumps (hydraulic rams)

From above pumps Centrifugal pump have maximum efficiency (85%) also head developed is more hence it is decided to propose the use of centrifugal pump for lifting the water.

Design pipes for respective farmers:

Water lifted from intake tower using pump is then sent to farmer's field using conduits or pipes. For that purpose concrete pipe can be used. The design of water supply conduits depends on the resistance to flow, available pressure or head, and allowable velocities of flow. Generally, Hazen-William's formula for pressure conduits and Manning's formula for free flow

conduits are used. Hazen-William's formula for velovity of flow is given by $U=0.85\ C\ rH^{0.63}S^{0.54}$ and Manning's formula $U=1/n\ rH^{2/3}S^{1/2}$ where, U= velocity, m/s; rH= hydraulic radius, m; S= slope, C= Hazen-William's coefficient,a nd n = Manning's coefficient. Using this discharge required diameter of pipe has to be found out and head loss can be checked with Darcy-Weisbach formula i.e. $hL=(fLU^2)/(2gd)$

Suitable techniques of land irrigation:

Water delivered at farmer's field can be applied using suitable irrigation techniques like furrow irrigation, drip irrigation, sprinkler irrigation. The above steps start with the design of the intake structure the necessary data required for the designing of the structure and the irrigation system.

Conclusion:

Basis problems and demands of the villagers were identified using personal visits and feedback survey and its analysis. The problems were identified and ranked as per the demand of the stakeholders. The design steps and the survey conducted has concluded that the design process adopted is more beneficial and economical. The proposed structure serves the main objective of smart village and development of village as whole as per shared vision planning for the village.

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