Assessment of Cluster Suitability for Clustering of Villages: A Conceptual Framework

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Abstract— India's development is trending towards Smart Development of settlements. These settlements need special focus based on different criteria for evaluation. Geographical information system (GIS) and Multi criteria evaluation are the most common techniques used to analyze different suitability including urban areas as well as rural areas. This paper basically gives a conceptual framework for clustering of villages based on different parameters. GIS are mainly used for creating interactive queries (user-created searches), analyze spatial information, edit data in maps, and present the results of all these operations. Population and production factors are two broad parameters have been considered in cluster suitability analysis. Cluster suitability in ArcGis has been carried out based on agricultural productivity, employment density, regional connectivity, forest cover and cropping intensity. For this clustering, Sehore district has been taken as a case study.

Key words: Cluster, GIS, Weighted Overlay

I. INTRODUCTION

The concept of cluster based economic development is relatively new term for the activities in India in which a region has developed specialized competencies that allow it to produce goods at large scale and a better service network for sale outside the region. Clusters are generally a concentration of competing and collaborating firms and enterprises. These enterprises in cluster have shown higher productivity and have stimulated regional industrial growth. Cluster based economic development approach has influenced local, regional, state, and national economic development policy worldwide. Agro based clustering is a new approach which provides employment with competitive nature. And when we talk about local economy, it boosts the local economy and promotes regional development.

II. LITERATURE STUDY

Agro based cluster is relatively a new approach in agricultural development in India. It's simply a concentration of producers, agribusiness and institutions that are engaged in the same agricultural or agro industrial subsector, and interconnect and build value networks when addressing common challenges and pursuing common opportunities (Nogales,2010). So it has three basic components and they are:

- Concentration of producers: Production of agricultural products in concentration always increases the competitiveness between the producers and result in good quality production.
- Agribusiness: This will deal with the business for agro-products such as soybean has been used for making so many by products like soya milk, soya oil, etc. These agribusinesses have sub sectors which will help in promoting agribusinesses. They are: Agricultural inputs, Agricultural production, Agro processing and Marketing and trade.

Porter"s diamond model is an economic model developed by Michael Porter in his book "The Competitive Advantage of Nations" in 1996. In this model he mentioned that any cluster development is based on four factors and they are: Factor Conditions, Demand Conditions, Related & supporting industries and Firm structure and strategy.

And they are characterized by interdependence relations between all factors.

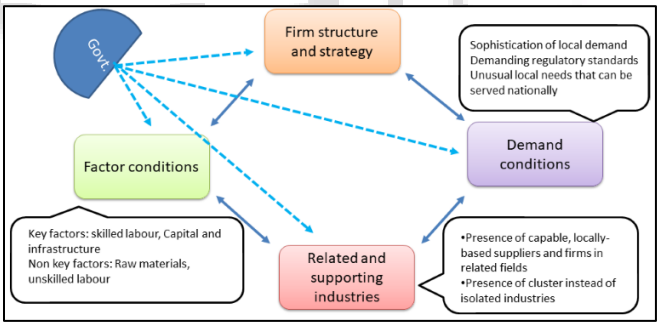

Fig. 1: Agro based cluster

III. INTERNATIONAL EXPERIENCE OF CLUSTERING

Country	Clustering Features
Great Britain And Northern Ireland	– Purpose: To reduce the lag in productivity and significant disparities in productivity levels between different regions of the state. – Measures: 1) A Practical Guide to Cluster Development, which composed feasibility of the mechanism and features of clusters. 2) Formed a steering group for the development of clusters, which operates under the Cabinet of Ministers. 3) Create a map of the clusters with identification of 154 clusters from 8 to 18 in each region, depending on the geographic location, the development and specialization of each region.
Japan	– Purpose: Boosting business activity, increased competitiveness. – Measures: 1) A Regional Bureau of Economy, Trade and Industry (RBETI), that works directly with small and medium-sized businesses.

	2) Encourage the expansion of clusters in the direction of cooperation with universities to create new business venture.
Portugal	– Purpose: To improve the competitiveness of the national economy. – Measures: 1) Development of a national plan of action (analysis of existing clusters and regions to determine their specialized entrepreneurs). 2) The creation of cross-border clusters.

Table 1: International Experience of Clustering

IV. CLUSTER SUITABILITY ANALYSIS

This Clustering analysis was done in two parts. Mapping of Sehore district based on different parameters and then weighted overlay method used in ArcGIS for cluster suitability. Maps prepared for cluster suitability were:

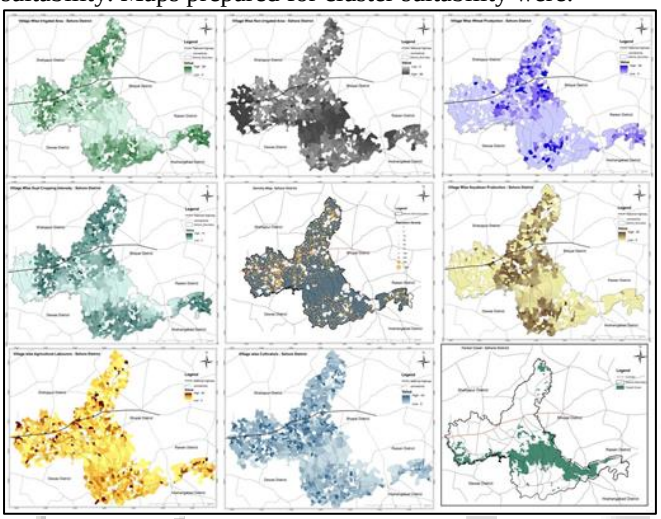

Fig. 2: Clustering analysis

Cluster suitability is a process through which several factors have been taken into consideration for using it in Weighted Overlay method in GIS. These factors were irrigated land percentage, non-irrigated land percentage, forest cover, wheat and soybean production density, etc. Weightage based on the respective influence of the factors were assigned by discussing with the expertise.

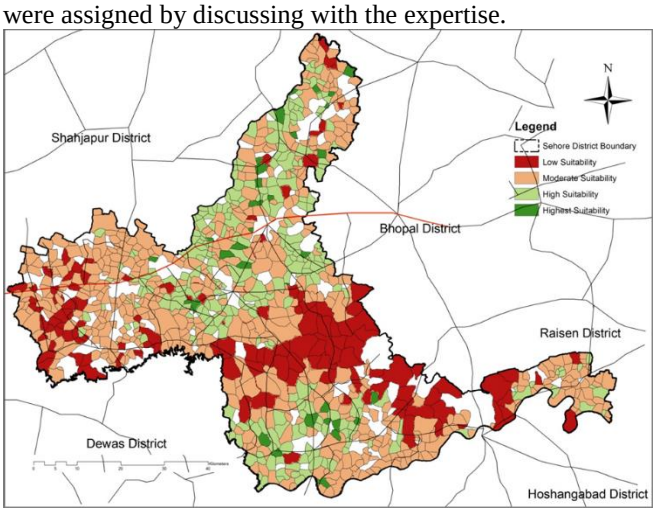

Fig. 3: Clustering analysis

In this cluster suitability, all the villages have been classified into four different categories. The villages with deep green colour are having the highest suitability and these villages will be more preferred for clustering process. There is very little number of such villages in the district. The villages with light green colour are the high suitable in suitability analysis and are large in numbers and will be supported by highest suitable villages. The villages with saffron colour are the moderate suitable villages which have scope of development down the years. The villages with red colour are the villages which are least suitable for clustering process. All the high suitable and highest suitable villages has been considered for clustering process that lies in a radius of 5 Km with a buffer of 2 km.

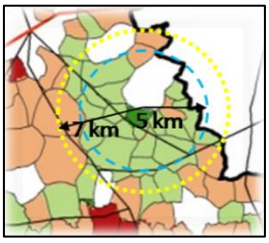

Fig. 4: Clustering analysis

Cluster suitability factors	Influence %
Irrigated land percentage	15
Non Irrigated land percentage	5
Dual crop Intensity	15
Agricultural Laborers	10
Cultivators	7
Forest cover	5
Wheat production density	10
Soybean production density	15
Population density	10
Regional Connectivity	8
Total	100

Table 2: Cluster suitability factors

V. CONCLUSION

This clustering approach is based on population and production of the villages. Thus finding the potential of development to boost the local economy will enhance the regional economic development. This approach can be used to clustering of villages as per guidelines of RURBAN MISSION and these villages may emerge as a smart village.

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