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ORIGINAL ARTICLE

A Study on ICT Infrastructure available in KVK's of Uttar Pradesh, INDIA

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ABSTRACT
Present age is said to be the ICE age as Information, communication and entertainment has become the new tool of development and progress. The agriculture sector cannot remain isolated from the tremendous applications of information and communication technologies. Krishi Vigyan Kendras (KVK's) are the medium of transfer of new agricultural technologies and practices from the source (universities and research institutions) to the farmers. The role of information communication technologies cannot be overlooked at this juncture. In the present study the ICT infrastructure available at KVK's of Uttar Pradesh (UP) was assessed through a survey of KVK employee's. The information was collected on several parameters. Then multivariate technique of cluster analysis has been used to group KVK's of UP on the basis of ICT infrastructure available with them in order to gauge their e-readiness and to initiate group specific programs for enhancement of ICT infrastructure available.
KEYWORDS: *e-Readiness, ICT, Extension service provider, Extension educationist, Cluster analysis*

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INTRODUCTION

The present era is the era of information and knowledge revolution. Many electronic resources are available. The increase in information availability on the web has affected information seeking behavior. Innumerable types of information, in a large variety of containers and in many different locations, are all available in one place. In the modern society, the types of information and the media which present them have become manifold and multifarious, offering men and women a vast selection. Information and communication technologies (ICTs) are devices to transmit information from source to receiver without noise. The word ICT was verbalized by Stevenson in the year 1997 in his report entitled "Information and communication technology in UK School; An independent enquiry" to the government and promoted the new national curriculum document. It is to denote a wide range of services, application and technologies, using various types of equipments and software, often running over telecommunication network [3]. Access to information and communication technologies (ICTs) implies access to channels and modes of communication that are not bound by the barriers. New forms of social organizations and productive activities have been emerged, which if nurtured, can become transformational factors as important as the technology itself. The ICTs are creating new opportunities to bridge the gap between information haves and information have not's in the developing countries. More than 70% population lives in rural India. The agriculturally rich developing countries like India need to harness ICT potential in bringing about the agricultural and rural development. The importance of information and communication technologies in agriculture is not new, and many traditional methods of managing and communicating information will continue to be critical for agricultural development. In India, all internet users are more than 100 million, we have the internet penetration rate of 8.4% and has the 10.7% of Asian Internet user population. India ranks 4th position in top 20 countries with highest number of internet users. Information technology will bring new information services to rural areas on which, farmers as users, will have much greater control

than ever over current information channels. Access to such new information sources is a crucial requirement for the sustainable development of the farming systems. Information technology when applied to the rural and agricultural conditions can improve the linkage between research sub-systems and farmers' sub-systems for extension sub-systems. Therefore it becomes necessary to know the e-readiness of the KVK which are engaged in the process of disseminating information to the farmers using ICT's. Knowledge about the ICT infrastructure available with the KVK's will help in making plans for the future for effectively transferring knowledge from lab to the land [2-10]. In the present study the ICT infrastructure has been ascertained by asking questions to the employees of different KVK's in Uttar Pradesh. The questionnaire consists of about 25 questions on the basis of which the ICT infrastructure at a particular KVK was assessed. In order to enhance the ICT infrastructure available with different KVK's it was important to form groups of KVK's having similar infrastructure so that detailed and specific plans can be made for them. For grouping of KVK's the statistical technique of cluster analysis was used.

MATERIAL AND METHODS

In the present study a survey of KVK employees were undertaken to estimate the ICT infrastructure available with them. 53 KVK situated in Uttar Pradesh were selected for the study and a questionnaire regarding the ICT infrastructure available with them was filled by the scientific workers of the KVK's. 25 questions were asked to each worker and the answers were given in quantitative variables. In order to gauge the ICT infrastructure available with each KVK and to fulfill their need for improvement, it was pertinent to group the KVKs with respect to ICT infrastructure available with them so that group specific programs for support to enhance the ICT infrastructure could be implemented. The KVK's were also classified on the basis of the organization by which they are governed into KVK's belonging to ICAR, State government and NGO's denoted respectively by I, S and N in parenthesis against their names.

Grouping of individuals when there is only one variable measured on each individual is relatively easy and can be done by making classes and forming frequency distributions etc. But when large number of variables is measured on each individual of the population forming groups becomes a complex task. Here in comes the role of multivariate statistics in which by using the technique of cluster analysis individuals can be grouped when large number of variables are measured on each individual. In the present study 25 questions (variables) where asked to each worker of a KVK. Cluster analysis was used to form groups of the KVKs based on the responses of the employees. In cluster analysis the patterns in a data set are explored by grouping the observations in to clusters. The prime aim of clustering is to form optimal groups such that observations in a group are similar within a group but the groups are dissimilar to each others. The methods used for clustering are Hierarchical clustering and partitioning. In *hierarchical* clustering we typically start with n clusters, one for each observation, and end with a single cluster containing all n observations. At each step, an observation or a cluster of observations is absorbed into another cluster. We can also reverse this process, that is, start with a single cluster containing all n observations and end with n clusters of a single item each .In *partitioning*, we simply divide the observations into g clusters. This can be done by starting with an initial partitioning or with cluster centers and then reallocating the observations according to some optimality criterion. Other clustering methods that we will discuss are based on fitting mixtures of multivariate normal distributions or searching for regions of high density sometimes called modes. Several computer algorithms have been developed to form clusters. Hierarchical methods have been used in the present study which is of two types- agglomerative and divisive [11-18]. In this process, the number of clusters becomes smaller and smaller and the clusters themselves grow larger. We begin with n clusters (individual items) and end with one single cluster containing the entire data set. An alternative approach, called the *divisive* method, starts with a single cluster containing all n items and partitions a cluster into two clusters at each step The end result of the divisive approach is n clusters of one item each. Agglomerative methods are more commonly used than divisive methods.

ICAR	STATE GOV			NGO
Lucknow (I)	Fatehpur(s)	Lalitpur(s)	Muzaffernagar(s)*	Chitrakoot*(N)
Bareilly (I)	Hamirpur(s)	Banda(s)	Rampur(s)	Allahabad(N)
Kushinagar(I)	Agra(s)	Lakhimpur Kheri(s)	Saharnpur*(s)	Pratapgarh*(N)
Sant Ravidash(I)	Etah*(s)	Mainpuri(s)	Shahjahapur(s)	Sitapur-1(N)
Deoria(I)	Jalun(s)	Mohaba(s)	Ghaziabad(s)	Auraiya(N)
Raebareilly*(I)	Unnao(s)	Badaun*(s)	Pilibhit(s)	Ghazipur*(N)
	Aligarh*(s)	Nagina(s)	Jaunpur(s)	
	Firozabad(s)	Bulandshahar(s)	Gourkhpur(s)	
	Hathras(s)	G. B. Nagar(s)	Sidh.nagar(s)	
	Mathura(s)	Bagpat(s)	Varanasi*(s)	
	Kanpur Dehat*(s)	Meerut(s)	Balrampur(s)	
	Kannauj(s)	Etawah(s)	Mirzapur(s)	
	Farukhabad(s)	Jhansi(s)	Azamgarh(s)	
	Hardoi (s)	Sitapur- 2()		

RESULTS AND DISCUSSION

The results of the clustering of KVK's governed by state agricultural universities (SAU,s) are shown in the fig.1 which shows that the closest group which are having minimum distance between them wrt to the ICT infrastructure available is the group comprising of Farukhabad, Jalun, Kannauj and Firozabad. The KVKs of Etah and Unnao were also having the same ICT infrastructure as were the group of Hathras and Mathura. These three groups were very close to each other and have very similar ICT infrastructure. The next KVK which was having similar ICT infrastructure was that of Shahjahpur and Hardoi. The KVK's of Varanasi,and Saharanpur were grouped together and so were Jhansi and Lalitpur. The KVK's of Mahoba and Badaun were grouped together. The KVK's of Agra and Mainpuri and were grouped together, so were the group of Balrampur and Mirzapur. G. B. Nagar and Bagpat formed a group. Etawah, Banda and Bulandshahar, Pilhibhit formed the remaining groups. Nagina and Meerut formed a group.

Bariely and Deoria formed a group. Pratapgarh and Sitapur formed a group which were having similar distance between them wrt to ICT infrastructure as was the group of Jhansi and Lalitpur.

The KVK which were having the largest distance to all the other KVK's with respect to the ICT infrastructure available were Hamirpur, Sitapur, Fatehpur and Allahabad.

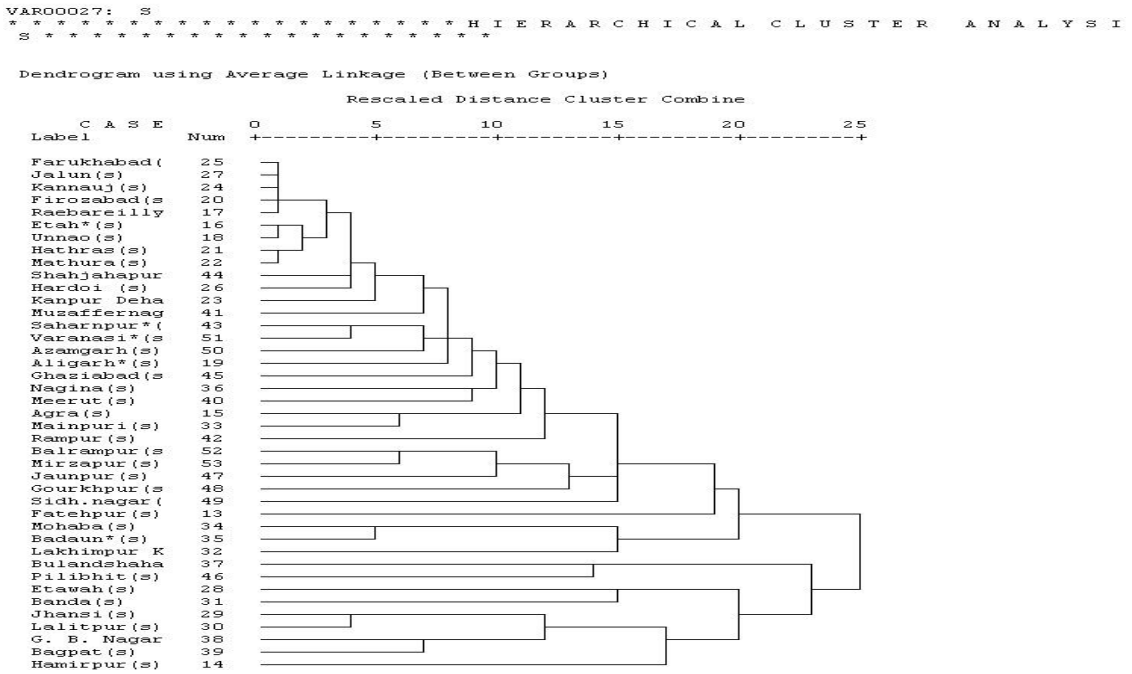

Fig.1 Grouping of KVK's Governed by State Agricultural Universities (SAU's)

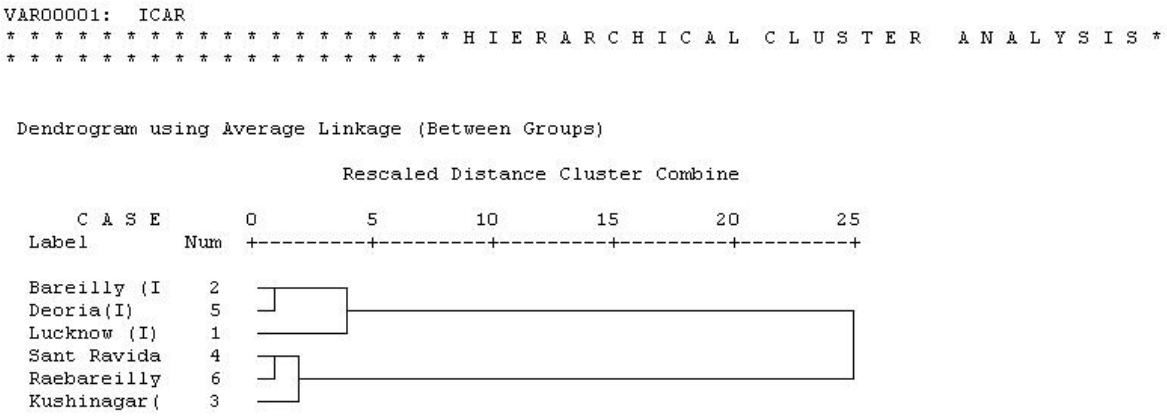

Fig.2 Grouping of KVK,s governed by ICAR

Among the KVK governed by the ICAR the closest with respect to the ICT infrastructure were Raebareliy and Sant Ravidas Nagar. Bareily and Deoria formed the second group. Kushinagar was closed to the group of Raebareliy and Sant Ravidas Nagar and ICT infrastructure at Lucknow KVK was different from both of these groups.

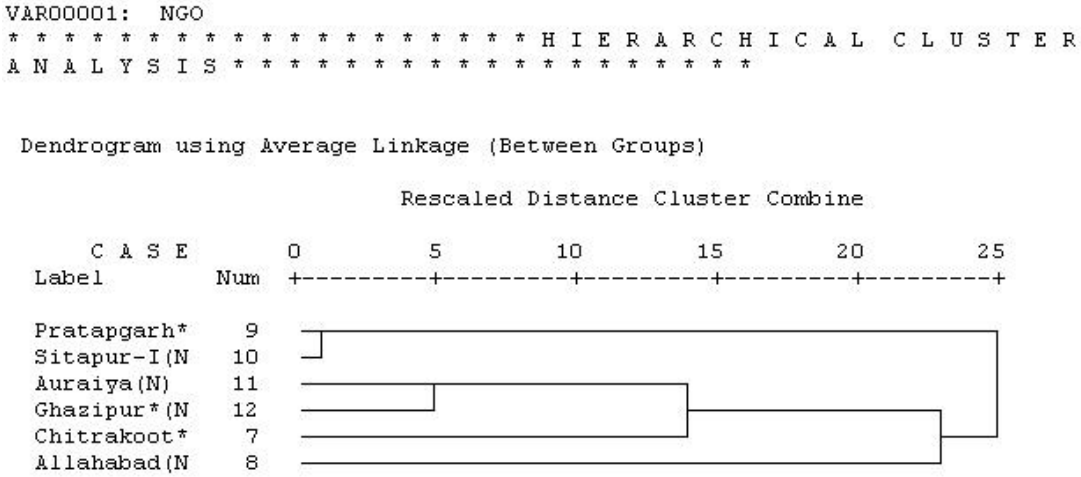

Fig. 3 KVK's governed by NGO's

Among the NGO's Pratapgarh and Sitapur 1 formed the first group with identical ICT infrastructure followed by the group of Aurraiya and Ghazipur. Chitrkoot was closer to Aurraiya and Ghazipur wrt ICT infrastructure. The ICT infrastructure at Allahabad was widely different form that of other KVKs governed by NGO's.

With respect to the overall grouping KVK of Raibarely governed by ICAR was closest to the group of Farukhabad, Jalun, Kannauj, Raibareli and Firozabad. Sant Ravidash nagar was closed to the group of Etah and Unnao, and Hathras and Mathura. Prataphgarh and Sitapur-1 KVK's governed by NGO were closed to Aligarh KVK governed by SAU with respect to the ICT infrastructure available.

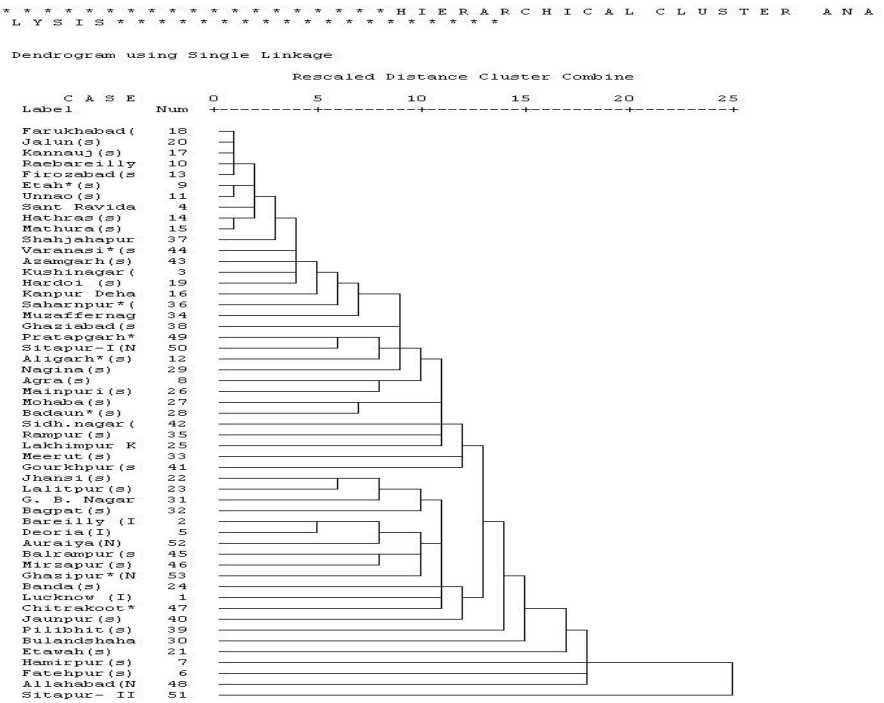

Fig 4. Combined groupings of all the KVK's.

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