

*Full Length Research Paper*

# Using the Delphi technique to assess cost-effectiveness of rural information and communications technologies (ICT) centers in Iran

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Accepted 6 July, 2012

**This Delphi study was aimed to identify the effectiveness of rural information and communications technologies (ICT) centers in rural communities of Kermanshah Township, Iran. Rural information and communication technology (ICT) centers play an important role in rural development through improving e-governance in rural areas. The study utilized a Delphi technique, carried out by participation of ICT experts to first determine indicators of effectiveness. Based on the identified indicators, effectiveness of rural ICT centers was assessed utilizing structured interviews with questionnaire. Results indicated that a majority of rural people never used internet services despite its availability. ICT centers also showed to have low effectiveness improving households' income, employment rate, diffusion of agricultural information, and e-commerce. They were found to be effective, up to some extent, in preventing migration to urban areas and decreasing number of daily trips to nearby cities as well as facilitating postal requirements and improving e-governance.**

**Key words:** Rural information and communications technologies (ICT) center, effectiveness, E-governance, Iran.

## INTRODUCTION

We are living in a world that brings together people from different contexts. In this situation, people may learn from one another, but they also need to have access to, and understanding of information and communication technologies (ICTs) (Helmer, 1966). This is especially important in rural areas. Not only do rural people need to understand rapid evolution of new ICTs, they also need to catch up with the changes imposed on social structures of work and home. It is indeed necessary to reshape Iran's rural information system by harnessing key information and communication technologies and developing skills required for socioeconomic development of rural communities. This understanding needs to

take shape within the context and realities of the countryside in terms of information literacy. If rural areas do not find their role as a major player in using or sharing ICTs, the whole process of rural development may face a new challenge by creation of an information gap in an ever-changing society.

ICTs can provide for rural communities, particularly in developing nations, an opportunity to meet their development goals such as poverty reduction, basic health care, and education far more effective than ever before. Using ICTs in rural areas for enhancing agricultural production is suggested to be immensely beneficial as most of the poor live in rural areas (Stufflebeam et al., 1985). Moreover, ICT application in rural areas can give them a voice and improve their employment. ICTs can directly help to the improvement of economic and social situation of rural people, leading to enhanced community livelihood.

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ICT centers are public places where people can access computers, internet, media, and modern training; an enabling environment for research and tele-working, so increasing employment opportunities (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2006).

Gomez and Hunt (1999), in their assessment regarding the International Development Research Centre (IDRC) interventions, explored the challenges and opportunities of telecenter evaluation in Latin America, Asia and Africa (Gómez, and Hunt, 1999). They also investigated emerging evaluation frameworks and methodologies as well as requirements and resources available for telecenter basic evaluation, monitoring, impact assessment, and identification of salient issues affecting their performance. It was revealed that telework centers were feasible entrepreneurial environments. Furthermore, large-scale use of such centers could result in substantial transportation benefits (Gómez and Hunt, 1999).

Based on the Nykvarn neighborhood work in Sweden, those employers seemed more willing and less skeptical compared to their United States counterparts in allowing their employees to work away from the office (UNESCO, 2006). Another assessment is related to the ITU evaluation of multipurpose community telecenter pilot projects case. One objective of the program was to evaluate social, economic and cultural impact of providing access to such facilities and services and thereby inform policy makers on the needs and cost-effectiveness of providing such tools for development. The second objective was to assess the needs and demands for ICTs in rural and remote areas. This case presented a common framework for evaluation of rural telecenter projects around the world, including research questions, indicators and tools. Moreover, the preliminary evaluation of telecenter pilot projects in South Africa was directed in indexes including accessibility, functionality, service usage, sustainability, operational costs, expenditure and income.

Sustainable access in rural India (SARI) has been widely acclaimed for its efforts to provide comprehensive information and communication services through computers and internet in rural areas in Tamil Nadu state of India. Detailed interviews with kiosk users and operators revealed that kiosks had reached 4 to 8% of village population, indicating that a very small fraction of village households had benefited from the kiosk. However, an in-depth field study revealed a number of other important factors relevant in depicting an accurate assessment of social and economic impacts of the kiosks.

Almost 34% of Iranian population lives in villages. The government intends to facilitate and extend ICTs to most villages. Iran's rural ICT network was established in 2000, when the village of Shahkooh in the north hosted the country's first multi-media center. Later in 2004, two well-equipped ICT centers were opened in nearby villages namely Gharnabad and East Livan. Then Iran's National

Rural ICT Strategic Plan was developed to provide communities with access to internet and its applications such as e-government, e-commerce, e-learning, e-banking and other e-services.

Geographical boundary of current study is limited to Kermanshah Township, west of Iran. At present, there are 22 ICT centers in rural areas of the Township as center for Kermanshah Province, west of Iran (Planning Deputy of Kermanshah Province Governor Generalship, 2007).

The main purpose of this study was to assess the effectiveness of ICT centers scattered across villages of Kermanshah Township. Research objectives were: (1) to assess ICT centers' effectiveness based on level of their goals achieved and benefits to household and communities; and (2) to assess the accessibility of these centers.

## MATERIALS AND METHODS

The study's design was a descriptive survey, which focused on a population of 6,218 rural household in Kermanshah Township, west of Iran. A sample of 367 rural households was selected through a stratified random sampling. Data were collected in two phases. The first stage utilized a Delphi technique with 15 ICT experts participating to identify indicators needed in determining effectiveness of rural ICT centers.

Delp et al. (1977) described the Delphi technique as a group process used to solicit, collate, and direct expert responses toward reaching consensus. Helmer (1966) also described this technique as a method of securing and refining group opinions and substituting computed consensus for an agreed-upon majority opinion. Stufflebeam et al. (1985) noted that Delphi technique was especially effective in obtaining consensus from a purposively selected group of experts.

The study employed a series of three self-completing postal questionnaires. The first round used a questionnaire with this open-ended question: "What are major indicators for assessing effectiveness of rural ICT centers?" This question produced a wide array of response categories. Responses were then categorized in 28 categories to produce items for the second round questionnaire, in which respondents were asked to rate the items identified in round one using a five-point Likert-type scale (1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, 5 = strongly agree). Responses from this step produced a list of categories, which later were reduced to 25 items. In the last step of Delphi technique, participants were asked to provide a dichotomous indication of whether they agreed or disagreed that each of the listed items could be regarded as indicator of effectiveness. Results showed a consensus on 22 statements.

The second phase utilized a structured interview using a questionnaire developed based on findings of the first stage using Delphi technique. The purpose of this stage was to determine effectiveness of rural ICT centers. To establish the content and face validity of the survey instrument, a panel of experts containing academic staff of the Faculty of Agriculture in Razi University was established, which revised the instrument afterwards. Reliability of the instrument was measured by selecting a sample of 30 rural households, later excluded from the study. Cronbach's coefficient (for the variables related to the effectiveness construct) was measured to be 0.77, which meant the instrument being reliable to measure effectiveness. Data were then coded and analyzed using the statistical package for the social sciences (SPSS).

**Table 1.** Delphi technique- round one: level of agreement towards effectiveness indicators (n=15).

Indicator	Agree (%)
E-commerce	88.2
Filling leisure times of rural youth	87.1
Improving postal services	84.2
Reducing trips to urban areas	83.6
Improving employment opportunity via job searching	82.3
Increasing access to telephone	81.8
Facilitating official registrations by Internet	80.2
reducing rural-urban migration	78.8
Developing crop insurance	77.1
Providing business services	76.2
Growing the number of community businesses	75.5
Improving access health and hygiene information	73.2
Providing access to information on rural cooperatives	72.5
Increasing agricultural sales value	71.4
Providing access to information about agricultural markets	69.8
Providing access to information about agricultural inputs	67.5
Providing access to information on weather	66.1
Providing awareness on events in the country	65.5
Reducing cost of information and communication	65.4
Reducing time of access to information and communication	64.9
Providing access to information on input and output prices	46.1
Changing household income	63.9

## RESULTS

First phase of this research sought to identify major indicators of assessing effectiveness of rural ICT centers. Table 1 contains a summarized list of indicators identified till round three. As showed in Table 1, panel members agreed that 22 items constituted major indicators of assessing rural ICT centers' effectiveness. The highest level of agreement was reached on e-commerce (88.2%). Over 80% of panel members agreed that six additional categories were also important indicators of effectiveness. These six indicators were: filling spare times of rural youth, improving postal services, reducing trips to urban areas, improving employment opportunities, increasing access to telephone, and facilitating official registrations. Some additional indicators were also listed in Table 1.

Perceptions of sample rural household heads regarding the effectiveness of rural ICT centers are shown in Table 2. Overall, ICT centers were perceived as somewhat effective by rural people ( $M=2.55$ ,  $SD=0.87$ ).

Respondents revealed that rural ICT centers were only effective in terms of two indicators; namely increasing access to telephone (Mean=4.21; on a scale where 5=very effective and 1=not effective), and facilitating official registrations via internet (Mean=3.58). As identified in Table 2, level of ICT centers effectiveness was perceived to be very low based on changes in household

income, e-commerce, access to information about agricultural input and output prices, awareness of national events, increasing value of agricultural sales, growing number of community business, business services, developing crop insurance, access to agricultural weather information, access to information concerning agricultural inputs, access to information about agricultural markets, access to information on rural cooperatives, and improving employment opportunities via job searching. These centers were to some extent effective in the rest of indicators (Table 2).

## DISCUSSION

Establishing rural ICT centers has been one of the most basic Iranian national policies in order to provide information and communication technology services to rural communities. Therefore this research was conducted to analyze the effectiveness of such ICT centers. It tried to identify the most important indicators of assessing rural ICT centers effectiveness. Overall, rural communities and households evaluated the centers effective to some extent. However, this effectiveness was mostly as a result of increased access to telephone and facilitated official registrations rather than services envisaged by the authorities in the Ministry of Information and Communications Technology. For example, from the

**Table 2.** Effectiveness level of ICT centers as perceived by rural household heads (n=367).

Indicator	Mean	SD
Increasing access to telephone	4.21	0.89
Official registrations by Internet	3.58	0.97
Reducing trips to urban areas	3.38	0.99
Improving postal services	3.22	0.87
Reduction in monetary cost to obtain information and communication	3.19	0.98
Reduction in time to obtain information and communication	2.99	0.87
reduction in rural-urban migration	2.75	0.84
Filling leisure times of rural youth	2.73	0.78
Access to improved health and hygiene information	2.68	0.86
Improving employment opportunities via job searching	2.42	0.84
Access to rural cooperatives information	2.41	0.88
Access to information about agricultural markets	2.31	0.87
Access to information about agricultural inputs	2.28	0.99
Access to agricultural weather information	2.27	0.89
Developing crop insurance	2.23	0.86
Business services	2.13	0.88
Growth in the number of community businesses	1.96	0.78
Increasing value of agricultural sales	1.93	0.85
Awareness of events in the country	1.88	0.85
Access to information about agricultural input and output prices	1.84	0.84
E-commerce	1.83	0.99
Changes in household income	1.79	0.89

Scale: 1=not effective, 2=of little effectiveness, 3=somewhat effective, 4=effective, 5=very effective.

rural households' point of view, these centers made little impact on household income improvement, e-commerce, and access to information regarding agricultural input and output prices.

Rural ICT centers need to be reshaped towards undertaking critical duties in the process of rural development; such as e-commerce, providing and disseminating crucial information to rural communities. They can also be empowered to provide information concerning agricultural production and marketing, agricultural subsidies, cooperatives, insurance, finances, and public credits. Providing relevant training courses for rural ICT centers' staff and rural households could improve the effectiveness.

Training courses could be in the subjects such as philosophy, purpose, and nature of ICTs; types of services that these centers can provide; and even their cultural and social consequences. Rural communities and households should be involved in participatory planning and management of rural ICT centers, including both financial investment and decision making. Further and continuous evaluation studies could help policy makers understand social and economic outcomes of rural ICT centers.

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