# Analysis of Rate of Adoption of ICT and its Determinants among of ICT users in Rural Areas (Case of Tarom City)

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Abstract: *The present study aimed at exploring the roles of individual-social characteristics, the characteristics of ICT, access to ICT and information resources of ICT on the rate of adoption and application of ICT among ICT users in Tarom city, Zanjan Province. The data of this descriptive-correlational study were collected by using structured interview and questionnaire. The population of the study consists of ICT users located in the Tarom city. Using Morgan table, 196 users were selected as sample. Results showed that access to ICT, individual information resources of ICT, characteristics of ICT, individual-social characteristics, mass information resources of ICT affect. level of adoption and application of ICT, which these variables, totally, explained 61/5 percent of variations in the level of adoption and application of ICT.*

**Keywords:** ICT, Innovation, Adoption, Application.

## 1. Introduction

Information and communication technology (ICT) as a tool of empowerment, all the constraints of cost, space and time has broken. Development of information in rural areas, especially Internet technology, has created new environment and actors in rural areas [9]. Information and Communication Technology (ICT) Leads to empowerment, social development, economic development and improvement of rural livelihoods [6].. That also Plays an important role in climate change, natural disaster, water supply, food security, dealing with hurricanes, drought management, capacity building of local capacity (individual and organizational) knowledge sharing and integration of indigenous and modern knowledge [10].

There are potential capacity for the use of technology in rural areas and taking advantage of its positive impact on the many and varied services and opportunities available to the rural communities.

Especially, development of information and communications technologies (ICT) as a potential means to overcome on deteriorating situation in marginalized rural and physical distance between communities and the rural business is.

But interests of this technology and infrastructure services of that can not be divided equally between areas. without a coordinated strategy, there is risk of unequal development of ICT in rural and urban areas.

Civil society and business have cheap and easy access to the latest technologies, and while the rural areas have been neglected.

Now, three challenge of access, cost and quality have ahead in rural areas. About of the challenge of access of ICT must be said, due to the remoteness of rural areas and poor communication networks (roads) in rural, has led to poverty of economic and political and lack of access to goods, services, information and infrastructure, increases the vulnerability of families and prevent the role of these regions in the country's economic growth. It is necessary to mention about the challenge of the cost, due to the remoteness and scattered rural areas, access to basic health care services, education and central markets is very costly.

The expertise, efficiency, and quality professionals, entrepreneurs and workers in rural areas is much lower than urban areas

This is due lack of interest and lack of qualified personnel in his career, to stay in rural areas. All these matters, lead to the low service and the efficiency in rural areas [13].

One of the main shortcomings of diffusion researches is studing and focusing on individual innovations, because the innovation consequences are linked and understanding and perception of an innovation is based on its compatibility with previous innovation is accepted, therefore instead of studying innovation as a separate unit, should be paid to the study of set of innovations [12].

In this research, we will study the set of innovations of ICT (Information and Communication Technology).

The aim of this study is to determine the rate of adoption and use of ICT among the users in rural areas and that what factors affect on this process.

**The conducted studies in the world over:**

Mohamed Shaffri et al (2012) In their study on measuring ICT use on the West Coast fishermen, have implicated factors such as experience, age, gender, voluntary use of ICT, facilities, environmental, social impact, expected effort and expected performance on the use of information and communication technologies (ICT).

Galloway & Mochrie (2005) in a study on the use of ICT in rural firms have to point out that the political perspective, the

best way to lead to the adoption of this technology, is a multi-channel approach for this purpose.

D'Silva et al (2010) In their study of The effective factors on attitude of use of ICT in the leaders rural communities in Malaysia Express that degree of influence and usefulness, perceived benefits of ICT, the perception of ease of use, subjective norms, compliance and employment related has a significant effect on attitude use of ICT.

Cassim & Eyono Obono (2011) with a study on factors influencing on adoption of ICT for teaching pronunciation problems, noting that factors related to teacher such attitudes to ICT, the adequacy of information in regard to ICT, an understanding of the suitability of ICT, an understanding of the ease of use of ICT and other factors such as gender, age, teaching experience, access to computers, Internet access, location, school type, and school-based educational impact of adopting this technology.

Oye et al (2011) A study to provide a model of adoption and use of ICT for teachers and institutions of higher education, use TAM and UTAUT model for understanding the behavior of acceptance and use of technology by teachers. In this study has determined in 89 percent of presentations, use of ICT is necessary. Also barriers to the use of ICT refer to the time, cost and education.

twentieth century called Industrial society and today, the twenty-first century is information society and ICT will be introduced as a new innovation in this field [2]. Information and Communication Technology (ICT) Interactive relationship between the three domains of telecommunications, information and computer is creating [1].

In developing countries with use of ICT in rural areas as an innovator, we can overcome the many problems of rural communities, such as increasing rural to urban migration and lack of knowledge, skills, and educational facilities in rural areas [8].

innovative is ideas, methods, object or thing, that from the perspective of the individual is considered a new [12], [14]. Communication is the process by which messages are transmitted from the source to the receiver. Diffusion is also a special kind of communication process, which is related to the publication of new messages and ideas. The main elements of diffusion of new idea is Innovation by certain channels in the time domain between and among members of a social system is released.

Innovations are usually two forms of single and set of innovations. diffusion and reception of innovation strongly influenced social groups member. This means that when some group members accept innovation, the other members of group obey from them and this is the first step towards diffusion innovation and establish the relationship is between source and receiver is [12].

In present study, ICT in form of set of innovation into framework of four technology, Including ICT centers, the Internet, computers and telephones (mobile and fixed) will be examined and to measure the ICT adoption rate by farmers, decision innovation process of Rogers has been used. Rogers, in his newest book as diffusion of innovation, the innovation adoption stages is outlined as follows:
1.Knowledge  2. Persuasion 3. Decision 4. Implementation 5. Confirmation [12], [14].

To analyze the influencing factors on the adoption of ICT has used as the model of Rogers' innovation. The characteristics of the individual - social (age, education, income, Subjectivity of job, Achievement Motivation, cosmopolis and ICT user skills) and individual of information resources (family, friends, relatives and co-workers, and neighbors) and the mass of information resources (publications, radio and TV), ICT features (relative advantage, compatibility, Complexity, Triability and observability), ICT Facilities (computers, Internet ,Internet cafes and centers ICT) was used to measure the ICT adoption levels. Rate of adoption of ICT was obtained by decision innovation process of Rogers.

## 2.  Material and Methods

This cross-sectional research as a correlational- descriptive study utilized structured interviews using a questionnaire (having been reliable and validated) to collect data. Area of operations of present study is Tarom city. The population of the study consists of 400 ICT users. Using Morgan table, 196 users of ICT as sample were selected.

In order to assess the validity, content validity method was used and questionnaire by experts and professors of agricultural extension has modified.

To assess the reliability of questionnaire using Cronbach's alpha test, correlation coefficients were calculated for the answers given. Cronbach's alpha coefficients between 0/71-0/93, indicating acceptable reliability of the questionnaire.

For data analysis, the method of percentage, mean, standard deviation and coefficient of variation and path analysis SPSS 15 software has used. In this research, the adoption of ICT is the dependent variable and individual-social characteristics, ICT facilities, information resources of ICT and characteristics of ICT are independent variables.

## 3.  Results

### 3.1  Evaluation rate of Adoption of ICT

To measurement of the rate of adoption of ICT, decision innovation process of Rogers was used. According to Table 1, at Knowledge stage 76/5 percent, at persuasion stage 71/4 percent, at Decision stage 62/9 percent, at Implementation stage 72 percent, at confirmation stage 65/3 Percent of the respondents this process has been assessed as moderate or high.

The results in Table 2, about 17 percent of users, ICT in the limit of very low and low, 54 percent moderate level and 28 percent are accepted at high or very high level.

**Table 1**: Assessment of Adoption process

| Level of Assessment / Adoption process | low | | Very low | | middle | | high | | very high | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Frequency | Percent | Frequency | Percent | Frequency | Percent | Frequency | Percent | Frequency | Percent | Frequency | Percent |
| Knowledge | 8 | 4/1 | 38 | 19/4 | 101 | 51/5 | 25 | 12/8 | 24 | 12/2 | 196 | 100 |
| Decision | 11 | 5/6 | 45 | 23 | 80 | 40/8 | 31 | 15/8 | 29 | 14/8 | 196 | 100 |
| Persuasion | 15 | 7/7 | 58 | 29/6 | 81 | 41/3 | 17 | 8/8 | 25 | 12/8 | 196 | 100 |
| Implementation | 20 | 10/2 | 35 | 17/9 | 94 | 48 | 27 | 13/8 | 20 | 10/2 | 196 | 100 |
| Confirmation | 18 | 9/2 | 50 | 25/5 | 84 | 42/9 | 14 | 7/1 | 30 | 15/3 | 196 | 100 |

**Table 2:** Evaluation rate of adoption of ICT. index scores range is between 25-0.

| Rate of adoption of ICT | Total | |
|---|---|---|
| | Frequency | Percent |
| Very low and low (score less than 10) | 34 | 17/3 |
| Moderate (score between 11 to 15) | 107 | 54/6 |
| High and very high (scores between 25 to 15) | 55 | 28/1 |
| sum | 196 | 100 |

### 3.2 Analysis the impact of independent variables on the adoption of ICT

Combined path analysis and multiple regression has used to examine the effects of independent variables on the rate of adoption of ICT. The relationship between the independent variables affect the dependent variable in terms of theoretical and conceptual capabilities had been examined by using path analysis.

Next, the relationship of each independent variable was determined by other factors, the direct and indirect effects of variables to be measured. Table 3 shows results of this analysis, Fisher's exact test with the numerical value of 40/372 (F =40/372) at the 99 percent confidence level is quite significant and highly significant and that the relationship between the independent variables and the dependent variable is quite significant. The coefficient of R2 with numerical value of the 0/615 represents the average amount of variance in the dependent variable that is explained by the independent variables entered in the model. suggests that the 61/5 percent of the total variability of dependence variable are explained by the analytical model of present study.

**Table 3:** Enter regression to determine the effect of independent variables on the level of ICT adoption **, significant at p<0.01

| Variables | B | SEB | $R^2$ | t | Sig |
|---|---|---|---|---|---|
| Constant coefficient | -2/604 | 1/773 | _ | -1/468 | 0/144 |
| Individual characteristics | 0/017 | 0/027 | 0/032 | 0/612 | 0/244 |
| Access to ICT | 0/290 | 0/094 | 0/226 | 3/073 | 0/002 |
| Personal information resources | 0/660 | 0/203 | 0/213 | 3/242 | 0/001 |
| Collective information resources | 0/434 | 0/273 | 0/135 | 2/141 | 0/034 |
| Characteristics of ICT | 0/371 | 0/083 | 0/314 | 4/483 | 0/000 |
| $R^2$= 0/615 | | | F= 40/372 Sig= 0/000** | | |

Some of the independent variables entered in the model, were influenced by other factors, through Enter regression, the impact of these factors was investigated and the results are shown in Table 4.

To measure the total impact of the independent variables on rate of adoption of ICT, the direct and indirect effects of each factor was evaluated separately. According to Table 4, the ICT facilities by a factor of 0/378 has the highest indirect effect and and then to the individual - social characteristics, personal information sources and collective information sources are.

The results of the total (direct and indirect) also shows that ICT facilities by impact factor of 0/640, personal information sources by impact factor of 0/331, Characteristics of ICT by impact factor of 0/314, Individual-social characteristics by impact factor of 0/212, and the collective information sources by impact factor of 0/142 Influence on the rate of adoption of ICT. Assessing the implications of middleman and independent on the rate of adoption of ICT, research path diagram in Figure 1 has drawn.

**Table 4:** illustrate the direct and indirect effects of independent variables on the level of ICT adoption

| Variables | access to ICT | personal information resources | collective information resources | characteristics of ICT | direct influence | indirect influence | influence |
|---|---|---|---|---|---|---|---|
| individual characteristics | 0/230 | 0/027 | 0/064 | 0/078 | 0/032 | 0/180 | 0/212 |
| access to ICT | 1 | 0/491 | 0/201 | 0/594 | 0/326 | 0/378 | 0/640 |
| Personal information resources | | 1 | 0/457 | 0/171 | 0/213 | 0/118 | 0/331 |
| Collective information resources | | | 1 | 0/024 | 0/135 | 0/007 | 0/142 |
| characteristics of ICT | | | | 1 | 0/314 | _ | 0/314 |
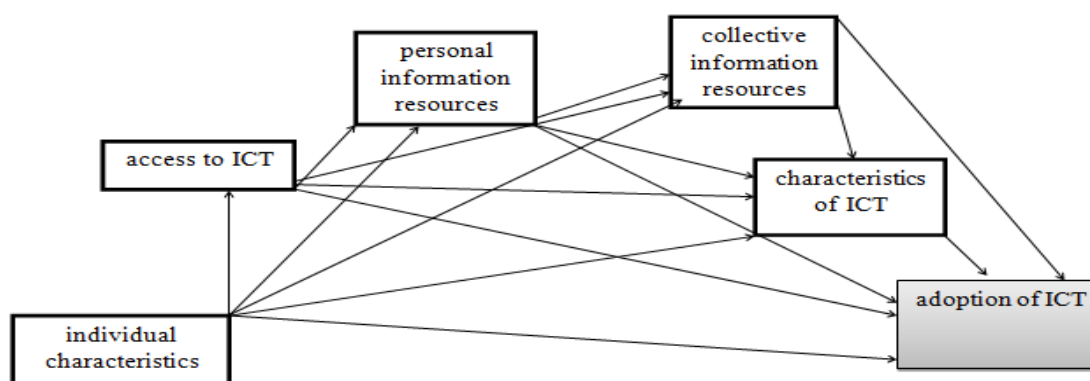


**Figure 1**: The direct and indirect effects of independent variables on the rate of adoption of ICT

## 4. conclusions

The findings of present study show that ICT facilities will have the greatest effect on the rate of adoption of ICT. It concludes with a study Mohamed Shaffri et al (2012) and Cassim & Eyono obono (2011) is in agreement. ICT facilities has a significant impact on the characteristics of ICT and can be said, access to set of innovations of ICT, can have a profound impact on the understanding of the individual from characteristics of ICT.

Personal information sources have the moderate effect on the rate of adoption of ICT. Present findings is in agreement with study of Mohamed Shaffri et al (2012). Personal Information resource by regression coefficient of 0/213 affect directly on the rate of adoption of ICT and by regression coefficient of 0/171 have impact on the characteristics of ICT, While the collective Information resource by regression coefficient of 0/135 affect directly on the rate of adoption of ICT and by regression coefficient of 0/024 have impact on the Characteristics of ICT. This suggests that personal Information resource has stronger effect than collective Information resource. Characteristics of ICT have the moderate effect on the rate of adoption of ICT. This findings is in agreement with study of D'Silva et al (2010) and Cassim & Eyono obono (2011).

## 5. Recommendations

According to the study, to developmentof ICT adoption in rural areas following recommendations are made:
Creation facilities in rural areas, such as centers of ICT and Internet cafes and support centers by provide facilities and incentives, especially in the beginning, providing internet access facilities, Move towards the development of Computer and Internet Training centers and creation a service facility for the farmers and their children in these centers. It eventually turned into a tangible need in the lives of farmers can adopt and use information and communication technology (ICT) met.

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