

# PAKISTANI WOMEN ENTREPRENEURS AND ICT INTERVENTION

**Hira Batool, Xidian University**  
**Kalim Ullah, Xidian University**

## ABSTRACT

*The present research focused on the challenge faced by Pakistani women in rural areas. The paper hypothesized the interplay of women's networks (ties to the community, ties to men in power and ties to family); use of ICT (information and communication technology which, means the use of internet and computer) for the success of women entrepreneurs. The results from two-year quasi experimental field study in ten different rural areas of Pakistan provided significant support for our proposed model. The results showed positive ties between family and community, but men in power showed negative tie related to information and communication use, entrepreneurial activity and profit. The information and communication interference also had a strong effect on entrepreneurship, with fifty new businesses in the ten intervention villages compared to 10 new businesses in the control villages. The outcomes also provide an indication of the active interplay of social networks and information and communication usage. The researchers also address the implications of our research for the grand challenges of empowering women in less developed countries.*

**Keywords:** ICT, Women, Pakistan, Entrepreneurship.

## INTRODUCTION

The United Nations planned eight Millennium Development Goals for dealing with poverty in order to improve the standards of living more specifically for the newly industrialized area such like Pakistan and India (<http://www.un.org/millenniumgoals/>). United Nations (2008) reported that the reason for setting eight target goals were to assess the progress after a decade later. The United Nations (2010) & (2015) failed to assess the progress. So, United Nations (2015) decided to reform the development goals from eight to seventeen that goes beyond the Millennium Development Goals based on the main causes of poverty and the worldwide need for the development named as sustainable development goals. Ericsson (2015) provided the reason for including the information and communication technology in sustainable development goals; the internet is the tool that will provide advances to every field of life. Obayelu & Ogunlade (2006) while various sustainable development goals include gender-based goals, one of them (SDG 5), is specifically addressed to women related hindrances, in specific linked to how to improve women's issues through offering improvement in quality of life, remove income related restrictions and elimination of gender pay gaps. The challenges faced by women are more severe in less developed countries, especially in rural areas, where centuries-old social cultural impediments limit access to education and information that can aid in their development. These challenges in turn result in women in these countries being highly underrepresented in government, land and property ownership and in credit and financing. Pakistan among the list of least developed countries is of specific interest since its economy is going to emerge that has

perceived a surge in its metropolitan development; however, rural inhabitants, particularly women, still trying to struggle due to a flared financial gap. Attaining sustainable development gap in Pakistan is predominantly a priority. More than 300 million people in Pakistan live in miserable poverty, more penurious people than live in all 26 sub-Saharan African countries combined.

More than two-thirds of Pakistan's populations exist in the geography or in one of the country's around half a million rural villages.

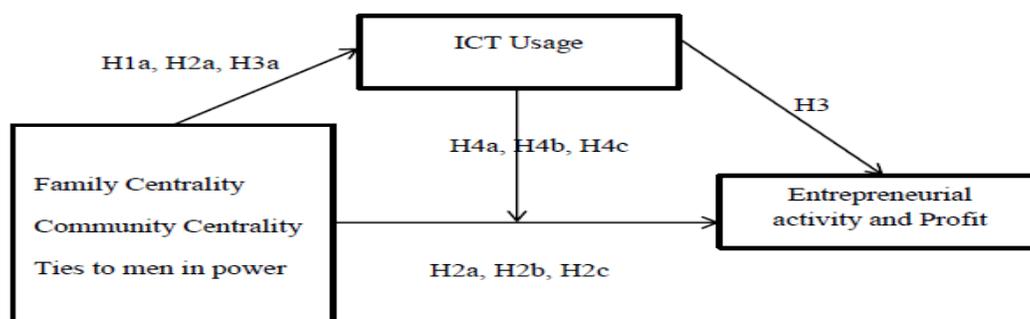
Lerner & Schwartz (2010) introduced an approach to promoting empowerment of women is to identify ways for women to generate and maintain their own income streams-viz., women's entrepreneurship Babbit et al. (2015) conclude that When there is no threat of loss to an individual's social structure, for example due to poverty, then family and social ties are stable and this has also been shown to a strong influence in a decision to engage in entrepreneurship. George et al. (2016) studied, conditions of desperate poverty (for reasons such as drought, disease and death) lead to the disintegration of social structure that in turn gives rise to a desire to improve the family's economic position thus motivating some to search for new opportunities for income gain. The results showed that the drought, death and disease usually lead to disintegration of social structure therefore bring motivation toward finding the ways to improve the financial situation of the families. Powell & Eddleston (2013) reported that potential solutions are numerous and indeed various plans have been implemented to facilitate the achievement of these goals although valuable, social cultural constraints frequently inhibit women's access to information, opportunities and funding. So, the old-decayed cultural values, social structure bounds the women to keep their motivations alive due to limited access to information. Radovic et al. (2013) concluded that female inequality concerns are rising all over the world but females need to move forward by coping with the modern trend in order to make their struggle successful. So, a need arises for the ICT (information and a communication system means use of internet and computer), more specifically for the women. Corno, Lal & Colombo (2014) also evidence the role Information and Communication Technology (ICT) for the entrepreneurial process; women can communicate to their suppliers and customers. Although, it is important for the women to understand and learn how ICT (Information and Communication Technology) as conventional educational programs usually facilitate the self-employment (Radovic et al., 2012). So, ICT conventional programs can be effectively used for women's interests and well-being. Toward these ends, the current research offers a social-structural view of ICT use and examines how social networks facilitate ICT use and how social structure and ICT use can jointly facilitate or hinder entrepreneurial activity and success among women in these contexts.

The paper is structured into seven main section; the first section presents the theoretical background of the study and the support of propose hypothesis under heading literature review. The second section brings the methodology which describes the detail on the sampling frame. The third section presents the procedure which tells the reader that how the information and communication intervention was set up and how data was collected from target sample over time horizon under the heading measures which are the fourth section of the current study. The fifth section presents the analysis approach (which analysis tool used and why) sixth and seventh section based on the results and discussion.

## LITERATURE REVIEW

Kilduff & Brass (2010) explained Social networks, which focus on various types of relationships among entities, here, individuals, can either provide opportunities or create constraints that affect important outcomes, e.g., life expectancy, susceptibility to infection, organizational performance. There are different types of networks that have been examined in prior research—advice, communication, friendship, hindrance, etc. The present study focused on the Zhang & Venkatesh (2013) recommendation regarding the social networks given our interest in interactions of women with various others in the village and how information is disseminated among these women and how the ties with various others and the concomitant communication affects their ICT use and entrepreneurial outcomes. Further, greater network centrality reduces the time and cost of acquiring new information and can be an important avenue for recognizing new ideas and identifying lucrative opportunities leading to better jobs, higher performance ratings and better salaries Kilduff & Brass (2010) Interaction and contact between people in different networks or different generations within organizations could potentially have positive impacts through the successful transfer of knowledge, skills and/or resources So, logically the central person will take less time in acquiring and delivering the knowledge and skills. Sykes, Venkatesh & Gosain (2009) evidenced the position of the network for the facilitation of information and communication technology in an organization setting. Burt (1992) meta-analysis showed that the central network has a strong connection with career success.

In simple means the long-term relationship that one build can directly affect the thoughts, cultural values and structural pattern of any rural areas. In rural areas usually, the one who has the greatest land in any area will be the centrally responsible for the informal ruling over the specific area. This may particularly factual for women in rural Pakistan. The present study advances the idea that frequent connections in certain types of networks may serve as constrain toward the women's access to innovative interventions and, eventually, their ability to generate unique streams of income for themselves and for their families. The current researchers view opportunities and constraints through a different lens, focusing on the advantages and disadvantages of network position as they vary across different networks (family, community and men in power) for the same structural position continuum (network [degree] centrality). Venkatesh, Thong & Xu (2012) studied information and communication technology plays moderation role that is beyond the networks and is affected by individual behaviors. (See Figure 1 for theoretical framework).



**FIGURE 1**  
**THEORETICAL FRAMEWORK**

## Network Position, ICT Use & Women Entrepreneur

Tseng, Hemenway, Kawachi & Subramanian (2010) defined family tie as the bonding between family members and centrality means any of the dominating family members who hold family members together like a bond. In rural Pakistan usually, the grandfathers or their eldest son play the centrality role. Bertaux & Crable (2007) reported the fact that in Pakistan there is an increase in the number of women entrepreneur. Malhotra et al. (2012) reported the reason that Pakistani women entrepreneurs are facing in rural area i.e. dual duty on women's shoulder regarding house and financial supporter, having limited knowledge of skills and restricted access to market and information. Hinson (2011) suggests that all these barriers can be removed through providing women access to information and communication technology and to networks. In rural Pakistan women usually get values as a result of ties to family members. So, the current study contends that family centrality (the person who holds all family members together if, allow their women toward information and communication usage or discuss information and communication usage) will be an important supporter of information and communication usage in the intervention villages also supported by the previous literature (Venkatesh & Sykes, 2013). On the other hand the present study also wants to study whether the family ties do affect entrepreneurial activities or process. Mahajar, Yunus & Razak (2013) supported our thoughts from previous literature that family networks do have a positive influence on the entrepreneurial activities and for the survival of the existing business. Batjargal et al. (2013) provide the understanding towards the rural areas where women usually discuss their problem with family members, ultimately their support give them confidence that is the mainstream for the start or the maintenance of any business. So, on the bases of previous literature support from (Bruderl & Preisendorfer, 1998; Stuart & Sorenson, 2005) the present study hypothesize that

*H<sub>1a</sub>: Community centrality will positively influence information and communication usage.*

*H<sub>2a</sub>: Community centrality will positively influence entrepreneurial activity and profit.*

Zhao, Frese & Giardini (2010) described bonding among the men who are in power; political leaders or having some authority at the domestic or institutional level. In a rural area of Pakistan usually, the owner of the maximum number of lands in rural area formulate the authoritative group who rule over the people known as "Panchayat". The men in the Panchayat have the authority for leadership. In rural area, men are against the women for using information and communication technology known as the "behayahe" in their native language (Joshi, 2015). Jamali (2009) argue that the direct connection to men in power is greatly responsible for the usage of information and communication technology for the success of entrepreneurial success but the thoughts of the present researchers are the literature ignored the role of "Panchayat" who negatively affects the women engagement with ICT and entrepreneurial activity that's why this study hypothesize as supported by (Islamia, 2013; Iyengar, 2013; Yardley, 2011) that

*H<sub>1b</sub>: Ties to men in power (Panchayat) will negatively influence information and communication usage.*

*H<sub>2b</sub>: Ties to men in power (Panchayat) will negatively influence entrepreneurial activity and profit.*

## Relationship between ICT Usage, Entrepreneurial Activity and Profit

Melissa, Hamidati, Saraswati & Flor (2015) researchers in Indonesia evident the use of information and communication technology results in a better economic gain and are significant for the activities directly related to entrepreneurship. Grace, Kenny & Ojiang (2004) concluded that the use of ICT helped one direct access to desire information. For example, one wants to know the licensing detail so by using information and communication technology he can open government websites or desire details. Now a day many of the world known universities are providing free e-business courses for the initialization of business so, they can be fruitful to women in the remote areas (Macueve et al., 2009). (Crabtree, 2016; Deloitte, 2015; McKinsey, 2014) reported that in rural Pakistan the government are also taking initiative for proving ICT access for the betterment of lives through providing free training courses. For example, [mdi.com.pk/is](http://mdi.com.pk/is) offering free training programs in the different rural area of Pakistan. [www.edi.com.pk/is](http://www.edi.com.pk/is) the online platform for the business consultancy. [Sti.gov.pk](http://Sti.gov.pk) provides rules for doing successful business. [Kashf.org](http://Kashf.org)/provides financial aid. In short, ICT can allow rural area women to empower their thoughts and ideas. On the basis of the above detail, the study hypothesize that

*H<sub>3</sub>: The use of ICT will positively influence entrepreneurial activity and profit.*

## Interplay of Social Network and ICT Usage

Logically, when women in the rural area of Pakistan find support from their family and community they will find more time for the information and communication usage. Women after ICT usage will share more ideas with their ties that they will get from ICT. So, the tie and technology together bring more facilitation toward the entrepreneurial process and profit. Additional, as encounters are tackled during their business activity, the rehearsal between knowledge gained from information and communication usage and the tie to members, be they supporters from family or from the community, will lead toward the better business results. Thus, we hypothesize:

*H<sub>4a</sub>: ICT usage will act as a moderator between family centrality and entrepreneurial action and profit such that high usage of ICT will bring stronger relationship between family centrality and entrepreneurial activity and profit.*

*H<sub>4b</sub>: ICT usage will act as a moderator between community centrality and entrepreneurial action and profit such that high usage of ICT will bring stronger relationship between community centrality and entrepreneurial activity and profit.*

## METHODOLOGY

The researchers conducted quasi-experimental field study over the period of two years. The study was done in the ten different villages of rural Pakistan. Venkatesh & Sykes (2013) highlighted the need for quasi-experimental study in order to deeply understand how information and communication technology can be used to overcome the grand challenges in the rural area of Pakistan. Data on social networks and entrepreneurial activity were obtained annually through structured interviews. Data on entrepreneurial profit were cross-validated after interviews with the government officials through government fillings. In five villages intervention staffs based on ICT usage was deployed but in another 5 village there was no such intervention made by

researchers and made as control villages. The data were obtained with the help of paid research assistants who were trained in gathering research data, conducting interviews and research techniques. The research team was closely engaged with the research project, making their routine and annual visits to monitor and observe the data collection procedure. At the end of the 2 years period, the main researchers of the paper revalidate the emerging stories of entrepreneurship.

## **Sample**

The sampling frame for the five intervention villages involved 4,165 adult women. To identify those villages that are located in the remote area of Pakistan and smaller in the size, having desperate poverty; lacking access to water, electricity and having no cooperative like in the larger rural areas was done through contacting NGO. During two years of the study, the response rate in the intervention villages found 70-80percent. The sampling frame for another five control group involved 4300. The sample size across the intervention villages was 3123 and for control, villages were 3225 adult women as recorded.

## **PROCEDURE**

### **Intervention of ICT**

The five intervention villages were randomly selected from the sample of ten villages. Three desktops enable computers were installed in the five intervention villages that were internet based and team-based named as (ICT intervention team). Each of the staff gets training of eight hours per day from attendants. The attendants were the social activist from the nearby area who gets their trained role from the researchers of the paper. It is important to mention that all the team members of ICT intervention group and attendants were female. The researchers assign attendants a role to provide information access to the residents of the area because most of the villagers were unable to even read or write. In reality, attendants act as proxy use highlighted by Parikh & Ghosh (2006) because they played a crucial role in facilitating information access. Prior the installation of ICT the information was provided to the villagers that how the ICT can work for them. The researchers of the current paper were also the student so they can't able to offer any financial incentive to attract the majority of the villagers. So, the information was decided to spread through the main author once in the month that its self is lady and villagers can get easy attraction from urban ladies

### **Social Networks and Entrepreneurial Activity**

During two years female professional interviewers were hired for interviewing each woman in the sample. The interviewers were directed to collect data on the social networks and another aspect of lives; decision on starting their own business. Detail information from interviews was gathered regarding the entrepreneurial activity (milk delivery, food delivery) created by women usually served inside the villages and did not obtain much support through ICT intervention. For example some women in the villages possessing their own cows and start selling milk to other villagers. These kinds of business don't require much support from house, community or government. Our interviewers helped us uncover such type of business by collecting data both in the intervention and non-intervention groups. All the interviews were

conducted in the private so the women can easily reveal their hidden networks. The interviewers set a time log for data collection. Network variable captured at the start of the year, while ICT use captured throughout the year, entrepreneurial activity and profit captured at the end of the year

### **Entrepreneurial Profit**

Data on the annually gathered profit was collected through taking help from government officials. The research assistant traveled toward the government officials' offices for gathering data. Each year the trained interviewers also collect data but in order to ensure the accuracy of the findings the main author directed to cross-check the findings. In case of the business like milk seller (as discussed above) the interviews are the only source to ask about the annual profit because they don't submit annual income to the government offices

## **MEASURES**

### **Family-Centrality, Community & Men in Power**

Roster method was adopted to collect data from ties. The researchers develop a roster of the entire community after collecting data from government officials. As per the government officials in villages family members means children, parents, grandparents, in-laws, siblings, siblings' wives and their children. Community includes all the women adults. Men in the power are those members who are in "Panchayat". It is interesting to note that all the men in power that researchers met were men. The researchers excluded family members from the family-centrality network in order to make them exclusive. The other two community network and men in power were mutually exclusive because all the government officials were men and the entire community network were women. During the structured interviews, the participants were asked to note their degree of communication with the community members. The response rate was provided from 1 to 5 (1: less than moth, 2: monthly, 3: weekly, 4: Daily, 5 Multiple times day). Borgatti, Everett & Johnson (2013) suggested measuring the centrality score for the structured interviews and the present paper used UNICET 6.29 for calculating centrality score weighted by tie to nuclear and extended family members, tie to non-family community member and the tie to men in power

### **ICT Usage**

Information and communication usage for the five intervention villages were recorded through the total number hours each ICT participant use in two years of the study. The ICT participants maintained a physical ledger of the visitors. These logs were used to cross match the logs recorded by the internet. The researchers set zero use of ICT in the control village group. To further outline the difference between ICT intervention versus control villages, the study assigned dummy variable 0 to control villages and 1 to intervention villages-such that variable would permit the researchers to inspect the difference that originates from ICT use being zero in the control group (due to no access) and treatment group (by choice)

## **Time**

The researchers coded time from year one to year two with regard to data collection, as the interviewers set the time frame for every variable.

## **Entrepreneurial Activity and Profit**

Entrepreneurial activity was measured through entering 1 for the women who started some business in the specific year. Entrepreneurial profit was obtained each year through the interviews. The interviewers enable the researchers to also access towards the informal businesses position. The women usually maintained their own profit record sometimes they report to government officials in case they lend loan. If case possible the researchers cross-validate the profit recorded through the interview and to government officials. 0.70 Correlation exists between what profit was measure through the interview and the archival measure, lending credibility to the self-reported.

## **Control Variables**

Following the George et al. (2016) worked for the rural villages the present study consider the age of the women, children below the age of 5 and above 5, husband education as the control variables. As the literature highlighted that number of children above the age of 5 can help their mothers in the business and also children below the age of five can create hindrances for their business. Similarly, the husband education could result in the greater support; economically and in overwhelming other household/sociocultural related obstacles

## **ANALYSIS APPROACH**

Ballinger (2004) reported the use of GEE (Generalized Estimating Equations) is to investigate the predictions. GEE is chiefly suited for the erection of data; it's not only used for the modeling of time (the year in the present study), but accounts for the systematic, non-independence, person-level and person-year variance presented by repeated actions from the same participants over time. Entrepreneurial activity in the present research was dichotomous, within respectively person-year and was hence estimated using GEE's logic function. The researchers collected the network-based data at the start of the year and castoff it to forecast entrepreneurial activity and profit at the end of the year, therefore building a time lag into the model. The priority of GEE in its place of Hierarchical Linear Modeling (HLM) meanwhile the researchers don't make any suppositions time invariant higher-level (individual-level) variables. In addition to the dummy variable that allowed distinguishing between control and intervention group villages, researchers pooled the data across both intervention and control group villages, setting ICT use as 0 in the control group. As for the analysis of entrepreneurial activity is concerned those who started a business during the period of current study was consider.

	<b>Mea n</b>	<b>S.D</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>
Age	53.29	13.22											
Children below age 5	2.71	1.89	-0.16*										
Children above age 5	4.09	2.98	0.26*	0.12*									
Husband's education	0.28	0.49	-0.18*	0.08*	0.10*								
Intervention (1: Interv. Village)	0.48	0.51	0.07	-0.20*	0.16*	0.19*							
Family Centrality	22.28	11.21	0.25*	0.11*	0.12*	0.15*	0.21*	0.15*					
Community Centrality	141.10	45.21	0.22*	0.12*	0.13*	0.18*	0.17*	0.14*	-0.25*				
Men in Power centrality	10.39	7.99	0.16*	0.14*	0.13*	0.06	-0.19*	0.26*	-0.25*	0.17*			
ICT use	16.12	40.95	0.10*	-0.26*	0.30*	0.21*	0.38*	0.11*	0.13*	0.30*	0.22*		
Entrepreneurial activity	0.03	0.11	0.11*	-0.11*	0.23*	0.11*	0.35*	0.19*	-0.23*	0.19*	0.44*	0.20*	
Entrepreneurial Profit	67.08	36.41	0.15*	-0.21*	0.22*	0.13*	0.40*	0.24*	-0.24*	0.28*	0.50*	0.24*	0.17*

\*p<0.05, \*\*p<0.01.

<b>ICT use</b>		
	<b>Model1</b>	<b>Model2</b>
Age	0.03(0.02)	0.03(0.02)
Children below age 5	-0.17**(0.03)	-0.14*(0.03)
Children age above 5	0.18**(0.02)	0.14*(0.02)
Husband's education	0.13*(0.03)	0.12*(0.03)
Intervention (1: Interv Village)	0.19**(0.02)	0.13*(0.02)
Family Centrality		0.28**(0.04)
Community Centrality		0.41**(0.03)
Ties to men in power		-0.29**(0.04)
R <sup>2</sup>	0.17	0.31
ΔR <sup>2</sup>		0.14**

\*p<0.05, \*\*p<0.01. Unstandardized betas are reported with robust standard errors in parentheses.

<b>Entrepreneurial Activity</b>				
	Model1	Model2	Model3	Model4
Age	1.06	1.05	1.04	1.02
Children below age 5	0.91	0.91	0.91	0.93
Children age above 5	1.20**	1.13*	1.13*	1.12*
Husband's education	1.15*	1.16*	1.13*	1.06
Intervention (1: Interv Village)	1.24**	1.05	1.03	1.02
Family Centrality		1.25**	1.24**	1.23**
Community Centrality		1.29**	1.19**	1.18**
Ties to men in power		0.25**	0.29*	0.31*
ICT use		1.72**	1.64**	1.54**
Family Centrality* ICT use			1.36**	2.82
Community Centrality* ICT use			1.31**	1.07
Ties to Men in power*ICT use			-0.19*	1.13*
R <sup>2</sup>	0.19	0.37	0.42	0.49
$\Delta R^2$		0.19**	0.05*	0.07**

\*p<0.05, \*\*p<0.01. Unstandardized betas are reported with robust standard errors in parentheses.

<b>Entrepreneurial Profit</b>				
	Model1	Model2	Model3	Model4
Age	0.11*(0.01)	0.09(0.02)	0.05(0.02)	0.06(0.07)
Children below age 5	-0.15**(0.02)	-0.12*(0.04)	-0.12*(0.04)	-0.09(0.06)
Children age above 5	0.15**(0.02)	-0.12*(0.03)	-0.12*(0.03)	-0.09(0.07)
Husband's education	0.19**(0.02)	0.14*(0.03)	0.12*(0.03)	0.08(0.11)
Intervention (1: Interv Village)	1.24**	1.05	1.03	1.02
Family Centrality		1.25**	1.24**	1.23**
Community Centrality		1.29**	1.19**	1.18**
Ties to men in power		0.25**	0.29*	0.31*
ICT use		1.72**	1.64**	1.54**
Family Centrality* ICT use			1.20**	2.82
Community Centrality* ICT use			1.18**	1.07
Ties to Men in power*ICT use			-0.19*	1.13*
R <sup>2</sup>	0.19	0.37	0.42	0.49
$\Delta R^2$		0.19**	0.05*	0.07**

\*p<0.05, \*\*p<0.01. Unstandardized betas are reported with robust standard errors in parentheses.

## RESULTS

Results are presented in tabulation form that ranges from 1 to 4. Correlation among variables is presented in Table 1 and Table 2 presents the result of ICT usage, similarly Table 3 and Table 4 highlight the outcome gathers from entrepreneurial activity and profit in both intervention and non-intervention group.

As the findings reveal that 50 new businesses were started by the women in the intervention villages. At the end of this study, all of them were active and were operating

successfully. 39 businesses were those businesses that were operating without getting any license from the government because their plan was informal including offering milk services handicrafts, pure ghee and farming support to people and restaurants in the city. Rest of 11 businesses were established on the larger scale where women were operating stitching schools, getting knitting orders from online stores, selling kites to the urban market. On another side in non-intervention group, only 10 new businesses were reported and only 5 were functional at the end of this study. The interesting thing to note here is that these businesses don't offer services to other village people or in urban areas instead of the women aware of utilizing their animals as a source of income through selling milk to community tie. The noteworthy time difference was also observed between the intervention and non-intervention villages. Those villages where ICT intervention was reported took less than eight months for starting their businesses while non-ICT village's people took more than twelve months for initializing their business. The annual profit of the businesses in the intervention villages was 50,000PKR and the non-intervention business recorded 17,000PKR per annum. The intervention businesses employed an average of 3 people while non-intervention employed just one employee or none.

### Hypothesis Results

The study proposed the ties to family, community and men in power have some impact on ICT usage. The impact proposed for family and community was positive while for men in power was negative. The results support our proposed hypothesis ( $b=0.28$ ,  $p<0.01$ ) family centrality account for 28% change in ICT usage. Similarly, ( $b=0.41$ ,  $p<0.01$ ) community centrality showed 41% change in ICT usage. In simple means, if any underdeveloped area wants to beat with women employment issue through ICT once need to bring into account the community centrality and family centrality as one present change in both of these will bring 52% and 28% change in ICT usage. The relationship between men in power and ICT usage found as negative ( $b=-0.29$ ,  $p<0.01$ ) which means that greater the number of men in power lower the rate of ICT usage among women as supported by the present study. (See Model 2 in Table 2).

For entrepreneurial activity (See Model 2 in Table 3) and for entrepreneurial profit (See Model 2 in Table 4) family centrality bring increase in the odds of entrepreneurial activity 25% at ( $p<0.01$ ) and community centrality by 29% ( $p<0.01$ ). On other side the men in power shows negative association with entrepreneurial activity (odds ratio=0.25,  $p<0.01$ ). Also, family centrality ( $b=0.18$ ,  $p<0.01$ ), community centrality ( $b=0.17$ ,  $p<0.01$ ) and ties to men in power ( $b=-0.19$ ,  $p<0.05$ ) were significantly connected to entrepreneurial profit. Therefore, the proposed  $H_1$  and  $H_2$  hypothesis were supported.

The proposed  $H_3$  (See Model 2 in Table 3 and Table 4) that ICT has a positive effect on entrepreneurial activity and profit also supported by the results of the present study. 1% change in the ICT effort will bring 72% change in the entrepreneurial activity and 0.59% for profit ( $p<0.01$ ).

The study proposed the moderation role of ICT and men in power with relation to entrepreneurial activity and profit. The results of the study showed that (See Model3 in Table 3) ICT use through means of family centrality increased the entrepreneurial activity by 36% ( $p<0.01$ ) and community centrality heighten it to 31% ( $p<0.01$ ). Similarly, the odds ratio between ICT usage and men is power showed negative relation (odds ratio=0.64,  $p<0.05$  in Table 3) with entrepreneurial activity. The method of high and low odd ratios was used for testing ICT as a moderator. The study noted that when ICT usage was high there was a strong increase in family and entrepreneurial activity by 72% but this relationship was not observed

when ICT usage was low. Similarly, the relationship between community centrality and entrepreneurial activity increased up to 56% with increased in ICT usage but none was observed on low ICT usage. The three-way interaction model (See Model 3 in Table 4) family ( $b=0.20$ ,  $p<0.01$ ) and community centrality ( $b=0.18$ ,  $p<0.01$ ) with ICT usage were significant so,  $H_4$  was supported by current study.

## DISCUSSION

The results of the present study showed that social network and ICT intervention plays role in the promotion of women entrepreneurship. The comparative analysis of intervention villages group and control villages group showed that with the ICT intervention the women can start the more new businesses and can generate better revenue as compared to without ICT usage. In relation to family and community tie with ICT usage, they proved to be the facilitating conditions in promoting women entrepreneurship as compared to men in power that are in line with the study of previous researchers (Wellman et al., 1990; Zhao et al., 2010; Venkatesh et al., 2016). George et al. (2016) concluded that social dissolution like death, undesirable life events stemmed from greater entrepreneurial occasions and presented study also evidenced through study findings. In George et al. (2016) study, social networks and ICT use are important for the development and the success of women entrepreneurship and the special effects work independently and mutually. In hypothetical terms, study findings strengthen some previous work about family and community centrality aid as compounds in the setting of new business success, then that ICT usage assists as the accelerator of entrepreneurial activity and success. These are along the lines articulated by (Johns, 2006). The particular networks identified here may be relevant in both developed and developing countries but the negative impact of ties to men in power is unique to women in developing countries. The issues or puzzles in entrepreneurship for women include lack of access to financing, markets, networks, time, skills and training-and women's access to ICTs helps alleviate these challenges (Hinson, 2011). The study found some relevant evidence related to Zhang et al. (2013) study who specifies that women in the ICT intervention villages achieved more success than the women in the non-intervention group. Our findings suggest that ICT use will result in increased savings and wealth, thus improving access to ICTs for women will be beneficial. Locating Internet centers in locations that are accessible to women, keeping in mind mobility restrictions for women in Pakistan will be helpful; in addition, staffing such centers with women can ease cultural restrictions and concerns about cross-gender communication (Best & Maier, 2007). Our findings can form the basis of social or policy interventions that can be studied in future research. The possible future research questions can consider other challenges like by adding the detail study on the role of time in entrepreneurial success and study. For example, it could be valuable to know the impact of complementary reserves/interventions, such as governmental-programs, non-governmental organizations' creativities and other broadcasting actions. Other similar surveys would be appreciated in the quest of the other grand encounters as well. For instance, if an ICT involvement can originate to decrease maternal mortality, what harmonizing investments are significant given that the administration of Pakistan is creating big reserves in healthcare education and mobile clinics to improve the health of citizens in rural Pakistan? Added issue value pursuing is how to efficiently address the distracted poverty that symbolizes much of rural Pakistan. Our results spur the third set of questions which is outside the management and entrepreneurship area but connected to information systems where the emphasis contains the design system of ICT. The study concludes that use of ICT will effect in improved savings and

prosperity, thus cultivating ICT access for women will be positive. Best & Maier (2007) suggest that the location of internet is important in Islamic countries so, the country like Pakistan should keep it mind that location should be easily accessible in order to promote women entrepreneurship through ICT intervention. Accompanying “women-only” training programs on the usage of ICTs can aid to better participation with less limitation.

## APPENDIX

1. Predicting ICT use: Model 1  $ICT\ use = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + \epsilon$ .
2. Model 2  $ICT\ use = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + \epsilon$ .
3. Predicting entrepreneurial activity: Model 1  $Entrepreneurial\ activity = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + \epsilon$ .
4. Model 2  $Entrepreneurial\ activity = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + b_9\ ICT\ use + \epsilon$ .
5. Model 3  $Entrepreneurial\ activity = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + b_9\ ICT\ use + b_{10}\ (family\ centrality * ICT\ use) + b_{11}\ (community\ centrality * ICT\ use) + b_{12}\ (ties\ to\ men\ in\ power * ICT\ use) + \epsilon$ .
6. Model 4  $Entrepreneurial\ activity = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + b_9\ ICT\ use + b_{10}\ (family\ centrality * ICT\ use) + b_{11}\ (community\ centrality * ICT\ use) + b_{12}\ (ties\ to\ men\ in\ power * ICT\ use) + b_{13}\ time + b_{14}\ (family\ centrality * time) + b_{15}\ (community\ centrality * time) + b_{16}\ (ties\ to\ men\ in\ power * time) + b_{17}\ (ICT\ use * time) + b_{18}\ (family\ centrality * ICT\ use * time) + b_{19}\ (community\ centrality * ICT\ use * time) + b_{20}\ (ties\ to\ men\ in\ power * ICT\ use * time) + \epsilon$ .
7. Predicting entrepreneurial profit: Model 1  $Entrepreneurial\ profit = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + \epsilon$ .
8. Model 2  $Entrepreneurial\ profit = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + b_9\ ICT\ use + \epsilon$ .
9. Model 3  $Entrepreneurial\ profit = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + b_9\ ICT\ use + b_{10}\ (family\ centrality * ICT\ use) + b_{11}\ (community\ centrality * ICT\ use) + b_{12}\ (ties\ to\ men\ in\ power * ICT\ use) + \epsilon$ .
10. Model 4  $Entrepreneurial\ profit = b_0 + b_1\ age + b_2\ children\ below\ age\ 5 + b_3\ children\ above\ age\ 5 + b_4\ husband's\ education + b_5\ intervention + b_6\ family\ centrality + b_7\ community\ centrality + b_8\ ties\ to\ men\ in\ power + b_9\ ICT\ use + b_{10}\ (family\ centrality * ICT\ use) + b_{11}\ (community\ centrality * ICT\ use) + b_{12}\ (ties\ to\ men\ in\ power * ICT\ use) + b_{13}\ time + b_{14}\ (family\ centrality * time) + b_{15}\ (community\ centrality * time) + b_{16}\ (ties\ to\ men\ in\ power * time) + b_{17}\ (ICT\ use * time) + b_{18}\ (family\ centrality * ICT\ use * time) + b_{19}\ (community\ centrality * ICT\ use * time) + b_{20}\ (ties\ to\ men\ in\ power * ICT\ use * time) + \epsilon$ .

## REFERENCES

- Burt, R.S. (1992). The social structure of competition. *Networks and Organizations*, 57-91
- Buskens & Webb, A. (2009). *African women & ICTs: Investigating technology, gender and empowerment*. Radical International Publishing.
- Bertaux, N. & Crable, E. (2007). Learning about women. Economic development, entrepreneurship and the environment in India: A case study. *Journal of Developmental Entrepreneurship*, 12(4), 467-478.
- Batjargal, B., Hitt, M.A., Tsui, A.S., Arregle, J.L., Webb, J.W. & Miller, T.L. (2013). Institutional polycentrism, entrepreneurs' social networks and new venture growth. *Academy of Management Journal*, 56(4), 1024-1049.

- Brüderl, J. & Preisendörfer, P. (1998). Network support and the success of newly founded businesses. *Small Business Economics*, 10(3), 213-225.
- Bertaux, N. & Crable, E. (2007). Learning about women. Economic development, entrepreneurship and the environment in India: A case study. *Journal of Developmental Entrepreneurship*, 12(4), 467-478.
- Borgatti, S.P., Everett, M.G. & Johnson, J.C. (2013). *Analyzing social networks*. Thousand Oaks, CA: Sage.
- Ballinger, G.A. (2004). Using generalized estimating equations for longitudinal data analysis. *Organizational Research Methods*, 7(2), 127-150.
- Best, M.L. & Maier, S.G. (2007). Gender, culture and ICT use in rural south India. *Gender, Technology and Development*, 11(2), 137-155.
- Corno, F., Lal, R. & Colombo, S. (2014). Entrepreneurship & new venture creation. Key elements of the entrepreneurial ecosystem facilitating the growth of ICT entrepreneurs in Italy. *European Scientific Journal*, 2, 330-345
- Ericsson (2015). *ICT & SDGs. How information and communications technology can achieve the sustainable development goals*. The Earth Institute Columbia University.
- Grace, J., Kenny, C. & Qiang, C.Z.W. (2004). *Information and communication technologies and broad-based development: Partial review of the evidence*. World Bank Publications.
- Hinson, R.E. (2011). Banking the poor: The role of mobiles. *Journal of Financial Services Marketing*, 15(4), 320-333.
- Islamia, J.M. (2013). *Discriminatory and derogatory practices against women by Khap Panchayats. Shalishi Adalats and kangaroo courts in India: An empirical study in the states of Haryana, Uttar Pradesh (west), West Bengal & Rajasthan*. New Delhi, India: National Commission for Women.
- Iyengar, R. (2013). *Two Indian sisters ordered to be raped by village council beg Supreme Court for help*. Time.
- Joshi, A. (2015). Need for gender sensitive counseling interventions in India. *Psychological Studies*, 60(3), 346-355.
- Jamali, D. (2009). Constraints and opportunities facing women entrepreneurs in developing countries: A relational perspective. *Gender in Management: An International Journal*, 24(4), 232-251.
- Kilduff, M. & Brass, D.J. (2010). Organizational social network research: Core ideas and key debates. *The Academy of Management Annals*, 4(1), 317-357.
- Moyi, E.D. (2003). Networks, information and small enterprises: New technologies and the ambiguity of empowerment. *Information Technology for Development*, 10(4), 221-232.
- McPherson, M., Smith-Lovin, L. & Cook, J.M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, 415-444.
- Malhotra, A., Kaneshadasan, A. & Patel, P. (2012). *Connectivity: How mobile phones, computers and the internet can catalyze women's entrepreneurship*. Pakistan case study: Washington DC: The International Center for Research on Women.
- Mahajar, A.J., Yunus, J.M. & Razak, A.Z.A.B.A. (2013). Business opportunities and managerial skills in enhancing the involvement of entrepreneurship in Malaysia. *International Foundation for Research and Development (IFRD)*, 72(60), 436-457.
- Melissa, E., Hamidati, A., Saraswati, M. & Flor, A. (2015). The internet and Indonesian women entrepreneurs: Examining the impact of social media on women empowerment. In A. Chib, J. May & R. Barrantes (Eds.), *Impact of information society research in the global south* (pp.203-222). Singapore: Springer
- Macueve, G., Mandlate, J., Ginder, L., Gaster, P. & Macome, E. (2009). *Women's use of information and communication technologies in Mozambique: A tool for empowerment?*
- McKinsey (2014). *Pakistan's technology opportunity: Transforming work, empowering people*. McKinsey Global Institute, McKinsey & Company.
- Powell, G.N. & Eddleston, K.A. (2013). Linking family-to-business enrichment and support to entrepreneurial success: Do female and male entrepreneurs experience different outcomes? *Journal of Business Venturing*, 28(2), 261-280.
- Pines, A.M., Lerner, M. & Schwartz, D. (2010). Gender differences in entrepreneurship: Equality, diversity and inclusion in times of global crisis. *Equality, Diversity and Inclusion: An International Journal*, 29(2), 186-198.
- Parikh, T.S. & Ghosh, K. (2006). Understanding and designing for intermediated information tasks in India. *IEEE Pervasive Computing*, 5(2), 32-39.
- Prentice, D.A. & Miller, D.T. (2016). When small effects are impressive. *Psychological Bulletin*, 112(1), 160-164.
- Rovai, A.P. (2002). Building sense of community at a distance. *The International Review of Research in Open and Distributed Learning*, 3(1)

- Renzulli, L.A., Aldrich, H. & Moody, J. (2000). Family matters: Gender, networks and entrepreneurial outcomes. *Social Forces*, 79(2), 523-546.
- Radovic Markovic, M., Salamzadeh, A. & Razavi, M. (2013). *Women in business and leadership: critiques and discussions*.
- Radovic Markovic, M., Lindgren, C.E., Grozdanic, R., Markovic, D. & Salamzadeh, A. (2012). *Freedom, individuality and women's entrepreneurship education*.
- Sykes, T.A., Venkatesh, V. & Gosain, S. (2009). Model of acceptance with peer support: A social network perspective to understand employees' system use. *MIS Quarterly*, 33(2), 371-393.
- Sharma, A., Dua, S. & Hatwal, V. (2012). Micro enterprise development and rural women entrepreneurship: Way for economic empowerment. *Arth Prabhand: A Journal of Economics and Management*, 1(6), 114-127.
- Stuart, T.E. & Sorenson, O. (2007). Strategic networks and entrepreneurial ventures. *Strategic Entrepreneurship Journal*, 1(3-4), 211-227.
- Tseng, K.C., Hemenway, D., Kawachi, I. & Subramanian, S.V. (2010). Family ties and the frequency of heroin use. *Journal of Substance Use*, 15(1), 60-74.
- United Nations (2008). *Official list of MDG indicators*. New York: United Nations.
- United Nations (2010). *The millennium development goals report 2010*. New York: United Nations.
- United Nations (2015). *The millennium development goals report 2015*. New York: United Nations.
- Venkatesh, V., Thong, J.Y.L. & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. *MIS Quarterly*, 36(1), 157-178.
- Venkatesh, V. & Sykes, T.A. (2013). Digital divide initiative success in developing countries: A longitudinal field study in a village in India. *Information Systems Research*, 24(2), 239-260.
- Venkatesh, V., Rai, A., Sykes, T.A. & Aljafari, R. (2016). Combating infant mortality in rural India: Evidence from a field study of health kiosk implementations. *MIS Quarterly*, 40(2), 353-380.
- Wellman, B. & Wortley, S. (1990). Different strokes from different folks: Community ties and social support. *American Journal of Sociology*, 96(3), 558-588.
- Yardley, J. (2011). *Unelected councils in India run villages with stern hand*. The New York Times.
- Zhao, X.Y., Frese, M. & Giardini, A. (2010). Business owners' network size and business growth in China: The role of comprehensive social competency. *Entrepreneurship and Regional Development*, 22(7-8), 675-705.
- Zhang, X. & Venkatesh, V. (2013). Explaining employee job performance: The role of online and offline workplace communication networks. *MIS Quarterly*, 37(3), 695-72