

# To Measure the Joint effect of Demographic variables on the extent of use of ICT among small and medium enterprises: Evidence from the selected industrial town of Haryana, Punjab and Himachal Pradesh

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## Abstract

The present paper is based on the objective to measure the joint effect of demographic variables on the extent of use of ICT among small and medium enterprises: Evidence from the selected industrial town of Haryana, Punjab and Himachal Pradesh. Small and medium Enterprises in India are known as the backbone of the economy rather SMEs play a central role in the overall growth of the industrial economy of the country. The reason behind is that these enterprises are employing about 40% of India's workforce and contributing 45% to India's manufacturing output, they play a significant role in generating millions of jobs, especially at the low-skill level. The current scenario clearly states that the growth of our economy is impossible without the growth and development of these enterprises, but these enterprises are far behind the larger counterparts in the economy.

**Keywords:** SMEs, Information and Communication Technology (ICT), Manufacturing Industries.

## Introduction

### Information and Communication Technology (ICT)

Any technology that assists in transmitting, capturing, processing information electronically and facilitates communication is defined as ICT (Apulu, Latham, & Moreton, 2011). Number of researchers use the terms Information and Communication Technology (ICT) and Information Technology (IT) interchangeably; however, Ruiz-Mercader, Meroño-Cerdan, & Sabater-Sánchez, (2006) argued that information and communication technology (ICT) is a wider concept than information technology (IT); Information technology covers computer software, hardware and peripherals like scanner, printers and so on; telecommunication technologies include mobile telephones, fixed lines, and broadcasting television and radio through satellite; Network technology comprises of internet through wide range of options like Local Area Network (LAN), dial-up, broadband, Wide Area Network (WAN) as well as satellite technology, websites and network securities. In this research, ICT is also regarded as different technology like computers, websites, internet, wireless communications, etc. In 21<sup>st</sup> century application of ICT has been expanded into various economic and non-economic activities. Organizations are integrating ICT to increase productivity. ICT reduces the transaction cost and enhances the reliability and transaction speed for B2B (Business to Business) and B2C (Business to Customer) transactions. Knowledge management and information management system also improves with the help of adoption of ICT. Moreover ICT is very important tool for service

quality and external communication improvement(OECD, 2004). In past years, the growth of ICT usage across the industries around the world states that ICT results in improved organizational performance. Organizational performance is based on the productive use of ICT. In developing countries the use of ICT is not much developed or under-utilized. It means proper use of ICT can improve the performance of the firms in developing countries. Governments also, all over the world, are embracing ICT to offer superior services to their citizens. The selection of ICT by the organizations needs business environment, trust, open competition, security, standardization and also availability of financial resources for ICT (UNCTAD, 2004). The perspective of the study is to analyze the impact of ICT adoption on the performance of small and medium scale enterprises. Organizational performance is the result of robust information about business with the help of ICT which enables SMEs to access that information. Tools of ICT among SMEs with any kind of business environment have been observed as crucial resources which help SME to enhance or improve competitiveness. For the quick delivery of services and efficient administration for the SMEs, ICT adoption is very much required. SMEs face number of challenges regarding implementation and adoption of ICT eg. lack of skilled human resources and infrastructure are the major barriers which inhibit the adoption of ICT in the organization.

## SMEs

In accordance with the provision of development of Micro, Small and Medium Enterprises (MSMED) act, 2006 MSMEs are classified into two categories:

1. **Manufacturing Enterprises:** These firms are engaged in production or manufacture of products or goods pertaining to any industry specified in the first schedule of industries (development and regulation act, 1951) or employing plant and machinery in the process of value addition to the final product having a distinct name or character or use. The manufacturing Enterprise is defined in terms of investments in Plant and Machinery (FICCI-CMSME, 2014).
2. **Service Enterprises:** The firms are involved in rendering or providing of services and are defined in terms of investment in equipment

The limit for investment in plant and machinery/ equipment for manufacturing/ service enterprises are as under:

### Manufacturing Sector

Enterprise Categories	Investment in Plant and Machinery
Micro Enterprises	Does not Exceed twenty five lakhs rupees
Small Enterprises	More than twenty five lakhs rupees but do not exceed five crore rupees
Medium Enterprises	More than five crore rupees but do not exceed 10 crore rupees

(FICCI-CMSME, 2014)

### Service Sector

Enterprise Categories	Investment in Equipment
Micro Enterprises	Does not Exceed ten lakhs rupees

<b>Small Enterprises</b>	More than ten lakhs rupees but do not exceed two crore rupees
<b>Medium Enterprises</b>	More than two crore rupees but do not exceed five crore rupees

(FICCI-CMSME, 2014)

## Literature Review

**Pokharel (2005)** *observed Singapore warehouses to assess the logistic companies' perception towards the ICT.*

Current status of the use of ICT has been examined through the survey of transportation service providers and warehouses of Singapore. The result of the studies has revealed that ICT has been used by maximum logistic firms in the nation, however, the type and extent of usage mostly depend on the firm size and availability of the technology in that particular region. More than one industry are availing the services of logistics firms, particularly in Singapore nation. Sometimes more than one logistics functions are performed by the single logistics firm. Logistics firms majorly focus or consider the following ICT opportunities: (i) To minimize the errors related to data entry, (ii) To enhance the level of customer service, (iii) Efficiency, (IV) Cost savings. Analysis of the studies has revealed that the usage of ICT in the firm is directly proportionate to the size of the logistic firms in Singapore. Although, industry type of the logistics firm as well as the logistic services provided by the firms may have difference. A major limitation of the study is the firms incorporated in this particular study are only related to warehouses and transportation of logistic services, however, to recognize the more general aspects, other logistic services should be included.

**Koning and Gelderblom, (2006)** *studied the extent of ICT use by old workers and to what extent ICT adoption by old workers influences their job performance.* Data was collected from the employees of various age groups from the two sectors, wholesale trade and printing industry. By controlling the influence of other explanatory variables and ensuring that old users were from the selected group, various types of ICT use were compared with the number of age group users. Probit model was used to analysis the results. The results of the study have revealed that older workers' groups had less practice of ICT in their professions, less use of complicated applications and had more strain in using ICT than young workers. Another finding of this study was the change in ICT skills which positively affected the performance in the organization. Major limitation of the study was that data was collected from the two forerunners sectors in the ICT field, therefore the results could be generalized only to those industries where ICT plays the significant role.

**Zhu et al. (2006)** *argued adaptation of internet based e- business, innovation by companies in a global setting.* Data was collected from 1857 firms from retail industries across 10 nations. The Structural Equation Modeling (SEM) technique was used to conclude the results. It was difficult to forecast in this particular study if there was any positive impact of e-business diffusion on the performance of firms. This study majorly emphases on the diffusion of e-business and the implementation of ICT. It was revealed that competition significantly affected the adoption and initiation of technology to some extent and too much competition had negatively impacted the initiation of

technology as more competition would derive the organization to chase the latest technology without knowing the effective use of existing technology. Technology readiness is found most significant factor, in order to facilitate assimilation in developing nations. On the other hand, in the developed nations, technology integration has been found the strongest as e-business is evolving. On the basis of diffusion of technology and process theories, three adaptation levels have been examined in this study:

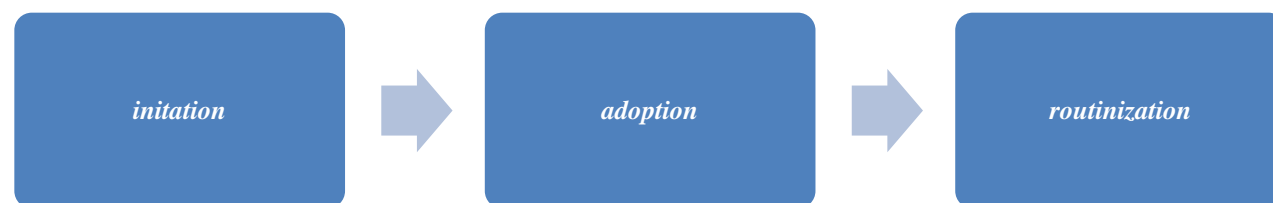


Figure 1 Adaptation levels of ICT

**Mutula and Brakel (2006)** studied the status of e-readiness in SMEs with regard to ICT adoption in Botswana country and compare it with global trends. The study was based on the doctoral project carried out from 2002-2005 at Johannesburg University. Qualitative method was used for collecting the data, through group discussion and in depth interview, from 114 SMEs of Botswana. The study was conducted in two phases, one is empirical phase and the other was a pre empirical phase. The results of the study revealed that as compared to developed nations, maximum number of developing nations had not yet achieved a reasonable measure of e-readiness status and not meritoriously involved in the technology based industrial environment. The study represents the framework, which can assist the governments of developing nations in decision making with regard to ICT investment and helps SMEs to penetrate international technology based environment. This study also concludes that medium sized enterprises as compared to small scale enterprises are more attached with information technology. Major ICT applications used by SMEs in Botswana are computers, internet access, photocopies, websites, printers, e-mail communications, telephones, Microsoft applications. However, as compared to developed nations SMEs, developing nations SMEs, don't exploit the full potential of ICT in order to compete effectively in the global markets, due to the following factors: use of outdated technology; lack of infrastructure related to e-Commerce; lack of maintaining websites and skills development.

**Chuang et al. (2009)** observed the extent of ICT adoption in which composition effect of top management managerial characteristics, was investigated on the adoption of ICT in SMEs based on Upper Echelon Theory. Several hypotheses were formulated with regard to management characteristics of top management team to the extent of adoption of ICT in various functional areas. Data was analyzed with the help of multiple regression analysis and revealed that average age and average education of top management team had significant impact on the extent of adoption of ICT. On the other hand, group heterogeneity which includes gender and ethnicity, of top management team had adversely impacted on the adoption of ICT in SMEs. The results of the study were based on wholesale industry of trading, which is the major limitation of the study. Secondly, the study ignorance the effect of firm size as number of studies conclude that the firm size influence the adoption of ICT (Levenburg, Thomas, Motwani, Schwarz, & Motwani, 2005). Another limitation was, study didn't differentiate between the owners of the firm and managers

of the firm. In the future, studies could be conducted to examine the association between top management team (TMT) characteristics and adopting and non-adopting decisions of ICT.

## Research Methodology

### Objective of the Study

To Measure the Joint effect of Demographic variables on the extent of use of ICT among small and medium enterprises

### Hypothesis of the study

*Null hypothesis H1(i): The joint effect of demographic variables on the use of ICT among small and medium enterprises is significant.*

### Data Collection

In order to achieve this objective both primary and secondary data have been used. Secondary data was collected from research papers and website of the ministry of micro, small and medium enterprises. The secondary data has been used to understand the adoption of ICT among the small and medium enterprises around the world. The primary data was collected from the respondents with the help of a structured questionnaire.

### Population

Target Population of the study includes the small and medium enterprises located in the three states of northern India i.e. Punjab, Haryana, and Himachal Pradesh.

### Sampling Unit and the Respondents

The sampling units are the small and medium enterprise from where the data have been collected. The respondents were the CEO's/MD/Proprietor/Partner and their family members actively involved in the business of the enterprise.

### Sample Size and sampling technique

The data was collected from 180 small and medium enterprises. In the study, the purposive sampling technique has been used. A purposive sampling is a non-probability sampling, that is selected, based on characteristics of a population and the objective of the study.

### Data Analysis Techniques

To test the relationships between various variables related to ICT, statistical technique for hypothesis testing specifically, multiple regression analysis with dummy variables have been used.

## Research Analysis

In this section, the joint effect of all demographic variables on the use of ICT has been examined using multiple regression with dummy variables.

The procedure of multiple regression analysis with dummy variable is somewhat different from the normal multiple regression analysis. In this procedure, the predictor variables are categorical in nature, whereas the outcome or dependent variable is continuously variable. These categorical predictor variables are first converted into dichotomous dummy variables. Dummy coding is a way of representing groups of people using only zeros and ones.



To do this, several di-chotomous dummy variables are created from a categorical variable. The numbers of new variables are created, one less than the number of groups in the categorical predictor variable. The omitted variable is used as the reference variable or base variable and other variables are the analysis variables. In the study, the variable firm size has four categories or groups in the original categorical variable, therefore three dummy variables would be created. The first group would be used as the reference or base category and other three categories will be used in the regression analysis and their results would be compared with the base category. The rule is that either first or last category is used as reference/base category. Table 1.1 exhibits the summary of dummy variables created and used in the multiple regression.

Table 1.1  
Summary of dummy variables

Variable	Number of groups	Number of Dummy Variables	Base/reference category
Gender	2	1	Female
Age	4	3	20-29 years
Education	4	3	High School
Firm Size	4	3	Below 10 employees
Age of firm	6	5	Below 3 years
Firm Type	2	1	Proprietorship
Sector	2	1	Trading and Manufacturing
Investment	3	2	25 lakh to 1 cr.
Total	27	19	

The regression results thus produced are same as normal multiple regression results. The results of regression analysis are exhibited in table 1.2

The age of the owner/ partner significantly affected the use of ICT in the firm. As the age of the owner/partner increased, the extent of use of ICT decreased significantly as three dummy age categories obtained negative as well as significant regression coefficients suggesting that these age groups used less ICT as compared to age group of 20-29 years (the reference category).

ICT use among male owners/partners was not significantly less than the firms with female owners/partner as a regression coefficient ( $b=-0.20$ ) was not significant (at  $= -0.67$ ,  $p = 0.50$ ). Gender of the owner/partner did not affect the use of ICT in the firm.

Education of the owner was not found to be a significant and consistent predictor of use of ICT among the firms. The owners having an education level of graduation used significantly more ICT in their firms than the firms with owner's education of high school (reference category) as a regression coefficient ( $b = 1.60$ ), was found to be highly significant ( $t = 4.28$ ,  $p = 0.000$ ) suggesting that as the education level of owner of the firm increased from high school to graduation, the level of ICT increased by 1.60 units which is a significant jump in the use of ICT. But any further increase in education (to the master level or profession level) did not significantly affect the use of ICT.

The size of the firm significantly affected the use of ICT in the firm. As the size of the firm increased, the use of ICT in the firm also increased. The firms with employees between 10-49 used significantly more ICT than the firms with under 10 employees (reference category) as a regression coefficient ( $b = 1.42$ ) was found to be highly significant ( $t = 6.30$ ,  $p = 0.00$ ). Similarly, firms with employees between 50-100 and above 100 used significantly more ICT as compared to firms with under 10 employees.

The age of the firm also significantly affected the use of ICT in the firms. Although it was found that the use of ICT among the firms with age between 3-7 years was not significantly different from the use of ICT among the firms having age below 3 years (reference category) as a regression coefficient ( $0.71$ ,  $t=1.86$ ,  $p = 0.07$ ) was not significant. But after this, as the age of the firm increased, the ICT also increased. The use of ICT among the firms with age between 7-10 years was significantly higher than the use of ICT among the firms having age below 3 years (reference category) as a regression coefficient ( $b=0.86$ ,  $t=2.13$ ,  $p = 0.03$ ) was significant. Also, the use of ICT among the firms with age between 10-15 years was significantly higher than the use of ICT among the firms having age below 3 years (reference category) as a regression coefficient ( $b=1.62$ ,  $t=3.87$ ,  $p = 0.000$ ) was highly significant. Also, the use of ICT among the firms with age between 15-20 years was significantly higher than the use of ICT among the firms having age below 3 years (reference category) as a regression coefficient ( $b=1.93$ ,  $t = 4.39$ ,  $p = 0.000$ ) was highly significant. Also, the use of ICT among the firms with age above 20 years was significantly higher than the use of ICT among the firms having age below 3 years (reference category) as a regression coefficient ( $b=2.16$ ,  $t= 5.13$ ,  $p = 0.000$ ) was highly significant.

ICT use was not significantly different among partnership and proprietorship firms as a regression coefficient ( $b = 0.26$ ,  $t = 1.63$ ,  $p = 0.11$ ) was not significant.

The use of ICT among trading and manufacturing firms was significantly less than the firms engaged only in manufacturing firms as a regression coefficient ( $b = -0.45$ ,  $t = -3.20$ ,  $p = 0.00$ ) was highly significant.

Investment of the firm did not affect the use of ICT as regression coefficients were found to be insignificant.

Table 1.2  
Results of regression analysis

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	F-Stat	Sg.	R2
	B	Std. Error	Beta					
(Constant)	1.95	0.53		3.66	<b>0.00</b>	28.5	0.000	0.745
Age=30-39 years	-2.88	0.42	-0.44	-6.83	<b>0.00</b>			
Age=40-49 years	-1.38	0.30	-0.55	-4.59	<b>0.00</b>			
Age=above 50	-1.72	0.25	-0.59	-6.79	<b>0.00</b>			
Gender=Male	-0.20	0.30	-0.04	-0.67	0.50			
Education=Bachelor	1.60	0.37	0.50	4.28	<b>0.00</b>			
Education=Masters	0.52	0.33	0.21	1.58	0.12			
Education=Professional/Others	0.65	0.36	0.22	1.77	0.08			
Firm_Size=10-49	1.42	0.23	0.54	6.30	<b>0.00</b>			

Firm_Size=50-100	0.64	0.24	0.22	2.60	<b>0.01</b>			
Firm_Size=Above 100	0.57	0.28	0.18	2.06	<b>0.04</b>			
Existence=3-7 years	0.71	0.38	0.26	1.86	0.07			
Existence=7-10 years	0.86	0.40	0.27	2.13	<b>0.03</b>			
Existence=10-15 years	1.62	0.42	0.42	3.87	<b>0.00</b>			
Existence=15-20 years	1.93	0.44	0.40	4.39	<b>0.00</b>			
Existence=above 20 years	2.16	0.42	0.76	5.13	<b>0.00</b>			
Firm type=Partnership	0.26	0.16	0.10	1.63	0.11			
Firm_sector=Trading & Manufacturing	-0.45	0.14	-0.17	-3.20	<b>0.00</b>			
Investment=1 cr. to 5 cr.	-0.40	0.23	-0.11	-1.77	0.08			
Investment=5 cr. to 10 cr.	-0.17	0.23	-0.07	-0.73	0.47			

## Conclusion

In this study, utmost efforts were made to avoid any kind of biasness in selection of firms or respondents and efforts were made to cover all types of manufacturing firms of Haryana in ambala division so that the population is well represented and finding of the study could become more relevant. The overall effect of demographic variables on the use of ICT among small and medium enterprises was found to be highly significant as F-statistics (19, 160) = 28.50 was found to be highly significant ( $p = 0.000$ ). The value of model fit (Adjusted  $R^2 = 0.745$ ) was very high. The 19 independent dummy variables jointly predicted only 74.5% variation in the emotional intelligence. Thus, it may be concluded that the extent of use of ICT among small and medium enterprises was largely dependent on the demographic profile of firms' management. Also, the effect of individual variable was examined using the regression coefficient.

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