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Research Article

ICT System for 14.0 Adoption: Comparative Study to Assess the Readiness in Manufacturing MSMEs

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One of India's fastest-growing industries is the manufacturing sector centered on exports. Additionally, it has a greater impact on the economic development of India. Technology in the export-oriented manufacturing sector makes a significant contribution to the rise in productivity, which also boosts profits. The study's major goal is to learn more about the adoption of the 14.0 ICT system by manufacturing enterprises with reference to MSMEs and to evaluate its efficacy. In order to gather information for this goal, a survey approach was used, with the dimensions of ICT infrastructure, ICT hardware, software, and information systems, as well as people and human resource factors, as the instruments. Multiple regression and descriptive statistics were used to evaluate the data on a sample size of 7 businesses from the Pondicherry region. The conclusion is that firms have a significant gap in their ICT preparedness in terms of ICT infrastructure, ICT hardware, software, and information systems, and this must be treated seriously by the businesses if technology advancement is to continue in the future.

1. Introduction

Information and communication technology (ICT) has been used in many kinds of enterprises across the globe. ICT is a broad category of technological tools and resources that are used to connect, create, distribute, store, and manage information. It makes it possible for businesses to work together and communicate information widely. ICT infrastructure, ICT hardware, software and data systems, and people make up ICT progress. These are essential building blocks for the advancement of ICT in businesses [1–4]. Businesses use ICT as a tool to manage operations, assist work, and supply customers who must follow their strategies and training plans. Organizations should therefore assess their own ICT strategies and master programmes considering group plans. Operating models should be modified to align with all necessary elements to advance ICT within businesses in a sustainable and sufficient manner [5, 6].

ICT-related readiness testing tools have been developed and are being used by numerous organizations. Even in developing countries, these tools are not the best to use to assess small and medium-sized businesses. E-readiness assessment programmes and versions are the name of these evaluation tools [7–11]. They also provide a helpful guide for multinational corporations looking to invest in technologically advanced nations and adapt their Web tactics to local circumstances. The actual ICT preparation assessment product is an evaluation tool designed to determine the current level of ICT usage and ICT penetration levels in medium- and small-sized commercial enterprises. The ability of the examined businesses to successfully adopt, operate, and utilise information and communication technologies will be the result of using the model [12]. The specific model provides macro perspective kinds that have been derived into frameworks and even important signals.

Public and private are the two basic categories under which small and medium-sized institutions might be placed. The majority of businesses in developing nations, including G. R. Tiongkok, India, the Philippines, and Thailand, have already incorporated ICT into their operations and product offerings, but only a small number of these businesses self-evaluate their ICT openness levels, strategies, and master plans. For small to medium-sized businesses in public regions and commercial industries, the ICT willingness evaluation design typically presents significant indicators that may be related with vital ICT progress [13–16].

ICT readiness reveals a company's attitude towards maintaining current technology and other elements that can be employed as needed. The issue is whether businesses maintain ICT infrastructure, hardware, software, information system, and people and human resource readiness with their business [17–20]. Now, even large businesses, such as those in the semiconductor industry, are adopting newer technologies, such as three-dimensional IC integration employing Cu-Cu bonding [21–28], various revolutionary nanometer-level device fabrication techniques, even bio devices, and wearable antennas [29–35].

1.1. Objectives of the Study

(i) To know about the readiness level of the firms based on the dimensions

(ii) To compare the dimensions related to ICT readiness to find out the relationship between the factors

(iii) The know about the readiness of individual companies taken for the study

1.2. Scope of the Study. The study's goal is to evaluate how prepared businesses are for technology and ICT-related factors. The study's primary goal is to inform businesses (MSMEs) about the value of being ready for various technologies and aspects that they may implement in the near future.

The framework model for the relationships among the ICT readiness dimensions, including ICT infrastructure, ICT hardware software, information system, and people and human resource, is shown in Figure 1.

2. Methodology

Type of research: descriptive research has been implemented towards the study.

Type of data collection: primary data collection: the primary data was collected through questionnaire (survey method); secondary data collection: the secondary data was collected from websites, journals, and magazines.

Sample size: a total of 7 SME firms from Pondicherry were taken into study towards data collection.

Type of sampling: as the sample size was chosen randomly, random sampling technique has been adopted towards the research.

Tools used for the study: descriptive statistics and multiple regression analysis.

Scaling point used for the study: 1=fail, 2=poor, 3=average, 4=good, and 5=excellent.

2.1. Limitations of the Study

(i) The sample size is limited to 7 MSMEs

(ii) There may be a bias towards primary data collection

(iii) The study area is limited to Pondicherry

3. Results and Discussion

The organizations fail to have readiness levels with network backbone (1.14), network security (1.0), and network dependability and survivability (1.0) within their businesses, according to the mean value for readiness level with ICT infrastructure.

According to Table 1's analysis of the electric and power dimension, the firms' preparedness levels for their companies' electric and power supply systems (2.43), backup systems (2.57), and safety (2.71) are all below average. The physical infrastructure metric reveals that businesses do not prioritise readiness for data center rooms (1.0), general rooms (1.29), and management policy (1.43).

3.1. Interpretation. The mean value towards the readiness level with ICT hardware shows that the firms fail to have readiness level with personal computer (1.43) and mobile and nomadic devices (1.0) with reference to the dimension client.

While analyzing about the readiness level related to server with the companies, the companies fail to produce server for internal usage (1.0) and server for external usage (1.14) with in their companies as depicted in Table 2.

While analyzing about factors related to storage, the companies fail to have readiness level with personal storage (1.43), server storage (1.0), and secondary and back storage (1.43) towards their company data.

In analyzing the readiness level related to office hardware, the firms have poor readiness level with optical drive devices (1.0), input devices (1.0), and output devices (1.0).

3.2. Interpretation. The mean value of factors related to readiness of general and support on software and information system depicts that firms have failed to have readiness level towards information systems (1.14) and failed to have readiness towards software of the companies as shown in Table 3.

The corporations fail to have readiness on their knowledge base (1.0) and issue handling (1.0) while examining the readiness of services and issues with the firms. The analysis of the documentation for software and information systems reveals that the firms are not ready for software and information systems (1.0) (1.14). When looking at how prepared corporations are for information security, it shows that they are not prepared for confidentiality (1.0) and integrity (1.0) (1.0). Analysis of the companies'

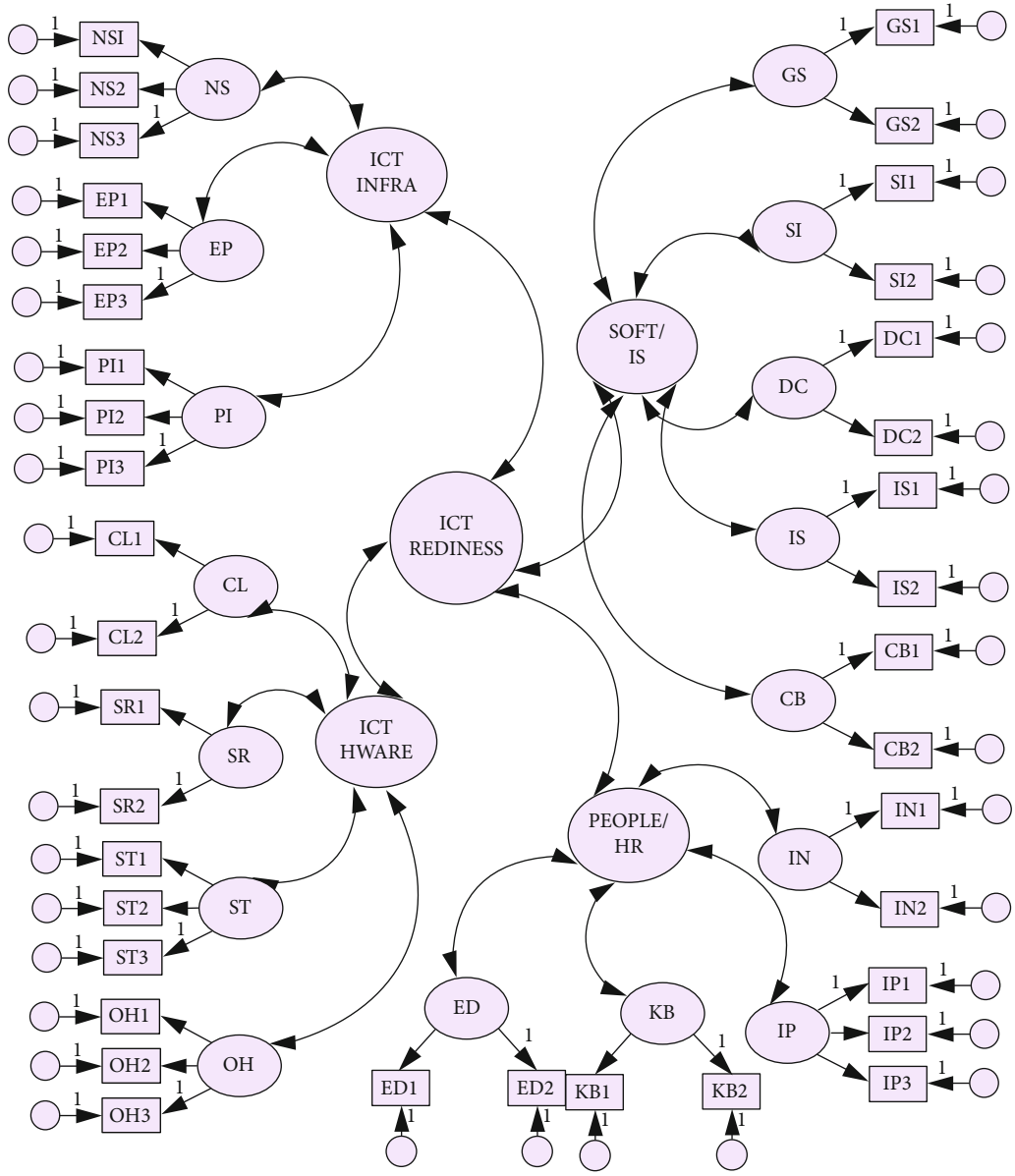

Figure 1: Framework towards the model comparison between ICT readiness and dimensions related to ICT readiness.

Table 1: Readiness level towards ICT Infrastructure.

Readiness	Particulars	Mean	SD
Network system	Network backbone	1.14	0.378
	Network security	1.00	0.000
	Network dependability and survivability	1.00	0.000
Electric and power	Electric and power supply system	2.43	1.512
	Electric and power backup system	2.57	1.272
	Electric and power safety	2.71	1.380
Physical infrastructure	Data center room	1.00	0.000
	General room	1.29	0.488
	Management policy	1.43	0.787

Table 2: Readiness level towards ICT hardware.

Dimensions	Factors	Mean	SD
Client	Personal computer	1.43	0.787
	Mobile and nomadic devices	1.00	0.000
Server	Server for internal usage	1.00	0.000
	Server for external usage	1.14	0.378
Storage	Personal storage	1.43	0.535
	Server storage	1.00	0.000
	Secondary storage	1.43	0.787
	Optical drive devices	1.00	0.000
Office hardware	Input devices	1.00	0.000
	Output devices	1.00	0.000

Table 3: Readiness level towards software and information system.

Dimensions	Factors	Mean	SD
General and support	Information systems	1.14	0.378
	Software	1.57	1.134
Services and issues	Knowledge base	1.00	0.000
	Issue handling	1.00	0.000
Documentation	Information systems	1.00	0.000
	Software	1.14	0.378
Information security	Confidentiality	1.00	0.000
	Integrity	1.00	0.000
Core business	Information systems	1.71	0.756
	Software	1.71	0.756

readiness for their main business operations reveals that the companies are not ready for information systems and software (1.71) (1.71).

The mean value shows in Table 4 that the firms fail to have readiness towards awards given to the employees (1.29) and they have a poor readiness towards innovation encouragement policy (2.86).

While analyzing the factors related to investment in people, the companies have a poor readiness towards management on investment (2.43) and training and seminar related to investment with people (2.14) and the firms fail to have readiness towards examination and certification (1.29) with the companies.

The dimension knowledge base shows that the companies fail to have readiness towards knowledge resources (1.14) and knowledge management (1.14).

While analyzing the dimension education, the companies have a poor readiness level on education level and responsibility of the companies and the companies fail to have readiness level on education encouragement policy with the companies.

3.3. Multiple Regression. Figure 2 describes that while comparing the factors related to ICT readiness based on ICT infrastructure, there is a positive relationship between network system and network back bone with the companies and there is no relationship between network system and network security and network dependability and survivability with the companies.

The companies are concentrating more on electric and power supply system and backup system meanwhile the firms do not have a readiness level towards power safety with the firms.

A positive correlation exists between readiness towards general room and management policy and ICT infrastructure, and relationship does not exists between management policy and ICT infrastructure. While analyzing the factors related to ICT infrastructure, as a whole, there is positive correlation between ICT infrastructure and network system, electricity and power, and physical infrastructure.

While analyzing the dimensions related to ICT hardware, positive relationship exists between client, software information systems, and ICT hardware with the companies. There is a positive relationship between software information systems and readiness towards general support of the firms, services and issues, documentation, and information security.

The dimension people and human resource shows that positive correlation exists between the dimension and innovation, investment with people, and readiness towards knowledge base.

3.4. Company-Wise Analysis towards Developing Factors Related to ICT Readiness Mathematical Model of ICT Readiness Level. The effects of this precise model label ICT preparedness levels of the contributing organizations. The particular ICT openness levels can provide ICT point priority intended for ICT expense and operations. For cases, if ICT infrastructure variable receives current ICT willingness level, this implies that ICT infrastructure has the highest goal for ICT investment together with management. Typically, the mathematical type can provide a standard level of ICT readiness of each one organization. Often, the priority as well as ranking can deliver the consciousness levels of ICT factors in organizations. The exact descriptions are generally explanation on the factors and ICT ability levels. The below equation demonstrates the exact model of ICT readiness review.

Table 5 shows about the readiness of the firms related to the dimensions taken for the study. Out of 7 companies taken for the study, the companies do not have any plan towards readiness with ICT infrastructure, ICT hardware and software, and information system as the calculated value is at 0.8; meanwhile, on an average, the companies have a study ICT master plan on vision and missions and the HR factors related to them.

3.5. Findings. The readiness level towards the companies taken for the study shows that a proper ICT has not been implemented by the companies.

Almost all the firms have a lag towards ICT infrastructure, ICT hardware, software, and information system but some firms have a minor readiness towards people and human resource related to ICT readiness.

Table 4: Readiness level towards people and human resource.

Dimensions	Factors	Mean	SD
Innovation	Awards	1.29	0.756
	Innovation encouragement policy	2.86	1.345
Investment in people	Management on investment	2.43	1.272
	Training and/or seminar	2.14	1.215
	Examination and/or certification	1.29	0.756
Knowledge base	Knowledge resources	1.14	0.378
	Knowledge management	1.14	0.378
Education	Education level and responsibility	2.00	1.291
	Education encouragement policy	1.43	1.134

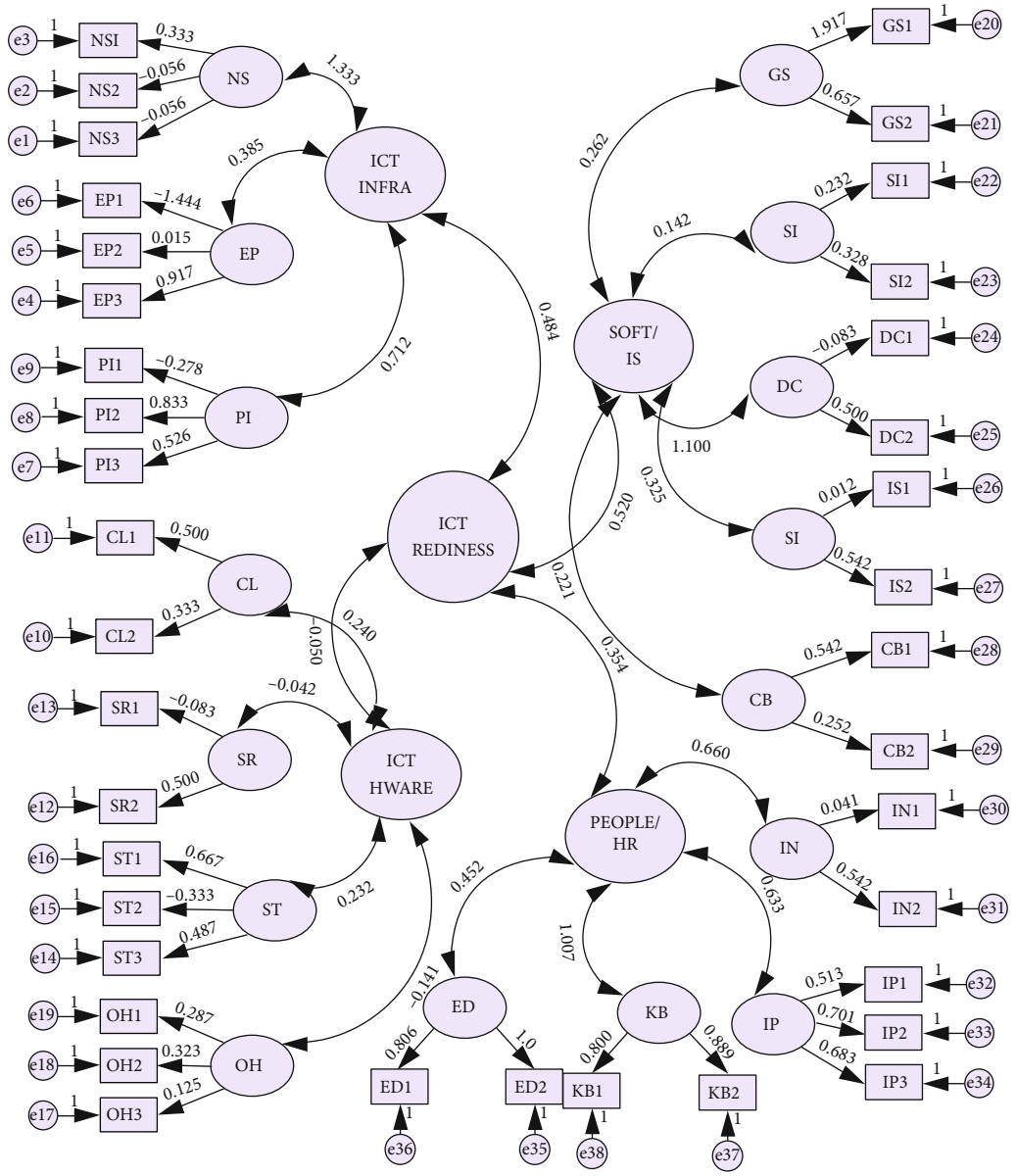

Figure 2: Comparison between ICT readiness and dimensions related to ICT readiness—output towards the model.

Table 5: Readiness of the firms related to the dimensions taken for the study.

Company	ICT infrastructure	ICT hardware	Software and information system	People and human resource
Firm 1	0.8	0.8	0.8	1.0
Firm 2	0.8	0.8	0.8	1.0
Firm 3	0.8	0.8	0.8	0.8
Firm 4	0.8	0.8	0.8	0.8
Firm 5	0.8	0.8	0.8	0.8
Firm 6	0.8	0.8	0.8	0.8
Firm 7	0.8	0.8	0.8	0.8

3.6. Suggestions. It is advised to apply the ICT preparedness model to evaluate the ICT readiness in small and medium-sized businesses in a developing nation like Thailand. The model was created using research data that was gathered from seven different organizations. The model consists of 15 crucial criteria for assessing each of the four key ICT factors: people, information systems and software, hardware, and infrastructure. The organization's ICT investment and management policies can be prioritised using the ICT readiness level. Because there are fewer indications than in other e-readiness evaluation tools and because they are simple, there is less complexity in the data collecting procedures, which lowers the cost of evaluation methods.

4. Conclusion

Technology plays a vital role in the increase in productivity, which also raises profitability, in the export-oriented manufacturing industry. The main objectives of the study are to assess the effectiveness of the 14.0 ICT system and learn more about how manufacturing firms, namely, MSMEs, are adopting it. ICT enables economic growth by broadening the reach of technologies such as high-speed Internet, mobile broadband, and computing. A survey approach was utilized to obtain data for this objective, and the instruments were the dimensions of ICT infrastructure, ICT hardware, software, and information systems, as well as people and human resource factors. The conclusion is that firms have a significant gap in their ICT preparedness in terms of ICT infrastructure, ICT hardware, software, and information systems, and this must be treated seriously by the businesses if technology advancement is to continue in the future. Extensive use of ICT can allow microenterprises with ideas and technologies to remain small and profitable, and some microenterprises have generated substantial global sales by exploiting their intellectual property over the Internet.

Data Availability

The data used to support this study are included within the article.

Disclosure

The publication of this research work is only for the academic purpose of Jimma Institute of Technology, Jimma University, Ethiopia.

Conflicts of Interest

The authors declare that they have no conflict of interest regarding the publication of this paper.

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