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ICT for Improving Competitive Performance of Small and Medium-Sized Enterprises (SME's) through Information & Knowledge Management: An explorative study

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Abstract

Purpose: *The study focuses on describing competitive performance of the selected agro-food processing firms of J&K and influence of the information & communication technology (ICT) in improving competitive levels of processing firms of an agriculture & horticulture rich state of Jammu and Kashmir.*

Design/methodology/approach: *The present study is based upon exploratory research design where in primary data has been collected through a well-structured questionnaire. The questionnaire has been administered on 82 firms, out of which data from 61 firms has been found to be valid and complete. The data has been statistically analyzed for reliability and two composite indexes i.e. Total Competitive Performance Index and ICT Competence Index. The two constructed indexes have been regressed for determining the relationship between Total Competitive Performance Index and ICT Competence Index.*

Findings: *Positive relationship has been revealed between Total Competitive Performance Index & ICT Competence Index and supports importance of the ICT Competence Index in improving competitive performance of the agro-food processing firms of J&K.*

Originality/value: *The study can be beneficial to the agro-food processing entrepreneurs in evaluating their present status of ICT implementation in their firms and also in defining their future competitive position as well as improving their competitiveness. The study can also be helpful in drafting specific industrial policies for the agro-food processing industry of J&K and also designing specific policy initiatives for increasing the information and knowledgement management in micro, small and medium-sized enterprises (SMEs) of J&K.*

Keywords: *ICT, Competitive Performance, Competitiveness, Firm Level Competitiveness.*

Introduction

Micro, Small And Medium-Sized Enterprises (SMEs) are the growth engines of an economy, especially developing economies such as India. The significance of SMEs lies in their contribution to large industrial establishments and meeting the local & regional market demands. These enterprises are also significant in terms of their employment and revenue generation capacity, particularly at the regional level. India opened its economy to the global competition and investment in 1991. Reforms of 1991 were aimed at exposing Indian industrial establishments to the global competition and improve their competitive performance by using new advancements in the fields of technology, information management and knowledge management. With

the introduction of new business policies and reforms, landscape of business competition changed in India and made it inevitable for manufacturing firms to focus on improving competitive performance, specifically of Micro, Small And Medium-Sized Enterprises (SMEs). The reforms also enthused researchers and academicians on exploring the strategic areas which can increase the competing capabilities and competitive performance of Indian firms.

The operational activities of a firm are very much crucial for generating revenues and employment, which are important elements for improving competitiveness of a nation **(Koc, 2009; Laurentiu, 2009)**. Competitive performance of a firm sets base for the competitiveness level of a nation and also ensures the growth of firms, industries and nations **(Joshi et al., 2011)**. Among various level of competitiveness, firm level competitiveness is considered to be very much significant. Firm level competitiveness is largely described through competitive performance of a firm and is improved by the internal factors of a firm such as Technology, ICT, Marketing, Human Resource Management etc. Technology & ICT has been held as an important and essential elements for improving the competitive performance of a firm and thus for firm level competitiveness. Firms based upon the competition structure and market base position through superior economic and financial performance compete at the market place through their distinct competencies which also refer to the dynamic capabilities **(Chaudhuri & Ray, 1997; Teece et al., 1997; Veliyath & Zahra, 2000)**. Over the period, competitiveness of the firms is given an importance in terms of survival and success of the firms in competitive market places **(Ambastha & Momaya, 2004)**. The significance of Technology and ICT in improving the competitive performance and firm level competitiveness among SME's is still at its infancy stage in the developing countries, particularly at the regional levels.

Firm level competitiveness of agro-food processing industry in India, particularly in J&K, is a potential industry with multiple opportunities for investment. The industry is in need of interventions in various areas for the strategic growth and development of this industry in India and J&K. With India witnessing increasing consumer consumption of processed & convenience foods, the demand for processed foods is increasing day-by-day. The states like Jammu and Kashmir have a comparative advantage in terms of availability of raw material and availability of labour. In this background, the present study aims at evaluating the competitive performance of the agro-food processing firms of J&K and explores influence of the ICT competence on the competitive performance. The paper is based upon premise that the information & knowledge management through usage of ICT is very much essential in improving

competitive performance of the SME's at the regional levels and conflict driven areas such as J&K. The paper ahead discusses literature pertaining to the firm level competitiveness & ICT and the status of ICT competence & competitive performance of agro-food processing SME's of J&K.

Review of related literature

Competitiveness is a well-researched concept and is multi-dimensional in nature. It has been studied by the researchers & academicians with different educational credentials and research objectives, which lead to the complexity in its understanding **(Latruffe, 2010; Siggel, 2006)**. Literature review suggests three levels of competitiveness - macroeconomic level (International level), mesoeconomic level (Industry level) and microeconomic level (firm level) **(Chaudhuri & Ray, 1997)**. Among these three levels of competitiveness, firm level competitiveness has attracted the significant attention of the researchers & academicians because of the fact that for a successful nation/industry, firm level competitiveness is very much essential element **(Koc, 2009; Laurentiu, 2009)**. Competitive firms are significant sources of high revenue and employment generation in an economy. Thus, firms with high competitive levels boost progress of a nation and its people **(Buckley et al., 1988; Voulgaris & Lemonakis, 2014)**. Firm level competitiveness consider firm as an object of investigation and consider internal elements of a firm, both tangible and intangibles resources of firm like technology, ICT, marketing capabilities, human resource, innovation capabilities etc. as an essential sources for improving the firm level competitiveness **(Ambastha & Momaya, 2004; Chaudhuri & Ray, 1997; Nelson, 1992; Porter, 1990; Prahalad & Hamel, 1990; Shan & Hamilton, 1991)**. Due to the qualitative nature of these dimensions and availability of the data regarding these dimensions firm level competitiveness has remained unmapped in the literature, particularly at the regional levels and in SME's. However, there is an increasing consensus among the academicians and researchers on using competence approach for analyzing the firm level competitiveness **(Chaudhuri & Ray, 1997)**.

Competence approach emphases on the competencies, which are an outcome of firm's internal resources such as technology, ICT, marketing etc. and stresses on raising competencies for building, maintaining & sustaining firm level competitiveness. Literature review reveals that the competitiveness has been studied by interdisciplinary areas of research such as economics, operations as well as strategy **(Ambastha & Momaya, 2004)**. The field of strategy defines the competitiveness through performance metrics. Resource based view of firm discusses competitiveness of a firms by analyzing the heterogeneous and imperfect mobile resources that may be tangible or intangible **(Barney,1991; Grant,**

1991; Rumelt, 1984; Wernerfelt, 1984). The resource based theory views firms as efficiency seekers by using various competencies.

Information & communication technology (ICT) may be defined as computer aided technology for processing, storing, and communication of information **(Molloy & Schwenk, 1995)**. The review of literature stresses on the implementation of the ICT in a firm due to its multiple benefits **(Lee et al., 2000; McAfee & Brynjolfsson, 2008; Montoya et al., 2009)**. ICT offers more opportunities to customize products and services, constitute embedded business processes and investments in the hardware, software, data and people **(Reddy, 2006)**. ICT has improved the access to market information, changing customer preferences & taste and helps in managing & understanding competition through electronic data interchange **(Boudreau et al., 1998; Njelekela & Sanga, 2015; Reddy, 2006)**. It has shortened the reaction time, response to the threats and challenges and also lowers the intensity of the impact **(Ansoff, 1975)**. ICT also facilitates quick and information based decision making **(O'Reilly, 1978; Molloy & Schwenk, 1995)**. ICT allows firms to store both qualitative and quantitative data which improves the effectiveness and efficiency of decision making. The implementation of ICT in a firm provides bases for the information and knowledge management.

The review of literature on competitiveness highlights that the firm level competitiveness is a prospective research area, particularly in developing and regional economies. Resource based view of firms & competence approach offers an understanding in analyzing firm level competitiveness. With increasing availability of ICT as well as its adoption, the strategic importance of ICT is becoming significant for improving information and knowledge management. However, there is a gap in literature in measuring the ICT competence of the SME's at the regional level, particularly in the conflict driven economies such as Jammu and Kashmir, which are to be bridged in.

Research methodology

The present study is based upon the exploratory research design with primary objective of evaluating the relationship between ICT competence & firm level competitiveness in SME's and to measure the influence of ICT competence on the competitive performance of a firm. Firm level competitiveness has been defined through total competitive performance index. The recent stream of literature holds firm level competitiveness as an outcome of resources possessed by a firm for developing competencies **(Barney, 1991; Peteraf, 1993; Porter, 1990; Prahalad & Hamel, 1990)**. The recent literature also reveals that the firm level competitiveness based on the competence approach has received a significant importance **(Chaudhuri & Ray, 1997)**.

The main emphasis of the competitiveness is the competitive performance of the firm, thus competitive performance is equivalent to firm's competitiveness level **(Singh et al., 2007).** Performance analysis is a strategic tool for measuring competitiveness **(Chenhall, 2005; De Toni et al., 1997)**. The use of financial and non-financial parameters represents the accurate system for measuring the performance of a firm **(Sanchez et al., 2012)**. Multiple variables show a holistic and broad picture of the competitive performance of a firm **(Sousa, 2004)**. The review of the literature reveals the significance of competitive performance of a business firm is described by aggregation of measures of manufacturing, marketing and financial performance **(Cleveland et al., 1989)**. Manufacturing measures include cost, quality, dependability/delivery and flexibility **(Boyer & Lewis, 2002Hung et al., 2015; Kim & Arnold, 1992; Kumar et al., 1999; Prester, 2013; Shahnawaz, 2015; Ward et al.,1998)**. Marketing performance has been measured through sales performance **(Lau, 2002; Moorman & Rust, 1999; Peter & Veronica, 1998; Sharma & Fisher, 1997)** and financial performance has been measured through profit after tax **(Buckley et al., 1988; Fischer & Schornberg, 2007; Moorman & Rust, 1999)**. Keeping in view the discourse of the literature the present study incorporates these six variables for defining the competitive performance of the agro-food based manufacturing units in J&K. The proposition related to technology factor and competitive performance is

P_{01}: *ICT competence does not influence competitive performance*

P_{01A}: *ICT competence does influence competitive performance*

$\boldsymbol{P_{01}}$ represents a proposition which is compared with the alternate proposition $\boldsymbol{P_{01A}}$. For testing the proposition, regression analysis is performed at 5 per cent level of significance. The study is largely based upon the primary data collected through a well-structured questionnaire. The questionnaire was administered on 82 firms, out of which data from 61 firms was found to be valid and complete. Collected primary data is analyzed statistically for reliability and correlation as well.

Results and discussion

Competitiveness of a firm is described through the tactical decisions of an industry and technology adoption. The competition based upon the technology and economics of performance are deep rooted characters for firm level as well as industry level competitiveness **(Porter, 1985)**. The influence of investments in technology, both production and information technology like ICT, on the firm level competitiveness is still an unexplored area of research in the agro-food processing industry in India, especially in the state of Jammu and Kashmir.

The present study has been drafted upon the performance indicators for the evaluation of firm level competitiveness of the identified agro-food processing units in Jammu and Kashmir. As advocated by the **Sanchez-Gutierrez et al. (2012)**, the combination of the financial and non-financial factors forms an adequate system for measurement of the competitive performance of a firm. Within this background, the present study has incorporated both financial and non-financial factors for evaluating the competitive performance of the targeted firms. The main emphasis of competitiveness is the competitive performance and thus competitive performance has been taken as proxy for competitiveness **(Singh et al., 2007)**. Measures of manufacturing, marketing and finance have been combined for describing the total competitive performance of targeted firms **(Cleveland et al., 1989)**. In totality, six dimensions i.e. cost, quality, dependability, flexibility, sales and profit after tax, pertaining to the measures of manufacturing, marketing and financial have been combined to estimate total competitive performance index (TCPI) of the small medium enterprises involved in agro-food processing in J&K state. The targeted firms were entreated to evaluate the six dimensions in contrast to their nearest competitors and report evaluation on five point likert scale measuring 1 as poor, 2 as satisfactory, 3 as average, 4 as good and 5 as excellent. The likert scale has been preferred as the agro-food processing unit holders were reluctant in sharing core information. Therefore, five point likert scale has been used as it enables to capture significant scale of responses. The responses collected on cost, quality, dependability, sales and profit after performance has been standardized & aggregated for constructing the Total Competitive Performance Index (TCPI).

ICT competence in the present study has been described through following statements – Usage of internet based information systems for forecasting & distribution management in the firm, Usage of computers in the firm for file management, Usage of internet based information system for the procurement of raw material in the firm, Improvement in firm performance due to the investment in ICT on an average period of last five years and Investments in ICT/ICT up-gradation with future perspective. The Cronbach's coefficient alpha for reliability measurement has been found to be 0.808, which reflects the scale used in the present study is reliable.

To measure the relationship between ICT competence and TCPI, regression analysis technique has been used at 5 per cent level of significance. The regression reveals a significant relationship exists between exogenous variables and endogenous variable at 5 per cent level of significance. The value of the "R" has been reported as 0.630 indicating that high level of correlation between the exogenous variables

and endogenous variable. The value of R^2 has been found to be 0.396 significant at 5 per cent level of significance. The model explains nearly fifty three per cent of variable. The model thus in the case of measure of competitiveness is fit to be explained as

$$Y = c + aX_1 + e$$

Where, Y= TCPI as a proxy for competitiveness.
X_1 = ICT competence
a = coefficient of ICT competence
c = constant
e = error term

Thus the relation is explained as

$$TCPI = 1.093 + 4.428\ (ICTCI)$$
$$(0.109)^*\ (0.712)^*$$

Note: Figures in parantheses represents standard error;
** represents statistically significant at 5 per cent level*

To test the validity of model, the study incorporated ANOVA or F test. It has been revealed from statistics that the corresponding F value appears to be 38.72, which further seems to be statistically significant at 5 per cent level of significance. Thus the test statistics conclude the overall goodness of fit of the model.

With reference to the finding, proposition P_{01} stands to be rejected in terms of the influence of ICT over the firm level competitiveness and P_{01A} stands accepted i.e. ICT competence does influence competitive performance. The ICT competence holds a positive relationship with TCPI, with one per cent change in investment in ICT the TCPI has an increase by 44 per cent and thus depicts more competitiveness for the firm in long run.

The results reveal the significance of ICT in building & improving the firm level competitiveness of agro-food based manufacturing units of J&K state. The results hold ICT as an essential factor for enhancing competitiveness of agro-food processing firms. ICT competence improves flexibility in operations and manufacturing processes of the small medium firm as well as helps them in producing better quality products **(Vinas et al., 2001).** ICT infrastructure has multiple influences on the performance of small medium enterprises. It also helps small sized firms to improve their innovative capabilities, respond to market & customer needs at a faster speed, customization & variety etc. **(Meredith, 1987)**. Information & communication technology (ICT) improves access to the market information, changing customer preferences & taste and helps in tackling the changing business competition through use of electronic data interchange **(Boudreau et al., 1998; Njelekela & Sanga, 2015; Reddy, 2006)**. It also has reduced the reaction time, response to threats &

challenges and also lowering of intensity of the impact **(Ansoff, 1975)**. ICT also facilitates quick and information based decision making **(Molloy & Schwenk, 1995; O'Reilly, 1978)**. Thus, ICT improves the competitive performance of the SME's and thus act as crucial element for improving firm level competitiveness.

During the primary survey of agro-food processing units of J&K, it has been witnessed that the SME's of agro-food processing industry have started realizing the significance of ICT competence for firm level competitiveness and thus have started investing in it. However, during survey it was also observed that the ICT adoption is being carried out without any proper planning and need evaluation. The present study observes that the ICT competence holds potential in defining the competitive performance of the SME's and can also lead to the growth. However, there may be certain challenges involved in building the ICT competence among SME's. Most of the SME's are family and traditional oriented business with low orientation towards technology advancements, especially ICT. Besides, financial implication associated with building ICT infrastructure & upgradation also act as main hurdle to the ICT competence. Also some SME's are in transition from first generation to the second generation, which sometimes create conflict of opinion. These factors in SME's need to be resolved amicably and efforts should be directed towards leveraging upon investment in ICT infrastructure.

Conclusion

The present study is an effort towards understanding the significance of ICT in the competitive performance of a firm. The study also focused on sensitizing agro-food processing entrepreneurs of J&K about the ICT competence & its significance and thus favors facilitating the information and knowledge management in SME's of J&K, especially in agro-food processing units. The results of present study reveal positive relationship between firm level competitiveness and ICT competence, which reflects that agro-food processing units can improve their competitive performance by building their ICT competence. Investment in ICT acts as a strategic investment towards growth and development of the SME's in the conflict driven Jammu & Kashmir State. The present study is an exploratory study with certain limitations in terms of availability of absolute data about ICT, as small and medium firms do not maintain any proper database about various qualitative based dimensions of a firm and orientation of the SME's towards research is also very much restricted. Despite of all the limitations, the present study made an effort towards highlighting the role of ICT in firm level competitiveness among SME's. The results can be advantageous to the entrepreneurs in understanding

linkage between ICT & competitiveness and can also be strategic to the policy makers in framing policies for the SME's.

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