

Trends in Management of Technology (MOT) Practices in Small and Medium Enterprises (SMEs) in India: A Study of Select Food Processing Enterprises

J. Krishnaiah and B. Rajashekhar

Abstract—Worldwide SMEs have been accepted as the engine of economic growth for promoting equitable development. SMEs play a pivotal role in the overall industrial economy of the country. The liberalization of Indian economy has opened now opportunities for SME sector. . SMEs are moving to implement technology management practices to sustain in the global economy. The study focus on current technology management practices in Small and Medium Enterprises of selected food processing enterprises in the state of Andhra Pradesh in India. An Integrated model for Technology Management Practice model has been developed which influence the brand image and business growth to influence to improve business performance. A purposive sample (N = 141) of small and medium sized food processing enterprises were surveyed by administering a questionnaire to the enterprise owners or chief executive officers/managers The challenges being faced by the SMEs in the complete environment have been highlighted.

Index Terms—MOT, SME, food processing enterprise, intellectual property rights.

I. INTRODUCTION

The integration of SME in the global market is the key issue today. The SMEs suffer from a twofold problem on the one hand, asset constraints and limitations in critical resources restrict the capability to compete in a global environment; on the other hand, local markets and niches are being attacked by powerful international organizations [1].

Small and Medium Enterprises constitute a vibrant and dynamic sector of the Industrial economy of India. SMEs are the backbone of any economy. In Indian context over 40% of our export is from SMEs and after agriculture it is the 2nd highest employment generation sector. Innovation is the key of any SME for creation, sustenance and growth of any business. As per fourth census of 2006-07 that there are about 26 million units (over 90 percent total industrial units) in this sector employing nearly 59 million people in India.

There are over 6000 products ranging from traditional to high-tech items, which are being manufactured by the SMEs [2] - [3].

The post liberalization era in the Indian economy has enhanced the opportunities and challenges for the small industries sector. With their dynamism, flexibility and innovative drive they are increasingly focusing on improved

production methods, penetrative marketing strategies and management capabilities to sustain and strengthen their operations. They are thus poised for global partnership and to absorb latest technologies in diverse industrial fields [4]-[5].

Technology plays a key role in providing cutting edge for development with acquisition and technology adaptation to suit the local conditions [6]-[7]. Effective and efficient technology management practices are especially important for small and medium-sized enterprises (SMEs) during all life-stages of an enterprise due to the critical role of technology in entrepreneurial activities [8].

In the rapid changing and increasingly competitively global economy technology has become organizations greatest asset and there is no universal methodology for Technology Management practices to suit all Enterprises. Enterprises have to evolve their own Technology Management practices according to their line of activity, nature of R and D pursued, culture and funding pattern [9].

The main variables affecting innovation are consisting of firm strategy, expenditure on research and development, use of technological information sources and overall performance of the firm [10]. The technology adaption and firm performance in Small and medium Enterprises is mainly depend upon the Educational back ground and previous Industrial experience of the Managing Director/General Manager of the firms [11].

The Global Processed Food Industry accounts for over 3/4th of global food sales and it is valued at US \$ 3.2 trillion. Despite the large size of the industry, only 6% of the processed food is traded the world over as compared to bulk agricultural commodities where 16% of produce is traded. The USA is the single largest consumer of processed food and accounts for 31% of the global sales. This is because as countries develop, high quality and value-added processed food such as convenience food is preferred over staples, which are prevalent in less developed economies [12].

India is the world's second largest producer of food next to china, and has the potential of being the biggest with the food sector. The food processing industry is one of the largest industries in India-it ranked fifth in terms of production, consumption, export and expected growth. The food industry is on a high as Indians continue to have a feast [13].

The confederation of India industry (CII) has estimated that the foods processing sectors has the potential of attraction US \$ 33 billion of investment in 10 years and generate employment for 9 million persons [14].

Though the food processing industry is large in size, it is still at a nascent stage in terms of development of the

Manuscript received May 17, 2012; revised June 21, 2012.

J. Krishnaiah is with the Andhra Pradesh State Financial Corporation, Hyderabad, India (e-mail:krishnaiahj@rediffmail.com).

B. R. shekhar is with the School of Management Studies, University of Hyderabad, Hyderabad, India (e-mail:b_rajashekhar@gmail.com).

country's total agriculture and food producer; only 2 percent is processed. The industry size has been estimated as US \$ 70 billion by the ministry of food processing, government of India. The industry employs 1.6 million workers directly. Value addition of food products is expected to increase from the current 8 percent to 35 percent by the end of 2025. Fruit & vegetable processing, which is currently around 2 percent of total production will increase to 25 percent by 2025 [15].

The popularity of food and agro products is not surprising when the sector is now offering a growth of more than 150 percent in sales. With such promise in the sector, a number of foreign companies have joined the fray. While we brands such as McDonalds, pizza hut and Kentucky fried chicken have become household names, more are on their way.

The new wave in the food industry is not only about foreign companies arriving here attracted by the prospective size of the market. It is also about the migration of the made in India tag on food products traveling abroad. Indian food brands and fast moving consumer goods (FMCGs) are now increasingly finding prime shelf-space in the retail chains of the US and Europe. These include cobra beer, bikanevala foods, MTR foods ready-to-eat food stuff, ITC's kitchen of India and satnam over sea's basmati rice. The Indian food processing industry stands at \$ 135 billion and is estimated to grow with a CAGR of 10 per cent to reach \$ 200 billion by 2015.

The industry is segmented into sectors namely consumer foods consist of confectionery and bakery, refinery edible oils, milk and allied products (dairy). The other sectors are fruit and vegetables, grains and cereals, fisheries and Meat and Poultry, seafood. The classification is not distinct as many processed products overlap different segments [16].

II. OBJECTIVES

The objective is to study is technology management practices in Small and Medium Enterprises of selected food processing enterprises in the state of Andhra Pradesh in India and identify key strategies which influence business performance.

III. METHODOLOGY

The study area consists of three regions of Andhra Pradesh namely Ralyalasema, Telangana and Coastal. The present study focus on the food processing enterprises : i) Food industries like confectioneries like biscuits, wafers, candy chocolate, ii) Oil industries like solvent extraction plants, refined edible oils, iii) Bakery Industries like bread and instant food, iv) Dairy industries like milk and dairy products. A purposive sample of 141 processing enterprises among four categories in three different regions in Andhra Pradesh, were selected for the study.

Primary data was collected through a structured questionnaire administered with the enterprise owners or chief executive officers/managers selected SMEs. The questionnaires were distributed to 141 respondents of SMEs. The assessment of variables i.e. Technology Management strategies identified from the study of Vijay Jain and Ravi

Kiran(2012) [9], using Likert's five point scale viz. 1. Strongly Disagree 2. Disagree 3. Neither Agree nor Disagree 4. Agree 5. Strongly Agree.

The Secondary data was collected from annual reports of the companies, books, journals and articles related to SMEs, MOT and IPR.

The demographic profile of the respondents of SMEs is shown in table I.

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE

Item		N	%
Gender	Male	101	71.63
	Female	40	28.37
		141	
Age Group	20-30 years	10	7.09
	31-40 years	30	21.27
	41-50 years	11	7.80
	over 50 years	90	63.84
		141	
Type of business	Sole Proprietorship	17	12.05
	Partnership	58	41.13
	Joint Venture	7	4.96
	Registered Company	59	41.86
		141	
Highest Level of Education	Normal education	54	38.30
	Diploma	16	11.35
	Degree	25	17.73
	Masters	20	14.18
	Professional	26	18.44
		141	

IV. RESULT AND ANALYSIS

Descriptive and inferential statistical technique - ANOVA was used to analyze the impact of technology management practices among food processing enterprises.

The top four ranked technology management strategies identified through descriptive analysis were: i) Technology up-gradation ii) Indigenous technology development iii) Investment in R and D, iv) IPR used. The results were shown in table II.

TABLE II: TECHNOLOGY MANAGEMENT STRATEGIES ADOPTED BY SMEs

S. No.	Technology Management Strategies	Mean	Rank
1	Technology up-gradation	4.6	1
2	Indigenous technology development	4.44	2
3	Investment in R&D	4.3	3
4	IPR used	4.19	4
5	Change in management practices	3.65	5
6	Marketing Strategies	3.6	6
7	Reduced material & energy per produced unit/transaction	3.52	7
8	Price strategy	3.34	8
9	Re-training of workers	3.21	9
10	Improved quality of goods & services	3.18	10
11	Reduced labor cost	3.16	11

The Cronbach alfa is 0.832 for all the 11 items. The reliability statistics of the sample is shown in table III.

For in-depth analysis, ANOVA (Analysis of Variance – one way) was also applied to find the relation between

nature of industry and technology management strategies adopted by SMEs. The results of the same are given in table III.

TABLE III: TECHNOLOGY MANAGEMENT STRATEGIES ADOPTED BY SMES-ANOVA

Technology Management Strategies	Cronbach's Alpha if Item Detected	Between Groups (BG) / Within Groups (WG)	Sum of Squares	df	Mean Square	F	Sig.
Investment in R&D	0.798	BG	0.517	3	0.172	0.689	0.012
		WG	34.221	137	0.25		
		Total	34.738	140			
Marketing Strategies	0.812	BG	1.414	3	0.471	1.87	0.138
		WG	34.543	137	0.252		
		Total	35.957	140			
Improved quality of goods & services	0.810	BG	16.019	3	5.34	32.443	0.045
		WG	22.548	137	0.165		
		Total	38.567	140			
Reduced labor cost	0.826	BG	20.229	3	6.743	56.541	0.21
		WG	16.338	137	0.119		
		Total	36.567	140			
Reduced material & energy per produced unit/transaction	0.830	BG	8.524	3	2.841	7.68	0.086
		WG	50.682	137	0.37		
		Total	59.206	140			
Technology up-gradation	0.819	BG	8.416	3	2.805	4.964	0.003
		WG	77.414	137	0.565		
		Total	85.83	140			
Change in management practices	0.813	BG	3.161	3	1.054	4.359	0.006
		WG	33.109	137	0.242		
		Total	36.27	140			
Indigenous technology development	0.814	BG	2.214	3	0.738	2.712	0.037
		WG	37.276	137	0.272		
		Total	39.489	140			
Re-training of workers	0.826	BG	24.627	3	8.209	75.026	0.12
		WG	14.99	137	0.109		
		Total	39.617	140			
Price strategy	0.845	BG	11.354	3	3.785	15.114	0.021
		WG	34.306	137	0.25		
		Total	45.66	140			
IPR used	0.808	BG	6.549	3	2.183	10.945	0
		WG	26.726	134	0.199		
		Total	33.275	137			

The ANOVA results highlights that Marketing Strategies, Reduced labor cost, Reduced material and energy per produced unit/transaction, Re-training of workers have not emerged significant, while for all other strategies the results are significant since $p < 0.05$.

V. CHALLENGES FOR TECHNOLOGY MANAGEMENT PRACTICES

The common challenges facing by SME of India are as given below:

- Non availability of raw material at competitive cost
- Cut-throat competition from China and other low cost production center etc.
- Difficult in identifying appropriate technology and assistance.
- Inability to compete with big organization in terms of products quality, quantity and range of product
- Lack of access to global market
- Inadequate infrastructure facilities like road, power, communication etc.
- Inability to compete with big organization in terms of products quality, quantity and range of product

VI. INTEGRATED MODEL FOR TECHNOLOGY MANAGEMENT PRACTICES (TMP)

Technology Management Strategies and Operations

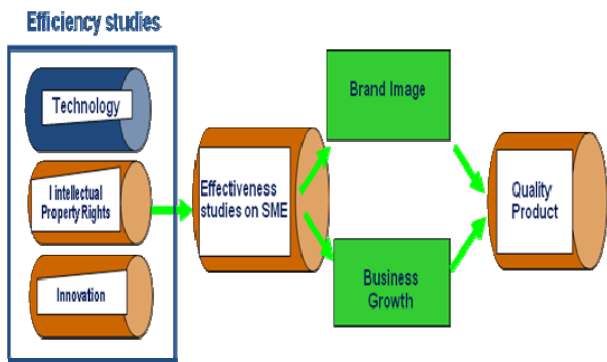


Fig. 1. TMP Integrated model.

The SMEs in the food processing enterprises are fragmented in the business operations. The sustainability and inclusive growth of SMEs contributed to the economic growth for technological capability advantage. The integrated model as shown in fig 1 depicts the TMP. In this model, efficiency strategies for operation SMEs drive the performance indicator for brand image, and business for achieving quality products and performance.

Further studies can be made for the assessment the impact of technology management strategies for SME's business performance useful Multivariate techniques like MANOVA.

VII. CONCLUSION

Management of technology practices become more evident as company grows and consequently management of technology becomes critical for the enterprise successes. SME's need to adapt technology up gradation strategy through indigenous technology developed and invest in Research and Development .TMP integrated model thrust on improving SME's business performance to built competitive advantage and sustainability .

In the competent environment SMEs develop an aptitude for innovation, creativity and flexibility which enable them to respond with more quickly to the technological and structural changes to adapt the dynamic demand pattern of the consumer. It is right time to keep SME growth engine on the right way and direction to put emphasis on the formulation of SME friendly policies conducive operating environment improvement of proper infrastructure and also by adapting appropriate modern technology.

In future IPR is also one of the emerging areas for efficient technology transfer in the global environment.

REFERENCES

[1] A. P. F. Mundim, R. Alessandro, and A. Stocchetti, "SME in Global market: Challenges, opportunities and threats," *Brazilian Electronic Journal of Economics*, pp 1-11, June, 2000.

[2] S. Mittal, "Bring about innovations in SMEs," *SME World*, pp 38 - 39, January, 2010.

[3] L. Sharma, "SMEs in prospect and retrospect," *Commemorative Special' 98*, pp 99 - 102, 1998.

[4] K. Lakshman, "Small scale industries-A perspective," *Commemorative Special' 98*, pp. 103 - 106, 1998.

[5] A. K. Upadhyay, "Small and medium scale enterprises: Need for management consultancy and echnology Upgradation," *Commemorative Special' 98*, pp. 29 - 136, 1998.

[6] G. K. Saxena, "Small industries development bank of India: Role of technology in SMEs," *Commemorative Special' 98*, pp. 121 - 127, 1998.

[7] Y. Nikaido, "Technical efficiency of small-Scale industry application of stochastic production frontier model," *Economic and Political Weekly*, pp 592 -597, February, 2004.

[8] K. Sahlman and H. Haapasalo, "Perceptions of strategic management of technology in small high-tech enterprises," in *proc PICMET 2009, Oregon USA*, pp. 93-104, 2009.

[9] V. Jain and R. Kiran, "Technology management strategies and small medium enterprises of Punjab manufacturing: A use-based sector analysis," *Journal of Intellectual Property Rights*, Vol. 17, pp. 64 - 72, January, 2012.

[10] A. Hadjimanolis, "An investigation of innovation antecedents in small firms in the context of a small developing country," *R and D Management*, pp.235-245, March, 2000.

[11] R. Thurasamy, O. Mohamad, A. Omar, and M. Marimuthu, "Technology adoption among small and medium enterprises (SME's): A research agenda," *World Academy of Science, Engineering and Technology*, pp.943-946, 53 2009.

[12] Food processings. [Online]. Available: <http://www.nsdindia.org/pdf/food-processings.pdf>

[13] Indian food industry. [Online]. Available: <http://indianfoodindustry.net/>

[14] Cygnus Business Consulting and Research Pvt. Ltd., "Quarterly Performance Analysis of Indian Industries and Companies (QPAC)", *Indian APF Industry*, pp. 19 to 23, January - March, 2012.

[15] India food processing. [Online]. Available: http://www.cci.in/pdf/surveys_reports/food-processing-india.pdf

[16] S. Kantar, "MSME in India: An overview," *SME World*, pp.34-35, May, 2012. .



J. Krishnaiah is currently working as Manager (Technical) project department in Andhra Pradesh State Financial Corporation (APSFC), Hyderabad, India. He is currently involved to study the technical feasibility and financial viability of Project reports related to Food Processing, Chemical and Pharmaceutical Enterprises. He has published research papers in National and International Conferences.

Presently, he is also doing part time Ph.D in School of Management Studies, University of Hyderabad, Hyderabad, A.P., India



B. Raja Shekhar is currently working as a Professor in the School of Management Studies, University of Hyderabad, India. His research papers are widely published in various National and International journals in the areas of Quality Management and Supply Chain Management. Prof. Shekhar's primary areas of interests include Quality Management, Supply Chain Management and Project Management.