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Impact of Product and Process Innovations on the Performance of SMEs

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ABSTRACT

The paper deals with a recent research study on the requirement of R&D to create new products and processes through innovation management and its impact on the overall performance of SMEs. Findings are made to know whether SMEs' significant level of R&D for product/process innovations influences growth. Feedback was obtained from the SMEs for the number of products/process introduced and R&D expenditure as a percentage of sales. The ratings on the level of innovations are made to analyze the impact on the performance of SMEs.

Keywords: Performance of SMEs, Product Innovations, Process Innovation, R&D Expenditure, Engineering Sectors.

1. INTRODUCTION

A study has been conducted to understand the R&D intensity to create new product and process/services done through innovation management. One of the main objectives of the research study was on the application of technologies and management of R&D for Innovations in Small & Medium Enterprises (SMEs) from engineering sector. The paper is supplement to the article published with a title "An analysis of R&D expenditure and innovations (product and process) by SMEs and its impact on performance" [1].

Innovation comprises, a process of idea creation, elements of creativity and R&D, but ultimately it is implementing new products / process with significant technological improvements [2]. Product innovation is the market introduction of new goods or significantly improved goods and which are new to the company. Process / service innovation is the implementation of new or significantly improved production processes, distribution method, or support activity which are new to the company [3]. The hypothesis is that product innovation and process / service innovation influences performance significantly [4]. Impact of product innovation is stronger than process / service innovation. The process innovation involves reengineering such as technical design, R&D and improving internal operation of business process for the process of transforming inputs to outputs, which are the important parameters that measures firm's growth [5]. The literatures, Government policies and reports shows that innovation is a critical factor in today's entrepreneurial activities. Innovation plays important role for SMEs when compared to large firms with an effective way to improve firm's productivity due to resource constraint to exploit new opportunities and to gain competitive advantage [6].

The literature review was done with regard to bring accuracy and newness of the research. After conducting an extensive review of literature and searching for similar research work based on the objectives of the study, it was found that there were not many studies conducted. Hence, the research gaps identified are on R&D for Product / Process innovations in SMEs.

2. SAMPLING PROCESS AND DATA COLLECTION

A detailed questionnaire was prepared for the research study to collect number of product and process innovations and R&D expenditure as a percentage of sales from the SMEs. SMEs were sampled out from areas of Electronic / Electrical equipments, Mechanical equipments, Electronic / Electrical components, Machined Components, Sheet metal component, Rubber / plastic components, Foundry & Forging, which are actively involved in automobile / aerospace / defence sectors / consumer electronics, across the country [7]. The structured questionnaire was developed and made to reach to a large number of SMEs to collect data in fillable format under engineering sectors which are manufacturing and trading companies.

3. DATA ANALYSIS

A total of about 300 SMEs responded all over the country, participated in the study and replied with valuable responses which were provided by the CEOs and MDs of the SMEs. The primary data is considered for grading the performance of SMEs based on the level of product / process innovations. Performance analysis of SMEs was done which is based on the performance indicators which are the outputs of the firms depending on the influencing parameters which are the inputs of the firm [3].

The following are the parameters identified for the study. The responses for these parameters from the organisations were graded on the 10-point scale based on rating parameters given below:

3.1 Rating Product Innovations (Input parameter)

Parameter 1 – Product Innovations

Product Innovations will be graded based on implementation of new products.

Table 1 : Ratings for the parameter - Product Innovations

Product Innovations	**Higher number of product innovations**			**Moderate number of product innovations**		**Lesser number of product innovations**	**Very poor number of product innovations**
	More than 10	9 to 10	7 to 8	5 to 6	3 to 4	1 or 2	Zero
Rating scale 1 to 10	9	8	7	5 - 6	3 - 4	1 – 2	0

3.2 Rating Process Innovations (Input parameter)

Parameter 2 – Process Innovations

Process Innovations will be graded based on implementation of new processes and / or significantly technological improvements in production processes.

Table 2 : Ratings for the parameter - Process Innovations

Process Innovations	Higher number of process innovations			Moderate number of process innovations		Lesser number of process innovations	Very poor number of process innovations
	More than 10	9 to 10	7 to 8	5 to 6	3 to 4	1 or 2	Zero
Rating scale 1 to 10	9	8	7	5 - 6	3 - 4	1 - 2	0

3.3 Rating percentage of R&D expenses to Sales year on year

Parameter 3 – Percentage of R&D expenses to Sales year on year

The percent of R&D expenses to sales amount given in lakhs year on year for five-year data are rated based on the average of the percentage change.

Table 3 : Ratings for the parameter - R&D expenses as a percentage of Sales

% R&D expenses to Sales year on year	High rate of R&D to Sales	Moderate rate of R&D to Sales	Lesser rate of R&D to Sales	Very poor rate of R&D to Sales
	More than 30.1%	10.1% to 30.0%	5.1% to 10.0%	0.1% to 5.0%
Rating scale 1 to 10	8 - 10	5 - 7	3 - 4	1 - 2

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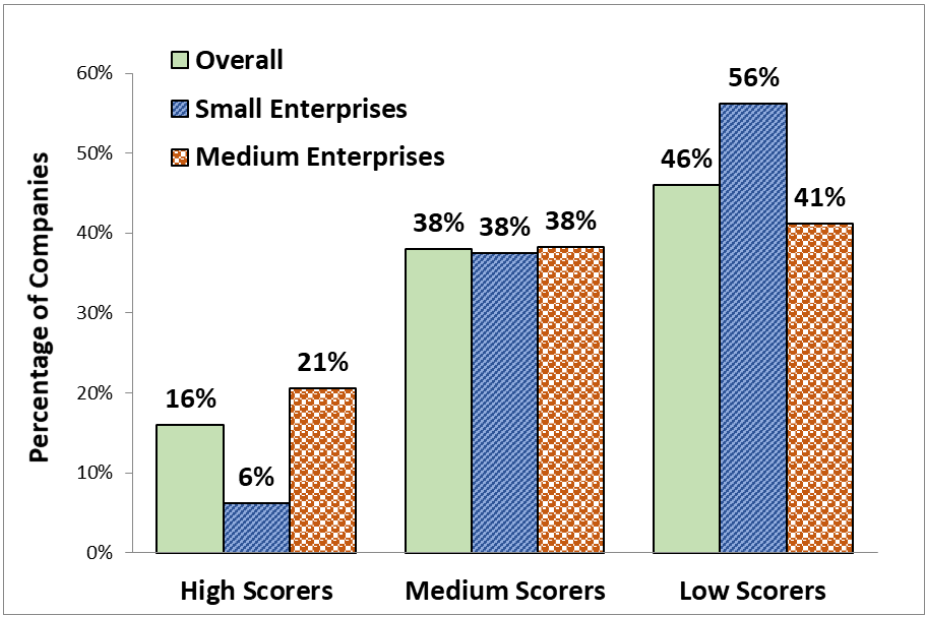
4. SCORE ANALYSIS

In the score analysis the ratings of the companies are analyzed based on the high scorers, medium scorers and low scorers in the parameters of product / process innovations and R&D expenditure as a percent of sales. The high scoring companies are considered who have scored 7, 8, 9 and 10. The medium scoring companies are considered who have scored 4, 5 and 6. The low scored companies are considered who have scored 0, 1, 2 and 3. The percentage of high scorers, medium scorers and low scorers are depicted in the histogram for companies, small enterprises and medium enterprises.

The score analysis is done for companies to get the overall score and separately for companies according to their industry size, (i) Small enterprises and (ii) Medium enterprises and according to their product category namely, (a) Electronic, electrical components & equipments, (b) Machined and sheet metal components and (c) Materials, casting, forgings and others.

The Graph 1 shows percentages of high scoring, medium scoring and low scoring companies for ratings on product / process innovations considering industry size:



Graph 1. Score analysis on Product / Process Innovations for SMEs

Overall performance of the SMEs with respect to product / process innovations is as follows. 16% are high scorers and 38% are medium scorers, totaling to 54%, remaining 46% are low scorers. Hence, the performance of the companies is below average and is not good enough.

Industry size has an influence on product / process innovations, considering high and medium scorers, medium enterprises have performed better than small enterprises. One reason is that medium enterprises have better technology management for innovations.

The following Graph 2 shows percentages of high scoring, medium scoring and low scoring companies for ratings on product / process innovations considering product category :

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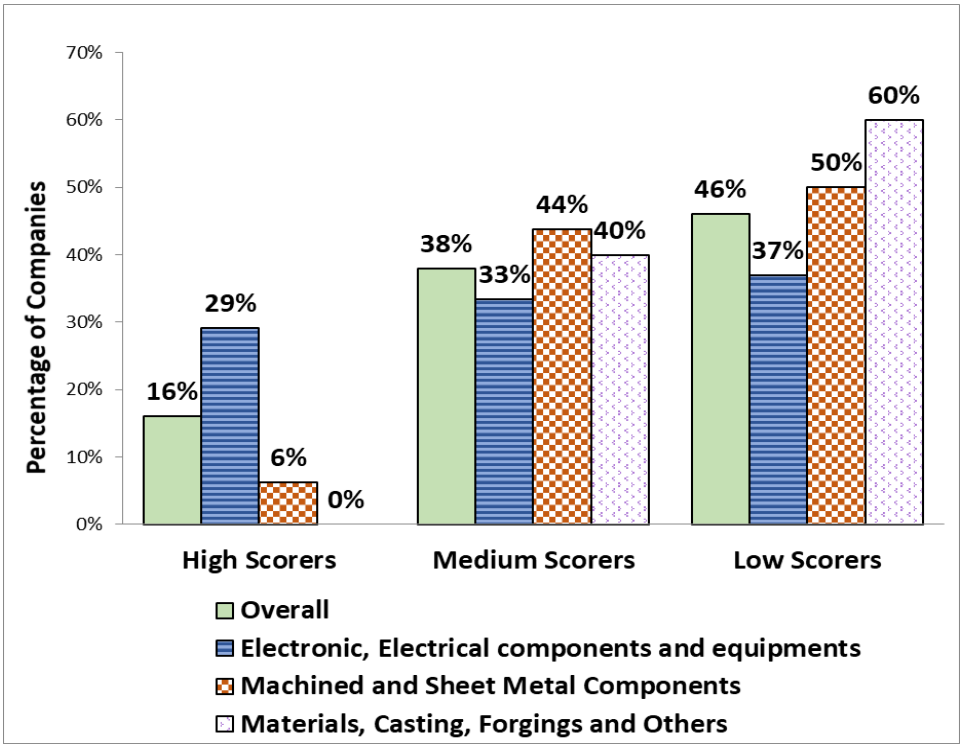
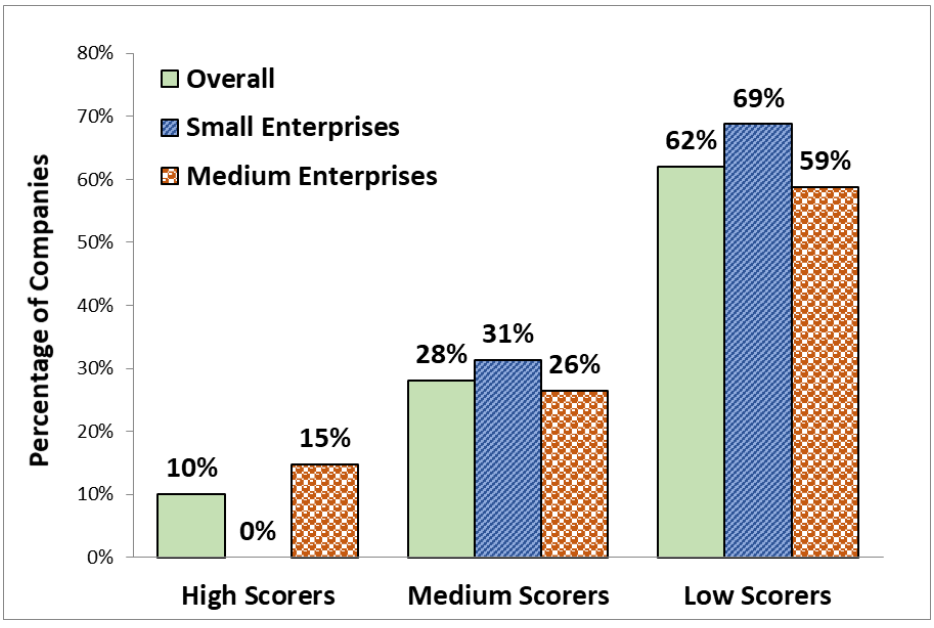


Graph 2 : Score analysis on Product / Process Innovations considering product category

Product category has an influence on product / process innovations, considering high and medium scorers, companies belonging to product category of electronic, electrical components & equipments have performed better than companies belonging to machined and sheet metal components and companies belonging to product category of materials and casting.

The following Graph 3 shows percentages of high scoring, medium scoring and low scoring companies for ratings on R&D Expenses as percent of Sales considering industry size:



Graph 3 : Score analysis on R&D Expenses for SMEs

Overall performance of the SMEs with respect to R&D expenses as percent of sales is as follows. 10% are high scorers and 28% are medium scorers, totalling to 38%, remaining 62% are low scorers. Hence, the performance of the companies is very poor and SMEs are to be persuaded to spend on R&D.

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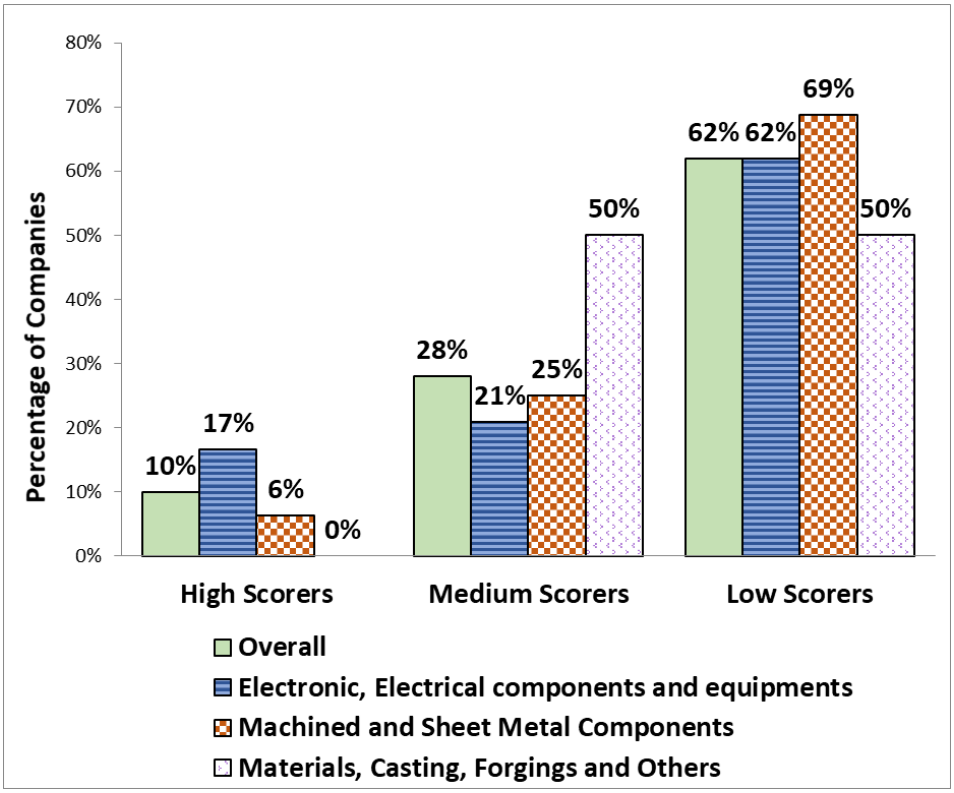
Industry size has no influence on R&D expenses as percent of sales, SMEs are to be provided with a lot of support on incentive schemes, technological incentives and training for better managing R&D to make them more innovative.

The following Graph 4 shows percentages of high scoring, medium scoring and low scoring companies for ratings on R&D Expenses as percent of Sales considering product category:



Graph 4 : Score analysis on R&D Expenses considering product category

Product category has an influence on R&D expenses as percent of sales, considering high and medium scorers, companies belonging to product category of materials and casting have performed better than companies belonging to product category of electronic, electrical components & equipment's and companies belonging to machined and sheet metal components.

5. CONCLUSION AND RECOMMENDATIONS

Higher the rate of R&D expenses to sales will lead to more product / process innovations. In exceptional cases the organizations with less rate of R&D expenses to sales could do more product / process innovations due to Technology Acquisitions. Increasing the importance given to Technology Acquisition by entering strategic alliance to develop or acquire potential technologies will lead to more number of product innovations. Product Innovations and Process Innovations have a definite impact on growth of sales. Product Innovations and Process Innovations have also a definite impact on growth of profit. As this lead to new products and improved processes improving quality, increasing productivity etc. these in turn lead to more orders. The companies who depend on subcontract may lead to problem in future if they are not doing R&D in process and product innovations.

SMEs are to be provided with a lot of support on incentive schemes, technological incentives and training for better managing R&D to make them more innovative and therefore R&D to be incentivised for indigenous development.

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