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Technological Innovation: a Necessity for Sustainable MSME Sector in India

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Abstract - **Micro, small and medium enterprises (MSMEs) are considered the back bone of the national economy due to their versatile contributions in terms of employment generation, export promotion and removal of regional imbalance. There is the evidence that these MSMEs are not operating at its maximum potential output due to their technological obsolescence. This paper explores the innovation in MSMEs by the academic intervention to improve the productive performance of MSME sector in India.**

Keywords: MSME, Industry institute Interaction, productivity

1. INTRODUCTION:

A new environment for small-scale enterprises has emerged after the globalization and liberalization and posed certain challenges and opportunities for the industrial sector of developing countries. The challenges are for small producers and manufacturers, who have to survive in competition with the advanced multinational companies [16].

As per [15] most of the Indian MSMEs are technological backward. Therefore it is very difficult for the Indian MSME to create a place for themselves in the global community chain, where advanced manufacturing methods have become increasingly characteristic.

According to [16], technological up gradation is the key to the survival of MSMEs in this fast changing economic, technological and information environment. Technology helps to improve the competitive strength of any industrial unit either through cost reductions, productivity/ quality improvements, or a combination of all [3].

According to [5], one of the ways in which firms can increase their productivity, is through innovative activities. As per [16] there is the need of the process and product innovation for the productivity growth of MSME sector in India.

2. TECHNOLOGICAL INNOVATION:

Over the past few years, innovation has become one of the most attractive areas of research in the field of management [14]. Innovations play a very important role in the sustainable industrial growth of the nation.

As per [16] technological innovation is the process, by which an entrepreneur plans, implements and evaluates technical changes to create new opportunities for enhancing the firm's competitiveness and growth. As per [10], there are three types of technological innovation:

(a) PRODUCT INNOVATION: It is the introduction of improved product design, core characteristics, technical specification etc. There are two types Product innovation;

(i) IMPORTANT INNOVATION: refers to new innovation or the new application which combines with old technology.

(ii) GRADUALLY INNOVATION: refers to use new material or new fittings to improve product performance or reduce product cost, or improve the overall system of a product through changing the part function of a product.

(b) SERVICE INNOVATION: It is the developmental result of service industry when knowledge-intensive service attach to the industry. It not only includes new thought or new plan which transforms into new or improved service, but also includes the financial services. Service innovation is one of technical innovation types which most suits for small and mediumenterprises.

(c) PROCESS INNOVATION: It is the introduction of a new or significantly improved production process involving new ways of producing goods and services that maximizes speed, service, quality, simplicity and waste reduction.

2.1 TECHNOLOGICAL INNOVATION IN MSME SECTOR

Innovation is a key factor in a firm's competitiveness in developing countries. The MSMEs cannot avoid this aspect of innovation if they want to develop and maintain a competitive advantage and/or gain entry into new markets [2].

Successful MSMEs are generally more flexible, adapt themselves better and implement new ideas. The flexibility of MSME is due to their simple organizational structure, low risk and receptivity features, facilitating them to be innovative [7]. Therefore, MSMEs across industries have the unrealized innovation potential. [6]

The ability and innovative capacity of MSME varies significantly, depending on their sector, size, focus, resources and the business environment in which they operate [4] Reid (1993), Innovation ¡n the MSME depends not only upon the internal technological capability but also on their capabilities to access technical information from a range of external sources, of which suppliers and customers play a vital role.

According to [16], innovation depends on internal sources but is also strongly influenced by the overall environment of the MSMEs. [9], a survey in the U.K. found that internal factors are likely to be the more important core determinants, of whether innovation plays a key role in success or failure, than the external factors. By and large, these studies underlined the importance of both internal and external factors as the driving forces of innovation.

According to [11], both product and process-oriented innovation is required in the MSMEs for sustenance in this competitive environment. Information and knowledge can help to create innovation in MSMEs (Min et al., 2008). Hence, Technological innovation in the MSMEs by academic intervention (Industry/Institute Interaction) has been analyzed in this study.

3. INDUSTRY INSTITUTE INTERACTION

Effective industry/institute interaction is the requirement of day, to train and develop the right kind of technical man power necessary to sustain and promote the industrial and economic growth of the nation (AICTE, IIPC). In India, industry/institute interaction for many years but the progress is limited to organizing seminars and workshops in institutions, industry and institutions want to interact but they are busy in attending their routine activities. Though in the curriculums of the institutions, students are required to work in industries, popularly known as "Summer Training", yet in majority of the cases this is being done as a formality from both sides (President Speech, 2006). As per [1], for effective industry/institute interaction, an important task is to develop appropriate strategy, which considers barriers to progress, covers risk and focuses on long-term relationships, rather than working for restricted mutual benefits

A strong Industry/institute interaction will facilitate the academic staff to develop commercial applications with, student's participation in the industry. Also, students will have opportunities to work in real industrial environments and to develop their technical skills under the guidance of the faculty [8].

Closer interaction between academia and industry is the need of the hour. Industry/Institute interaction is beneficial for both and is like the technology donator-acceptor [13]. A case study has been done to analyze the effect of technological innovation by Technical Institutions on the productivity growth of MSME sector in India.

4. PLANT STUDY DESIGN APPROACH:

A case study has been done in the MSME unit. For the case study one group of final year mechanical engineering students (under the guidance of Author) were sent to the MSME unit in Faridabad for their project work to access the impact of academic intervention on the productivity growth of MSME sector in India and after completing the project a questionnaire has been used to accessing the innovation in MSME unit by the engineering students. The questionnaire includes the 16 industrial job capabilities and skill of operating personnel [12].

4.1 INVESTIGATION AND SOLUTION:

The selected MSME units generally do the job work & make the auto component "window regulatory assembly" for cars.

Window regulatory assembly consists of following parts:

1. Long Arm
2. Short Arm
3. Pinion Carrier
4. Clutch Housing
5. Main sector and Arm
6. Panel Plate

During the investigation, following operation has been studied;

1. Production process,
2. Plant layout and
3. Tool room

The Plant layout had been changed and applied the process and product layout i.e., similar machine such as power presses, lathe machine are placed in one place in sequence according to the operation performed and after

Window regulator assembly part	Production /hour before Intervention of Academia (No. of Pieces)	Production/hour after Intervention of academia (No. of Pieces)
Long Arm	400	435
Short Arm	410	440
Main Arm and Sector	300	320
Pinion Carrier	430	470
Clutch Housing	450	490
Panel Plate	300	325

systemized the tool room, searching time of tool in tool room reduced and considerable increase the productivity of the unit.

4.1.1 IN PLANT STUDY ANALYSIS

A case study have been done in the MSME units by the engineering students under the guidance of the author and collected for the production data before and after the intervention of academia.

Production data analysis as shown in table 1

TABLE 1: PRODUCTION DATA FOR WINDOW REGULATORY ASSEMBLY

Source: Author Calculation

OBSERVATION: Improvement in the productivity as shown in table 2

Table 2 Improvement in productivity	
Component	% improvement in productivity
Main Arm and Sector	6.60%
long arm	8.75%
Short Arm is	7.20%
Panel Plate is	8.30%
Clutch Housing is	8.80%
the Pinion and Gear	9.30%

Source: Author Calculation

Overall productivity improvement in MSME unit is 8.16% after the intervention of academia

4.1.2. MEASUREMENT OF INNOVATION:

Interaction between the MSMEs and technical institutions gives the platform to create the innovation such as product and process innovation in MSMEs showing a remarkable growth in productivity of MSME unit. To the measurement of innovation, a questionnaire include 16 industrial job capability has been analyzed. In the questionnaire 16 job capabilities and skills are to tick the supervisors and entrepreneur to identify the items that are valuable in their job using a scale in which

1= much worse than average 2= somewhat worse
3= about the same 4= somewhat better
5= much better than average

4.1.3 RESPONSE ANALYSIS OF SUPERVISORS/ENTREPRENEURS FOR THE INDUSTRIAL JOB CAPABILITIES OF THE OPERATING PERSONNEL OF MSME UNIT

The industrial Job capabilities are divided into professional skill, professional concept, and professional capabilities. The response received for operating personnel as shown in table 3, table 4, table 5.

TABLE 3 PROFESSIONAL SKILLS

Depth of technical understanding	1.5	2
Integrating and synthesizing information from different fields	2.5	2.75
Ability to work in interdisciplinary teams	3.25	3.75
Ability to communicate ideas verbally	4	4.5
Total Score of Professional Concept	17.25	19.75
Improvement in Professional Concept (14.5 %)		

Source: Author's observation and calculation

TABLE 4: PROFESSIONAL CONCEPT

	Weightage of different factors	
Industrial job Capabilities	Operating personnel before the intervention of academia	Operating personnel after the intervention of academia
Understanding the relationship between work and customer needs	2.75	3
Meeting business goals while satisfying technical requirements	1.5	1.75
Leadership ability	3.4	4
Solving problems within the constraints of time, money, and human resources	2.75	3
Ability to transfer outside technology into the firm	2	2.25
Networking within the company	3.25	3.75
Total Score of Professional Capabilities	15.65	17.75
Improvement in Professional Capabilities (13.4%)		

Industrial job Capabilities

	Operating personnel before the intervention of academia	Operating personnel after the intervention of academia
Ability to communicate ideas in writing	3.25	3.75
Creativity and innovativeness	2.75	3

Source: Author's observation and calculation

TABLE 5 PROFESSIONAL CAPABILITIES

Industrial job Capabilities	Weightage of different factors	
	Operating personnel before the intervention of academia	Operating personnel after the intervention of academia
Ability to grasp quickly the key features of new problems	3.5	4
Contribution to the firm's technical work	3	3.75
Breadth of technical understanding	2.5	3.25
Ability to define the steps needed to solve new problems	2.25	3
Total Score of Professional Skill	11.25	14
Improvement in Professional Skill (24.4 %)		

Source: Author's observation and calculation

4.1.4 OBSERVATION

As the table 3, 4, 5, shows that Professional skill, professional concept, professional capabilities, among the operating personnel has increased up to 24.4%, 14.5% and 13.4% after the intervention of academia. This shows the innovation in small units due to the expertise of the engineering students**.**

5. CONCLUSION

Industrial job capabilities of operating personnel affect the productivity growth of MSME units, is therefore supported by the study results. The remarkable productivity improvement in the MSME units proves the contribution of

industry/ institute interaction for the growth of MSME sector in India. Further the response analysis of the supervisor/entrepreneur has been done for the industrial job capability of the operating personnel and found that after intervention of academia industrial job capabilities of the operating personnel improved**.** This shows that technical institutions can create the technological innovation in the MSMEs that can improve the productive performance of the MSME sector and make them sustainable in competitive market.

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