Demystifying Knowledge Management in Indian Manufacturing SMEs

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Abstract

The purpose of this research work is to explore various insights on knowledge management in the Indian manufacturing Small and Medium Scale Enterprises (SMEs). The research outcome is the learnings from the analysis of in-depth interviews conducted with CEOs, top managers, manufacturing consultants, students and various talk shows covered. This study also includes a brief review of knowledge management practices in SMEs and covers various barriers to knowledge management. The study concludes that the in-depth study of market orientation, which is one of the subsets of knowledge management, learnings from consultants, attending conferences/workshops outside India specific on a particular topic & subtopic of manufacturing processes, extensive use of internet and frequent interactive sessions with employees are seen as key driving factors of knowledge management. Knowledge management professionalism, social networking and industry academia interaction require more attention and workout as these would help position India as an international manufacturing destination, specific to innovation and sustainable development. This research study also suggests few managerial implications for owners of SMEs for the effective use of knowledge management in their organizations.

Keywords: Manufacturing; Small and Medium Scale Enterprises (SMEs); Knowledge Management (KM)

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1. **Introduction**

Knowledge management is not a new concept, but it is a major area of concern around the world, as businesses go through turbulent phases especially in the knowledge driven economy. Everyone has a different perspective of looking at it. Many researchers have proposed different definitions on knowledge management. According to Levinson [21], knowledge management lacks a universal definition. Anand and Singh [2] point out that it is difficult to understand knowledge management completely by just studying definitions, because it is associated with many other elements. Its effects and challenges keep on changing, depending upon how much of it is valued and practically followed. In manufacturing SMEs, knowledge can come from owners, production managers, supervisors, workers, vendors, customers, consultants, conferences, social media, market orientation, knowledge portals, knowledge forums, books, case studies, research papers and the list goes on. The role of knowledge management in business strategy has to be justified in the context of survival in the competitive market today.

Recently, a survey was conducted by Deloitte Touche Tohmatsu Limited and the U.S. Council on Competitiveness with more than 550 CEOs and senior manufacturing leaders with an aim to understand the trends, which can create a competitive global manufacturing environment[6]. Subsequently, they declared a Global Manufacturing Competitiveness Index (GMCI). Studies conducted on the countries’ manufacturing competitiveness index rankings showed that India ranked 4th amongst the top 38 countries considered. China, Germany and United States of America ranked among top 3, leaving behind India. It is expected that India will rank second in the upcoming five years. Among the ten identified global drivers of manufacturing competitiveness index ranking, the talent driven innovation ranks first and has the highest index rating. They have identified two sub components of this main driver. The first sub component is the quality & availability of researchers, scientists & engineers and second sub component is the quality & availability of skilled labour. This has given a clear cut understanding that knowledge management will play a vital role in getting India towards being a global manufacturing destination.

2. **Indian SMEs**

SMEs play a vital role in the economy of developing and developed countries. More attention has been focused on SMEs only during the past ten years in India and this is one reason as to why knowledge management is not very much explored in SMEs. Considering the importance of SMEs, the Indian government has admitted this sector in its five year plan [15]. Manufacturing is one of the most important sectors in the SMEs segment. Manufacturing SMEs are linchpin of Indian economy. Innovations are required to achieve competitiveness. Innovation requires proper knowledge management. Many SMEs have realized the importance of KM and implemented it successfully, while some are working on it. Most of them face problems, while implementing KM in their perspective areas. There are many SMEs clusters in India. Around 6000 different types of products are manufactured in India [24]. The literature shows that concerned governments, non-government organizations, academia and manufacturing consultants play a very important role in shaping the knowledge base of the SMEs.

3. **Literature review**

Literature review conducted during this research work covered two sets of studies conducted so far. The first is on the Indian studies, which describe different types of work done in the field of KM in Indian manufacturing SMEs. Second study is about global studies done on factors, barriers influencing knowledge management, knowledge sharing, new knowledge creation and innovations.

3.1 **Indian Studies**

A lot has been already said about Knowledge management in SMEs. Very few studies have been conducted so far on Knowledge management in Indian manufacturing SMEs. There has been no specific in depth studies conducted as far as the Indian manufacturing SMEs are concerned. A postal survey on knowledge management practices in Indian manufacturing industries was conducted in the year 2006 [28]. The survey work basically focused its findings on public sector, private sector and government organizations. Most of the organizations surveyed were large scale
organizations. The study concluded that the knowledge management initiatives are getting well anchored. According to them, top managements are aware of the role of culture in KM and the use of IT tools has played major role in the entire process of Knowledge management. Pillania[26] conducted a research on creation and categorization of knowledge in automotive components SMEs in India. According to studies conducted, international automotive component manufacturers have a better sensing about knowledge creation as compared to the common view in Indian firms [26]. Research work suggested policy measures for increasing the knowledge base of SMEs [26]. Karthikeyan.et al [15] conducted a study to identify various factors that contribute towards knowledge management practices in an automobile industry in India. Studies revealed that the training based on competency gap, Systems, Applications, Products in data processing (SAP), Research and Development (R&D) were the key factors responsible for enhancing the KM of the employees [15]. Rajender and Kumar [17] also conducted an empirical study to analyse the KM practices in the SMEs. Out of 4 samples of SMEs considered, only one was a manufacturing firm. According to them, the Central and the State governments and industrial associations need to promote the SMEs by providing financial assistance to up-grade technology, liberal tax policies, interest rates and R&D facilities etc. [17]. A research on strategic issues in knowledge management in small and medium enterprises was conducted for automotive component manufacturing SMEs [27]. The study found that, a well-developed and coordinated KM strategy and active top management participation are two of the key strategic issues in KM in the Indian context [27]. A geographical study was conducted by Mulimani et al. [1] to find out the problem of small scale industries of Goa. According to their studies, there is a lack of awareness about modern skills and technology [1]. This study also indicated as to how the geographical location affects SMEs, as there is lack of infrastructure in some areas [1].Choochote [14] investigated knowledge management processes of manufacturing SMEs’ in the automobile components in Pune. According to the findings, lack of IT infrastructure was identified as a major barrier. The study concluded that the understanding of SMEs about the knowledge management processes was the most influential factor.

The extant literature review indicates that most of research has so far been focused on the automotive sector leaving behind a variety of other sectors.

3.2 Barriers/Factors influencing KM, KS and Innovations

The following are the various types of studies conducted by academicians, scholars, practitioners and professionals. Research in the field of knowledge management started with the basic understanding about knowledge in the 1960s. Polanyi [22, 23] introduced the concept of tacit and explicit knowledge. Nonaka and Takeuchi [10] explored the creation of knowledge in organizations. After these pioneer contributions, the areas in knowledge sharing barriers were explored. Piatier [3] carried out research in the field of barriers to innovation in SMEs for the Commission of European Communities in 8 European countries. It was noted that the attitude of top manager to risk or employee resistance to innovation were the key barriers in the area of skills [3]. Bessant and Rush [11] have also addressed barriers to innovation, lack of technological expertise and lack of technological education in SMEs. Andersen and American Productivity & Quality Center (APQC) [5] have addressed that culture, technology and measurement influence the performance of knowledge management processes in his knowledge management model. Szulanski[8] analysed internal stickiness of knowledge transfer in eight companies. According to the analysis, the major barriers to internal knowledge transfer are recipient’s lack of absorptive capacity, causal ambiguity and an arduous relationship between the source and the recipient [8]. According to a study conducted by Bullinger et al.[9], lack of awareness and scarcity of time were reported as the most significant barriers to implement KM [20]. Weiss [19] found that trust, rewards and incentives affect knowledge sharing practices within organizations. Barson et al. [25] identified knowledge sharing barriers by working with industrial companies. Majority of the barriers were concerned with people issues such as internal resistance, trust, fear of exploitation and scepticism over thinking [25]. An extensive survey was done by Sveiby and Simons [29] of 1,180 staff members in the Australian Transport Union (ATU). They determined that the ATU culture was not conducive to knowledge sharing [29]. According to them, the on-going downsizing program (through voluntary retirement) creates problems such as inadequately maintained systems for documenting technical knowledge and poor access to training and skill development [29]. The findings of Riegewere strengthened by the survey of Sveiby and Simons [29]. Riege has expressed a total of thirty nine
barriers and classified these barriers into three types [4]. First is a set of seventeen individual barriers, second is a set of fourteen organizational barriers and eight technological barriers [4]. Lindsey [18] in the Encyclopaedia of knowledge management has listed one hundred and twenty four knowledge sharing barriers. Singh and Kant [20] have identified nine barriers to KM initiatives in the organization, out of which the lack of top management commitment was considered most important in their findings. The study of Joshi et.al. [30]about knowledge sharing in organizations found the lack of top management support as well as lack of understanding of KM as the two most important barriers out of 10 barriers, which they considered.

Almost all types of barriers have been expressed by eminent scholars and academicians in the field of knowledge management covering various implementation issues. These barriers still exist in different proportions. These barriers may be appearing in different areas like manufacturing, educational institutes, hospitals and forensic investigation etc. To overcome them, it is necessary to find out as to why these barriers exist and as to why their nature is different in different fields. It is also necessary to find out as to what has been practically done so far to overcome them.

4. Research objectives

Considering the need for research, the objectives for the proposed research are identified as:

1) To find out what are the driving factors of KM in Indian context.
2) To study relevant issues in KM in Indian manufacturing SMEs arising during the study.

4.1 Research methodology

To understand small firms, hypo-deductive approach is not a suitable research approach as it limits the generation of knowledge about their processes activities and outcomes [7,12,13]. The research approach adapted was qualitative in nature. A holistic approach has been considered to get a better perception about knowledge management in the Indian context. According to Stainback and Stainback [31], a holistic description of events, procedures, and philosophies occurring in natural settings is often needed to make accurate situational decisions. Interviews were informal in nature. Informal methods are a better fit for tacit knowledge [10]. All the interviews were open-ended allowing those experts to respond to them in their own words. This informality generated a high degree of trust for exploring more sensitive ideas.

Indian SME manufacturer’s directory was referred to find out different manufacturers in different domain areas. Interaction with 15 Manufacturing SMEs were made, out of which full response from 12 SMEs were obtained. Since it was a qualitative research, sample size was limited. Since the interviews conducted were informal in nature, minimum time and maximum time were in the range 45 minutes to 3 hours. Interviews were conducted in Mumbai, New Mumbai and Pune. Responses from organizations, which are in the industrial clusters and also which are not within the cluster were covered. Majority of the interviews were conducted in the industrial estates. Majority of the interviewees (12 in number) were CEO/owner or other departmental heads with a clear view and knowledge of manufacturing processes, products and customers. The interview schedule has included questions on various sections such as knowledge management practices, barriers and challenges ahead. In order to gain a deeper understanding, interaction was done with two senior manufacturing consultants one from Mumbai and another from Pune. Also interaction was done with 2 students pursuing their project in manufacturing SMEs at different locations in Mumbai. A talk show was also attended on National Skills and Development: Challenges and opportunities to get a better understanding about future issues in KM which was addressed by MD & CEO of the National Skill Development Corporation India (NSDC). All the interviews were noted and studied, thus allowing further detailed analysis.

We will first describe SMEs and then do the analysis. This exploratory study summarizes critical facts of KM in SMEs using insights gained from SME units. SMEs manufacturing different products, like cutting tools, printing equipment’s, heat exchangers, industrial explosives, custom designed vacuum system & components, hydraulic control systems, converting & printing machines, color & additive master bath, polymer compounds, seamless tubes, plastic injection and blow molds were surveyed. The names of SME units and interviewees have been anonymized for confidential reasons.
5. Description of case units

1. Manufacturer of cutting tools

This SME has been associated with the cutting tools industry, since its establishment in 1975. This SME manufactures and sells high quality saw blades, knives, cutters & tools for wood, plastic, non-ferrous metals, iron and steel, stone and construction industry. The manufacturing process is completely automated with state of the art plant & machinery and is supervised by highly skilled technicians. Every product manufactured is put through stringent quality control in order to ensure superior quality and product consistency, which are critical design features found in all the products. SME has won three prestigious industry awards. They have a wide marketing network as well as a technical team that renders quick and optimum solutions for any problems encountered by customers. Their ability to adapt to the changing needs of the industry is what keeps them ahead of their competitors. In-house R&D team is dedicated to finding intelligent solutions in order to further enhance product performance. Engineering has over 3000 satisfied customers. Products are also exported to various countries such as UK, USA, Saudi Arabia, Egypt, West Africa, Sri Lanka etc.

The managing director continuously upgraded his knowledge on manufacturing processes by attending international conferences and workshops on best practices in manufacturing processes in Germany, China and Italy and studied them in detail and implemented one by one in his organization. Forming team and assigning each of them some work apart from regular activities. Not only assigning them, but also helping them in performing that work. The managing director made use of online blogs and forums. There is daily in depth involvement with the workers, which makes knowledge sharing much faster and efficient. The managing director has also trained employees of a big company. The managing director got an assignment of designing a tool for the big company. But the big company demanded to follow their engineer’s procedure to design tool. The managing director suggested that it’s traditional method and by using that design procedure the tool will fail. But company insisted to follow their procedure and this SME followed the same procedure. While testing the tool failed. Then the approach suggested by the managing director was implemented and tool design was successful and tool worked properly after testing. Company then insisted that the managing director to train their team of engineers new design method. He trained them and finally changed their traditional mind set on tool design. Knowledge sharing attitude differs from person to person. Production workers feel that sharing knowledge may affect job security. This is the major concern reported by many SMEs. Production workers have limited job specific knowledge of particular machines. The same machines may not available with other SMEs. They have limited scope of changing job in similar industry. They make a mindset of not sharing knowledge with others and also resist adapting new techniques. This is the main reason, the organization structure gets disturbed. Many SMEs and senior manufacturing consultants have reported fear of sharing market secrets with others.

2. Manufacturer and Designer of printing equipment’s

This SME manufactures advanced technology multicolor presses for the decoration of disposable plastics containers. The containers are used for fast-moving consumer goods. The common applications include cups and glasses used in the storage. Containers for serving or dispensing of ice-cream & cold beverages, mineral water, fruit juices, and processed foods. The other uses include containers for detergent packaging and pails for packing paints. The presses are based on the dry offset process, which is a combination of the rotary letterpress and the conventional offset printing process. The dry offset process allows fast and accurate print reproduction on the container suited for large volume production runs. Presses are carefully designed and precisely manufactured to ensure not only excellent print results, but also many years of service life without the need of any major maintenance. The above presses are configured in various stages of automation for the feeding of containers into the press and the drying (curing) of printed containers. Many mix and match features and equipment options allow customers to configure the press suited best to customer needs.

Managing director has learned from the consultants each and everything that is necessary for their organization and then trained the same to the workers one by one according to each individual role. Cross functional training is
not being extensively implemented in this organization, causing delay in project when worker leaves the organization. Few years back the managing director served as a visiting lecturer to a regional diploma college but now due to busy schedule that interaction is discontinued. We observed that sub units were at remote locations and small, which caused hindrance in flow of knowledge.

3. Manufacturer of heater exchangers

This unit was established in Pune in the year 1993. After having a huge experience in the same field, with the help of technical experts they have achieved perfection in this field of thermal technology. This SME not only serve large scale industries in India, but also exports products to many other countries. SME is also having the ISO 9001:2000 certification in designing and fabrication of all types of heat exchangers. They design and manufacture chemical plant machineries / equipment’s in heat transfer units as heat exchangers (both, air cooled type of heat exchangers & water cooled type of heat exchangers), oil coolers, intercoolers, after coolers, intercooler and after coolers for centrifugal compressor. All types of radiators, all types of fin tubes like spiral ribbon wound fin tubes, wire wound finned tubes, helical tension wound fin tubes, integral fin tubes, crimped fin tubes, elliptical fin tubes, rectangular fin tubes, condensers, evaporators, cooling coils & condenser coils for air conditioners. SME is having very strong and technically sound management as well as skilled labors.

Manufacturer of this medium scale enterprise had a good knowledge base about lot many thermal related products. This knowledge was outcome of his huge experience and learning from a big industry which he used to start his own firm. Welding is managed in house but that doesn’t mean that welding knowledge is created within the floor shop is being managed. We observed a task based approach rather than skill based approach in this SME.

4. Polymer compound manufacturer

It is one of the leading color & additive master bath & polymer compound manufacturers in Asia. Incorporated in the late seventies, the company has been providing an advanced level of solutions to the plastic processing industry’s ever changing and challenging needs. They use the latest technologies in machinery, R&D, and materials coupled with a wealth of talent and experience to stay ahead. They have two manufacturing facilities and are the only one master batch manufacturer in Asia with the capability of manufacturing resin specific master batches for more than 30 different resins. There have more than thousand customers in more than forty different countries. They are approved vendors to multinational companies in the household products, electrical appliances, consumer products, construction and automotive OEM segments. It is an ISO 9001:2008 certified and professionally run organization. It is recognized by the government of India as a prestigious star export house.

The strength of any company lies in its people. As a constant effort to enhance the knowledge, skills and abilities of the staff, they frequently sponsor education and training programs. Group get-togethers and team building exercises ensure an environment that is highly productive, able and capable. They support the educational programs for their employees, which include Master of Business Administration (MBA), computer education, foreign languages and technical training on polymers and processing.

It is one of the knowledge intensive organizations among surveyed. Internal competitiveness within the business units was high and lack of social network was addressed as organizational issues by the project manager.

5. Safety fuses manufacturer

It is India's leading safety fuse manufacturers. The company in all has more than 100 employees. The company’s manufacturing plant is located in Maharashtra and manufactures safety fuse. The manufacturing unit is being spread across 100 acres of land. The company’s safety fuses are sold in India and seven other countries. They have in house R&D. SME is engaged in community and social initiatives on labor and environment standards in compliance with the principles of the global compact. It plays an active role in community development, serving rural communities adjacent to its manufacturing locations.

We observed a responsible behavior of this SME in terms of social corporate responsibility as compared to the other SMEs. Cross functional training was not given much priority.
6. Vacuum system and components manufacturer

This SME was founded in 1996. It is India's leading manufacturer of custom designed vacuum system and components. They work with customers' understanding, needs and budgetary constraints, designing systems to suit customer research and budget. Their mission is to maintain the quality improvement process continuous and to provide high technology, dependable products and services, which ensures long term customer satisfaction and loyalty, all at a reduced cost.

This firm is one of the knowledge intensive organizations with lot of knowledge about market orientation serving product to many developed and developing countries.

7. Hydraulic control systems manufacturer

This SME has been in the field of hydraulic control systems, hydraulic valves, pumps and cylinders, since 1992. The product range includes industrial oil coolers, relief modular valves, reducing modular valves, throttle modular valves, throttle with check modular valves, check modular valves, pilot operated modular valves, counter balance modular valves, pilot operated relief valves, solenoid controlled relief valves, pressure control valves, pressure reducing valves, gear pumps etc. They have a team of dedicated engineers and a highly skilled workforce. They have latest in-house machinery and infrastructure under one roof. They deal in a wide range of hydraulic equipment’s of different size and capacities according to customer’s request and also export products to meet demands the world over. The products are now being used in the industrial, construction, offshore, ground support equipment, machine tool presses, plastic and special purpose machines etc.

C.E.O. has expressed the concern of consultants not willing to share design knowledge. This is also one of the knowledge intensive SME were technical knowledge is very well contributed and managed by the involved family members.

8. Printing and converting machines manufacturer

This SME has a vast experience in manufacturing printing and converting machines for the flexible packaging materials, paper, film, foil and board. It is a multi-product engineering company specializing in the design, manufacture and support of world-class printing and converting solutions. Having, vast sales and technical experience in the industrial printing industry, they have made a range of unique products catering to wide challenges and requirements of their clients.

Internal competitiveness is high and difference in experience level of employees is high which affects knowledge sharing practices.

9. Switch gears manufacturer

This is one of the most innovative SMEs, which manufactures switch gears. They have achieved manufacturing excellence. They have expanded their business units because of huge domestic demand. Two students pursuing their master projects in this SME were contacted and interviewed. It was observed that knowledge sharing practices were at its best in the main manufacturing unit, where students were working on the floor shop. This knowledge intensive SME was a golden certified vendor of a big well known company. The students working with another location of the same SME experienced different working culture. It was observed that there is a difference in knowledge sharing practices of workers who are on payroll and contract basis. This shows that disparity between contractual and permanent positions of employees in manufacturing sector effect knowledge sharing practices. It was identified that when SME owner expanded their business units they are in need of qualified skilled person as key person for their particular unit. But such people due to attractive salary packages prefer big companies. SME owners then approached big company for retired person having knowledge of specific domain and huge experience as a consultant or employee. They mostly approach companies, where they supplied parts. In this way they manage to
run the company. If one retired person goes after some years then another comes in the company and this continues. In this way they bring knowledge from big company to their organization. Business runs properly but sharing the knowledge with the younger employees remains big challenge from the retired person. This is the glitch in the system which makes knowledge sharing circle incomplete needs to be removed as we owe our country to the younger generation.

10. Heat exchangers manufacturer

It is a small scale company which manufactures heat exchangers managed by two business partners. It is located at Andheri, Mumbai in the industrial premises. We observed a task based approach rather than skill based approach in this SME.

11. Seamless tubes

This company was promoted in 1977 by a group of technocrats to produce specialized seamless tubes in India. With a unique combination of Assel Mills and a PQF mill, it is one of the world largest and most diversified manufacturers of specialized seamless tubes. They produce both Hot-finished as well as Cold-finished seamless tubes ranging from an outside diameter of 6mm to 273mm. The tubes are used in a variety of applications such as the manufacture of auto-components, bearing races, OCTG products, drill rods, boilers, heat-exchangers, etc.

The company experienced some technical issues in manufacturing process after promoting the floor shop engineer in administration then bringing again the same person on floor shop. This has happened number of times. It indicated that manufacturing system being person oriented rather than process oriented.

12. Plastic Injection & Blow moulds manufacturer

This company is a manufacturer and exporter of Plastic Injection & Blow moulds for household and industrial use. It started off in 1970 with a small work force and resorted to conventional mould making methods. It is today, one of the leading mould makers in India with seven tool rooms in Mumbai and Thiruvananthapuram, Kerala. Equipped with state of the art designer hardware and CAD/CAM software they have catapulted into the future and thus grown with the needs of the customer. Moulds are used for household use, industrial use, furniture, poultry and garden.

The above description provides an overall idea about knowledge management in SMEs and their select issues. It also helps us to understand driving factors of knowledge management in Indian context.

6. Analysis

The facts revealed through the analysis of 12 manufacturing SMEs, interaction done with manufacturing consultants, students and talk show attended have helped to identify the potential factors affecting knowledge management in Indian manufacturing SMEs. In summary, select critical facts identified are summarized below:

[1] The small scale enterprises have not shown much interest in exploring the market knowledge related to their product.

[2] Fear of sharing business secrets with others was the most important barriers reported. It has to be decided as to what to share and what not to share. Confusion exists because people often confuse with business knowledge and technical knowledge which can be avoided by broadening the perspectives on knowledge by awareness programs. Majority of the OEMs insists SMEs to patent the products which they supply for specific application thereby keeping the knowledge protected.

[3] To create a working environment suitable for innovation requires proper alignment of knowledge management and contribution from involved family members, which still remains a challenge in Indian SMEs.

[4] Consultants play a very important role in SMEs. Their role varies depending upon need of the SMEs. Consultants take a technical interview with individual workers of different departments and identify their knowledge depth. Then they take interviews of concerned people who guide these workers asking technical questions and identify
how much they have been communicated and understood with the workers. Once this knowledge gap is identified then corrective plan of action is prepared for the concerned departments for the SMEs.

[5] Its more of individual barriers in Indian SMEs as compared to organizational barriers and technological barriers in the manufacturing SMEs surveyed.

[6] It was observed that there are hardly any KM certification institutes and KM training institutes in India. So there is urgent need for the same at the earliest as every production manager is essentially a knowledge worker and must how to implement and measure and improve knowledge management practices in his organization.

[7] There is very less use of cross-functional training and rotation programs which led to huge knowledge loss in SMEs. Loss to tacit knowledge created on shop floor and reinventing the wheel when a employee leaves a job.

[8] We observed one thing that KM is implemented in many big companies in different sectors and when such big companies when start new subsidiary they create KM culture and implement knowledge management at earlier stage in that SMEs.

[9] Language is seen as a barrier to communication as we see that there are more than 20 languages spoken in India which makes it difficult to develop effective social networking among employees.

[10] We could experience from our studies that quality of knowledge imparted to employees by some International companies in Indiasome 20 years back was so effective, which developed confidence among the employees and as a result many of the employees started their own SMEs.

The study concludes that the in depth study of market orientation which is one of the subset of knowledge management, learning from consultants, attending conferences/workshops outside India specific on particular topic and subtopic of manufacturing processes, use of online websites, blogs and interactive sessions with workers are the key driving factors of KM in knowledge intensive manufacturing SMEs. Knowledge management professionalism, lack of social network and industry academia interaction are seen at grass root level. The study also reveals that it’s more of individual barriers in Indian SMEs as compared to organizational barriers and technological barriers in the manufacturing SMEs surveyed.

7. Conclusion

The findings of this research work confirm the existence of driving factors as discussed in our studies in Indian context. These driving factors are varying in nature of output and their characteristics in different SMEs according to their objectives and expected outcomes. However the SMEs have not recognized the potential benefits of industry-academia, knowledge management professionalism and social network. These three factors need to be worked on in the Indian context. As this study employs multiple cases operating in India, the findings may not be generalized to SMEs from other countries and regions. This research paper will also serve as an eye opener for underdeveloped countries and SMEs in India.

The following recommendations are some of the managerial implications that can be derived from the results of the study:

[1] Investment in knowledge management out of business profit share needs rethinking.

[2] The top management must be aware of basics of KM and best practices, role of Chief Knowledge Officer (CKO) etc. For this they must go for Knowledge Management Certification (KMC). Train their employees from KM training center. If training centers are not there within the proximity they must opt from distance learning courses. Attending KM workshops will also lead to effective knowledge sharing practices.

[3] Managers need to learn about what attributes of knowledge influences product development processes and innovation in their respective fields.

[4] Frequent interactive sessions among individual employees and engineering students as well as different branches of same organization and different organization shall enhance skill and efficiency.
References


