Technological Flexibility in Micro Small and Medium Enterprises (MSMEs): A Case of Small Scale Engineering Industries of Gujarat

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Abstract: **- This paper focuses on the need of technological flexibility in Small Scale Industries (SSI) now known as Micro, Small and Medium Enterprises (MSMEs) sector in India. It is estimated that this sector has registered a steady growth in the production and generation of employment. However, to survive in the open and competitive economy like India, technological flexibility is must. It is observed that adoption and better utilization of latest technology helps in improving the production of MSME sector. However, due to inadequate financial support and shortage of skilled labour in the state, this sector is not able to change the technology very frequently as per the need of the market. Thus, there is a need to focus on improving investment in both technology and labour to improve quality of the product and to fulfill the need of the market. Better / improved working conditions, training and labour welfare schemes can help in improving labour employability and productivity, while technological up-gradation and innovation and availability of cheap credit/finance facilities can help in increasing production and efficient utilization of capital. However, it needs to be borne in mind that the use of capital should be such that it complements the labour.**

To collect the requisite information about the study, field survey and in-depth interviews with the owners of the small scale engineering industries were conducted. In all 60 employers were contacted at their workplace i.e. at the factory to know about trends in investment in technology in small scale engineering industries of Gujarat.

Key Words: Technological Flexibility, Economic Reforms, Labor.

I. INTRODUCTION

The Micro Small and Medium Enterprise (MSME) sector is widely regarded as the engine of growth in the industrial development of Indian economy. This sector contributes significantly to total output, employment generation and economic and regional development of the country. However, increasing competition and globalization, along with the need to produce quality products at low prices, have prompted the industry to introduce new product development methods with modern technology. To survive in the globalized market, small scale industries must concentrate on technically superior methods of production. Thus, technological flexibility is need of the hour for the growth and development of small scale industries.

Meaning of technological Flexibility

Technological flexibility is adjustment and adoption of technology according to change in the product demand. This helps the firm in producing quality product at lesser cost and higher output in given time frame by way of adopting latest technology.

Objective of the study

The objective of the study is to know the technological flexibility of small scale engineering industries of Gujarat.

Methodology

For gathering adequate information, pilot study was conducted and questionnaire was prepared after taking viewpoint of the employers. About 70 employers were contacted at the time of field visit. However, only 60 employers' questionnaire considered valid for the analysis. The rest were rejected due to inadequate information.

Definition of MSME

Recognizing the contribution and potential of the sector, the definitions and coverage of the Small Scale Industry (SSI) sector were broadened significantly under the Micro, Small and Medium Enterprises Development (MSMED) Act, 2006 which recognized the concept of "enterprise" to include both manufacturing and services sector besides, defining the medium enterprises.

The limit for investment in plant and machinery / equipment for manufacturing / service enterprises is as shown in table 1. The table shows that a large number of enterprises can be covered in the MSMEs category through this classification.

Table 1: Limit of Investment in Micro, Small & Medium Enterprises in India

Manufacturing Sector	
Enterprises	**Investment in plant & machinery**
Micro Enterprises	Does not exceed twenty five lakh rupees
Small Enterprises	More than twenty five lakh rupees but does not exceed five crore rupees
Medium Enterprises	More than five crore rupees but does not exceed ten crore rupees
Service Sector	
Enterprises	**Investment in equipment**
Micro Enterprises	Does not exceed ten lakh rupees:
Small Enterprises	More than ten lakh rupees but does not exceed two crore rupees
Medium Enterprises	More than two crore rupees but does not exceed five core rupees

Source: http://dcmsme.gov.in/ssiindia/defination_msme.html

II. TECHNOLOGY AND INNOVATION IN MSMEs

Technology plays a crucial role in maximizing business opportunities and in the development of Micro Small and Medium Enterprises (MSMEs). However, in most of the small enterprises old methods and outdated technology is used in production process. But today, the competition is fierce, unlike in the past, when buyers were simply looked forward to purchasing the best quality products at the lowest prices. In this scenario, technological innovation is important as it helps the enterprises to improve the quality of product and competitiveness through market orientation.

To what extent enterprises want to adopt technological innovation depends on various factors, for instance, objectives and strategy of an enterprise, its internal technological capability, competition in national and international market, demand conditions, market opportunities, finance facilities, location of the unit, availability of skilled labour, R and D facilities and its accessibility etc. Apart from all these factors it also depends on level of development of regions in terms of education and technological infrastructure. Thus, either internal or external factors or a combination of both determine whether an enterprise undertakes technological innovations or not. The major sources of innovation for small enterprises are self-efforts, competition and customer needs which helps in achieving the objective of enhancement of competitiveness through quality improvement, cost reduction and meeting market needs.

A study done by the University of Cambridge (1992, 1996) on SMEs in Britain brought out that a high proportion of SMEs across industries were engaged in product as well as process innovations though the emphasis was more on new product development. It was also found that most of the innovating enterprises had in-house technological expertise and had significant links with universities and higher educational institutes.

According to Human Development Report (HDR) 2001, technological innovation is an expression of human potential and higher level of education makes powerful contributions to technology creation and dissemination. Economists argue that technological progress plays a pivotal role in sustained long term economic growth. In this era of rapid technological advance, mastering new technology is a continuous process. Without continuous upgrading of skills, countries cannot stay competitive. Therefore, to use new technology firms must be able to learn and develop new skills with ease.

Ghobadian, Rekettye and Lin (1995) in their study on mechanical engineering industry in the UK, brought out the innovative behavior of small enterprises. They found that innovating enterprises had higher turnover, higher sales per employee and higher profit growth as compared to non-innovating enterprises.

Technology development in the small enterprise sector has been one of the major objectives of government policy in India after economic reforms, mainly since the early 1990s. However, the policy relies heavily on technology transfer rather than promoting in-house technology innovation. There is hardly any institution or policy incentive to facilitate R & D and technological innovation endeavors of small enterprises (Bala Subrahmanya et al 2002). Of course, there is an extensive institutional network ranging from national to regional and sub regional levels, which provides technological support and technical inputs, among others, to small enterprises in India (Bala Subrahmanya 1997).

Challenges and Barriers in Technology Adoption before Indian MSMEs

China is considered the world's manufacturing backyard, due to its low manufacturing and labour costs when compared to those in India. The arrival of low-cost products from China has made difficult for Indian manufacturers to compete solely on the price front. Indian MSME sector must adopt latest technology in order to survive against the tough competition from foreign market. After economic reforms, increased domestic and foreign competition encouraged domestic

manufacturers to improve efficiency and bring into use advanced technologies on a larger scale (Goldar & Kumari 1999). However, only big industries could able to adopt advanced technologies while for small enterprises it was difficult. According to the study by Chaudhuri, Pal and Saha, deregulation of foreign capital and technology agreements immediately confers to competitive advantage but many firms may not be able to succeed in getting foreign technology. And when they succeed, other entrants who have traditional technology may stay away. However, this effect is not very significant for Indian industries because foreign investors did not find the Indian industries more attractive after such deregulations were announced.

According to the study by Desai and Taneja (1990) about 40 percent of small enterprises got technology support from large enterprises/plant suppliers while from the remaining enterprises, majority of them developed technology on their own or imitated others. However, a comprehensive attempt to understand the R and D and technological innovations in the small enterprise sector was done only recently as there was hardly any literature available till recently, which threw light on the R and D and technological innovations of small enterprises in India (Bala Subrahmanya et al 2002).
Moreover, there are many more challenges that Indian MSMEs are facing. They are as follows.

1. *Lack of Information related to upcoming technology and market trends*

One of the factors limiting the growth of MSMEs is the lack of adequate and timely information. Once small enterprises start the business, they may be interested in knowing about the suppliers of specific machinery that suit their needs, depreciation and maintenance cost of that machinery, technical information and market trends for their products etc. This information is rarely available at the grassroots level. Further, most of the MSMEs work on the designs given to them by domestic or foreign buyers. Thus, there is very little innovation in design and development of new product in India. Therefore, such enterprises require a strong new product development base for which investment in R&D is must. Moreover, the technology used by Indian MSMEs is also obsolete and imitated. Majority of the enterprises use second hand machines instead of new machines because new machines are very costly and there is lack of highly skilled manpower that can operate the machines efficiently. This has a direct implication on the profit margins, and a dip in productivity levels.

2. *Lack of skilled manpower and motivation*

When technology is changing, enterprises have to invest in worker training to remain competitive. There is requirement for high quality skills at all levels to attract high value-added activities and improvements in technology, profit and productivity. Therefore, employers must ensure that the skills of employees are appropriate to the technology adopted by the enterprise and production of goods.

It is also necessary to motivate them to be more productive by instituting awards and by acknowledging their efforts openly. The productivity of manpower can be improved by increasing investing in technology, training facilities, payment of high wages, employee's involvement in decision making, appreciation, rewards etc. These factors also have an impact on improving output, productivity and profit of small scale enterprises.

3. *Lack of proper Infrastructure development*

In the developing country like India, the quality of the infrastructure affects the growth prospects of MSMEs to a great extent. About 65 percent of the population lives in villages and about 45 percent MSMEs are located in rural areas (4th All India Census, MSME). However, many rural areas still suffer from deplorable state of basic infrastructure like transport, telecommunications and electricity. Due to these reasons, the integration of rural industries with mainstream industries is proving to be difficult. Also technological flexibility of rural industries is poor due to infrastructure bottlenecks. This, in fact, has been identified as a key deterrent to the growth of MSME clusters in rural areas.

4. *Lack of Technological Flexibility*

It is observed that larger the disembodied technology imported to the industry, the higher would be the productivity growth of that industry. However, high cost of technology, lack of finance facilities, poor infrastructure facilities and high maintenance cost of machinery further deters small firms from investing and adopting changes in the technology and hinders the growth of the MSMEs. Further, the use of traditional tools and old techniques in some of the product lines are additional reasons for the stunted growth of MSMEs. Although, innovative methods have been developed to increase productivity, they have not been used to a large extent, resulting in no substantial effect on the output. Thus, low technological flexibility is one of the important factors behind slow growth of Indian enterprises as compared to enterprises of developed countries.

According to the report on 'Technological Up gradation for Enterprise in Unorganized Sector', the most formidable problem faced by the SMEs in India has been in accessing technology and maintaining competitiveness. As per the report, the most important barrier in the adoption of improved technology is the lack of financial resources to the unit. In several instances, the cost of technology makes it difficult to be adopted. A large number of SSI units reported difficulty in obtaining sufficient funds from banks and financial

institutions. There was also the lack of awareness about the credit guarantee scheme. Other barriers observed are lack of awareness and information about the availability of requisite technology, desire to avoid risk of adoption of improved technology, low level of indigenous R&D, isolation from technology hubs, inadequate management skills and non-availability of technically qualified persons to operate the new technology.

The Way Forward

The small industries primarily need knowledge and access to latest technology, adequate financial aid, high level of R&D and adaptability to changing trends. With the increasing competition, globalization and the uncertainty due to the global recession, MSMEs will have to continuously incorporate the latest technology into their production processes as well as in their marketing and management functions, to cut costs, gain efficiency and consistency. However, the employers are able to do so when their workers are better educated to start with, since that lowers the cost of acquiring skills. Studies suggest that enterprise based training yields higher private returns than the post school training in both developing and industrial countries. Thus, there is a strong need to remove constraints to the adoption of new technologies which impede the productivity and growth of MSMEs.

III. EMPIRICAL ANALYSIS

The firms in the sample survey were small scale engineering industries of Gujarat employing less than ten employees. All these industries were exempted from the implementation of 'Factory Act' as less than ten workers are working in it. Most of the firms depended on their own fund for expansion as well as investment in technology was concerned. The average percentage share of investment in technology in total investment was 22.83 percent. Underutilization of capacity due to shortage of workers was common problem of all these firms.

Problems of Small Scale Engineering Industries of Gujarat

It is generally recognized that the healthy growth of SSI depends on the availability of raw materials, skilled manpower, cheap electricity, technical advancements, organized marketing of products, government's support and incentives and timely information regarding product up gradation. An efficient and sincere manpower is a key resource for any industry to flourish. If the manpower in the industry is motivated and efficient, a loss making organization can be converted into profit making organization.

Small enterprises in Gujarat state are presently handicapped in terms of availability of workers both skilled and unskilled. There is a shortage of trained and experienced technical personnel. Not only that there is high level of insincerity and absenteeism seen among the workers. Further, there is high labour turnover in these industries and despite high labour supply very few workers are willingness to work in these industries. Moreover, those who are working, they don't want to do overtime. Due to these problems the production suffers. The employers have to literally beg before them and also have to offer even higher compensation i.e. much above the minimum wage, so as to finish the work in time. To tackle such issues and to remove major bottlenecks in the process of production in such industries, labour reforms are required.

Another problem related to employees is high level of drop out. Due to this, lots of time is wasted in order to train the new employees. In the whole process, production suffers as the labour productivity is very low in the initial period of time when employee joins the organization.

Generally, performance and skills can be improved by payment of high wages, commitment, involvement and training which ultimately help firms in realizing their goals without increasing labour costs. There is also need to improve quality of work along with increase in cooperation and sincerity level. If the small scale sector wants to progress rapidly, efforts should be made in making labour more efficient by improving the infrastructure, by adopting appropriate technology and by giving them more incentives.

Appropriate technology is a dynamic process that must change with the change in the country's technological skills. Appropriate technology means the one which needs local raw material, utilize available skills and cater to the local demand. The level of technology in the small scale industries is backward or conventional compared to large scale enterprises. In most of the small scale industries the machines were second hand which required constant attention and maintenance which increases the cost and also hampers the development of the enterprise.

IV. RESULTS AND FINDINGS FROM A SURVEY

In pursuance with the objective, the researcher has tried to find out technological flexibility of small scale engineering industries of Gujarat. On the basis of the questionnaire, a small sample survey was conducted to know the taste and preferences of employers about investment in technology and its importance in small scale engineering industries of Gujarat. About 60 employers of small scale engineering industries were contacted before coming to conclusion

1. Taste and Preferences of Employers About Technology

1.1 Do you have latest technology?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	52	86.7	86.7	86.7
	No	8	13.3	13.3	100.0
	Total	60	100.0	100.0	

86.7 percent employers were of the opinion that they have latest technology. They also said that they further want to invest in technology but getting labour that is well acquainted with technology is difficult therefore it is useless to invest more as it will lead to under utilization of capacity and wastage of resources on the part of employers. Firms want labour that has knowledge about the technology and can operate the machines efficiently. It is up to the technical institute to fulfill the demand of the industries. The institutes should give more emphasis on capacity building and training the students who are going to be absorbed in industries in near future.

1.2 What kind of technology do you prefer?

Normally, in small scale engineering industries, workers work on traditional lathe machines. However, over a period of time technological up-gradation is seen. Imported technology and CNC machines are installed in some of the industries. When asked about their preference for technology, 81.7 percent employers preferred CNC machines and 51.7 percent employers preferred imported new machines.

	Yes		No		NA/NR	
	Count	%	Count	%	Count	%
Technology - Traditional	3	5.0%	56	93.3%	1	1.7%
Technology - Computer Numeric Controlled (CNC)	49	81.7%	10	16.7%	1	1.7%
Technology - Imported Second hand machine	20	33.3%	39	65.0%	1	1.7%
Technology - Imported new machine	31	51.7%	28	46.7%	1	1.7%

Thus, among all types of technology Computer Numeric Controlled (CNC) is most preferred. This shows that the demand of laborer who can operate CNC machines will increase in future. Imported second hand machines are also in demand as new machines are very costly, investing in the new machines is out of the reach of small entrepreneurs.

1.3 Type of technology up gradation is required to increase production.

To increase production, automation in technology and use of software is important. Thus, 98.3 percent employers were in the favor of automation.

	Yes		No	
	Count	%	Count	%
Automation	59	98.3%	1	1.7%
Material handling equipments	15	25.0%	45	75.0%
Use of software	41	68.3%	19	31.7%
Any other	3	5.0%	57	95.0%

2. Share of Investment in Technology and Sources Information about New Technology

2.1 Are you in favor of investment in technology?

Employers were keen on investing in technology as it helped them in improving quality of product and reducing the cost of production in the long run. Thus, by investing in the technology they can survive in the competitive market. 98.3 percent employers were in the favor of investment in technology. Case studies reveal that traditional industries have suffered in recent years due to change in demand, preferences and designs and the failure of these industries in changing themselves to the changed requirement. Thus, technology plays an important role in the growth of the enterprise.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	59	98.3	98.3	98.3
	No	1	1.7	1.7	100.0
	Total	60	100.0	100.0	

2.2 Share of investment in technology in total investment

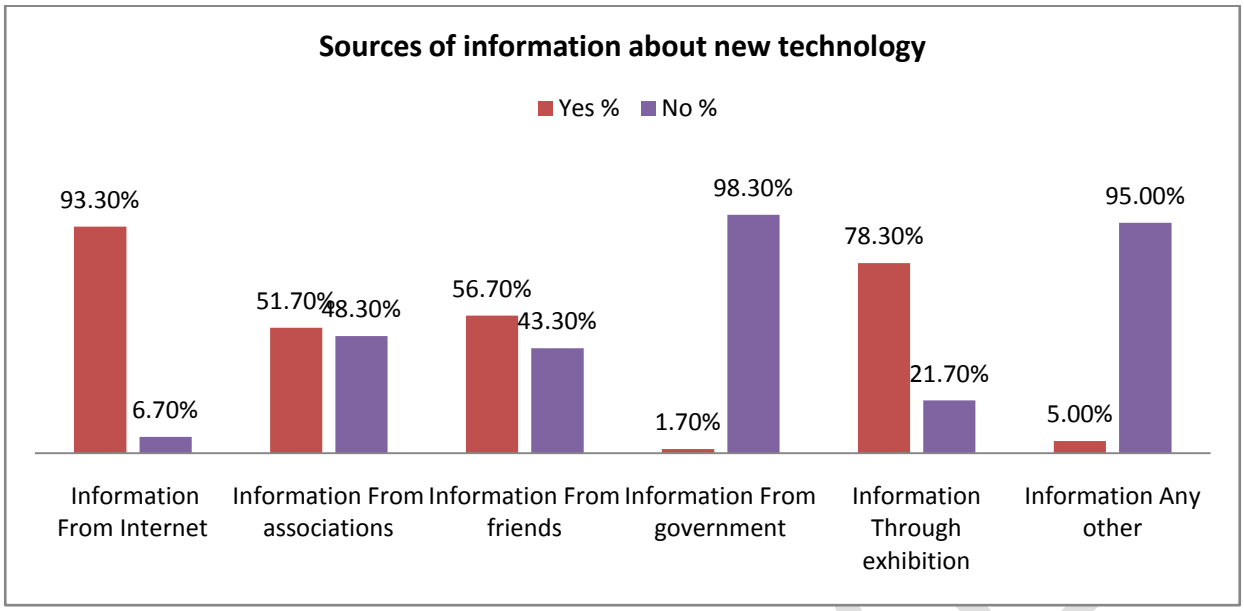
The share of investment in technology in total investment varies from 5 percent to 70 percent in the SSIs selected for the study. The average share of investment in technology in total investment was 23 percent. Employers wish to invest more in latest technology but higher depreciation cost of the machinery and shortage of skilled manpower stops them from further investment. Ultimately, these factors lead to increase in the cost of production.

All the employers are well aware about the latest technology. Getting information about new technology was also very easy for them. For 88 percent employers, it is easy to get information about the new technology. Internet was on the top as far as getting information about new technology is concerned.

2.3 Sources of getting information about new technology

	Yes		No	
	Count	%	Count	%
Information From Internet	56	93.3%	4	6.7%
Information From associations	31	51.7%	29	48.3%
Information From friends	34	56.7%	26	43.3%
Information From government	1	1.7%	59	98.3%
Information Through exhibition	47	78.3%	13	21.7%
Information Any other	3	5.0%	57	95.0%

The best source getting information is internet and exhibition as 93.3 percent employers used to get information from internet. Friends and associations also contribute towards this. However, the role of government is very meager. In fact, employers don't rely on government to gather such type of information. Organizing technology mela/fair also helps them in gathering information about technology. For many employers technology strength is derived essentially from the processes of knowledge sharing (with clients and suppliers) and knowledge flows that take place in the areas where they are located.



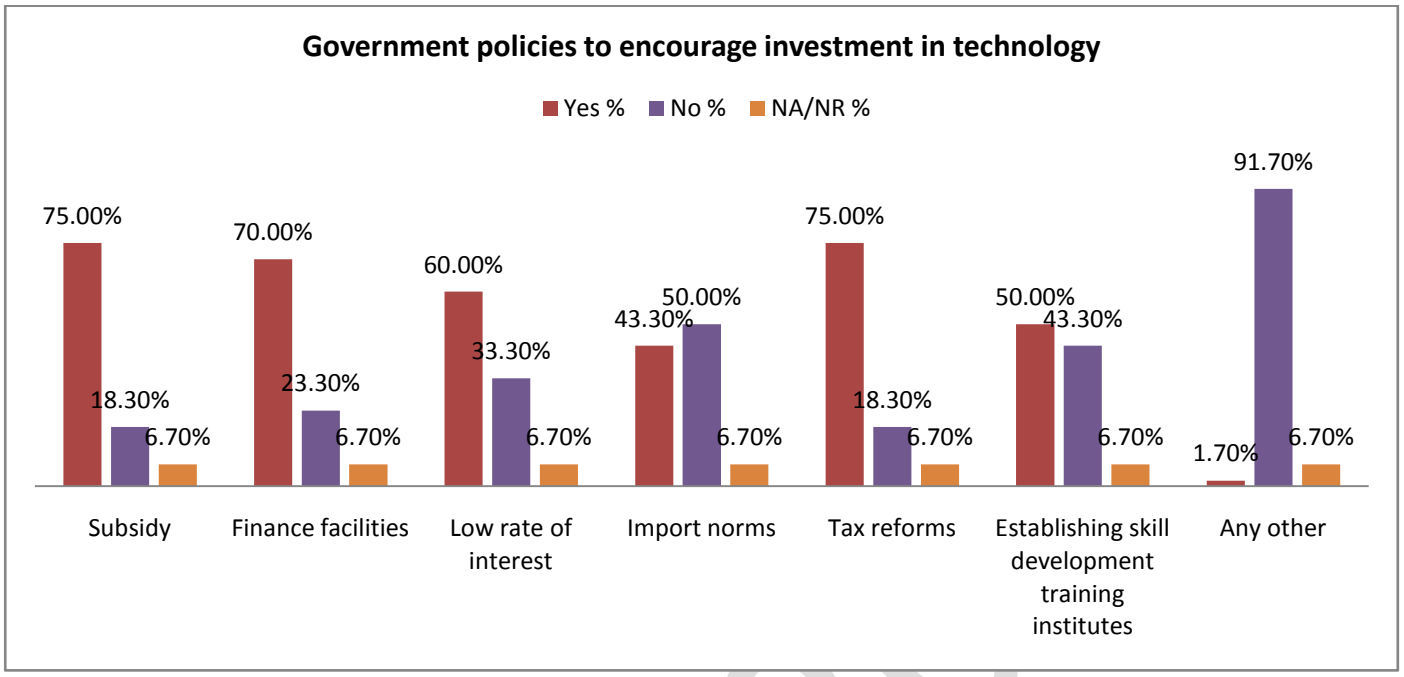
3. Supporting Background to Promote Investment in Technology

3.1 What kind of government policies encourages investment in technology in SSI?

Government policies like subsidy, tax reforms and finance facilities plays very important role in encouraging investment in technology in SSI. Also law rate of interest, establishing skill development training institutes and relaxation in import norms helps in encouraging investment in technology.

	Yes		No		NA/NR	
	Count	%	Count	%	Count	%
Subsidy	45	75.0%	11	18.3%	4	6.7%
Finance facilities	42	70.0%	14	23.3%	4	6.7%
Low rate of interest	36	60.0%	20	33.3%	4	6.7%
Import norms	26	43.3%	30	50.0%	4	6.7%
Tax reforms	45	75.0%	11	18.3%	4	6.7%
Establishing skill development training institutes	30	50.0%	26	43.3%	4	6.7%
Any other	1	1.7%	55	91.7%	4	6.7%

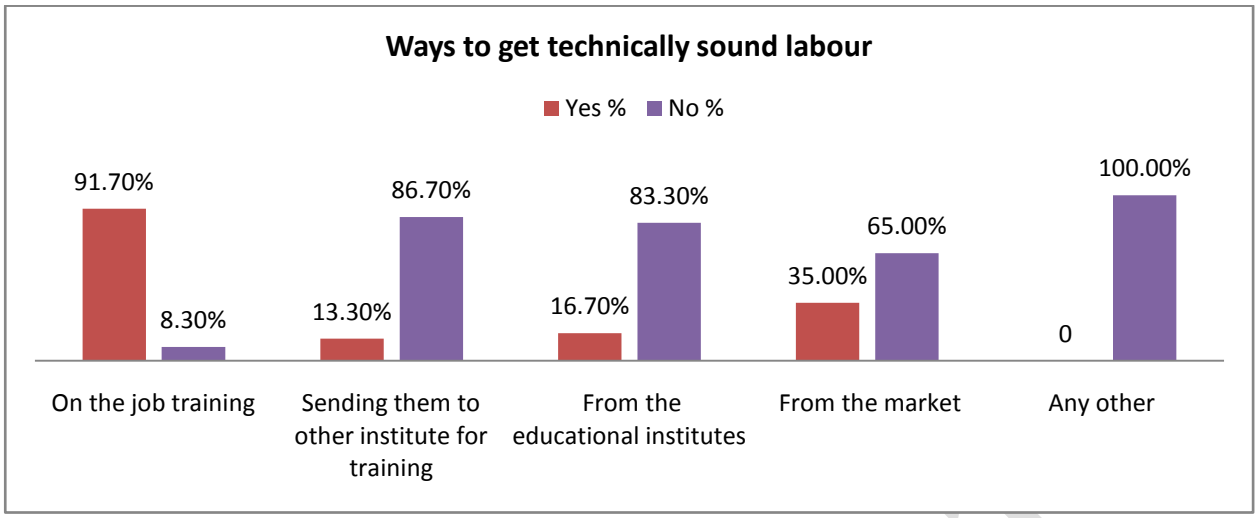
75 percent employers believed that government subsidy and tax reforms encourage investment in technology. 70 percent opined that increase in finance facilities also helps employers to invest in technology. Only 50 percent employers believed that establishing skill development training institutes encourages investment in technology.



3.2 How to get skilled labour that is well acquainted about new technology?

Skilled laborers who are aware about new technology are not available on demand. The employers have to give training to them. 92 percent employers said that when the laborers join the firm they did not know how to operate machines. Therefore, they give them on-the-job training when they join the firm. Thus, newly joined laborers learn from the senior laborer at the workplace. Employers didn't prefer to send them to other institute for training because after being trained there they changed the firm swiftly, consequently employers' time and money got wasted by sending them to other institutes for training. Educational institutes play very minute role in case of preparing the skilled labour which is directly absorbed in the industry. The following table gives an idea about how employers get skilled labour.

	Yes		No	
	Count	%	Count	%
Technology labour -On the job training	55	91.7%	5	8.3%
Technology labour - Sending them to other institute for training	8	13.3%	52	86.7%
Technology labour - From the educational institutes	10	16.7%	50	83.3%
Technology labour - From the market	21	35.0%	39	65.0%
Technology labour - Any			60	100.0%



4. Technology Vs Labour

4.1 Do you think that technology has substituted labour?

Adoption or the use of technology is not the better option to tackle the problem of labour shortage in the small industries. Because 80 percent employers were of the opinion that technology has not substituted labour. Firm cannot operate just on the basis of machines. It needs efficient laborers to handle machines and production both.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	12	20.0	20.0	20.0
	No	48	80.0	80.0	100.0
	Total	60	100.0	100.0	

4.2 Are wages related to technology?

There is positive relationship between wages and technology meaning that higher the investment in technology higher will be the wage rate. This is also because of the fact that the firms which invest more in technology need to employ qualified, trained and skilled manpower. Therefore, wages paid to such laborer tend to be higher than the unskilled laborer. In the survey, 95 percent employers replied positively for the above question. Only 5 percent employers said that wages have nothing to do with technology.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	95.0	95.0	95.0
	No	3	5.0	5.0	100.0
	Total	60	100.0	100.0	

Hence, in the modernized or technology oriented firms employers' were willing to pay higher wages as contrasted to non-modernized firms. This is because in the non-modernized firms, skills are not specific but rather are generic to the industry.

Thus, most of the employers of small scale engineering industries of Gujarat are in favor of adopting new technology because to survive in this competitive world it is must. Moreover, most of the firms felt that adoption of technology has helped in improving quality of product and in reducing cost of production or to improve price/performance ratio. The objective was to give new or modified products to the customers as per their demand. To promote and attract employers towards investment in technology, improvement in the infrastructure is need of the hour. Apart from that improvement in finance facilities along with tax reforms and labour market reforms will facilitate growth of SSIs. To attract laborers towards small industries, favorable working conditions and further improvement in wages is required.

Thus, India can grow faster if newer technology is adopted by small industries. continuous improvement of processes with participation of workers sharpens and upgrades their skills. As several international studies have shown, including a recent study in India by the Planning Commission, there is a "win-win" situation for both employers and employees when there is continuity of employment, with employees considered as an asset on the balance sheets of enterprises, rather than mere costs on the profit-and-loss account to be quickly hired and fired.

CONCLUSION

It is perceived that the future role of SSIs will be based on technology, productivity and competition. Therefore, efforts should be made to strengthen the SSIs by making them technologically flexible and also by way of diversification of production. This will help SSIs to achieve competitiveness and to remain competitive in order to survive before the multinational companies in terms of attracting technology, investment, goods and services. In this context, MSMEs in Gujarat need a strong government support and the supply of other inputs as well, particularly, improved credit/finance facilities, cheap raw material, incubation centers to promote innovation in technology and skill development institutes to promote supply of skilled work force which will shape the future of SSIs. The country must have policy on 'Technological Up-gradation For Small Industries' because it has become more pronounced in view of implementation of World Trade Organization (WTO) conditions.

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