

DIAGNOSTIC STUDY REPORT-BRASS PARTS CLUSTER AT JAMNAGAR

The Diagnostic Study Report of the brassparts cluster in Jamnagar is presented in the following section. The report is based on interaction and deliberation with the key SME actors in the cluster, the entrepreneurs with which the key SME actors do businesses, SME associations and national institutions. The secondary information was collected from various sources like books, articles, report, statistics collected from various libraries, documentation centres, association office, etc. Informal interviews were also conducted with some enlightened and experienced entrepreneurs who have a very long stint in this brassparts manufacturing business and expert scientists in the country's premier research laboratories and institutions.

The report is organised in the following fashion :

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1. Description of the Cluster

The origin of brass and bell metal industry can be attributed to the Mughal period. During the rule of Mughal Emperor Shahjehan, it is said Mughal Subedar Rustam Khan brought with his army one blacksmith who initiated the brass and bell metal work. The British Government encouraged this craft through organising exhibitions in London & Melbourne. Similar other exhibitions were also organised at Simla, Calcutta & Jaipur. All these initiatives popularised the brass artware in India and abroad. Although many crafts declined in artistic importance throughout the British period, but a few like gold and silverware, cotton and silk fabric, brass and copperware still retained their commercial importance. In the year 1980 with the initiation of British Government, a big exhibition of brass metal products were organised in the Webley. This also resulted in increasing the popularity of brass metal products.

1.1.1 Defining the Product

Charting out subtle differences:

In India the brass metal industry are located in three states namely Gujarat, Haryana, Orissa, Assam and Uttar Pradesh. But there is a subtle difference between the products manufactured in these three states. The products manufactured in Haryana, Orissa, Assam & Uttar Pradesh are mostly brass metal handicrafts and utility items made out of sheet metal components or single piece casting whereas in Gujarat it is mostly brass machined components. From the point of view of its application or usage pattern, the products manufactured in Uttar Pradesh, Orissa, Assam & Haryana are consumer products and are used as gift, utility or decorative items. Whereas the products manufactured in Gujarat can be classified as industrial product and consumed by industries as a part/ component of their final product. Unlike the above four states, the brass part product in Gujarat requires a lot of machining activities like turning, milling, grinding, drawing, boring, threading etc.

Broad product grouping :

In Gujarat, the brass part industry is mainly concentrated in Jamnagar district of Saurashtra. Jamnagar is one of the largest manufacturers of brass parts and 70% of the machined brass components of this country are produced here. The product manufactured in Jamnagar can be classified under the following categories;

- **Building hardware** like door & window hinges, stoppers, knobs, studs, handles
- **Sanitary & bathroom fittings** like Ventian blends, hangers, tap, curtain fittings

- **Electronic & Electrical accessories** like socket pin, battery terminal, switches, tester, cable glands, computer sockets
- **Automobile & cycle tube valves**, industrial control valves
- **Agricultural implements** like tractor accessories
- **Brass jewellery** and buttons like necklace, ear rings, bracelet, rings, bangles
- Various **precision machine components** as per customers specification

Though the exact number of products manufactured in Jamnagar cluster is not known, an article published by Jamnagar Factory Owners' Association indicates that about 10,000 variety of brass parts are manufactured in this city. The products in terms of its weight ranges from 1 gm. to 10 kg. and in terms of its length and diameter it varies from .05 mm. to 60 cm. It is estimated that 280 to 300 mts. of brass scrap is recycled everyday. As mentioned earlier, the brass parts manufactured in this cluster are mostly machined components and not sheet metal parts. Barring a few like building hardware and sanitary and bathroom fittings, the other products are supplied as ancillary items to large industries.

Global presence :

The brass parts manufactured in Jamnagar finds its place in the overseas market as well. Jamnagar is one of the largest automobile and cycle tube valve manufacturers in the world. Because of its precision and quality, these tube valves are exported in European and North American markets. The products are marketed through various marketing channels to countries like U.K., USA, Canada, Middle East, Europe, Africa, Sri Lanka, Pakistan, Indonesia, Malaysia, Singapore, Japan, Bangladesh, etc.

The Genesis of Development :

The development of brass parts industry in Jamnagar dates back to the year 1952. The pioneer was M/s Osam Industries, 59, Digvijay Plot, Jamnagar. During those days, it was manufacturing brass screws, pins and electrical ball holders. With the passage of time, some more units joined the business and in the year 1954-55, there were 15 enterprises manufacturing brass parts in Jamnagar. Electrical ball holders manufactured by Shri Babubhai Chinoy was of very good quality which had a composition of machined parts and sheet metal parts. This electrical bulb holders, pins and screws were widely accepted in Calcutta, Delhi & Mumbai markets. The process of manufacturing pins & screws were initially developed by him.

The Clustering Phenomena:

The gradual development and improvement in brass parts making machinery, tools, jigs, fixtures, die, has contributed to growth of the cluster. There were some expert technicians like Shri Hirji Mistry who was capable of developing new machines and modifying the existing ones. Jamnagar is well known **for customisation of machines** available in the market. Depending on the nature of the job, its configuration and its precisionability the technicians were able to make desired changes/ modification in the existing machines. This provided flexibility in the process of manufacturing, which is considered to be one of the most important factors for the growth of brass parts cluster at Jamnagar. Moreover, they were able to copy machines, which were imported, resulting in substantial cost saving. *(There is a saying in Jamnagar that import any machine and give it to the experienced technicians they will be able to replicate the same machine at a much lower cost.)*

So far **availability of raw material** is concerned, brass scraps and utensils brought from all over India were used for making these parts. The easy availability of raw material also contributed for the emergence and growth of the cluster. Moreover, there was enough **potential market** for these parts manufactured in Jamnagar. During the early years, electrical pins, holders, cycle tube valves were marketed in Calcutta, Mumbai, Ludhiana and Delhi. It was the time when buyers from all over the country were eager to get brass parts from Jamnagar and they were ready to make book orders may making advance payment.

Another factor, which has provided the right impetus, is the **decrease in import of bicycle tube** valve. In the early 1960s, the bicycle manufacturers within the country reduced their import substantially and started procuring it from the domestic market. This has resulted in increase in number of manufacturers making bicycle tube valve. In the year 1960, there were 250 brass parts manufacturing enterprises in Jamnagar compared to 15 in the year 1954. This has further increased to 700 units in 1967-68. Moreover, in the late 70s, the leading cycle tube valve manufacturing countries like Germany, Italy, USA, Japan did **change their product line** from tube valve to precision components. They were interested in making high value products instead of low value ones. They started concentrating more and more on premium product line to get higher value for their product and greater return on their investment. This factor opened a new avenue for the manufacturers at Jamnagar. They even started exporting the cycle tube valves to these developed countries during late 70s and early 80s.

Other factors which are equally important is **easy availability of the labour & low labour cost**. Skilled manpower was easily available within the city and because of higher payment more and more agricultural labourers and marginal farmers started learning the skills of making brass parts. Some of the salt workers were also shifted their occupation because of higher wage payment. Due to low labour cost, getting brass parts manufactured became cheaper for the large industries compared to imports of these parts.

In the year 1976, Gujarat Industrial Development Corporation (GIDC) felt the importance of this cluster and **established GIDC industrial estate** in Shankar Tekri. Basic infrastructure like electricity, road, water was easily available in these industrial estates. This provided tremendous impetus for the clustering phenomena and within a span of three years the total number of brass parts manufacturing enterprises increased to 1500 by 1980. The number grew to 3000 units in 1988 and 4500 in 1998. **Establishment of ports** in Bedi and Rosi bandar and the **strategic location** of Jamnagar (the Arabian sea) also contributed for the growth of the csector.

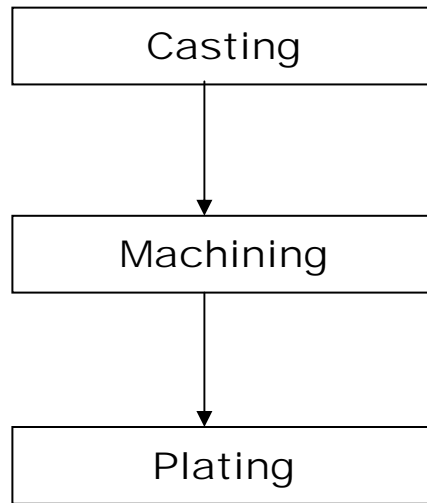
Another factor which also has considerable importance on the evolution of this cluster is **flexible specialisation**. Because of small scale of operation and sub contracting relationship entrepreneurs were able to manufacture wide range of brass parts having different shapes, sizes, configuration and tolerances. Even they were able to execute small orders (e.g. 50 pieces of a particular type of electrical conductor). Whenever they did not have the in-house facility of manufacturing certain precision items, they could execute the order by getting it done by other manufacturers. This has resulted in flexible operating practices and entrepreneurs specialising in their own field.

The following table shows the illustrative growth of brass parts industries in Jamnagar

Sr. No.	Year	No. of units
1.	1952	1
2.	1954-55	15
3.	1960-61	250
4.	1967-68	700
5.	1979-80	1500
6.	1988	3000
7.	1994	3500
8.	1998	4500
9.	2002	4000

1.1.2 Defining the various sub activities:

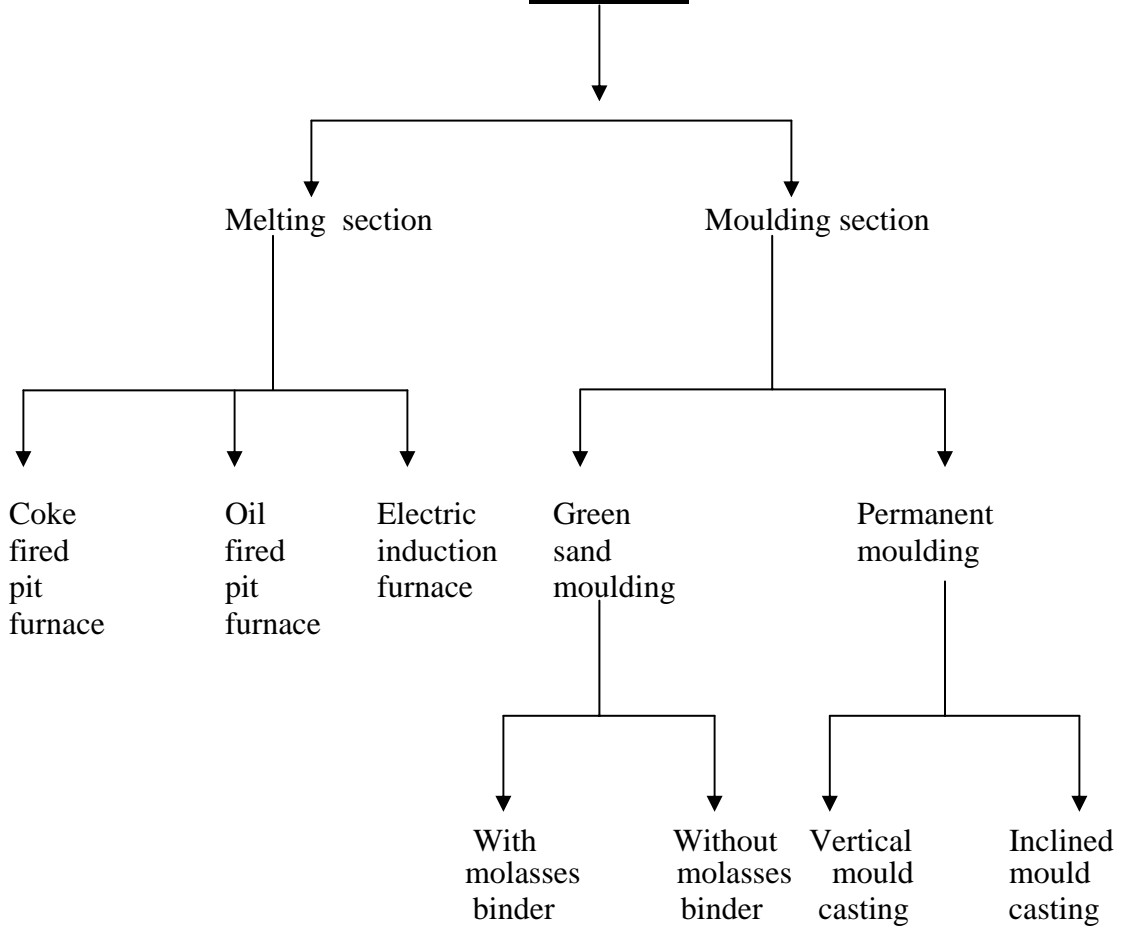
The process of manufacturing brass parts is comprised of three main operation;: Casting, Machining & Plating. The following chart depicts the process of manufacturing:



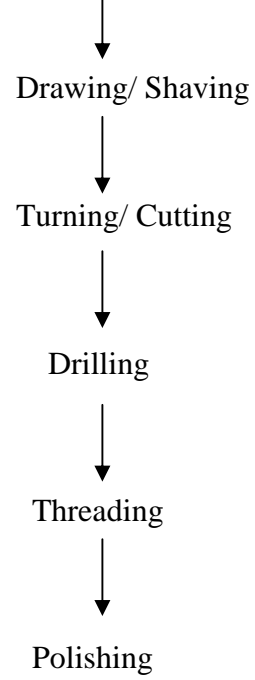
(Fig. : Brief Process Chart)

The brass scrap is melted at 1600 °C in the foundry. The same is poured in a mould to get the final casting. The casted material, mostly brass rod/ wire is then goes through various machining operation like drawing, cutting, milling, drilling, threading, burnishing, etc. The machining process is job-specific and varies from one product to another. Moreover, manufacturing some of the products (like cycle tube valve) requires very precision machining operation. The machined component, parts is then sent to plating shop for electroplating. Some of the plating operation done in Jamnagar are : nickel plating, zinc plating, copper plating, cadmium plating, silver plating, cobalt plating, gold plating, etc. The plating is done as per the requirements of the customers and application of the parts in the final product. For example, to get superior conductivity electrical parts are generally copper or silver plated. The various operating process is delineated in the following graph :

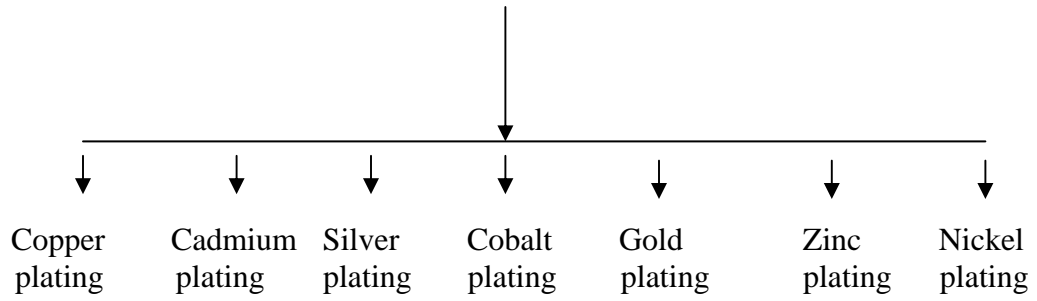
FOUNDRY



MACHINING



PLATING



1.1.3 Current Output

Since inception the number of enterprises involved in brassparts manufacturing kept on increasing till 1998. At present, there are 4000 brass parts manufacturing units along with 130 electroplating and metal finishing units and about 400 brass foundries. These foundries are catering to the needs of raw material supply for the above mentioned enterprises. Out of 400 brass foundries, 20-25 are oil fired and rest are all coke fired. It is estimated that around 280-300 MTS of brass scrap is recycled everyday.

So far output is concerned the value of products manufactured from this cluster is 300 crores per annum. Out of this, 30 crore worth of brass parts are exported and the rest are consumed in the domestic market. The product wise contribution of the output is as follows :

- Automobile and Cycle tube valves 35%
- Building hardware 25%
- Sanitary and bathroom fittings 15%
- Precision components 5%
- Other categories 20%

70% of machined brass components of the country is manufactured in Jamnagar. It was one of the largest cycle and automobile tube valve manufacturing clusters in the world (two years back). This tube valve is exported to almost all the developed countries and also in the developing and under developed countries. Most of the cycle manufacturers (like M/S Hero Cycle) and automobile manufacturers in the country, source tube valve from Jamnagar. Building hardware and automobile and cycle tube valves contributes 60% of the products manufactured in the cluster.

The cluster generates enough revenue for the central and state Govt. Moreover 50,000 workers are getting employment in this sector. The average employment in an unit is 9.

1.2 Geographical Location

The process of emergence of brass parts cluster in Jamnagar was spontaneous and not induced. A few pioneering entrepreneurs started manufacturing screws, pins and bulb holder. As their enterprises grew in volume and operation, others also followed. Though there is no apparent reason “why industry grew in Jamnagar and not in other parts of the states/ country?”, but the following

factors played an important role in fostering the growth of the brass part industry at Jamnagar.

Availability of raw material

Raw material used in brass parts are brass honey, dross of brass, pales in the form of strips and other scrap. This raw material became easily available in and around Jamnagar at a reasonable price. As the industry grew the process of procuring raw material, from within the country and abroad became more and more smooth. Other inputs like coke, molasses and machines were also available locally.

Skilled manpower and customised machines

Skilled technicians and workers were also easily available in this cluster. Because of low level of agricultural development (mainly due to scarcity of water) and non-availability of alternative occupation, people started learning the skills of manufacturing brass parts and operating the machines. The cost of employing a labour was also minimal. Moreover, duplicate, secondhand & customized machines were available at reasonable price.

Existence of well developed ports

Jamnagar has a pretty long coastline and the ports developed by Gujarat Maritime Board (GMB) were well developed. GMB has developed two ports viz., Rosi Bandar & Bedi Bandar. These ports had facilities of doing loading and unloading business in the ship. These ports have really contributed in flourishing the export-import business not only for brass parts manufacturing enterprises but also for enterprises involved in manufacturing chemical, fertilizer, textile and salt. Moreover the **strategic location of Jamnagar** made export-import business easier.

Flexible specialisation

There are about 10,000 varieties of brass parts manufactured in Jamnagar. The entrepreneurs were able to make wide range of parts having different configuration, dimensions and tolerances. Even the machines are customised locally and made available in the market at reasonable prices. Disintegrated firms and **subcontracting arrangement** made the manufacturing more flexible and specialised. Even when the buyers placed orders of 200000 pieces of a particular size cycle tube valve and 25/30 pieces of other sizes cycle tube valves, the manufacturers were able to execute the same.

The Soil Base

Though there is no apparent technical reason to support their claim, the entrepreneurs at Jamnagar are of the opinion that the soil (“chikni miti”) composition also helped in manufacturing quality brass castings. A composition of oil and sand is used in the mould to a particular give shape and size to the brass parts. The more is the binding property of soil and sand, the better is the quality of casting manufactured. The availability of water also ushered the growth of the cluster.

Patronage from Govt. of Gujarat

The Industries Dept, Govt. of Gujarat has facilitated the growth of the cluster by providing basic infrastructure and loan on easy terms. In the year 1976, Gujarat Industrial Development Corporation developed the GIDC industrial estate in Shankar Tekri. Land, electricity, water and industrial sheds were also provided amply.

Entrepreneurship:

Gujarat is well known for its entrepreneurs. People here, specially in Saurashtra region (Jamnagar belongs to Saurashtra region of Gujarat) are very entrepreneurial in nature. If they get slightest business opportunity they will not mind to jump on it. As some pioneering people started the business and getting good return on their investment, others did follow. This has happened with diesel engine cluster in Rajkot, Tiles cluster in Morbi etc. The **demonstration effect** and the entrepreneurial and risk taking attitude of the local people also paved the way for the growth of this cluster.

All these have contributed for the emergence and growth of the brass parts cluster at Jamnagar.

1.3 Core Cluster Actors:

Brass Part Industry – Mainstay of Jamnagar

The economy of Jamnagar is inextricably mixed up with that of brass part industry. 70% of the brass machined components of the country is manufactured here. This is the biggest brass parts manufacturing cluster in the country. Till 1988, the business performance of this cluster (including exports) and the emergence of new units kept on increasing steadily. However, during the late 90s and early 2000 the effect of liberalisation was sharply felt and the level of competition kept on intensifying. During 2000-2002, around 500

entrepreneurs have closed their operation and another 800 are running well below their capacity.

Structure of the industry :

The players in the brass parts cluster can be categorised as under :

Category 1 : There are entrepreneurs who import brass scrap and honey and distribute it to the local manufacturers. As per government policy, for booking import orders to the tune of more than 500 tons per annum, one can get 10% discount on import duty. This policy has contributed to the emergence of big importers having financial strength. These importers after procuring the scrap, distribute to the manufacturers as per their requirements. They also get quantity discount for booking large orders. This has become a specialised activity and there are about 20 large importers in Jamnagar.

Category 2 : This group is comprised of casting units. The imported scrap and honey and the locally available pale and dross are melted in the foundry. The melted metal is then poured in the mould to give different shapes and sizes. There are about 400 brass foundries supplying the basic raw material (i.e. casting) to the machining units. Out of this, 20-25 are oil fired and the rest are coke fired. Quality control and standardisation is very much important in this phase because any defect in casting can result in making sub-standard parts, components. This is one the most problematic areas in Jamnagar and a lot of technological intervention are required to minimise defects and produce quality castings.

Category 3 : Machining units are the main constituents of this category. Jamnagar is known for brass machining operation. Only by machining the casted component is given its final shape, size and configuration. There are several types of machines available in Jamnagar like drawing machine, slotting and drilling machines, turning machine, cutting and threading machine, grinding machine, milling machine, etc. In addition to these machines, tools, jigs, fixtures, motors, quality control instruments are also employed for manufacturing brass parts. The most of the value addition is done in the machining phase and there is lot of technicalities involved in the process of manufacturing. Lot of technical training, technology upgradation and implementation is to be carried out in this machining phase.

As per the information collected from Jamnagar Factory Owners Association and other secondary information there are around 4000 enterprises involved in this brassparts machining business.

Category 4 : Plating units engaged in electroplating business are the main constituents of this category. This is the last operation and defects in which can be immediately seen by the customers. It is not necessary that all the brass parts needs to be plated before it reaches the final customers. Only in specific products, for eg: electronics and electrical accessories, the process of electroplating is done. There are around 130 electroplating units in Jamnagar. They are basically doing the job work for the large manufacturers.

Category 5 : This group is comprised of dealers, merchant traders, exporters & marketing agents. 80% of the brass parts manufactured in the cluster are sold through this dealers/traders. Only limited number of cases manufacturers sell their products directly to the customers. Marketing being an important activity in the value chain, entrepreneurs involved in this activity charged premium price for their services. Substantial price addition (with little or no value addition) takes place in this phase. Most of the exporters are located in Mumbai, New Delhi & Calcutta and the manufacturers are supplying their products to various exporters. There are also big traders who procures and sells the product in the domestic market.

About 250 small, medium and large traders/exporters are involved in this business.

Category 6 : In this category, there are suppliers of machinery and tools, other inputs like jigs and fixtures, molasses, coke, crucible, furnace, measuring instrument, borax, packaging material, etc. These supplies/ inputs are required in various stages of manufacturing and finishing process. Though the exact number of the entrepreneurs engaged in this business is not known it is estimated that there could be 200 such players.

The existence of inter-firm & intra-firm linkages:

One of the most important attribute of Jamnagar brass part cluster is the existence of inter-firm and intra-firm linkages. The firms are mostly integrated horizontally and not vertically. Because of low scale of operation and sub contracting relationship the cluster is capable of executing all sorts of order. Even there are firms which have very little manufacturing base, like one or two machines, but still book the order, get it manufactured in other plants and execute orders. There are very little firms, which are vertically integrated and do most of the operation in-house. Especially, the process of casting and plating, in 99% of the cases, is done in specialised foundry and plating respectively. The limited scale of operation and sub contracting arrangement had resulted in flexible specialisation.

The following table gives an indication of the number of enterprises in various categories :

Sr.No.	Category	Number of units
1.	Category 1	20
2.	Category 2	400
3.	Category 3	4000
4.	Category 4	130
5.	Category 5	250
6.	Category 6	200

1.4 Other Cluster Actors

(a) Institutions having direct stake on the cluster:

THE JAMNAGAR FACTORY OWNERS ASSOCIATION

In the year 1948, the Jamnagar Factory Owners' Association was established. There are 3050 SMEs who are members of this association. In 1948, the brass parts industry faced severe problem due to shortage of coke and raw material. In order to overcome this problem, the SME entrepreneurs joined hands together and established the Jamnagar Factory Owners' Association.

This is one of the most active industry associations in Jamnagar. They do take up programmes and organise training for the members. All the leading brass parts manufacturers in Shankar Tekri Udyognagar, are members of this association. It has a strong financial base (annual revenue 5 lacs;- approx.) and well organised office facilities.

They organise periodic meetings for their members. A well equipped classroom was developed in their office premises for organising training programmes. When the Entrepreneurship Development Institute of India took up the cluster development programme, it was Jamnagar Factory Owners' Association which immediately came forward and joined hands with the project. Their proactiveness is reflected by the fact that they organised workshops on 'quality standardisation' (with SISI), on 'WTO and its impact' (with NSIC). They also helped EDI in conducting a cluster study five years ago. Moreover, they do take up issues with Govt. depts. and other institutions.

JAMNAGAR BRASS FOUNDRY ASSOCIATION

This association was established in the year 1964 in Shankar Tekri. 320 SMEs are the members of this association. Basically, all the foundry owners are the constituent members.

Among the services provided by this association are (a) helping entrepreneurs in bulk purchasing of raw material, (b) taking up issues like power cuts, road to the concerned Govt. dept.

PATEL COLONY INDUSTRIAL ASSOCIATION

The entrepreneurs in the Patel Colony Industrial Estate established this association in the year 1982. It has 100 members .

This association was never been very active. Its role ends with organising only a few meetings of the member entrepreneurs.

JAMNAGAR ELECTROPLATERS ASSOCIATION

It was established in the year 1980. At present, it has 82 members. This association also showed tremendous enthusiasm in the ongoing cluster development programme organised by EDI.

At present, the Electroplaters are facing severe competition and the rate of job work is decreasing day by day. For example, in earlier days, plating job which was priced Rs.5/- per kg. now has come down to Rs.2/- per kg. Due to recession in their business and internal competition among the entrepreneurs this association is striving hard to maintain its identity.

JAMNAGAR HARDWARES ASSOCIATION

Alike other associations in Jamnagar, this association is also not very active in terms of projecting the demand of the member SMEs to the concerned organisation, solving their problems. It was established in the year 1990 and the present membership is 175. It has never gathered momentum and remained at a very nascent stage.

Lot of initiatives has to be taken in order to make these associations vibrant and dynamic. Moreover, networking has to be established among various associations in order to ensure growth and development of the cluster. The activities to be undertaken for the capacity building of these associations are mentioned in the Action Plan.

(b) **Institutions having indirect relationship with the cluster**

NATIONAL METALLURGICAL LABORATORY

The National Metallurgical Laboratory is working in the field of metallurgy and metal sciences. It is one of the premier research institutes in our country. It has nine technology divisions like;

- Analytical Chemistry (ANC) Division
- Computer Applications (CAP) Division
- Corrosion Protection (CRP) Division
- Engineering (ENGG.) Division
- Ferrous Processing (FRP) Division
- Minerals Processing (MNP) Division
- Materials Characterisation (MTC) Division
- Materials Processing (MTP) Division
- Non Ferrous Process (NFP) Division

Unfortunately, NML never worked on brass metallurgy. But their R&D facilities can definitely be utilised to solve the technical problems of the cluster. What it requires is presenting the problem of the industry to the management in NML and convincing Govt. to open a branch of NML at Jamnagar.

CENTRAL ELECTRO CHEMICAL RESEARCH INSTITUTE

The Central Electro Chemical Research Institute is located in Karaikudi, Tamilnadu. Electropolishing which is an electrolytic process, is one of the most important technological requirements in Jamnagar. By adopting this process, the entrepreneurs in Jamnagar will not only get better quality and productivity but also reduce time and labour spent in other processes. This is definitely go to reduce work hazards and completely eliminate pollution created in the enterprises.

Whether CECRI has this technology or not, is not known, attempts are being made to know the availability of latest technologies applicable in brass part industry.

INDIAN INSTITUTE OF FOUNDRY

Defective casting is one of the most problematic area in the cluster. Casting is the initial process and any defect produced in this stage is going to have a bad repercussion on the final product. In the foundry, there are problems like coring and segregation, pinholes and blowholes, shrinkages, dimensional distortions,

rat bites, etc. All these problems can be eliminated with the adoption of latest technologies.

The Indian Institute of Foundry is working for the development of the foundry and it is expected that they will be able to provide a right technology for the cluster.

ENGINEERS EXPORT PROMOTION COUNCIL

Engineers Export Promotion Council was set up in the year 1954 under the sponsorship of Ministry of Commerce, Govt. of India. The main objective of the council is promotion of exports of engineering goods, projects and services from India. It has a membership of 8500 firms. Other activities of these organisation are :

- Promotion of Engineering Industry in the international market.
- Providing marketing intelligence of the exports, liasoning with overseas buyers.
- Organising structured promotional events
- Organising trade fair, buyers-sellers meet, etc.

There is an immense need to develop BDS in Jamnagar and all the associations have to network and play a pro-active role in order to ensure growth and sustainability of the cluster. The cluster actors have to be made competitive to face challenges due to Globalisation.

1.5 Current Institutional Matrix:

	Jamnagar Factory Owners Association	Nawanagar Chamber of Commerce & Industry	Jamnagar Brass Foundry Association	Jamnagar Hardware Association	Jamnagar Electroplaters' Association	All India Bicycle Tube Valve Manufacturers' Association	Patel Colony Industrial Association	District Industries Centre (DIC)	Small Industries Service Institute (SISI)	National Small Industries Corporation (NSIC)	Small Industries Development Bank of India (SIDBI)	National Metallurgical Laboratory (NML)	Indian Institute of Technology (IIT)	Other R&D Institutions.
Jamnagar Factory Owners Association	-	4	3	2	2	2	2	2	1	1	1	0	0	0
Nawanagar Chamber of Commerce & Industry	4	-	2	2	2	2	2	3	1	1	0	0	0	0
Jamnagar Brass Foundry Association	3	2	-	3	1	2	2	2	1	0	1	0	0	0
Jamnagar Hardware Association	2	2	3	-	2	1	2	1	0	0	0	0	0	0
Jamnagar Electroplaters' Association	2	2	1	2	-	0	2	1	0	0	1	0	0	0
All India Bicycle Tube Valve Manufacturers' Association	2	2	2	1	0	-	4	2	1	1	1	0	0	0
Patel Colony Industrial Association	2	2	2	2	2	4	-	2	0	1	1	0	0	0
District Industries Centre (DIC)	2	3	2	1	1	2	2	-	3	2	3	1	0	0
Small Industries Service Institute (SISI)	1	1	1	0	0	1	0	3	-	4	4	1	0	0
National Small Industries Corporation (NSIC)	1	1	0	0	0	1	1	2	4	-	4	1	1	1

	Jamnagar Factory Owners Association	Nawana gar Chamber of Commerce & Industry	Jamnagar Brass Foundry Association	Jamnagar Hardware Association	Jamnagar Electroplaters' Association	All India Bycycle Tube Valve Manufacturers' Association	Patel Colony Industrial Association	District Industrial Centres (DIC)	Small Industries Service Institute (SISI)	National Small Industries Corporation (NSIC)	Small Industries Development Bank of India (SIDBI)	National Metallurgical Laboratory (NML)	Indian Institute of Technology (IIT)	Other R&D Institutions.
Small Industries Development Bank of India (SIDBI)	1	0	1	0	1	1	1	3	4	4	-	2	2	1
National Metallurgical Laboratory (NML)	0	0	0	0	0	0	0	1	1	1	2	-	2	3
Indian Institute of Technology (IIT)	0	0	0	0	0	0	0	0	0	1	2	1	-	3
Other R&D Institutions.	0	0	0	0	0	0	0	0	0	0	1	2	3	-

The current institutional matrix depicts the relationship among the various stakeholders in the Jamnagar brass parts cluster. The nature of relationship between these cluster actors is not always very clear and direct. Some of them have very remote relationship and it is limited to the extent of organising some programmes, providing certain marginal services, and sometimes conducting informal meetings or some seminars and conferences.

There are few associations and institutions which are active, and providing the role of facilitators in solving the problems and taking up issues to the various Govt. depts. For example, the Jamnagar Factory Owners' Association has very strong linkage with Navanagar Chamber of Commerce & Industry and also with Jamnagar Brass Foundry Association. It has also good inter-linkage with District Industries Centre, Jamnagar. It organises training programmes, help in conducting study. Though there are other industry associations like Jamnagar Hardware Association, Jamnagar Electroplaters Association, All India Bicycle Tube Valve Manufacturers Association, Patel Colony Industrial Association, the nature of relationship and the extent of co-operation among these associations are very minimal. Only the Patel Colony Industrial Association which has some of the leading cycle tube valve manufacturers, have a very good relationship with All India Bicycle Tube Valve Manufacturers Association. This relationship has been developed based on the need of the enterprises and the homogenous nature of the final product manufactured.

Based on the role of these various support institutions, associations and strength of their inter-linkages and cooperation, they are given a score in a five point scale. The score '1' indicates that there is very little cooperation among this cluster actors whereas the score '5' indicates that there is strong inter-linkages and responsiveness among the cluster actors. This cooperation may be expressed in terms of joint planning, bulk purchasing of raw material and inputs, solving each others problems, taking up pertinent issues to various Govt. depts., organising seminars and conferences, implementing programmes jointly and reviewing the progress of the cluster through organising periodic meetings. The current institutional matrix delienating the scores, is shown in the above table.

The Govt. depts. which have direct/ indirect stake in the cluster but cetainly can play a very significant role for the overall growth of the cluster are;

- District Industries Centre (DIC)
- Small Industries Service Institute (SISI)
- National Small Industries Corporation (NSIC)
- Small Industries Development Bank of India (SIDBI)
- National Metallurgical Laboratory (NML)
- Indian Institute of Foundry (IIF)
- Central Electrochemical Research Institute (CECRI)

From the institutional matrix it is pretty clear that District Industries Centre has moderate linkages with local association and chamber of commerce. The relationship between Dist.

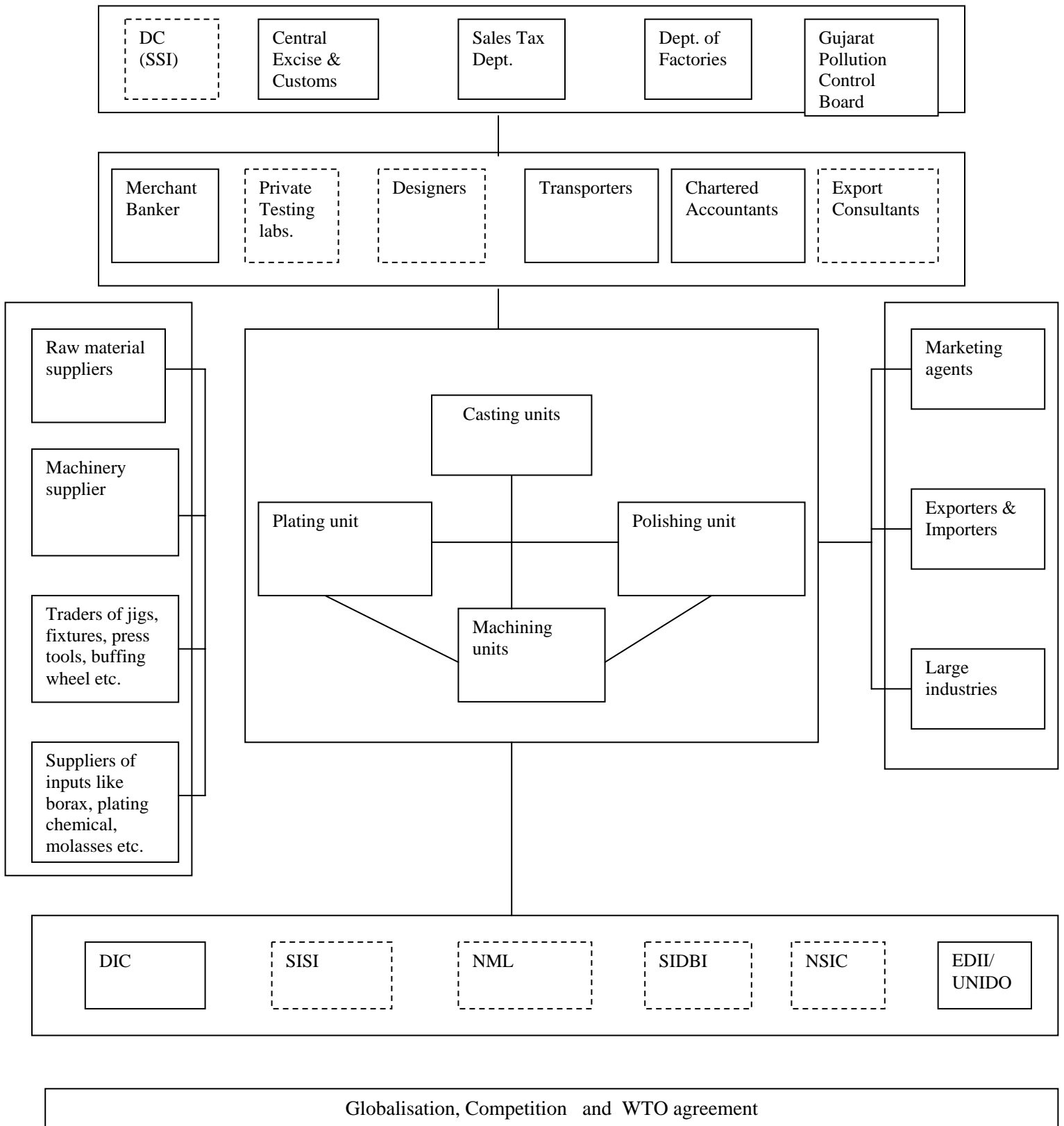
Industries Centre, SISI, NSIC, SIDBI is on the higher side. But it has very weak/ no relationship with National Metallurgical Laboratory and other R&D institutions. The association of NSIC & SISI with local industry associations is limited to the extent of organising one or two programmes and/ or conducting few programmes. The same is the case with SIDBI who has sponsored a “cluster study” for the Jamnagar brass parts cluster five years ago. The inter-linkages between SISI, NSIC & SIDBI is pretty strong and they do take up projects and programmes in association with (or with the sponsorship support) one another. The National Metallurgical Laboratory is one of the prime institutes in the country, which is working in the field of metallurgical science. The brass part cluster requires a lot of technological intervention in the field of brass metallurgy. In spite of this, there is hardly any linkage between NML & local industry associations. Surprisingly, in spite of having all the technical and laboratory facilities, NML never worked for the brass part industry. Neither the scientist in the NML knows about the requirements of this cluster nor the industry associations are aware of the technologies developed and the facilities available in NML. Same is the case with Indian Institute of Technology which has well developed metallurgy and materials engineering division. Moreover, IIT, Khargpur has a cell called sponsored research and industrial consultancy (SRIC). The objective of this SRIC cell is handling research projects and providing industrial consultancy for technology upgradation.

The current institutional matrix clearly shows that the relationship between these stakeholders is either minimal or moderate. This is one of the drawbacks of the Jamnagar brass parts cluster. All the leading clusters world wide, which are widely quoted in various articles, journals and books and which also provides a model for the developing and emerging clusters (e.g.: shoe making cluster in Emilia Romagna, Italy) exhibit a very strong relationship among the stakeholders and the cluster actors. A strong relationship and inter linkages among stakeholders can not only solve the problem of the cluster but also could source technology, finance, marketing etc. for the overall growth and development of the cluster. It is therefore important that the inter-linkage among these stakeholders needs to be strengthened by organising meetings and motivating each others. This can be taken up as a capacity building exercise for the cluster.

One of the main lacunae of the current institutional matrix is that it do not reflect the nature of relationship between stakeholders and its associated members (eg.: the relationship of the member entrepreneurs with the Jamnagar Factory Owners Association). Some of the member entrepreneurs told that Jamnagar Factory Owners Association is very active, organises periodic meetings and takes up important problems of the industry. While others are of the opinion that it is not that active and only a limited number of entrepreneurs are benefited in their activities and programmes.

It became clear from the diagnostic study that, not only inter-linkages among stakeholding institutions needs to be strengthened but also the relationship between individual enterprises and associations/ chamber of commerce needs to be improved. A win-win situation has to be created where all the cluster actors and stakeholders work in unison.

1.6 Present Cluster Map



The above Cluster Map of Jamnagar brass parts cluster indicates the various linkages and actors that exist in this cluster. (the bold lines indicates the prevalence of organisation whereas, dotted lines indicates the organisations to be developed.) So far Public Policy is concerned there are institutions like DC (SSI), Central Excise and Customs, Sales Tax Dept., Dept. of Factories & Gujarat Pollution Control Board. These organisations decide the policies, which have direct repercussion on the activities of the industry.

There are Commercial Service Providers like chartered accountants, export consultants and merchant bankers. The actors in this category provide valuable services on commercial basis. In Jamnagar, the availability of services are not omnipresent and effort should be made in strengthening these Business Development Services.

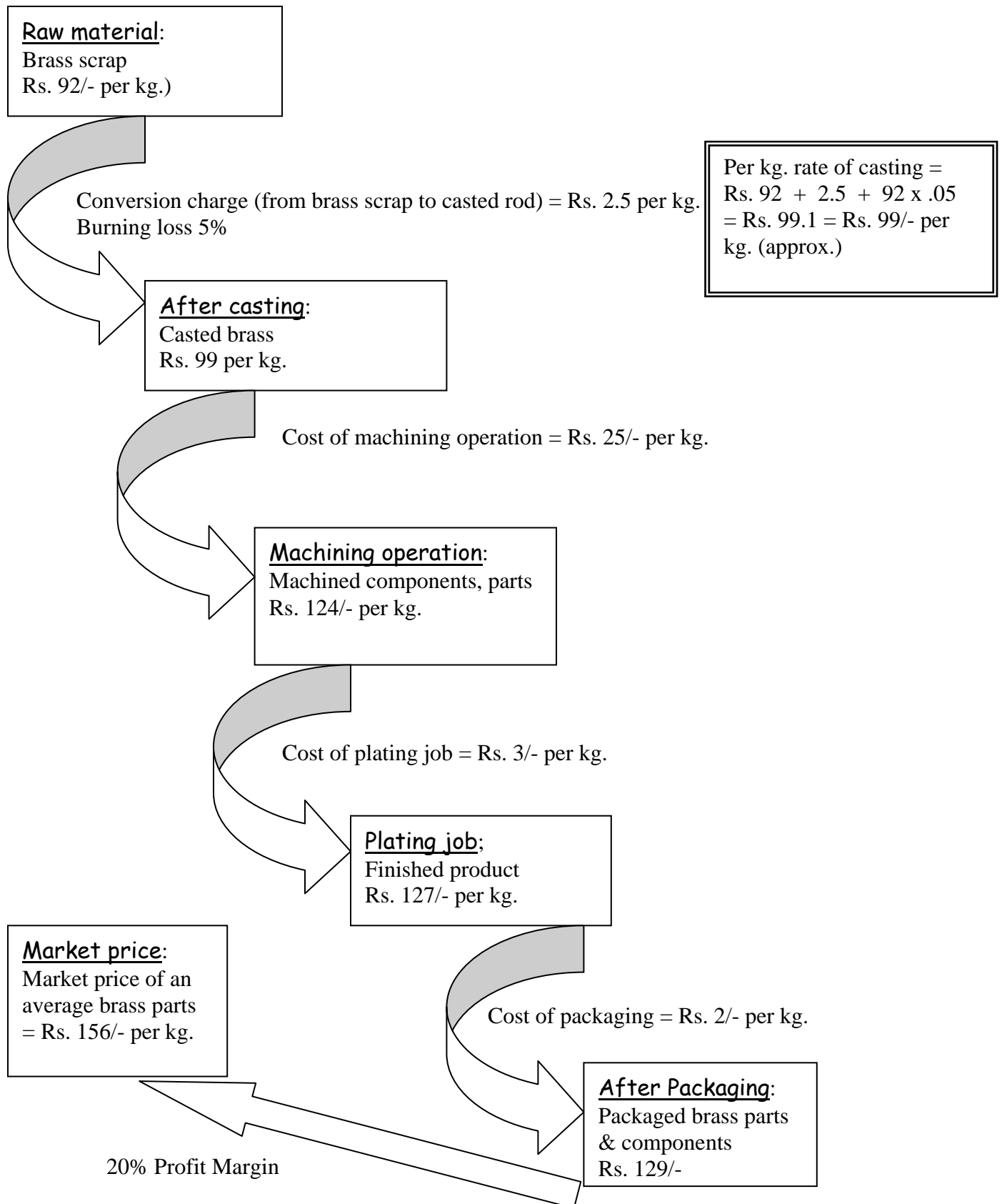
In the nucleus of the Cluster Map there is SMEs involved in manufacturing brass parts. There are foundry doing the job of casting and machining units. All the casted brass rods has to go through several machining operations in order to get the final product. There are also electroplaters and polishing units who does plating and polishing operations respectively on a job work basis. Some of the large enterprises have in-house polishing shop while plating is mostly done outside. The linkage among these SMEs is job-specific and commercial oriented. Another important thing, which needs to be highlighted here, is the practices of sub contracting. Any firm can take up any job and in case it does not have in-house facility it can get it done in some other firm. Sub contracting is widely prevalent in this cluster and this gives flexibility in the operating system.

Among the constituents of Backward Linkages there are raw material suppliers and suppliers of machinery, tools and other inputs. There are around twenty large raw material suppliers who imports brass scrap and honey from Gulf, China, Taiwan, USA, European and South American countries. The rule of the game here is the bigger is the import order, the higher is the amount of discount. Most of the machinery used in brass parts cluster in Jamnagar are local made and customised. The inputs, tools, borax, etc., are procured from the specialised suppliers. Most of the suppliers have a local presence or appointed trader/ dealer in Jamnagar.

Among the forward linkage members there are marketing agents, exporters and large industries. Though most of the marketing activity (around 80%) is done through marketing agents, traders and exporters but there are enterprises who are supplying products directly to large industries. For example, most of the cycle tube valve manufacturers are selling their products directly to the cycle manufacturers and some of them have ancillary arrangement with their parent organisation.

The organisations which are providing support services are DIC, SISI, NSIC, SIDBI, etc. The role of these institutions and their inter linkages were described in the current institutional matrix.

2 Value Chain Analysis



The above figure depicts the Value Chain Analysis of the brass parts cluster. It describes the degree of value addition in each stage of processing. As mentioned earlier, the main activities involved here are;

- Casting
- Machining
- Plating

The price of brass scrap available in the market is Rs. 92/- per kg. Brass foundry charges Rs. 1.5/- to Rs. 6/- per kg. depending on the cross section of the rods to be casted. Smaller is the cross section, higher is the conversion charges. On an average the normal rate of conversion can be treated as Rs. 2.5/- per kg. Moreover foundries charge 5% (by weight of casting) as burning loss. For exampl, for every 105 kg. of scrap foundries will supply 100 kg. of casted rod.

Thus per kg. rate of casting = $\text{Rs. } 92 + 2.5 + 92 \times .05 = \text{Rs. } 99.1 = \text{Rs. } 99/-$ (approx).

Though the rate of castings available in the market varies between Rs. 98/- to Rs. 120/- per kg the normal rate can be treated as Rs. 99/- per kg.

The casted rod is then sent for machining operation. This machining operation is job-specific. For some parts, components there are several machining process involved whereas, for others the number of operations are limited. The normal rate of machining is Rs. 25/- per kg.

Rate of brass parts after machining= Rs. 124/- per kg.

The charges of plating also vary between Rs. 2/- to Rs. 10/- depending on the plating micron and type of plating (e.g., cadmium plating, copper plating, silver plating). The normal plating rate can be considered as Rs. 3/- per kg.

Rate of plated parts, components = Rs. 127/- per kg.

The packaging charges are normally Rs. 2/- per kg. Most of the manufacturers have in-house packaging facility, barring a few who get it done outside.

Rate or parts, components after packing = Rs. 129/- per kg.

The profit percentage in this industry varies between 5% to 30%. However the normal profitability is 20%.

Thus brass parts and components available in the market at a price of Rs. 156/- per kg. For some specific product it can go upto Rs. 5,000/- per kg.

It is also reported that there has been increase in the rate of brass scrap, machines, tools, accessories over the years. However, due to stringent competition the rate of final products did not increased to that extent.

3 Analysis of Business Operation (Problems Identified)

The following section presents an analysis of business operations for the brass parts cluster. The analysis is built on the following factors viz.,

- Raw material
- Machinery & production
- Products & marketing
- Background of the entrepreneurs & their enterprises
- Finance & working capital
- Manpower requirement
- Infrastructural facilities
- Business Development Services

3.1 Raw material :

The raw material requirement of the brass part industry is met mainly from the following three sources :

- Old brass, copper and bronze utensils
- Imported brass scrap and honey
- Brass scrap from ship breaking yard

Change in
product
line

In old days, there was a practice of using brass, copper & bronze utensils in the households. But with the change in consumer taste and preferences, more & more people in India started using stainless steel utensils, which was easy to clean and maintain. Thus, the old brass and bronze utensils are sourced from all over India and used by the foundry owners at Jamnagar.

Imported
raw
material

As a matter of fact, 90% of the raw material requirement of this brass parts cluster is met through imports. The countries from which it is imported are USA, Singapore, Gulf and European countries. The imported raw material is available mainly in three forms

- a. Honey scrap
- b. Dross of brass &
- c. Pale in the form of strips

The quality of brass scrap and honey varies widely and its composition is not uniform. Any parts, components, equipment, machines, which has some copper/ brass as its base material, is imported. Most of the times, this scrap are made of two to three different metals and the job of the worker is generally separating other metals (like aluminium, iron) from the copper and brass. It is a tedious process but still in practice in Jamnagar. Moreover the separating process can never be 100% accurate and lot of impurities and other metals reach the foundry for melting. As a result the quality of casting is affected.

Is it
brass ?

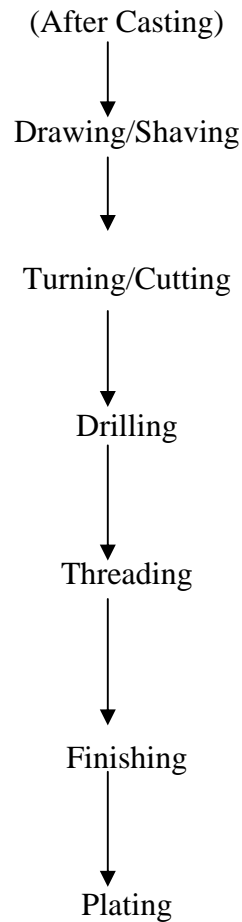
Technically speaking brass is an alloy of copper and zinc and the ratio of these products is 60 : 40 (60% copper & 40% zinc). For getting the right products and good quality, it is important that this 60 : 40 composition is maintained. However, due to heterogenous nature of the scrap (honey) and different alloying of the base metal, it becomes almost impossible to maintain this 60:40 ratio. As a result, the quality of the final product varies, defects are produced and the rejection rate increases.

The best method of getting the right quality and right alloying is using copper and zinc ingot. But because of higher price of ingot, scrap is used as the basic raw material. Because of cutthroat competition, manufacturers are not getting the right price for their products. This price war (on final product) compels them to use cheaper raw material.

The 'dross' of brass which is technically known as 'slag' and is actually the impurities produced in casting process. In technologically developed countries this is never used. In Jamnagar even the brass particles collected (separated by vibrating separator) from the dust is also used for casting. The percentage of brass in this dross is very minimal. Pales are generally are of good quality and are used for producing quality castings. It is estimated that about 280-300 mts. of brass scrap is recycled in a day.

3.2 Machinery & Production :

There are 10 to 15 types of machines used in the brass parts manufacturing cluster at Jamnagar. Some of these machines are wire drawing machine, slotting & drilling machine, turning machine, threading machine, wire straightening machine, grinding machine, milling machine, etc. Depending on the precise nature of products to be manufactured and the processes it has to go through, the requirement of machines varies. Though there is no generic manufacturing process but most of the products have to go through the following machining operations.



Customised Machines

Jamnagar is known for its customised machines. There are some very good technicians/mechanics who can copy any imported machine or machines of reputed companies. An imported machine which costs few crores can be copied and manufactured at a price of a few lacs. These machines are made available locally. The designs are customised to fulfill the requirements of a particular job. This is one of the greatest strength of Jamnagar brass parts cluster. This gives flexibility in operating practices. Majority of the entrepreneurs are using these customised machines.

Technological obsolescence

The process of manufacturing has mostly remained traditional. The process of melting machining, polishing and plating did not change much for the last 50 years. There is no temperature recording and temperature controlling devices in the foundry, no automatic machines, pressure die-casting machine, barreling and electropolishing plant. As a result, the industry is facing problems like coring and segregation, pinholes and blowholes,

shrinkages, dimensional distortions, etc. As a result, rejection rate is higher and lot of parts and components are used for recycling.

Lot of machining operations are carried out which either could have been minimised or eliminated. For example, for manufacturing a 2 mm. screw the casted rod which is of 5-6 mm. in diameter, is turned/ shaved repeatedly. This operation takes a lot of time and labour. The process can be completely eliminated if the technology of paste brazing is adopted.

Little
consideration
on
tolerances

Some of the parts manufactured in Jamnagar require very precision tolerances. For example, the cycle & automobile tube valve require precision measurement. This precisionability is obtained by manual filing and other operations. Because of not having the right technology, the rejection rate is very high. However, a pressure die-casting machine can help in getting precision parts and components at a much faster speed. This will eliminate the manual filling operation. Moreover, there are very few micro-meters to check the micron value of the products. There are entrepreneurs whose exports were turned down because of inability to maintain the precisionability of products.

3.3 Products & Marketing:

Sub
Contracting
Arrangement

There are about 10,000 brass parts manufacturers in the cluster. This was possible because of flexible (specialisation) operating system. Whatever be the volume of orders, the entrepreneurs in this cluster are able to meet that. They are capable of handling orders which are as small as 50 pieces and as big as lakhs of pieces. The sub contracting arrangement is widely prevalent in the cluster. In case, an entrepreneur does not have some machine, he can get it done in some other factory. The availability of customised machines and skills of the operators also provided impetus to growth.

The
products
are
omnipresent

The products are marketed within India and abroad. There are enterprises which have ancilliary arrangement with the parent unit and supplying components for a long period of time. This is mostly prevalent in cycle tube valve manufacturing sector. Cycle tube valve manufacturers have tie-up with the leading cycle manufacturers in Ludhiana. (M/s Atul Industries in supplying cycle tube valve to M/s Hero Cycles Ltd. for the last 16 years.). In other cases, the products are marketed through traders/ dealers. Jamnagar is known for cycle tube valve, electrical and electronic accessories and building hardware items and these products are supplied all over India.

Products marketed internationally

The products are marketed abroad too. Jamnagar is well-known for automobile, cycle tube valve, building hardware and sanitary fittings. The products are exported in countries like UK, USA, Canada, Middle East, Europe, Africa, Sri Lanka, Pakistan, Indonesia, Malaysia, Singapore, Japan & Bangladesh. Though there are some enterprises which are supplying brass parts directly to the customers in the importing countries but most of the exports are through agents/ traders. Generally, the brass parts manufactured in Jamnagar are sold to the exporters located mainly in three cities viz., New Delhi, Kolkata and Mumbai. They in turn sell these products to their fixed clientele abroad.

Why not forming export consortia ?

In the area of globalisation, the marketing activities of the entrepreneurs, needs to be integrated in order to capture the global market. As the units are small (with the exception of a few vertically integrated units), it is almost imperative that networking is done in order to capture largest export orders. This will not only ensure economies of scale but also developed accountability of the entrepreneurs. Export consortia can be formed to ensure brand building, participating in international fairs, negotiating with buyers, compete with other countries on quality and price fronts.

Niche markets are depleting

In earlier days Jamnagar has a niche market in Arab and African countries. The entrepreneurs had fixed clientele in these countries. However, after globalisation these countries are started procuring form countries like China, Taiwan, Thailand, Japan etc. Competition now-a-days is severe and the only way of survival is quality and price. This is all the more important because product differentiation is gradually disappearing.

In the present scenario the entrepreneurs can join hand together, form consortium and grab large export orders. There can a brand building initiative where all the Jamnagar products are projected under one brand name.

3.4 Entrepreneurs and their enterprises:

Enterprises are family controlled:

A majority of the enterprises are family owned. The owner and other family members are the manager, operator, marketer, technician, negotiator. There is hardly any qualified people recruited from outside. As a result no fresh idea came up and the process of manufacturing remained traditional. One needs to understand that there are several functional areas in an enterprise where qualified and experienced persons are required.

Little awareness:

The level of awareness of the entrepreneurs; especially in technical and marketing areas, is not as high as it should be. Low level of education and inability to communicate in English have remained a major problem for them. There are entrepreneurs who are

looking for certain machine, (e.g., pressure die casting machine) for the last 15 years but could not source it. While these are used widely in developed countries. Even in India, Hindustan Machine Tolls is manufacturing this machine. It is also extensively used in Central Ordinance Factory, Jabalpur and large industries like TELCO, Bajaj etc.

Demonstration Effect

Whatever manufacturing processes are available in the enterprises, it was developed in the process of coping others. As somebody started melting scrap in a typical crucible or making thread in a particular way, others just copied it. Outside interventions are minimal, especially in technology. At present there is no temperature controlling and measuring devices in the factory. In case one gets them from somewhere, others will follow.

3.5 Finance & Working Capital :

Finance has never been a problem for the entrepreneurs at Jamnagar. Some times excessive credit given to the customers create temporary shortage in working capital. Otherwise finance is easily available with local banks (lead bank being State Bank of Saurashtra). However stringent competition, compelling the manufacturers to supply at less remunerative price, sometimes may create shortage in working capital.

Machining units

The machining units are well organised in financial planning. Their financial controls and accounting systems are up-to-date and hence they are able to provide right information, balance sheet and profit and loss account to the satisfaction of term lending institutions and banks for getting working capital and term loan. However, cost of the machines being less the entrepreneurs hardly approach bank for term lending of their new machines. They have their accountant (mostly part time) to look after their accounts. The export oriented units are effectively utilising the export credit facilities

Job-working foundries and plating shop

For establishing a foundry one hardly needs any term loan because no machines are required and only crucible and furnace are necessary. However, due to high cost of brass and high turnover, the working capital requirement is high. This is either managed from internal sources or loan is taken from the bank.

The money required for establishing a plating shop is also not high. The same is either managed internally or loan is taken from bank.

3.6 Manpower :

Skilled workers are locally available to run the machines. Whenever a technician/ worker is required a notice is displayed in the main gate of the factory. Some of the jobs which otherwise could have been done by machines are done manually.

However, there is hardly any engineer employed in these enterprises and the production process remained traditional. This is one of the lacunas of the Jamnagar brass parts cluster. One of the main reasons of the technological backwardness of this cluster is non-existence of experienced engineers. Even there is no experienced HRD, marketing personnel and the business remained family oriented. Hiring experienced people in the above field necessitates higher pay, which the entrepreneurs are willing to offer. Moreover Business Development Services in technical and marketing area is difficult to find.

It is important that entrepreneurs in this cluster understand the importance of each functional area and the advantages of hiring experienced people.

Training

There is no training facilities/ institutions available in Jamnagar. The workers learn on the job and by observing others. However, the experience of working in one factory is utilised in another when he/ she joins the later one. Even R&D institutes and quality testing laboratories are non-existent.

3.8. Infrastructure:

The enterprises are located in four areas called Shankar Tekri, Patel Colony, M.P Shah Udyognagar and Digvijay Plot Area. In the year 1976, Gujarat Industrial Development Corporation set up GIDC industrial estate at Shankar Tekri. Another GIDC industrial in M.P. Shah Udyognagar was established subsequently. In these industrial estates, land is provided and arrangements were made for provision of electricity and water. As a result, the industry flourished. In the year 1976, there were around 1000 enterprises now it has gone upto 4000.

However, alike other industrial estates in India, there are problem of power cuts and the road conditions are not conducive. Due to frequent power cuts production is hampered.

3.9 Business Development Services :

The business development services have not grown much in Jamnagar as it has been in other industrial clusters. There is no technical training institutions, no R&D laboratory,

no management institutions, no testing facility, no marketing expertise, no design development institute available in Jamnagar. It is difficult why these services have not developed in Jamnagar because, in most of the cases these are demand-driven. Probably, the requirement of the cluster is not properly projected. Therefore, there is a need to have networking and consortium among the SMEs in the cluster.

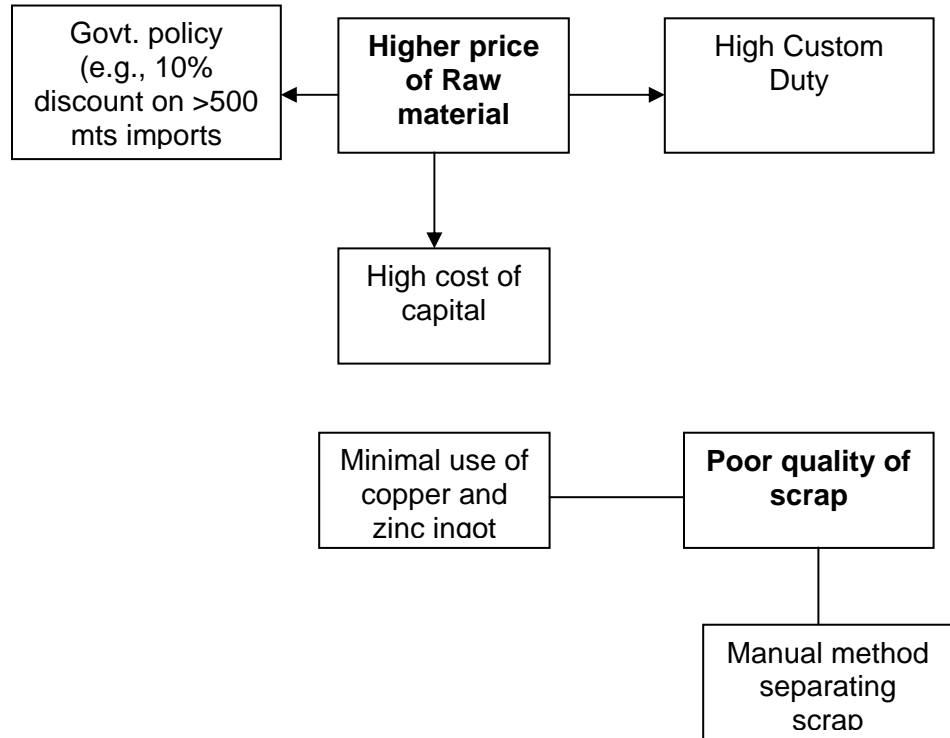
**Opening a
Branch of
NML**

National Metallurgical Laboratory, Jamshedpur is one of the premier institutes working in the field of metallurgy and metal sciences. It has developed several technologies which have application on various types of metals. A branch of this laboratory can definitely be established at Jamnagar for the benefit of the cluster.

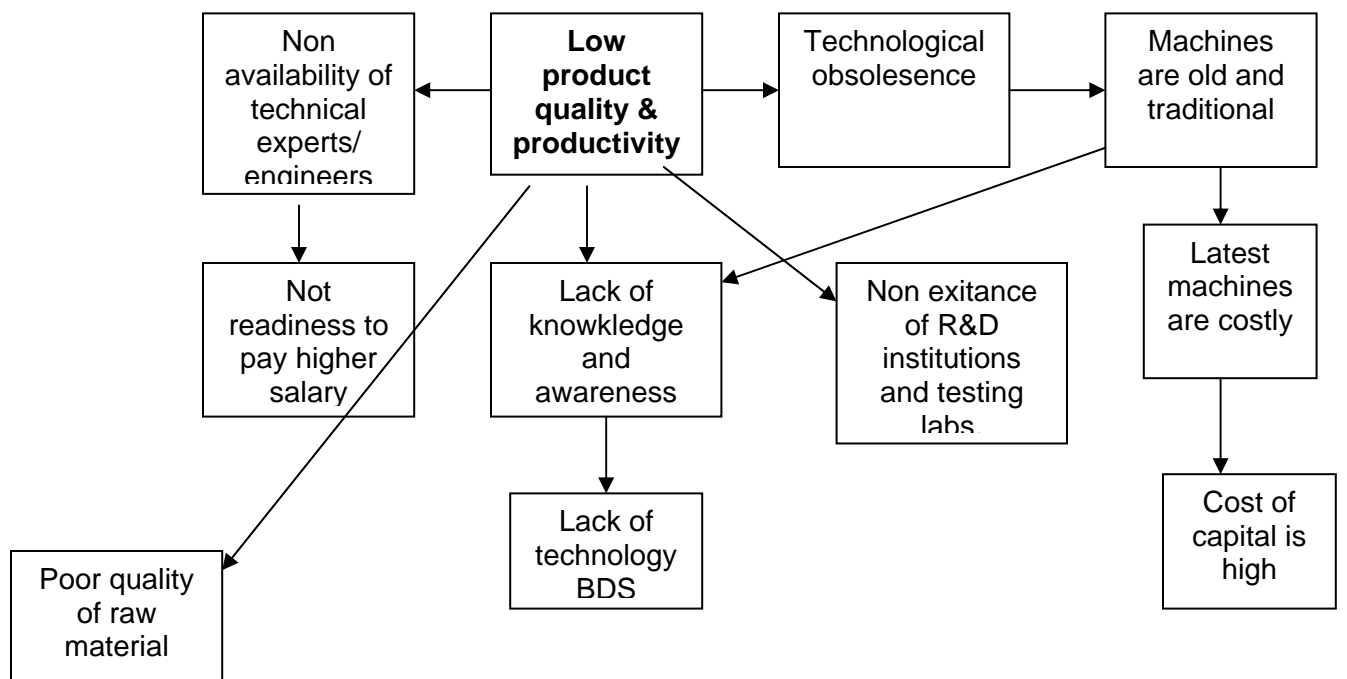
Similarly, technical training institutes and testing laboratories can also be developed to fulfill the requirements of the enterprises.

4. Reality Tree

Raw material

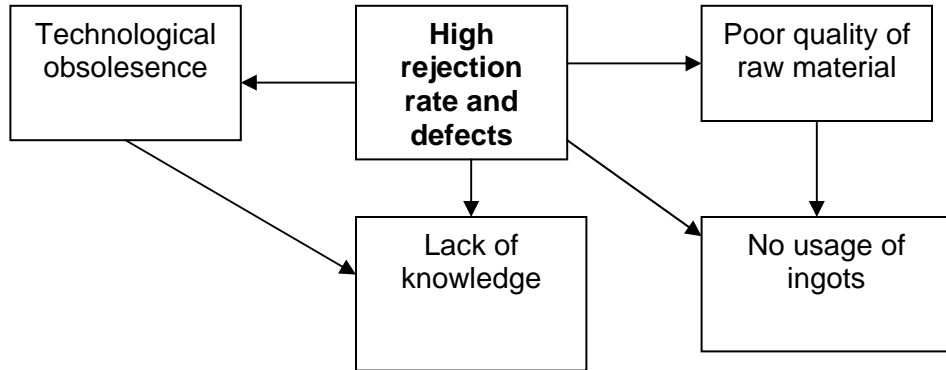


Machinery & Production

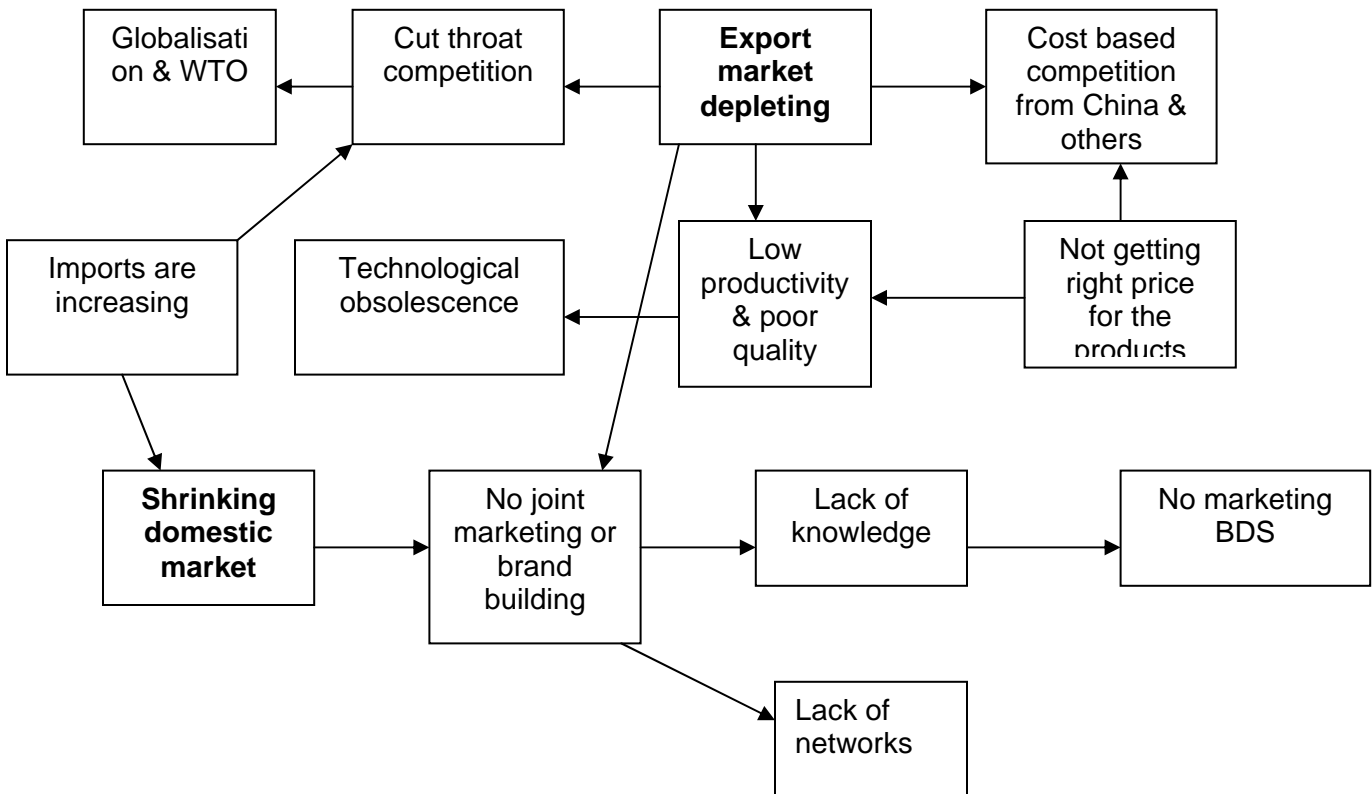


Products & Marketing

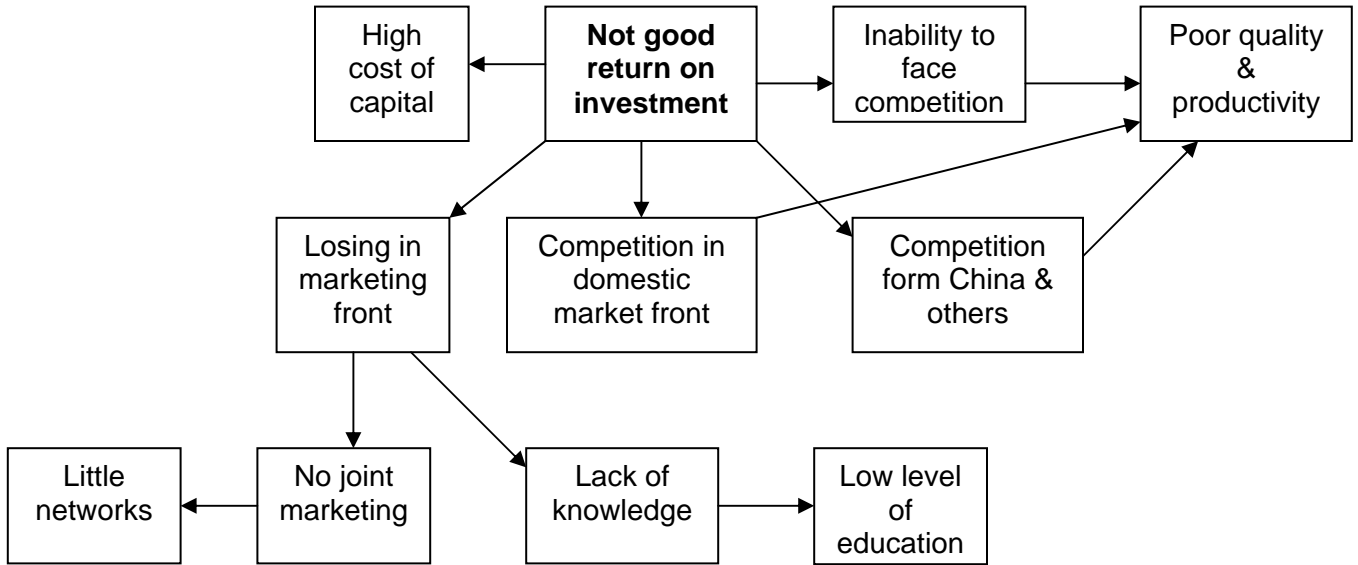
Products



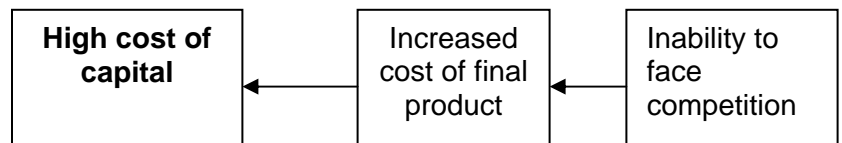
Marketing



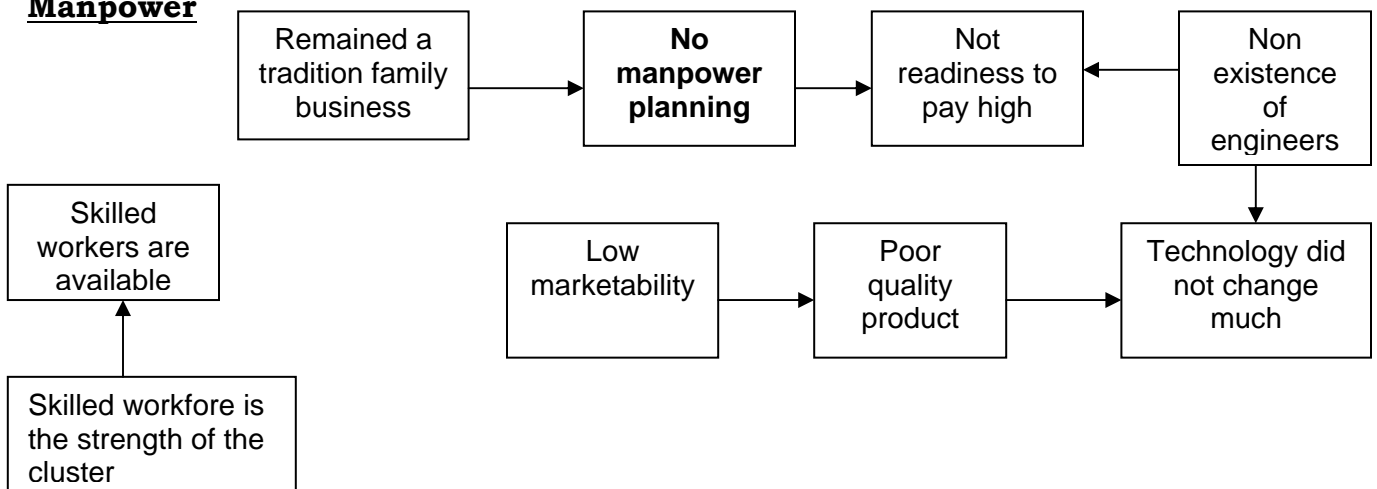
Entrepreneurs and their enterprises



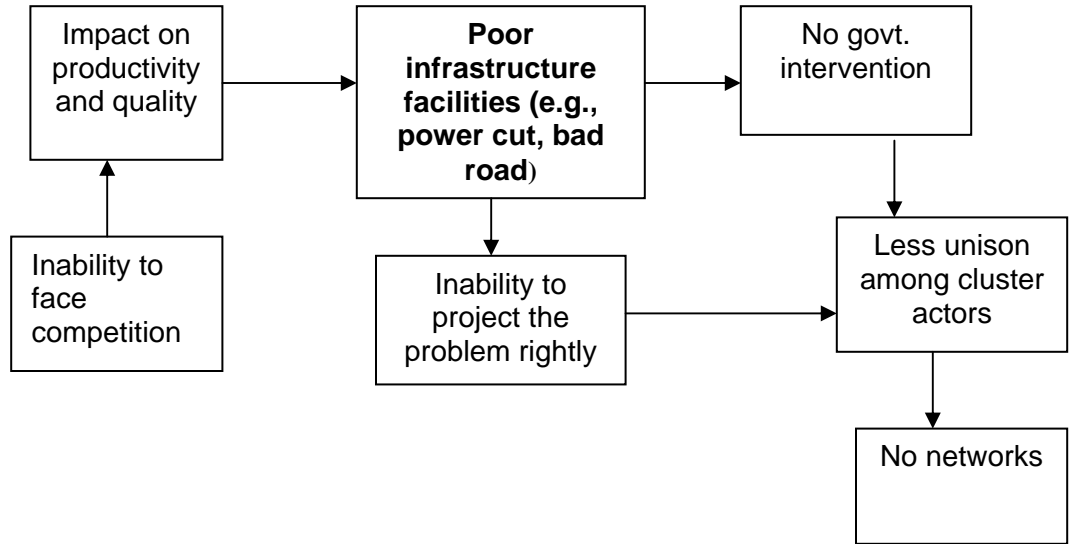
Finance and working capital



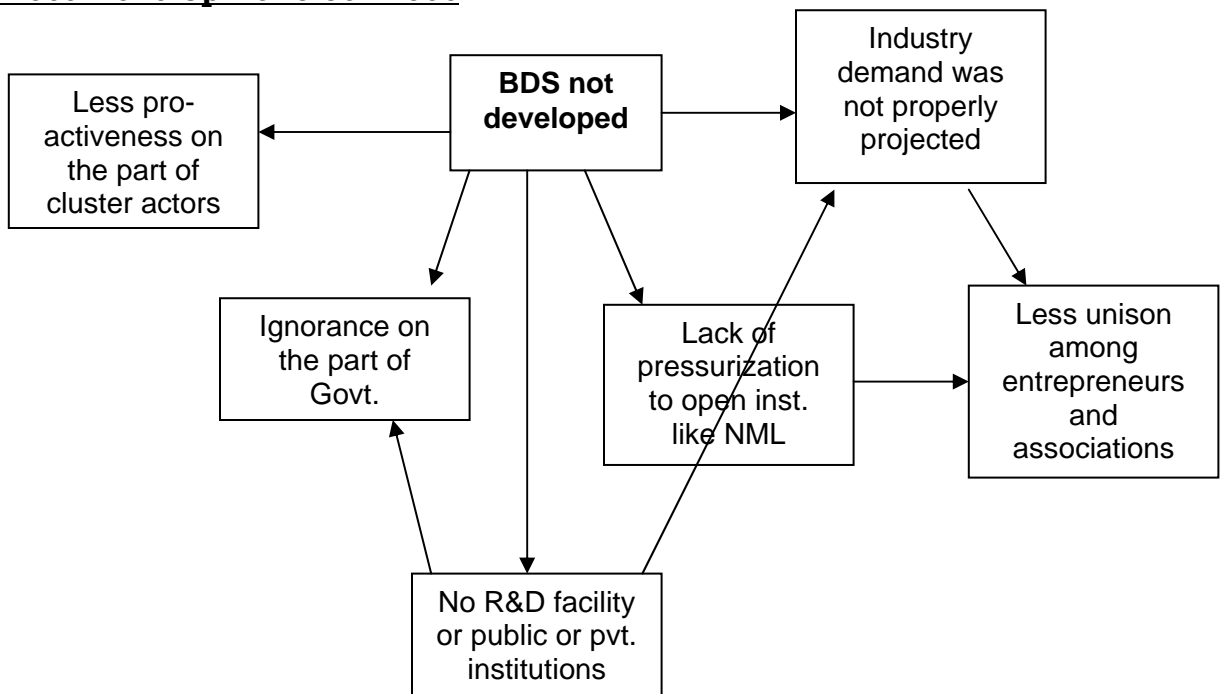
Manpower



Infrastructural issues



Business Development Services



5. Industry Structure Analysis:

<p>Entry barriers:</p> <div style="text-align: center; border: 1px solid black; width: 100px; height: 40px; margin: 10px auto;">Low</div>	<p>Rivalry:</p> <div style="text-align: center; border: 1px solid black; width: 100px; height: 40px; margin: 10px auto;">Moderate</div>
<p>Bargaining power of the suppliers:</p> <div style="text-align: center; border: 1px solid black; width: 100px; height: 40px; margin: 10px auto;">Low</div>	<p>Bargaining power of the customers:</p> <div style="text-align: center; border: 1px solid black; width: 100px; height: 40px; margin: 10px auto;">High</div>

The above figure depicts the Industry Structure Analysis of the brass parts cluster in Jamnagar. This industry structure analysis determines firm level profitability, competition, SME viability and prospect of growth.

The entry barrier in the above cluster is low because anyone can enter the industry with a minimum investment of Rs. 30,000-50,000/- and inputs are available plenty. There is no proprietary skills/ technology and there is hardly any product differentiation and brand identification. But for some enterprises, customer loyalty is very high. There are enterprises which are supplying their parts, components to the large industries and fixed clientele abroad for the last 20-25 years.

Another positive factor is the economies of scale which means the more you produce, the less is per unit manufacturing cost. These two factors (customers loyalty and economies of scale) pose some impediment for new firms entering into business. Adoption of latest technology (which is a costlier affair) can certainly provide impetus for the growth of the large firms. Moreover, enough emphasis should be given on brand building. Technology and brand can serve as entry barriers.

The rivalry amongst firms is moderate. Though there is rivalry in the domestic market, but it is limited in the exporting market front. Most of the producers have fixed clientele abroad to whom they are supplying for the last 15-20 years. There are large number of firms in the industry and the product differentiation is minimal. With the opening up of economy after globalisation, the growth potential of the industry is tremendous, provided technology is upgraded, economies of scale is achieved and marketing consortia is formed. Rivalry among firms can be reduced by encouraging non-price competition and product differentiation; notional or real (may be with diversification). Rivalry is moderated by the fact that the exit barrier is also very low.

The bargaining power of the suppliers in the cluster is low and there are large number of suppliers available in the market. There is hardly any switching cost from one supplier to another and no input differentiation. Moreover, the brass parts industry is an important customer for the suppliers. There is hardly any evidence of suppliers forward integrating. The bargaining power of the suppliers can be further reduced by forming hard networks for common bulk purchase.

So far bargaining power of the customers is concerned, it was found to be on the higher side. There is hardly any product differentiation and the customers can switch from one supplier to another. The switching cost is also very low. Moreover, customers are quality and price sensitive. However, for some enterprises there is strong customer-supplier relationship and the level of trust and loyalty is very high. Some customers of the large industries do not want switch over to new supplier on the fear of getting bad quality and not “in-time” delivery. The bargaining power of the customers can be reduced by forming consortium and brand building.

6. Strategy :

The brass parts cluster in Jamnagar has enough growth potential provided strategic intervention is made in certain “key areas”. The clustering phenomena was a natural process and it showed resilience in terms of encountering various problems in the past.

The “key areas” in which the strategic interventions are needed are given below :

- Technology upgradation
- Networking among cluster actors
- Developing BDS
- Export-led growth
- Liberalising Govt. rules & regulations

These are discussed in detail in the Action Plan. Moreover, for making the cluster development initiative sustainable in the long run, it is imperative to ensure “capacity building” of the cluster actors. An outside organisation intervention cannot produce desired result, especially in the long, unless efforts are made for capacity building of the cluster actors. The cluster actors should realise “the need-to-change” (in the changing scenario) and initiate actions in order to solve their problems and making themselves competitive. What is important here is that the process of change should be internalised rather than imposed.

7. Action Plan :

(i) **Technology upgradation :**

The manufacturing process of brass parts has remained mostly traditional. There is hardly any change in technology for about the last 50 years. The process of melting, casting, machining and plating have not changed much. Some pioneers started manufacturing brass buttons, screws, pins, etc. and others did follow. Whatever the process the pioneer adopted, also followed by other entrepreneurs. As a result, the quality and productivity of the cluster is very low. Moreover, there are problems like rat bites, blow holes, pin holes, shrinkages, dimensional distortions, coring & segregation, plating pill off, staining, etc. There is high rejection rate and lot of time and labour is wasted in correcting defects. Some times, $\frac{3}{4}$ of the material is recycled because of not having the right technology (e.g., brazing technology).

In order to eradicate these problems, there is an urgent need to establish a Common Facility Centre (CFC) and install pressure die-casting machine, temperature recording and controlling devices in the furnace, electropolishing plant, barreling process, brazing paste etc. The above technologies will help in;

- Minimising rejection rate
- Improving productivity and quality
- Saving of labour and time
- Eradicating dimensional distortions
- Producing precision parts & components
- Making the cluster competitive

Another thing which is also lacking in the cluster is 'diversification'. For example, no one in the cluster is manufacturing marine hardware, turbine parts, beryllium copper etc. These are the areas where the cluster can concentrate and demand of these products is going to increase in the coming years. Moreover competition in this product segment is also limited.

The cluster can also concentrate on substitute products. For instance, the cycle tube valve can also be made of hard aluminium (alloy) with brass plating. The technical characteristics and the hardness of the valve can be maintained and the cost will reduce drastically.

(ii) **Networking among cluster actors :**

The networking among cluster actors is very limited. Moreover, the role of the association ends in organising periodic meetings. Only when the entrepreneurs

face pressing problems, they do interact in groups. For example, entrepreneurs jointly written to the State & Central Govts. for liberalising their rules and regulations so that they do not need to comply with the formalities of 13 different regulatory authority/ dept. Otherwise, the interaction is very limited. This may be due to the fear that technology may be replicated and marketing related information may be passed on.

A strong network has to be created among cluster actors so that they can jointly solve each other's problem, pressurize Govt. in liberalising the rules & regulations. They even can jointly market their products in the global market in order to compete with "the economies-of-scale" approach of Chinese manufacturers. The industry associations need to be made proactive and networking has to be strengthened. This can be taken up as a part of capacity building exercise. The benefits of networking have to be explained to them.

(iii) Developing BDS :

Growth of Business Development Services especially in technical and marketing areas, are very limited. There is no technical training institute, no R&D and testing laboratory. As a result, the technology and the process of manufacturing has remained unchanged. Moreover, there is no consultant/ experts who can guide them in international marketing, export procedures & documentation, etc. Whatever the entrepreneurs learnt, they learnt it by doing it or from other entrepreneurs.

Therefore, Business Development Services have to be developed in the cluster. This will be an effective instrument of ensuring sustainability of the desired initiative. Branches of NML, Indian Institute of Foundry, testing laboratory, technical training institute etc. have to be established on an urgent basis.

(iv) Export-led growth :

The export of brass metal handicrafts of Moradabad is 2000 crore per annum against its turnover of 4000 crore. Whereas only 30 crore of brass parts is exported annually given the fact that production of this cluster is 3000 crore. There is a high disparity in the export performance between the brass metal cluster in Moradabad and Jamnagar.

The brass part industry in Jamnagar is mostly depended on domestic market.(at present) and the major products are cycle/ automobile tube vale, building hardware and sanitary fittings. On the contrary, Moradabad is basically depended on export market.

A few years ago, Jamnagar was one of the largest exporters of cycle/ automobile tube valves in the world. These tube valves were exported in countries like USA, Russia, Canada, France, Germany, Indonesia, Singapore, Malaysia, Gulf Countries & Africa. However, specially after liberalisation they are facing stringent competition from Chinese manufacturers. Because of adoption of latest technology, the entrepreneurs in China are able to improve on quality and productivity. Moreover, due to economies of scale they are able to offer products at lower prices. As a result, importers in developing countries started procuring from countries like Japan, China, etc. The entrepreneurs in Jamnagar have suffered heavily.

An export-led-growth strategy have to be pursued in order to revive its reputation in the international market. Brand building, participating in international exhibitions, developing brochures, joint marketing, forming consortium are some of the instruments of doing it. This is also necessary because the domestic market is getting saturated. Moreover, technology upgradation will enable them in improving quality and productivity and reducing the cost of manufacturing. They will be able to manufacture products of international standard. In addition to that, the entrepreneurs will be trained in 'how to overcome recession'. Recession marketing will be an important intervention.

Given the fact that middlemen/ traders are enjoying most of the profit share, efforts should be made to establish direct linkage between manufacturers and customers (though are a few entrepreneurs who are doing it). Training on international marketing, brand building, export procedures and documentation, exposure visit (cluster visit), participating in international exhibition etc. have to be organised.

(V) Liberalising Govt. rules and regulations:

The entrepreneurs are finding it difficult to comply with the rules and regulations of several Govt. departments. Most of their time is spent in filling up forms and submitting papers as per their requirements. According to the estimate provided by Patel Colony Industrial Association an entrepreneur needs to interact with 14 Govt. departments and fill up 154 different forms.

Therefore Govt. rules and regulations have to be liberalised The role of the Govt. department should be a facilitator rather than regulator. An awareness workshop for the Govt. officials in the form of "department-enterprise interface" can be organised.

The import duty on brass scrap is 67% compared to 5% in China and Tiwan. This itself makes the final product costlier than China. Some action needs to be initiated in reducing import duty. Moreover cost of capital has to be reduced and

made as per international standard. (the normal rate of interest in India is 125 compared to 5% in China, Japan.). All these require sensitising Govt. departments and officials.

Based on the above analysis the following activities can be organised at Jamnagar.

- ☞ Networking among cluster actors
- ☞ Organising Cluster visits
- ☞ Training Programme on AMT
- ☞ Workshop on Globalisation & WTO
- ☞ Training programmes on marketing challenges in brass parts industry
- ☞ Training on 'diversification as a strategic option'
- ☞ Training on international marketing
- ☞ Joint participation in national and international fairs
- ☞ Workshop on importance of health and safety measures
- ☞ Organising buyer-seller meet
- ☞ Workshop on export procedures and documentation
- ☞ Delegation to international markets
- ☞ Value chain analysis
- ☞ Study in understanding the present manufacturing processes & identifying the scope for improvement
- ☞ Workshop on technology upgradation
- ☞ Implant technological training to the entrepreneurs
- ☞ Personal counselling in solving technological problems
- ☞ Quality standardisation
- ☞ Developing BDS
- ☞ Department (Govt.) – Enterprise interphase
- ☞ Establishing Common Facility Centre (CFC) for demonstration and adoption of technology

9. Proposed activities for the coming year

- 1) Networking among cluster actors
- 2) Organising Cluster visits
- 3) Training programme on AMT
- 4) Training on international marketing
- 5) Training on 'diversification as a strategic option'
- 6) Study in understanding the present manufacturing processes & identifying the scope for improvement
- 7) Workshop on technology upgradation
- 8) Implant technological training to the entrepreneurs
- 9) Personal counselling in solving technological problems

SWOT Analysis:

STRENGTH

Markets: Strong presence in the domestic market Ancillary arrangement with large industries Developing trust and relationship in the long run Not much import of brass parts (till date)
Technology : Availability of customised machines Machines are available at low prices Demonstration effect
Inputs availability : Raw material is available in sufficient quantity. Availability of other inputs like borax, plating chemical, molasses, tools, crucible, mould, dye, buffing wheel & powder, etc.
Innovation capability : Ability to develop duplicate & customised machines Flexible operating practices
Skills : Workers are very skilled and working like machines Most of the job is learnt while doing it Vast pool of skilled labourers
Business Environment : Stable business environment till 1998

WEAKNESS

Markets : Loosing ground in the international market Imports started coming in Little information on changing customer preferences in the international market Middlemen/ traders enjoying most of the profits in the value chain
Technology : Traditional method of production Low level of technological development Manufacturing defects and high rejection rate Problems with quality and productivity
Inputs availability : Most of the raw materials are imported High custom duties (on raw material-about 67%) making imports dearer

<p>Innovation capabilities : Hardly any changes in design, technology, process and marketing</p>
<p>Skills : Non-existence of technical training institute No skill upgradation training for the workers</p>
<p>Business Environment : Business Environment is changing Competition is going to increase</p>

OPPORTUNITY

<p>Markets : Globalisation can usher tremendous market potential for the competitive firms (entire globe is the market – global village) Tariff and non-tariff barriers are depleting Quality & productivity is the rule of the game Enterprises can join hands together for international marketing, brand building and participation in trade fairs.</p>
<p>Technology : Advent of latest technology with the intervention of IC office, EDI & UNIDO. Creation of technological awareness among entrepreneurs Tremendous enthusiasm on the part of the cluster actors Prospects of establishing Common Facility Centre is becoming brighter Possibility of establishing R&D institutions or branch of CSIR laboratory (like NML)</p>
<p>Inputs availability : Competition is going to make availability of inputs cheaper and sufficient</p>
<p>Innovation capabilities : Exposure visits, participating in exhibitions may make the entrepreneurs and technicians more innovative and problem solving Demonstration effect</p>
<p>Skills : Increased awareness is likely to improve the skill base of the workers</p>
<p>Business Environment : Changing business environment can provide opportunity for enterprising firms.</p>

THREAT :

<p>Markets : Competition is going to increase Overseas importers are smart enough to change their sourcing country Imports is going to increase in the coming years Survival of the fittest</p>
<p>Technology : Low level of technological development Technology can impose a major threat unless it is changed/ modernized Technology is an ever changing process</p>
<p>Inputs availability : Difficulty in encountering competition unless raw material imports are made cheaper (90% of the raw material is imported and the custom duty is much higher compared to China & Taiwan). Quality of raw material</p>
<p>Innovation capabilities : Innovation is required in every facets of business operations</p>
<p>Skills : Skill base of the workers needs upgradation to adopt latest technology</p>
<p>Business Environment : The changing business environment is always a problem for the less enterprising firms.</p>