Competitiveness Analysis of a Medium Scale Organisation in India: A Case

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Abstract

Competitiveness of an organisation can be defined as its ability to sustain its long-term performance better than its competitors in the market. It can not be judged only by certain financial performance measures. For sustaining long-term performance, organisations need to focus on enablers and its results. This concept has been applied in present case study. Different issues of firm level competitiveness such as assets, pressures, constraints, strategy development, processes followed by organisation and performance have been analyzed. It has been illustrated with this study, that even a medium scale organisation can sustain its competitiveness in globalised market by using its limited resources effectively and updating existing facilities. Application of advance management systems such as Integrated Manufacturing Systems (IMS), Toyota Production System (TPS), up gradation of technology and proper utilisation of human resource have emerged as critical success factors for improving competitiveness.

Keywords: Competitiveness, Integrated Manufacturing Systems, Small and Medium Enterprises.

Introduction

Small and medium scale organisations are considered backbone of economic growth in all countries. Since economic reforms in 1991, Indian small and medium enterprises (SME) are facing a very different scenario compared with the protective environment of the past. Due to global competition, technological advances and changing needs of consumers, competitive paradigms are continuously changing. These changes are driving firms to compete, simultaneously along several different dimensions such as design and development of product, manufacturing, distribution, communication and marketing. Leading firm is characterized by dynamic strategic behaviour in terms of innovation, relationship management with market and suppliers, internationalisation processes, ability to organize and manage business networks etc. (Chiarvesio et al., 2004). According to Ajitabh and Momaya (2004), firm's competitiveness is dependent on its ability to provide goods and services more efficiently than others involved in the market place. Competitiveness can be studied at three levels: country, industry/sector and firm. Although all the three levels of competitiveness are interlinked with each other but keeping in view that it is firm that face direct competition and actually competes in the market place, this paper tries to analyze firm level competitiveness. D'Cruz (1992) defines firm level competitiveness as ability to design, produce and market products or services superior to those offered by competitors.

The industry and country are facilitators in providing the necessary infrastructure and support to the firms. Competitiveness of an organisation can be influenced by external as well as internal factors. Internal factors are material and energy prices, quality of manpower, R&D and technical capabilities, logistic management and other processes whereas external factors are potential new entrants, substitute product, bargaining power of the buyers and bargaining power of suppliers (Porter, 1998). In addition to this, other factors may be government polices, capital resources, availability of technical manpower and infrastructure of roads, communication and energy.

In most of the studies, competitiveness of an organisation is analysed in terms of certain financial parameters but according to Man et al. (2002), Competitiveness of small and medium enterprises (SMEs) should comprise the four major constructs relating to the firm’s internal factors, external environment, influences of the entrepreneur and the firm’s long-term performance. Singh et al. (2005) specified these four factors for the purpose of measuring competitiveness index of an organisation as assets, pressures, constraints, strategy development, competitive priorities, processes and performance in their framework. A Case study of an organisation from auto component sector has been considered to illustrate this concept. This paper discusses research objectives and framework for case study, company profile and other issues such as assets, pressures, constraints, strategy development, competitive priorities, processes and performance of the case organisation.

Research Objectives and Case Study Framework

According to Automotive Component manufacturers Association of India (ACMA), the domestic auto component
sector reported a total production of approximately $8.7 billion compared to $6.7 billion in 2003-2004 (approximately 30% growth). In spite of this growth rate, export share of this industry is just 0.25 to 0.5% of the global auto component industry sales (Economic Times, 2005). This implies a huge opportunity for the Indian auto component sector. To grab this opportunity Indian SMEs need to be competitive in domestic and global market simultaneously. Therefore this study is aimed to

- Illustrate the concept of competitiveness by taking a real life example to motivate other SMEs.
- Develop a framework for analyzing competitiveness issues.
- Identify major pressures and constraints of SMEs in highly competitive auto component sector.
- Identify key success factors for sustaining competitiveness of a medium size organisation.

Some of the models, which have been developed earlier for studying competitiveness, are Confederation of Indian Industries (CII)-Business Excellence Model (CII, 1994), Capability maturity model (CMM, 2002) and Assets, Processes and Performance (APP) model (Momaya, 2000). Since the above models do not consider the effect of pressures and constraints on competitiveness of SMEs, therefore framework for present research (Figure 1) is based on a study made by the authors in this area (Singh et al. 2004). According to this framework competitiveness of an organisation will depend on its assets, pressures, constraints, strategies for selecting competitive priorities and processes as well as performance. In present framework, strategy formulation has taken a center stage. According to this framework, assets, pressures and constraints will decide various strategies of organisation. Williams et al. (1995) identified significant relationship between manufacturing strategy and firm performance. In particular, the manufacturing function’s quality assurance process and its ability to deliver a quality product/service were found to correlate significantly with firm performance. Based on these strategies competitive priorities will be decided. Based on competitive priorities, various processes for improving product quality, machine utilisation, customer satisfaction, supplier development and cost reduction will be undertaken by organisation. Intensity and effectiveness of these processes will determine the performance of organisation. For measuring performance, quantitative and qualitative factors, such as market share, return on investment, profit after tax, export, customer satisfaction and employee satisfaction etc will be considered. Key items of different components of competitiveness framework are given in Table 1 (Singh et al. 2005). This framework can be also used for diagnostic and strategy formulation. Any organisation under study can be evaluated on the basis of various key items of framework. On the basis of mapping of an organisation on these key items of competitiveness, strong and weak areas for the organisation can be identified. Strategies should be framed to overcome on weak areas and take leverage on strong areas for improving competitiveness. This framework can be also used to quantify the competitiveness of organisation.

Competitiveness Index of organisation can help it to compare with competitors in the market. For the case company this diagnostic and strategy formulation approach has been demonstrated in following sections. Various sources of information about the company consist of annual reports, control charts, documentation of various processes and discussion with managers of various departments during regular scheduled visits.

### Figure 1: Framework for Competitiveness Analysis

![Framework for Competitiveness Analysis](image)

### Case study

Specific issues discussed in this case study are company profile, assets, pressures and constraints, competitive priorities, management practices followed by organisation, performance analysis, evaluation of competitiveness index and Strength, weakness, opportunity and threats (SWOT) analysis.

### Company Profile

SL Limited (SLL) was established in 1985 in technical collaboration with Denso Corporation, Japan to manufacture automotive air-conditioning systems. It is an ISO 9001, QS 9000, ISO 14000, TS16949 and OHSAS 18000 certified company. It has investment in plant and machinery of Rs 1,762.72 million (40 million US$). Presently, SLL has about 70% market share in India. The plant capacity of SLL has increased from 15000 units per annum in 1985 to approximately 5,00,000 units per annum in 2004. The company has the capability to manufacture compressors, condensers, heat exchangers and all the connecting elements that are required to complete the AC loop. It has also set up facilities for squeeze die-casting and manufacturing of multi flow condensers. It is the only company in India which has integrated manufacturing facility to manufacture all components of the AC loop.
### Assets
- Lower Cost than competitors.
- Relationship with suppliers and customers.
- Higher Level of IT applications.
- Growth conducive organisation culture.
- Employees’ awareness and commitment for competitiveness.
- Higher level of investment in R&D, Technology, HRD and Marketing.

### Pressures
- To reduce cost
- To improve quality
- To increase range of products.
- To reduce delivery time
- To cater frequent changes in supply schedule.
- To deliver in small lots

### Constraints
- Shortage of technical manpower
- Poor infrastructure for training
- Unreliable vendors
- Lack of quality consciousness
- Lack of support from customers
- Poor R&D infrastructure
- Poor financial position.

### Competitive Priorities
- Improvement in Product quality
- Reduction in Product cost
- Timely delivery
- Flexibility in production system
- Vendor development
- Human resource development.
- Effectiveness of value chain
- Leaner organisation structure
- Labour productivity
- Total productive maintenance
- Environment protection
- Employees’ welfare

### Processes
- Strategy Development
- Inventory reduction
- Improvement of process capability
- Improvement in product design
- Development of new products
- Automation of operations
- Identification of niches
- Introduction of new technology
- Total productive maintenance
- Identification of market changes
- Optimisation of work environment
- Use of information to optimize decisions
- Use of customer to define quality standards
- Development of employees’ skills
- Supplier development
- Customer satisfaction

### Comparative Performance Measures
- Manufacturing cost
- Level of inventory
- Delivery speed
- Flexibility in production
- Percentage rejection
- Labor productivity
- Capacity utilisation
- Employee turnover rate
- Throughput (Rs/hr)
- Employee satisfaction
- Customer satisfaction
- Supplier satisfaction

### Growth Oriented Performance Measures
- Market share
- Sales turn over
- Profit after tax
- Return on investment
- Exports

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Table 1. Key Items of the Components of the Framework
In SLL, overall decisions are taken by the business head in consultation with Manager Director. Head Engineering takes decision regarding product and process. The department heads are also authorized to take departmental decisions in consultation with business head. Organisational structure for SLL is shown in Figure 2. It aims to maintain the position of the market leader in the manufacturing and sale of AC systems and components. In doing so, it strives towards total customer satisfaction through the prompt delivery as well as reliable and cost effective quality products. In its pursuit of excellence, SLL strives for achievement of an eco friendly environment and employee’s satisfaction. Main customers of SLL include: Maruti Udyog Limited (MUL), Tata Motors, Hindustan Motors, Bajaj Tempo Limited, Honda Siel, Reva Electric, Denso, Kirloskar. The main competitors of SLL are Visteon, Behr India Limited, Sanden, Vikas and Delphi. Different issues related with competitiveness of SLL have been analysed in following sections.

![Figure 2: Organisational Structure for SLL](image)

**Assets of SLL**

Competitiveness of an organisation can be derived through diverse sources. The tangible and intangible assets and processes within an organisation that provide competitive advantage can be termed as sources of competitiveness (Momaya, 2000). Competitiveness is often derived from basic factors such as natural endowments. For instance, the competitiveness of the overseas ventures of Japanese firms has been derived mainly through factor endowments such as land and labour. In order to achieve the required levels of excellence, SLL focus on two key assets: people and technology. For SLL, some of the major assets are complete in-house manufacturing, original equipment manufacturing (OEM) customers, respected after sales market, training facilities, modern management practices and wide applications of information technology (IT) tools.

SLL has got infrastructure to accommodate manufacturing of all the components of an air conditioner with an installed capacity of 500,000 AC kits per annum. It has also got wide spacious rooms for the efficient working of 817 employees. It has logistic advantage as 70% of its suppliers are in radius of 30 kilometers whereas majority of its customers are in radius of 500 kilometers. Some of the intangible factors, which SLL enjoys as its assets for being competitive in market are brand name, technical collaboration with Denso, strong supplier base, able and committed leadership, good customer relationship, high level of awareness for competitiveness among employees.

SLL has adopted world class technology in condensers, evaporators and compressors to obtain improved air conditioning performance without changing the size of these components with assistance from its Japanese collaborator. With the help of new technology, SLL has developed compressors, capable of using eco-friendly refrigerants HRC 134a. This gives significant advantage of better performance and light weight. Similarly latest technology condensers are multi flow type and evaporators are MS type. These new type of heat exchangers gives advantage of high performance, compactness and lightweight against the existing serpentine ones. It uses thinner fin tubes along with unique refrigerant flow to be highly compact and efficient. The weight of these new type of heat exchangers are 50% less and the performance is 15% better than the traditional serpentine heat exchangers. Therefore new technology adopted by SLL ensures high energy saving and fuel efficiency.

SLL is very strong in R&D facilities to meet the requirements of its customers. SLL’s R&D department uses the state of the art computer aided design technology CATIA for engineering design and product development, for component and product evolution to ensure reliable and high performance of products. Simulation and tracking are used for project management. Some of the facilities available for product development and evaluation are design analysis software, product life cycle management (PLM), environmental chamber, vibration testing and bench test rig (calorimeter).

Another major asset of SLL is extensive applications of IT tools in different departments of organisation. SLL consider IT applications as a major strategy to achieve its...
vision of maintaining and enhancing customer focus, innovation and application of world class technology through PDCA, elimination of waste. Different business solutions available at SLL are shown in Figure 3. SLL has implemented ERP software SAP R/34.6C in 2002. In 2002-03, SAP was implemented in financial accounting, product cost controlling material management, production planning, sales and distribution, and quality management. During the year 2003-04, MRP, warehouse management were the major endeavors for SAP investment. In year 2004-05, SAP was implemented in supply chain department and performance management. Some of the IT applications at SLL are as follows:

- IT is used in new investments like communication with the vendors and customers, placing and checking orders online, reporting defects online etc.
- IT is used for procuring manpower according to the demand and requirement of the company.
- SLL has upgraded their manufacturing facilities from conventional machining methods to highly sophisticated CNC machines by using IT tools
- For tracking purposes, daily records are maintained online in the central database. Bar coding is used for the tracking of material. Punch cards are used for the tracking of employees.
- IT is also used for providing training to employees with

| In such a dynamic environment, organisations that are able to continually build new strategic assets faster and cheaper than those of their competitors will create long-term competitive advantage. |

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the help of presentations, slides, video conferencing, voice recording, simulation, photographs etc.

By using IT tools, SLL has experienced substantial decrease in cost of the products as overheads like cost of placing the order, making daily records, transportation cost, manpower required gets decreased.

Intangible assets for SLL are brand name, technical collaboration with leading Japanese company in this area, strong supplier base, able and committed leadership, motivated and highly satisfied employees, good customer relationship, high level of awareness and commitment for competitiveness among employees.

Pressures and Constraints

Due to globalisation of market, SMEs are feeling severe pressures to sustain their long term performance. To meet these demands of market, organisations feel certain constraints. Although SMEs continue to have the advantages of flexibility and rapid response, the traditional disadvantages due to size limitations may have worsened due to the demand for multiple technological competencies and by increased competition (Narula, 2004).

The main barriers to be competitive for SMEs are inadequate technologies as well as inadequate in house human expertise and poor financial resources. Resource scarcity can impact on the ability of smaller firms to enter global markets and can also limit a smaller firm’s ability to reach more advanced stages of internationalisation thereby affecting the competitiveness of organisation. SLL feels following pressures from market. These pressures are also shown with the help of fish bone diagram in Figure 4.

- To reduce 5-10% cost annually in spite of continuous increase in cost of inputs such as raw materials, labour, transportation and energy.
- To continuously reduce product rejection rate and to increase in warranty period.
- To cater frequent change in supply schedule and delivery at shortest time.
- To increase range of products due to entry of many OEMs in market and fast changing models of automobiles.
- To expand its production base to cater to the ever-increasing demand of its customers. Recently SLL lost an order from Tata-Motors due to delay in supply of AC kits for Indica cars due to that Tata Motors have started to look for another option for fulfillment of its requirement on time.

In meeting above challenges of market, SLL feels following constraints.

- In spite of increase in R&D facilities and technical up gradation, SLL faces some problems in meeting demand of export market in terms of design and development capability and product rejection rate.
- Since the SLL has got in house manufacturing of all its components they require minimum number of parts from vendors and hence their vendor relationship is poor. This results in unreliable vendors.
- SLL also faces hindrances from government agencies in its expansion plan to meet the demand of market.
- The growth of employees has been limited in SLL, which makes the employees and the workers less motivated towards their work in later stage of their service. It causes more employee turn over rate and causing loss to SLL's human resource.
- SLL has got the R&D support from Denso. It has got technically advanced man power and systems, but failed to utilize its capacity efficiently resulting in not able to enjoy the monopoly power in spite of being the market leader in given segment of product.

To overcome these constraints SLL is increasing its investment in training of employees, IT applications and R&D. In addition to this it is helping as well as involving its vendors in various processes by vendor rating and rationalisation.

Development of Strategies

In recent years, many large organisations all over the world have been focusing on their core business, down sizing and outsourcing. This trend has given many opportunities for SMEs to work in partnership with them. To grab these opportunities, SMEs in all sectors need to develop effective strategies for providing higher added values to customers in terms of cost, quality and services at shortest possible time. If an organisation wants to make a difference as a leader, it has to give time for developing strategies. Voss (2005) has observed that managers of SMEs have poor skills in reflecting upon their companies strategically. These limited skills make organisations in a sense out of control.

In sustaining their competitiveness, SMEs face many problems due to shortage of finance, skilled manpower and advance technology. Therefore strategy should match the organisation’s resources (e.g. financial, manufacturing,
marketing, technological, and work force) to its changing environment and in particular its markets and customers in the pursuit of its goals and objectives. In such a dynamic environment, organisations that are able to continually build new strategic assets faster and cheaper than those of their competitors will create long-term competitive advantage. The new competition is in terms of reduced cost, improved quality, products with higher performance, a wider range of products and better service, and all delivered simultaneously (Dangayach and Deshmukh, 2001).

It is generally observed that SMEs are reluctant for changes due to fear of failure and other constraints. Therefore SMEs should select their competitive priorities and processes carefully. Competitive priorities represent a holistic set of tasks, which should be performed by the manufacturing function in order to support the business strategy. Major competitive priorities for SLL are to reduce product cost, vendor development, to increase delivery speed and reliability, to improve product quality and to increase labor productivity. Some of the strategies adopted by SLL are:

- Involvement of employees at all levels and creating sense of ownership among them.
- Giving more emphasis on training of employees.
- Cost cutting through reducing inventories, reducing waste, better technology, better productivity and better supply chain management.
- Conducting quality audits for the entire department at periodic level.
- Upgrading process and product development capability.
- Growth conducive organisation culture.
- Updating technology continuously and simultaneous improvement in all other areas.
- Reducing dependence on its collaborator continuously.
- Developing strong in house R&D base to become self reliant.
- Developing dealers’ network.
- Awareness about energy conservation and environmental issues.
- Building new plants to meet the increasing demands of its existing customers.
- Customer satisfaction survey.

Depending on its strategy formulation and competitive priorities this organisation decides about various processes to be followed.

**Processes**

In present scenario of hyper competitive and challenging environment, firms should excel simultaneously in several areas without trade off, including innovativeness and responsiveness to their customers. The major challenge for SMEs is to continuously provide innovative and customised products using the best available process technologies. Improvements in competitors’ capabilities have shortened product life cycles, elevated product complexity and expanded accessibility to new technical breakthroughs. Capacity of a firm to maintain reliable and continuously improving business and manufacturing processes to meet above challenges is a key condition for ensuring its competitiveness in the long run. Some of the processes followed by SLL are discussed in following sections.

**Integrated Management System (IMS)**

IMS consists of three sub systems namely: Quality management system (QMS), Environment management system (EMS) and Occupational health and safety management system. QMS tries for customer satisfaction and competitive advantage. Quality policy of the company is to achieve customer satisfaction through adherence to quality systems and continuous improvement activities for delivering timely, cost effective and quality products and services.

EMS tries to minimize environmental impact and Occupational health and safety management system tries to eliminate or minimize physical harm or damage. SLL is committed to achieve total customer satisfaction by continual improvement in environmental performance for manufacturing of auto air conditioning systems and components through:

- Constantly striving to achieve and monitor eco efficiency by using lesser materials and energy as well as generating lesser waste.
- Complying with applicable legal/regulatory and other environmental requirements.
- Building awareness by effectively communicating environmental policy across the supply chain and workforce.
- Exploring opportunities for reuse of used material and manufacturing by products.

For satisfying its customers, SLL takes regular feedback on various factors such as quality, cost, delivery speed, technical/commercial assistance provided, management and other issues related to customers. The Managing Director directly handles the responses of customers. For environmental awareness and employees safety, it has taken various steps such as recycle and reuse of materials, prevention of all kind of pollution for green productivity, use of personnel protective equipment, noise level monitoring of power-generating set below 70 Db, green area near factory, awareness amongst employees by measures like...
painting; quiz competition on environment, discouraging the use of poly-bags, visiting cards of recycled paper, segregation of waste at source of generation by using red, blue and green bins.

Two main structures of integrated management systems are documentation structure and information structure. Documentation structure consists of manuals, SLL processes, references, formats whereas assessments and information structure consists of internal audits, external audits, management review, customer information, monitoring trends and knowledge bank. Basic management principles of this system are customer focus, leadership, involvement of people, continual improvement and mutually beneficial vendor relationships. All operations of this system are performed according to PDCA (Plan, Do, Check and Act cycle). Integrated management system has benefited to the company in terms of better customer satisfaction, competitive advantage, minimisation of environmental degradation, better safety of workers and enhanced goodwill in the market.

**Toyota Production System (TPS)**

SLL has implemented Toyota Production System (TPS). Training for SLL core team at MUL began in March 2003 and it started off in April 2003 at SLL. TPS helps to make an organisation an effective one. An effective organisation is that which focuses on customers, fast and flexible decisions, productivity and cost effective measures, benchmarking the best. In order to achieve the productivity and cost effectiveness, TPS is one of the strong tools. Basic concepts of TPS are satisfaction of customers' demands with minimum consumption of resources and maximized efficiency.

Various means of achieving TPS objectives are optimum use of manpower and machines, minimisation of inventory, synchronisation of flow, fool proofing and visual control. TPS has been devised to optimize the basic use of six resources to reduce the production cost i.e. Machine, Human, Material, Energy, Environment and Time. TPS tries to divide a physical activity in three forms saleable job, not saleable but necessary, and waste. TPS tries to identify waste in form of over production, idle time, unnecessary transport, unnecessary movement, excessive inventory, producing defective part, unnecessary inspections, unnecessary processing. It also identifies 3 M’s (Muri- Inconvenience, Mura- Non consistency, Muda- Waste) in manufacturing activities to achieve manufacturing excellence. By implementing TPS, SLL has achieved 54% savings in man-hours/kit i.e. from 6.67 to 2.67 man-hours / kit in span of two years.

**Vendors and Inventory Management**

It has been observed that vendor development helps in improving the performance of not only buyers but of vendors also (Humphreys et al., 2004). By vendor development, buying firm helps to their vendors for increasing their capabilities to improve their performance. SLL believes in concentration on core competencies and the development of vendors worldwide. SLL has also adopted similar production concepts to develop vendors for all major aggregates in India and this was possible with unique technical and process training, quality measures and financial assistance to local vendors. It prefers ISO certified vendors. SLL evaluates its vendors on basis of quality, cost, delivery reliability, flexibility, and infrastructure. It has also started rationalisation of its vendors for achieving the target of maximum two suppliers for a given technology. SLL encourages its vendors to follow the rule of Direct on line (DOL) dispatch of material, by which the material from the vendor is used on the line without inspection. It helps in material handling and in reducing inventory.

In globalised market, knowledge and skills have become a company’s means to gain a competitive advantage. To improve multi skills and knowledge of employees, education and training are the only means. Education and training of employees are also essential for effective implementation of various processes in an organisation.

As SLL looks for becoming a global competitor through technical edge, it gives top priority for developing its human resource. It includes the process of identification of weak

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**Training of employees**

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areas of the workforce and improving them by providing required training. By proper training of employees and their exposure to technology and organisation culture of Denso, SLL wants to improve its capability in selection, evaluation, adaptation, and absorption of technology. It will also help to improve its product up-gradation capability.

Main schemes available for training are: Graduate Engineer Trainee (GET) Scheme, Senior Engineer Research Scheme, and Diploma Engineer Trainee Scheme. Normally training duration is of one year. Training program is designed according to scheme. Some major areas of training are shop floor exposure to acquaint young engineer of working in shifts, people interaction, industrial relations, factory discipline and hands on job experience, basic understanding of technology, product, process, people, quality, customers, operational knowledge of the working areas, problem solving ability, focus on continuous improvement, sharpening the analytical skill, knowledge about quality concepts, SPC/ SQC, knowledge on IMS covering TS 16949/ISO 14001/ OHSAS 18001, problem solving techniques using 7qc tools and participation in quality circles.

Training methodology of SLL is shown in Figure 5. On the basis of company’s requirement and individual profile, first of all SLL identifies, what kind of training is required for a particular category of employees. On the basis of need identification, a schedule is prepared and training is provided. Then effect of training is evaluated in performance of employees. An annual performance review is done at the end of the year. Based on personal interview as well as on the job performance, trainee is confirmed in the regular Grade.

Product and Process Development

To keep in pace with international competition, companies are challenged to improve and innovate their products and processes constantly. Efforts made by SLL, for developing its products and process capabilities are discussed in following sub-sections.

(a) Product Design

SLL follows a certain pattern to design their products. Improvements are made on regular basis at each stage of product design to satisfy the needs of their customers. The set pattern, which SLL follows for their product design is as follows.

Supply chain department of SLL enquires about their customer requirements and collect the necessary data. Based on the customer requirements, the design personnel go for Thermal Design and Fitment Design. Thermal Design is to increase the energy efficiency, aesthetic qualities, life span and overall value of the components. Fitment Design is to efficiently design the chassis of auto air conditioner to the required specification. Based on the above two designs, system is accurately configured taking into account component characteristics and Bench Tests undergone on its components. Once the system is configured accurately, System Design & Evaluation and Prototype & Testing are carried out. In System Design and Evaluation, SLL constructs and builds a system that meets specific and often unique needs of their customers. In Prototype and Testing, a small model installed with the planned design is constructed and tested. If the tests are positive, then further procedures are taken otherwise the design is terminated. SLL understands the speed-to-market is critical for capitalizing on opportunities in the market place; so rapid prototyping has been done.

Both these steps in designing utilize CAD (computer aided design), CAE (Computer aided engineering), Vehicle Test, Road Test and Wind Tunnel Test. Then tooling and process selection is initiated. SLL laboratories capabilities include both mechanical and metallurgical analysis to ensure that the tool is build to fit the purpose. SLL also utilizes computer modeling to create tools on a consistent basis. Manufacturing engineers in SLL are experts in matching customer’s products needs with our specialized process, producing exactly what customers need.

Once the tools and the process are selected for designing, parts approval and line trials are initiated. In parts approval, with the help of the installed process and the desired tools the parts are tested and approved accordingly. In line trials, the components or parts are checked in the assembly line and if found any errors, corrected accordingly. There are comprehensive procedures related to designing and evaluation of product in SLL. If designing need any change, which arises according to their customer needs, can be dealt at this stage. Once the product evaluation phase is over, production takes place.

(b) Product Development

Product development success in terms of time and innovation contributes significantly to firm’s competitiveness. Mosey (2005) argue that SMEs can compete with their larger rivals by developing new to market products using novel and often simpler technologies. With the advent of technology, SLL customers have launched new products using novel and often simpler technologies. With emission and performance standards being enforced in India, as well as world over, there has been a quantum improvement in the technology of car air conditioning systems worldwide. SLL has also adopted world-class technology in condensers, evaporators (heat exchanging units) and compressors to obtain improved air conditioning performance without changing the size of these components.

Compressor is the heart of the car AC system. As a result
of minute studies in compressor designing, their collaborators have come up with the most efficient type of compressors in car / automotive ACs. Inner rubber parts of the compressors have been replaced from NBR to RBR to make it compatible for use with new eco friendly refrigerants HFC 134a. These new series of compressors give significant advantage of better performance and lightweight.

The latest technology condensers are multi flow type and evaporators are MS type. These new type of heat exchangers give advantage of high performance, compactness and lightweight against the existing serpentine ones. It uses thinner fins and inner fin tubes along with unique refrigerant flow to be highly compact and efficient. The weights of these new types of heat exchangers are 50% less and the performance is 15% better than the traditional serpentine heat exchangers. Technology focus is considered essential at SLL to remain competitive.

(c) Process Development

SMEs can gain competitive advantage through low defect rates or higher quality of products because it will help in implementing JIT system. SLL has upgraded its manufacturing capabilities for achieving automation of the line. They have installed new CNC machines to confirm precisely to the product requirement. Regular meetings are carried out at various levels to discuss the ways of eliminating defect. Quality teams have been constituted in every department whose function is to discuss quality issues at the end of every month.

Failure mode effect analysis (FMEA) is carried out to reduce the chances of occurrence of defects by finding out the causes responsible for defects and their impact on the quality of the product. It develops a ranked list of potential failure modes, thus establishing a priority. Various techniques being practiced for this purpose are Poka-yoke, inspection by workers, special devices for testing such as profile tester, roundness tester, flatness tester, surface finish tester, fixed inspection schedule and Kaizen. FMEA is a team effort. This helps in a great way as all the different fields of the process and product are addressed to and therefore potential failures can be effectively determined.

For improving machine productivity, SLL is following Total productive maintenance (TPM). Brah and Chong (2004) have observed that business performance of TPM firms is significantly superior to the non-TPM firms. Laugen et al (2005) have observed that increasing equipment productivity and environmental compatibility are the best manufacturing practices for improving performance of organisation in present scenerio. Steps taken by SLL for effective implementation of TPM are as follows:

- Providing awareness about TPM to all supporting departments.
- Helping them to identify P, Q, C, D, S, M (production, quality, cost, delay, safety and maintenance) in each function in relation to plant performance.
- Identifying the scope for improvement in each function and Collecting relevant data.
- Helping employees to solve problems in their circles and to cover all employees and circles in all functions.
- Making up an activity board where progress is monitored on both sides i.e. results and actions along with Kaizen.

TPM at SLL addresses seven major losses. These are processing loss, cost loss in areas such as procurement, accounts, marketing, sales, communication loss, idle loss, set up loss, accuracy loss and non value added loss.

Performance Analysis

Competitiveness of an organisation is reflected by its overall performance. For measuring performance, both subjective and objective measures should be considered. Although use of only subjective measures is also a reliable alternative to actual performance because managerial assessments are supposed to be consistent with objective internal and external performance. Performance of SLL on some measures is as below:

(a) Market Share

SLL is the largest manufacturer of car air conditioner system in India. It has maintained its leading position with market share of 70%.

(b) Productivity

This organisation has improved its productivity from 30 kits/man/month in 2003 to 62 kits/man/month in 2005. This has been achieved due to effective utilisation of resources by eliminating waste on different points.

(c) Inventory Status

Although average inventory cost of the organisation has decreased but Inventory status is not decreasing constantly. Each year it rises from July to August as companies manufacture more cars during this period because there is a boom in the Indian market from September to November due to festivals. By proper management of inventory, SLL is able to maintain 100% delivery performance with its major customers.

(d) Rejection Rate

SLL has observed an overall reduction in the rejection rate due to upgradation of CNC machines, better raw material, in house R&D and process control. Its product rejection rate has decreased from 500ppm in 2002 to 223 ppm in
2005. This is almost equal to global average of 200 ppm and better than domestic average of 1000 ppm for auto component sector (Economics Times, 2005). It has a target to achieve 30 ppm in 2006. The various techniques used at SLL to reduce rejection rate are:

- **Poka-yoke**- By making design and specification easily understandable by the worker and giving him training to operate the machine.

- **Inspection by Workers**- On the job testing is done by workers. They are given training to use testing equipments and follow the testing procedure.

- **Special devices for testing-profile tester, roundness tester, flatness tester, surface finish tester**

- **Fixed Inspection Schedule**- After every 2 hours top level personals from the quality department comes for checking of pieces from a batch and records are maintained to control defects.

- **Kaizen**- Each and every individual is given freedom to come up with ways and suggestions for reducing defects. cards are used for recording suggestions and best suggestion is awarded periodically.

In addition to above actions, other initiatives taken by SLL are employment of skilled labour instead of semiskilled labour and automation of processes. Regular meetings are carried out at various levels to discuss the ways for eliminating defects. Quality teams have been constituted in every department whose job is to discuss quality issues at the end of every month. FMEA is carried out to reduce the chances of occurrence of defects and to find out the causes responsible for defects and their impact on the quality of the product.

**(e) Sales**

Sales of SLL has constantly been on rise, since the demand of the mid size cars is on rise in the Indian market (Figure 6). Only in the year 2002-2003 there was a decrease in the net sales because that was the year, which saw decline in sales of cars by 12.6% in the Indian market. Apart from that year SLL has increased its sale from 88 million US$ in 2001 to 145 million US$ in 2005. This trend indicates about the growth of the organisation despite tough competition in globalised economy.

Sales have increased because of the following measures adopted by SLL:

1. Improving manufacturing ability and overall quality of prototype designs.
2. Replacing efficient processes with production techniques more suitable for mass quantities.
3. Meeting difficult production schedule deadlines and time-to-market requirements.
4. Reducing material scrap for parts that require secondary machining.
5. Taking customer feedback and understanding their requirements.
6. Giving full after sales services to its customers.
7. Visiting customer site and testing the products.

**(f) Awards and Recognition**

Awards and recognition motivates a company to strive for more and more success in terms of quality, performance, cost, supply etc. They are the real motivators for a firm who has constantly tried to deliver the best product to its customers. Some of the awards received by SLL are shown in Table 2.

![Figure 6: Sales Trend for SLL](image)

**Table 2. Awards Received by SLL**

<table>
<thead>
<tr>
<th>SN</th>
<th>Award</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Analyst award for excellence by ICFA of India</td>
<td>1997</td>
</tr>
<tr>
<td>2</td>
<td>Honda best improvement award for delivery</td>
<td>1998</td>
</tr>
<tr>
<td>3</td>
<td>Honda silver award for cost reduction</td>
<td>1998</td>
</tr>
<tr>
<td>4</td>
<td>MUL vendor performance award</td>
<td>1993, 94, 95, 98,2004</td>
</tr>
<tr>
<td>5</td>
<td>MUL manufacturing excellence award</td>
<td>2002-2003</td>
</tr>
<tr>
<td>6</td>
<td>MUL trophy for superior performance in the field of quality.</td>
<td>2003-2004</td>
</tr>
<tr>
<td>7</td>
<td>MUL certificate for superior performance through KAIZEN</td>
<td>2003-2004</td>
</tr>
<tr>
<td>8</td>
<td>MUL certificate for TIER-2 vendor up gradation</td>
<td>2003-2004</td>
</tr>
<tr>
<td>9</td>
<td>Award for Top 5 IT User Companies in Manufacturing segment in India (IT User Awards 2004)</td>
<td>2004</td>
</tr>
</tbody>
</table>

**Competitiveness Index of SLL**

In quantitative terms, competitiveness can be represented by a competitiveness index. For computing competitiveness index, different issues of framework (Figure 2) such as assets, pressures, constraints, strategy development, competitive priorities, processes and performance are considered. The framework of Cleveland et al. (1989) for production competence is extended to compute competitiveness index.
On the basis of Cleveland et al. (1989) model, competitiveness index is given as

\[ C_j = \sum W_i \log K_i \]

Where \( C_j \) = Competitiveness index for company j

\( W_i \) = Competitiveness issue

\( R \) = Rank of competitiveness issue

\( K_i \) = Inverse Rank (If \( R=1 \), \( K=7 \), when \( i =7 \), if \( R=2 \), \( K=6 \))

\( W_i \) = Weight assigned to particular competitiveness issue.

For assigning weight to different issues of competitiveness, the highest and lowest values of five point Likert scale i.e 5 and 1 are mapped 100% and 0% respectively. For each of the six issues of competitiveness, a weight is assigned. The criteria for weight (\( W_i \)) is as under:

\[ W_i = +1 \text{ (Strength), when percentage score > 60\% (Mean value>3).} \]

\[ W_i = 0 \text{ (Neutral), when percentage score is between 40-60\% (Mean value between 2 and 3).} \]

\[ W_i = -1 \text{ (Weakness), when percentage score< 40\% (Mean value<2).} \]

For illustration, an example of computation of weight is given below. Say, the mean score for processes is 4.2 on a scale of 1 to 5. Using two-point equation percentage may be calculated. It comes out be 4.2/5=0.84; therefore it is assigned weight of +1.

Computation of competitiveness index of SLL is illustrated with the help of a worksheet as shown in Table 3. First of all key items of various components of competitiveness framework are graded in Likert scale of 1 to 5 (1-Very low, 5-Very high). For pressures and constraints reverse scale i.e. 1-very high and 5- very low is considered because it is assumed that if organisation is feeling less pressure and constraints handling capability. On the basis of the score, organisation can visualize its position in industry/sector and identify gaps with respect to market leaders. It can also help in SWOT analysis of organisation.

### Table 3. Illustration for Computing Competitiveness Index of SLL

<table>
<thead>
<tr>
<th>SN</th>
<th>Competitiveness Components</th>
<th>Mean Rank (R)</th>
<th>Inverse Rank (Ki)</th>
<th>Log Ki</th>
<th>Weight (Wi)</th>
<th>W_i Log Ki</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Assets</td>
<td>3.63</td>
<td>3</td>
<td>0.60</td>
<td>+1</td>
<td>0.60</td>
</tr>
<tr>
<td>2</td>
<td>Pressures</td>
<td>2.33</td>
<td>7</td>
<td>0.00</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>3</td>
<td>Constraints</td>
<td>2.95</td>
<td>6</td>
<td>0.30</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>4</td>
<td>Strategy Development</td>
<td>3.67</td>
<td>2</td>
<td>0.70</td>
<td>+1</td>
<td>0.70</td>
</tr>
<tr>
<td>5</td>
<td>Competitive Priorities</td>
<td>3.50</td>
<td>4</td>
<td>0.60</td>
<td>+1</td>
<td>0.60</td>
</tr>
<tr>
<td>6</td>
<td>Processes</td>
<td>3.86</td>
<td>1</td>
<td>0.85</td>
<td>+1</td>
<td>0.85</td>
</tr>
<tr>
<td>7</td>
<td>Performance</td>
<td>3.38</td>
<td>5</td>
<td>0.48</td>
<td>+1</td>
<td>0.48</td>
</tr>
</tbody>
</table>

\[ \text{Competitiveness Index} = C_j = \sum (W_i \log K_i) = 3.23 \]

Theoretically competitiveness index value may range between -3.71 to 3.71. Competitiveness index of SLL shows that presently SLL is highly competitive organisation. However, there is scope for improvement in terms of pressures and constraints handling capability. On the basis of the score, organisation can visualize its position in industry/sector and identify gaps with respect to market leaders. It can also help in SWOT analysis of organisation.

### SWOT Analysis

After analyzing different issues for SLL on the basis of framework (Figure 1), strengths, weaknesses, opportunities and threats have been identified (Table 4).

Above observations show that SLL has got many strong areas. Due to these strengths and existence in Indian market from a long time, it could sustain its competitiveness till now. But it should be noted here that SLL has some major weaknesses such as inability to meet customer expectations at international market, dependency on its collaborator for technology upgradation and poor inbound supply chain. Presently SLL is mainly dependent on Indian market only but this situation can not ensure its long term competitiveness. Therefore it is urgently required that SLL should reduce its dependency on its collaborator and on Indian market. It should try to develop its own R&D, technology and enter global market aggressively.

### Concluding Remarks

While the concept of competitiveness has received considerable attention in the academic literature after globalisation of market, it has been analysed principally in context of large-scale organisations. In spite of significant contribution by SMEs in economic growth of all countries, analytical case studies on competitiveness of SMEs are very limited. In most of the available studies competitiveness has been analysed in terms of financial parameters only rather than a holistic approach. The holistic approach, as followed in this case study will give better understanding regarding long-term competitiveness of the organisation. Therefore present study has tried to bridge the gap in the literature on competitiveness. Framework used for this study has tried to capture all issues, which affect the SMEs competitiveness. Due to various pressures and constraints on SMEs for remaining competitive, this framework suits better than others for analyzing SMEs competitiveness. Major findings of this study are:

- SLL has given due focus for upgrading its technology, R&D facilities and IT applications to improve its product and process development capability.
- By applying advance management systems such as IMS, TPS, Vendor development and inventory management,
SLL has improved its performance in terms of productivity, cost, quality, delivery.

In spite of some weak areas such as dependency on its collaborator for technology, poor inbound supply chain and less share in international market, SLL has managed its resources effectively to sustain its leading position in the Indian market.

This study has demonstrated that even a medium size organisation, facing many pressures and constraints due to globalisation of markets can sustain its competitiveness. For this it is essential that organisations should not target only end results but should develop its enablers also such as assets, competitive strategies and processes to overcome on various pressures and constraints.

Most of the SMEs are still far away from the idea of upgrading R&D, technology, application of IT tools and advance management systems as well as reluctant for change. Therefore authors feel that this study will motivate SMEs to upgrade themselves proactively to meet the changing requirements of the market. In spite of the significant contribution of this study for motivating industry professionals, it has got some limitations. This study could not prioritise the importance of various components of framework in sustaining competitiveness of SLL as well as some critical strategies followed by organisation could not have been made open to authors due to personal reasons for management. Therefore it is felt that to generalize the findings of this study, more case studies of similar nature should be carried out.

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