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COMPETITIVENESS ANALYSIS OF OEM (ORIGINAL EQUIPMENT MANUFACTURER) IN INDIA: A CASE STUDY

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ABSTRACT

After globalization and opening of Indian economy, all organizations are facing great challenge for their survival and growth. In this scenario, they need to improve their competitiveness in domestic as well as global markets for sustainable growth. Competitiveness implies relative position of the organization in comparison to its competitors. Normally researchers have analyzed competitiveness in terms of certain business parameters. They have not adopted holistic approach for this purpose.

Present study has tried to analyze competitiveness of an Indian OEM by a holistic approach. In this apart from financial parameters, study has also tried to analyse assets, processes, strategy development, competitive priorities and challenges for the OEM with the help of a case study. Study has also tried to develop a framework for evaluating competitiveness of an organization. Finally Analytical hierarchy process (AHP) approach has been adopted to prioritize different issues of competitiveness framework.

Keywords: *Competitiveness, Analytical hierarchy process, Original Equipment Manufacturer.*

Introduction

Competitiveness originated from the Latin word, compete, which means involvement in a business rivalry for markets. In simple terms, it can be described as “the ability to compete”. However researchers have provided many different definitions on the comprehensive concept of competitiveness. Competitiveness can be categorized into three hierarchical and inter-dependent levels: nation, industry / sector and Firm. At Firm level, it can be understood as the ability to design, produce or market products or services superior to those offered by competitors, considering the price and non-price qualities (D’Cruz and Rugman, 1992). Competitiveness of an organization is its ability to sustain its long-term performance better than its competitors in the market (Singh et al. 2008). Leading firm is characterized by dynamic strategic behaviour in terms of innovation, relationship management with market and suppliers, internationalization 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.

The industry and country are facilitators in providing the necessary infrastructure and support to the firms. Competitiveness of an organization 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, logistics management and other processes whereas external factors are

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potential new entrants, substitute products, bargaining power of the buyers and bargaining power of suppliers (Porter, 1998). In addition to this, other factors may be government policies, capital resources, and availability of technical manpower and infrastructure of roads, communication and energy.

The competitiveness of an organization is usually analyzed in terms of certain financial parameters, whereas it 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 the competitiveness index of an organization as assets, pressures, constraints, strategy development, competitive priorities, processes and performance in their framework. A case study of an automobile two wheeler manufacturer has been considered to illustrate this concept in the present paper. Key items of different components of competitiveness framework are given in Figure 1 (Singh et al. 2005). This framework can also be used for diagnostic and strategy formulation. Any organization under study can be evaluated on the basis of various key items of framework. On the basis of mapping of an organization on these key items of competitiveness, strong and weak areas for the organization can be identified. Strategies should be framed to overcome on weak areas and take leverage on strong areas for improving competitiveness. Therefore this study aims to

1 Illustrate the concept of competitiveness by taking a real life example of an automobile OEM to motivate other OEMs.

2 To develop a Competitive analysis framework for analyzing competitiveness issues

3 To identify major pressures and constraints on OE Ms in highly competitive automotive sector.

4. To identify key success factors for sustaining competitiveness of OEM organization.

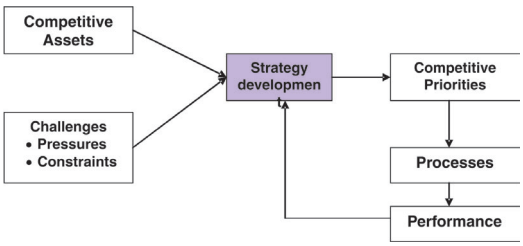

Figure 1: Framework for Competitiveness Analysis

Case Study

To analyze different issues of competitiveness framework we have taken a case study of an Indian OEM.

Company Profile

This organization was developed after collaboration of two companies A Ltd and B Ltd. A Ltd had originally started in the 1940's. A Ltd is a name synonymous with two-wheelers in India today. The A Ltd rolls their own steel, make free wheel bicycle critical components and have diversified into different ventures like product design. The A Ltd Group philosophy is: "To provide excellent transportation to the common man at easily affordable prices and to provide total satisfaction in all its spheres of activity". The A Ltd vision is to build long lasting relationships with everyone (customers, workers, dealers and vendors). The A Ltd Group has a passion for setting higher standards and "Engineering Satisfaction" is the prime motivation, way of life and

work culture of the Group.

The B Ltd was established in 1948. Since its inception, B Ltd has become one of the largest Japanese industrial concerns. It has also established itself as the world's largest manufacturer of motorcycles, commanding 25% of the world's motorcycle market and nearly 50% of Japanese market. Today B Ltd is acknowledged as the undisputed leader in motorcycle technology. B Ltd Company has 83 overseas production facilities in 35 countries looked after by a 93000 strong force. In 2001, its consolidated sales amounted to over 140000 crores.

ABC Ltd was the first company to introduce new generation 4 – stroke technology in India. With its seven models, ABC LTD commands 48% of the total market. Combined with technical excellence is a large dealer network, reliable and quality after sales and the provision of genuine spare parts. Capitalization Ratio ABC Ltd is as 26% A Ltd, 26% B Ltd and others - 48%. Table 1 shows major mile stone of ABC Ltd.

Competitive Assets

Assets are anything of value that is owned by a company, whether fully paid for or not. These range from cash, inventory, and other "current assets" to real estate, equipment, and other "fixed assets." Intangible items of value to a company, such as exclusive use contracts, copyrights, and patents, are also regarded as assets. Customers and customer relationships are the new assets for ABC LTD. They are not on the balance sheet, but they are the lifeblood of retailing, driving cash flow and enduring value. With fewer opportunities to build new stores, retailers now must focus on how to get more from existing stores and existing customers. We will discuss following assets of ABC LTD in details i.e. Operation Management, Logistic, Cost Factor, Knowledge base, Technology, Information Technology ,System Factor, Demand Conditions, Vendor management, Industry Infrastructure, Intangible Assets in following sections.

Operation Management

In early 1990s, sensing the oncoming winds of competition in two wheeler industry, ABC LTD embarked on the mission of becoming a world-class quality company. ABC LTD implemented famous Toyota Production System (TPS) and has today become a pioneer in India in applying the concepts of 'just-in-time' and Jidoka (automation with human touch) — the two pillars of TPS. ABC Ltd introduced Total Quality Management (TQM), to complete the Business Process Reengineering exercise for all its Process such as Product Development, Design, Manufacturing, Quality etc. Since then the company has been implementing the practice of TQM through various techniques. This has helped ABC Ltd in improving its technological as well as managerial capabilities. The Total Productivity Maintenance (TPM) program under the guidance of Mr. Hasegawa of Thai Honda, was launched to improve the overall equipment efficiency. The goal was to almost double the output without additional investments in equipment and manpower. The program helped to achieve this goal and also brought improvements on the shop floor. Post TQM and TPM Implementation, ABC Ltd have been very successful in reducing internal defects, customer returns, supplier rejection, and machine breakdowns.

ABC Ltd is adopting word class system at every stage from material procurement to dispatches. All the systems applicable at ABC Ltd are given in Table 2.

Logistic

The unique requirements from manufacturers in the automotive industry make handling their logistics operations—inbound and outbound—more challenging than most manufacturing industries. The manufacturing pace at many automakers requires a constant stream of just-in-time products to keep production lines rolling and every day cost control becomes a bigger issue for

automakers in a down market. The result is a list of logistics suppliers growing more customized to their automotive customers while those customers get more demanding in what they outsource to logistics organizations, both internal and external ABC Ltd reengineered its distribution process to reduce costs and improve response time for dealers and parts vendors.

Table 2: Systems in ABC Ltd

Description	System Application
Procurement	Multi source system, Direct on Line, Open Store, e-inventory control, Supply chain management
Production and planning control	Flexible manufacturing System, Kan Ban, JIT, word class manufacturing, Initial Part Tag, TPM, Robotic automation
Administration	e- appraisal system, On line manpower details, On line salary generation
Quality	PFMEA, CNC controlled Measuring machine, 3D CMM SPC/SQC, Integrated Management System, TQM
Sales and Marketing	on line generation of sales invoice, on line order booking, on line information Forecasting

This organization has warehouses near the customer sites. This supplies the materials according to customer schedules. Daily stock check is kept through e-mail by logistic department and a minimum stock level is always kept in line to feed the customer line. In some cases like Ford run their own Milk Run System to collect the supply from suppliers end. In this case logistic department of organization ensures the ready ness of the stock.

Cost Factor

Locally and globally, product cost is one of the most important drivers of competitive advantage. Managing costs across the entire value chain helps a company in building sustainable cost advantage. It would enable a company to be price competitiveness as well. The success of companies like Akai and Nirma indicates that cost advantage is critical in emerging market like India. ABC Ltd is lagging from its competitors in product price. A major learning from the competitive market is the effort the ABC Ltd had to make in the area of cost rationalization on a continuous basis. Cost optimization was achieved through various cost improvement projects, use of alternate fuels and by cutting down on our overheads. A reduction of 8.24% was achieved in manufacturing variable cost in 2005–06 over last year.

In spite of product cost, for any organization to be competitive in market, advantage in terms of labors cost and energy cost plays a crucial role. This organization does regular comparison of labors cost, raw material cost and energy cost with its competitors.

A study of “energy consumption” has shown decreasing trend during couple of years despite increasing of loads, resulting clearly due to the following initiatives taken recently as well as in the past.

1. The impeller and Oil skimmer of centralized coolant system have been modified.
2. Furnace Heaters are now controlled through PID and Thyristors.
3. Rewinded motors have been replaced by energy efficient motors.
4. The air distribution system has been modified. Now it is possible to stop air distribution to non functional area.
5. Double tube lights have been replaced with single lights that have effective reflectors.
6. Additional natural ventilation has been installed on the roof in selected areas.
7. A centralized water distribution system has been installed.

Additional investment and some of our recommendation is being implemented for reducing

the consumption of energy.

1. Installation of new natural ventilators on identified roof in dispatch, stores, and Weld and Press Shop.
2. Energy efficient lighting and motors for FDV.
3. VFD installation for high powered motors and compressors.
4. Installation of 7500cfm refrigerant dryers.
5. Installation of temperature controller in cooling towers.
6. Installation of heat recovery system for DG sets

To reduce power generation cost, there is a plan to install more HPS DG sets. A vapors absorption chiller machine is also being installed to ensure better heat recovery for DG sets.

Information Technology

ABC Ltd continues to adopt and implement information technology (IT) for enhancing the overall efficiencies of the organization. Different applications of IT in this organsation are shown in Table 3. In keeping with the plans, the Company is currently implementing SAP's Supplier Relationship Management (SRM) module and Customer Relationship Management (CRM) to connect dealers and vendors for carrying on business electronically. The Company is among the first ones to implement these solutions and continues to be a model reference site for SAP. The Company is continuously upgrading the IT infrastructure to meet the business needs. The IT infrastructure is state of the art and aims at high throughput, high availability, and capable of scaling up to accommodate the Company's growth.

Table 3: IT Applications in ABC Ltd

Department	IT Application
Procurement	Automatic procurement plan, On line purchase order generation, On line ordering ,e-mail, internet
Production and planning control	Automatic generation of MPS, MRP, Production order, and status of WIP, SAP, DOL, Robots, Automatic Painting System
Administration	Internet, e-mail, On line manpower details, On line salary generation
Quality	Gear measuring center, software DATA MYTE, 3D CMM
Design	Internet, e-mail, Software like Pro-E, CAD
Sales and Marketing	Internet, e-mail, on line packing slip, on line generation of sales invoice, on line order booking, on line information about the dealers stock, Forecasting calculation

Intangible Assets

Some factors of assets cannot be measured in quantitative terms but can be felt qualitatively. These are known as intangible assets. Some of the intangible factors, which this organization enjoys as its assets for being competitive in market are as follows.

1 Good Brand Name

2 Good Customer Relationship

3 Improved supplier base (ISO9001 certified)

4 Technical Collaboration with Japanese organization.

5 Able and committed Leadership

6 Motivated and highly satisfied employees

7 High level of awareness and commitment for competitiveness among employees

8 Growth and export oriented government support

Challenges

The ABC Ltd expects that the two wheeler industries will continue to unravel well into the future. In fact, during the last year in review, an incremental market of close to three million motorcycles was produced. ABC LTD does not expect volume to suffer on account either rising crude price or insufficient rains. Higher petrol price, in fact, could result in preference for cheaper motorized transport, and here two wheelers have a natural advantage over four wheelers.

There is, however, a flip side to the growth potential, the entire major manufacturer in India, as well as manufactures from china and Korea are targeting the motorcycle segment. The past year has seen a slew of launches. While the customer has benefited, it has added some pressures on the company's market share. Margins could also be under pressure during coming year with continually rising input prices, especially steel, aluminum and rubber, also for the first time, there were visible indications of a consolidated in the domestic two wheeler markets. Sales of number of two wheeler manufacturers either declined of stagnated compared to the previous year. In years to come ABC Ltd expects this process of consolidation to continue.

Slowdown: The possibilities of lower growth rate in two segments i.e. premium and the deluxe segment can not be ruled out and therefore constitute a risk factor for ABC Ltd business. As the market leader, a possible slowdown may be in the two-wheeler industry and motorcycle market constitutes a risk factor for ABC Ltd.

Competition: Expansion plans of wholly-owned subsidiaries of global automobile players could increase the scope and level of competition in Indian two wheeler industries in the near and medium term. Aggressive marketing strategies, especially in the areas of introduction of new models as well as expert market forays continue to be a matter of concern.

Input cost: A further rise in input cost, especially steel and aluminum could constitute a threat to profit margin future. Major challenges faced by ABC LTD for its competitiveness are to reduce product cost.

ABC LTD has to bring following changes in their process, product and system because of above market and competitors pressures.

- A wide product range (100cc to 250cc motorcycles) that is responsive to rapidly changing market needs.
- Introduction of new products based on indigenous R & D.

The company is facing following constraints in meeting above challenges.

Capacity constraints: ABC LTD have been facing capacity constraints, especially after launching new models, and while they are in the process of continuously adding capacities

Supply Constraints: There is major problem with ABC Ltd that single source of multi parts. When ABC Ltd increases the production or launches the new products the ABC Ltd faces supply problem not to having multi sources. Any operational problem occurs either ABC Ltd has to stop the production or they have to compromise with quality.

Different pressures on OEMs are conformance quality, *i.e.*, low defect rates; product features or attributes competitive price and performance. Other challenges are effective

implementation of IT tools and supply chain integration (Stockdale and Standing, 2004), new product development capability (Sonia and Francisca, 2005) and information gap between marketing and production function (Xiong et al., 2006)

Strategy Development

Business success depends on the formulation and implementation of viable strategies. ABC Ltd is going forward to reinforce their leadership by developing the appropriate strategy for achieving word no1 status in the two wheeler market. The company has planned to launch eight new motorcycles in the market at different customer segment. The ABC Ltd is facing new competition in terms of reduced cost, improved quality, products with higher performance, wider range of products and better service and all delivered simultaneously. For the coming month and years, as long term competitiveness ABC Ltd is planning to adopt strategies as per model shown in Figure-2 to get important growth in two wheeler industry. According to this model, for developing strategies this organization focus on current mission and goals, SWOT analysis both externally and internally and finally it evaluate the effectiveness of these strategies implementation.

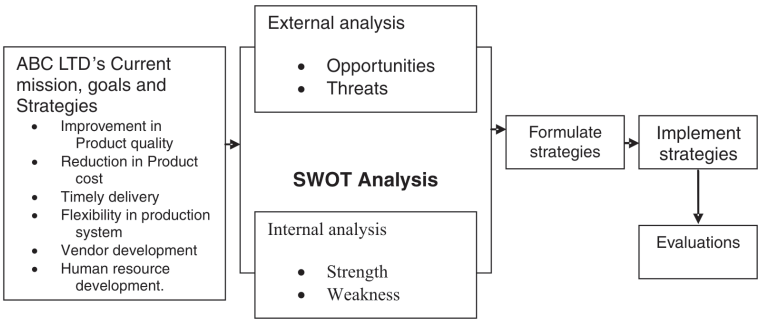

Figure 2: Strategic Development Process in ABC Ltd

Competitive Priorities

ABC Ltd has clear cut manufacturing strategy aligned with marketing strategy. Vision and mission are set at the top level. In line with mission and vision, Directors of different functions formulate the manufacturing objectives for the organization. Major competitive priorities for ABC Ltd in order of priority are: Vendor development, Human resource development, Labour productivity, Product quality. The main elements of ABC Ltd's long term strategy are high use of AMT (Advanced manufacturing technology), stress on continuous improvement through TQM, 5S, KAIZEN, continuous emphasis on waste elimination., lean manufacturing, employee empowerment and involvement, fostering quality at source, reduction in non productive time, safety measures for employees and smooth material movement, systematic problem solving, and production planning as per market requirement (Table 4).

Table 4: Segment wise market requirement of Motorcycle

Product Segment	2006-07 (%)	2005-06 (%)	2004-05 (%)
Low Price(100cc)	48	54	63
Value(125cc)	33	25	18
Premium(150cc+)	20	21	19
Total	100	100	100

Competitive Process

ABC Ltd has its competitive process with best-in-class and highest standards of professionalism, comprehensiveness and accuracy. Capacity of a firm to maintain reliable and continuously improving business and manufacturing processes to meet above challenges will be a key condition for ensuring its competitiveness in the long run. Some of the processes followed by ABC Ltd are new product development, Innovation Management, Supply Chain Management, development of Human Resources, Total Quality Management, Total Productive Maintenance, Product, Process and System Development, Inventory Management

New Product Development System

A product development system must be process oriented, ensuring that the capabilities and architecture of the system effectively support each of the activities necessary to actually accomplish the process of the product development. As a starting point to develop a product development strategy, the company determines its primary strategic orientation. The ABC Ltd recognizes that it cannot be all things to all people and that it must focus on what will distinguish it in the market place. There are six primary product development strategic orientations which is focused in ABC Ltd while developing a new product The new product passes through five trials T0, T1, T2, PP1 & PP and corrective and preventive action is taken in product design, process and system to reduce problems those are faced during trial stage. Mass production is started if new product is passed in all inspection and testing.

Research and Development

The ABC Ltd first accessed Japanese technology in 1985-86 through a technical collaboration. Since then, ABC Ltd has accessed to some of the best automobile research technology. Over the years, the company has also collected huge amount of market feed data. This has given ABC Ltd considerable insights into Indian conditions and segment-centric customer requirements. Meanwhile, over the year, ABC Ltd has honed its own research capability. This has helped in large scale localization and integration allowing the company to keep cost low even at the time of initial launch of a product. Not only that the company's R&D has already developed requisite infrastructure and expertise to develop, test and approve products in-house as per Japanese collaborator specification and acceptance criteria. This in turn allowed the ABC Ltd to launch state of art bikes with a high local content as per Indian customer requirement.

Innovation Management

Innovation management is a important process of managing innovations (e.g. ideas) in ABC Ltd. As per ABC Ltd philosophy, the first stage in innovation is for someone to generate an idea. It is typically a technical insight into a product or process or thought about a service or system. In some cases ideas arises from observed problems either now or in the future. An idea almost is stimulated by the goals of the organization or an opportunity that appears suddenly. Various stimuli can lead to the generation of an idea from customer problems and observing problems to visiting vendors and having informal discussions with colleagues. Idea generation leads to opportunity recognition where someone can see an opportunity for developing the idea into a new product, process or service.

Supply Chain Management

ABC Ltd has set up a Supply Chain Management (SCM) Group with the objective of aggregating the purchase requirements of all Group Companies and making cost-effective bulk purchases.

The company strengthened its supply chain by adding a few robust suppliers. Transfer of

best practices from the company to suppliers is a regular feature. Zero defects, TPM and JIT clusters have provided significant benefits. Product training centers established at key locations help in timely and frequent training of dealer personnel on sales and service aspects. During 2006-07, the company plans to further extend its network in 100 towns. The customer loyalty programme - Miles and Smiles, launched during last few years, has found an overwhelming response with more than 125,000 members already enrolled.

The company has a network of more than 700 main dealers and over 1,800 service dealers across the country. During the current year, while 52 new dealers were appointed. This addition of 52 dealers is the largest network expansion in the automobile sector during the year under review. Around 1,250 rural outlets were created in towns with population of 25,000 and below. These are small and exclusive service centres manned by young engineers at various neighborhoods. Around 100 outlets are already in operation at various locations. In the coming years, this concept will be fully extended across the country.

Development of Human Resources

The company continues to maintain its impeccable record on industrial relations evidenced by the fact that not a single day of work has been lost because of labour unrest. As on 31st March 2006, the company had 5893 employees on its rolls. The Human resource function has concentrated all its efforts under the broad banner of "Organisation Capability Building"; through key initiatives such as Development of Knowledge, Skills and Attitudes (KSA), Knowledge Management, Building a learning culture within the organization .The company continues to achieve 100% participation of employees in TQM. The employees have completed more than 1,500 projects through Quality Circles and Cross Functional Teams. The average number of suggestions implemented per employee has gone up to 50 in the current year.

Total Quality Management

TQM is a system approach to quality management. It refers to complete commitment to quality in all spheres of the organization. ABC LTD decided to focus on policy deployment and Daily Routine Management (DRM) to achieve their TQM implementation. As a result, ABC Ltd redefined its management of processes for new product development system, manufacturing quality, supplier quality and customer quality. In the new system, each manager is required to define his role, his metrics, his measurement of performance to date and steps being taken to improve performance.

Total Productive Maintenance

TPM involves everyone in the ABC Ltd from operators to senior management in equipment performance improvement. It encompasses all departments including: Maintenance, Operations, Facilities, Design Engineering, Project Engineering, Construction Engineering, Inventory and Stores, Purchasing, Accounting and Finance, Plant and Site Management. ABC Ltd has the following five goals in implementing TPM activities:

1. Improving equipment effectiveness
2. Improving maintenance efficiency and effectiveness
3. Early equipment management and maintenance prevention
4. Training to improve the skills of all people involved
5. Involving operators (occupants) in routine maintenance

Product, Process and System Development

The ABC Ltd's product and process design approach is linked to the business strategy. ABC

Ltd has defined five dimensions to competition: cost, quality/performance, flexibility, dependability and innovativeness. The ABC Ltd is a world class manufacturer may be effective in all dimensions, but can only excel in one or two dimensions. The ABC Ltd's strategy is considered in the approach to product and process design. In any case, a general strategy for ABC Ltd is to move towards to concentrate on doing a few things well. This implies focused product and process design which further implies standardization and simplification of products and parts within each focused facility.

Inventory Management

A good inventory management system has always been important in the workings of an effective supply chain. New technologies and collaborative methods of working with trading partners will revolutionize this practice. Those who embrace, implement, lead and master these new technologies and inventory management system methods will develop a significant competitive edge over rival firms in the marketplace.

At ABC Ltd, for the purpose of having the optimal inventory, SAP software is used. Inventory analysis is done at all levels i.e. component, raw material, consumables and finished goods. Schedule of procurement for new material and flow of goods with in the company, is made on the basis of inventory analysis with SAP. To make the system more effective there is separate production planning and control (PPC) department. PPC department uses SAP to release the daily, weekly and monthly plan and purchase and Production Engineer decides the inventory norms as per production plan. A physical inventory of WIP and finished goods is done on daily basis and report released on daily basis by PPC department. All the analyses on inventory is carried with the help of SAP and pre decided inventory norms.

Performance of ABC Ltd

Performance measurement is the process of quantifying the efficiency and effectiveness of manufacturing system. Performance of an enterprise is often measured as a ratio of output to input. The outputs constitute the products of the enterprise and the inputs are the resources used by the enterprise

Over the years ABC Ltd has maintained its leadership in the two wheeler market by continuously improving its competitiveness. Competitiveness of a firm can be assessed on multiple parameters: Market Results, Financial Results, Comparisons with competitors, Product Results, Process Results, etc. Hence, a detailed analysis on various organizational performance measures will help us assess ABC Ltd's level of competitiveness.

ABC LTD has been highly successful in lowering Manufacturing costs, Fuel Consumption, in-house rejections, and improving profitability and inventory turnover ratios. ABC Ltd achieved overall rejection rate 2016 ppm against targeted 2262 ppm in 2004~05 and 1864 ppm against 2000 ppm in 2005~06 (Table 5). That was the big benchmark among its competitors. The Rework and delivery time also achieved within the target by doing Kaizens and Poka yoke in process and system.

Table 5: Rework/ Rejection trend of ABC Ltd

Description	Unit	2004~05		2005~06	
		TAR	ACT	TAR	ACT
Rejection	PPM	2262	2016	2000	1864
Rework	%	3	2	2	2.4
Delivery	%	100	100	100	100
Production Rate	Nos/unit/day	6200	6210	6500	6510

Annual sales of the ABC Ltd crossed 3 million units for the first time during the year 2005-06. It was 3000751 units as compared to 2621400 units in 2004-05. In value terms total sales increased 14.5% as compared to last year (Table 6).

Table 6: Market Results

Description	2001-02	2002-03	2003-04	2004-05	2005-06
Sales (nos)	1425302	1677537	2070147	2621400	3000751
Growth in Sales (nos) (%)	38.40	17.70	23.40	26.60	14.5
Market Capitalization	6670	3758	797	10943	17781

The size and growth of ABC Ltd's market capitalization is often one of the critical measurements of ABC Ltd's success or failure. Market capitalization is the number of common shares multiplied by the current price of those shares. However, market capitalization is increased from 10943 to 17781 in 2005-06.

ABC Ltd in 2005-06 accounted for 48% of the Indian two wheeler market. The company maintained its grip in the motorcycle segment with market shares of a little less than 50%. In the previous year, ABC Ltd sold one million more two wheelers than its nearest competitors. The lead was maintained in 2005-06. ABC Ltd is dispatching more than 99.9% straight pass vehicles to the customer. Total complaints in the product are less than 200 PPM. Annual sales crossed 3 million units during 2005-06 and in value terms total sale increased 14.5% to Rs 8714 crores from Rs 7422 crores in 2004-05. The operating profit (PBT before other income) grew by 16.2% from Rs 1080 crores in 2004-05 to Rs 1256 crores in 2005-06. The operating profit margin decreased marginally from 14.6% in 2004-05 to 14.4% in 2005-06. Profit after tax reflected a growth of 19.8% from Rs 810 crores in 2004-05 to Rs 971 crores in 2005-06. Other income increased by 14.2% from 137 cores to Rs 156 crores.

Evaluation of Competitive Index

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

$$C_j = \sum\{W_i \text{ Log } K_i$$

Where C_j = Competitiveness index for company j

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 (Strength), when percentage score > 60% (Mean value>3).

= 0 (Neutral), when percentage score is between 40-60% (Mean value between 2 and 3).

= -1 (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 = 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.

Score of different attributes for ABC Ltd are given in Table 7. Computation of competitiveness index of ABC Ltd is illustrated with the help of a worksheet as shown in Table 8. 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 organization is feeling less impact of pressures and constraints then it is capable of meeting market demands to remain competitive. For this purpose original response in Likert scale (1-Very low, 5-Very high) were changed in new scale of 5 to 1 (5-Very low, 1-Very high). Mean for a particular issue (Component) is calculated after taking average of scores for all its key items. After this rank, inverse rank and weight for each issue is decided. Sum of entries of last column (W_i Log K_i), will give competitiveness index of ABC LTD i.e. 3.41

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

Table 7: Key items of the components of the framework

S. N.	Competitiveness Factor		Five point Likert scale					
			1	2	3	4	5	Mean
1	Assets	Operation Management	■	■	■	■		3.64
		Logistic	■	■	■			
		Cost Factor	■	■	■	■		
		Knowledge base	■	■	■			
		Technology	■	■	■	■		
		Information Technology	■	■	■			
		System Factor	■	■	■			
		Demand Conditions	■	■	■	■	■	
		Vendor management	■	■	■			
		Industry Infrastructure	■	■	■	■		
		Intangible Assets	■	■	■	■		
2	Pressure	Fear of slowdown in sale	■	■	■			2.4
		To reduce cost	■	■	■			
		To improve quality	■	■				
		To increase range of products	■					
		To reduce delivery time	■	■	■			
3	Constraints	Shortage of technical manpower	■	■	■			2.6
		Poor infrastructure for training	■	■	■			
		Lack of quality consciousness	■	■				
		Labour productivity	■	■	■			
		Environment protection	■	■				
		Employees' welfare Growth	■	■				
		Under utilization of capacity	■	■	■			
4	Strategy Development	Planning of strategy	■	■	■	■	■	3.8
		Analysis of weakness and threats	■	■	■	■		
		Execution of Strategy	■	■	■			

		Monitoring of performance						
5	**Competitive Priorities**	Improvement in Product quality						3.57
		Reduction in Product cost						
		Timely delivery						
		Vendor development						
		Human resource development.						
		Labour productivity						
		Total productive maintenance						
6	**Processes**	New Product Development						3.71
		Research and Development						
		Innovation Management						
		Supply Chain Management						
		Development of human resources						
		Total Quality Management.						
		Product, Process development						
7	**Performance**	Productivity						3.67
		Process Results						
		Market Results						
		Product Results						
		Customer Results						
		Financial Results						

Table 8: Illustration for Computing Competitiveness Index of ABC Ltd

SN	Competitiveness Issue	Mean	Rank (R)	Inverse Rank (K_i)	Log K_i	Weight (W_i)	W_i Log K_i
1	Assets	3.64	4	4	0.60	+1	0.60
2	Pressures	2.40	7	1	0.00	0	0.00
3	Constraints	2.60	6	2	0.30	0	0.00
4	Strategy Development	3.80	1	7	0.84	+1	0.84
5	Competitive priorities	3.57	5	3	0.48	+1	0.48
6	Processes	3.71	2	6	0.79	+1	0.79
7	Performance	3.67	3	5	0.70	+1	0.70
Competitiveness Index = Cj =$\sum$ {Wi Log Ki}=3.41							

AHP Analysis to Prioritize the Competitiveness Issues

For prioritizing different competitiveness issues such as assets, pressures, constraints, strategy development, competitive priorities, processes and performance, analytical hierarchy process has been applied in this study.

AHP is a problem-solving framework and flexible, systematic method employed to represent the elements of a complex problem. It is based on the three principles: decomposition, comparative judgment and synthesis of priorities. The general structure of AHP is as hierarchy is to be made. The characteristic of AHP is allowing both qualitative and quantitative attributes to be included to carry out evaluation. For each sub-criterion, ratings are necessary to provide a basis and ease for the comparison of the performance of a large number of companies to be evaluated. The priorities of criteria and sub-criteria are synthesized to establish the overall priorities for decision alternatives.

Once AHP hierarchy of factors and sub factors are completed, now five steps are necessary to do the AHP calculation for all factors. A Program can be made in excel sheet as per

following steps (Saaty, 1980)

1. Enter pair-wise responses in Excel.

2. Calculate an Individual-level matrix.

3. Normalize the comparisons.

4. Calculate the performance score and consistency score.

5. Determine consistency ratio.

Results of this analysis are given in table 9. Consistency ratio for this analysis is 0.089. It is less than 0.1 therefore analysis can be accepted.

Table 9: AHP Calculations for Competitive Factors Prioritization

Competitive Factor Prioritization							
Sub Factors	**Assets**	**Pressures**	**Constraints**	**Strategy**	**Priorities**	**Process**	**Performance**
Assets	1.000	0.500	2.000	0.500	2.000	0.500	0.500
Pressures	2.000	1.000	1.000	0.250	0.500	1.000	0.500
Constraints	0.500	1.000	1.000	0.250	2.000	1.000	1.000
Strategy	2.000	4.000	4.000	1.000	3.000	2.000	2.000
Priorities	0.500	2.000	0.500	0.333	1.000	0.750	2.000
Process	2.000	1.000	1.000	0.500	1.333	1.000	2.000
Performance	2.000	2.000	1.000	0.500	0.500	0.500	1.000
Sum	**10.000**	**11.500**	**10.500**	**3.333**	**10.333**	**6.750**	**9.000**

Normalize the Comparison							
Sub Factors	**Assets**	**Pressures**	**Constraints**	**Strategy**	**Priorities**	**Process**	**Performance**
Assets	0.100	0.043	0.190	0.150	0.194	0.074	0.056
Pressures	0.200	0.087	0.095	0.075	0.048	0.148	0.056
Constraints	0.050	0.087	0.095	0.075	0.194	0.148	0.111
Strategy	0.200	0.348	0.381	0.300	0.290	0.296	0.222
Priorities	0.050	0.174	0.048	0.100	0.097	0.111	0.222
Process	0.200	0.087	0.095	0.150	0.129	0.148	0.222
Performance	0.200	0.174	0.095	0.150	0.048	0.074	0.111

Sub Factors	**Performance Score**	**Consistancy score**
Assets	0.115	7.739
Pressures	0.101	7.686
Constraints	0.109	7.723
Strategy	0.291	7.706
Priorities	0.115	7.687
Process	0.147	7.666
Performance	0.122	7.718

Checking Consistency:
λmax =
(7.739+7.686+7.723+7.706+7.687+7.666+7.718)/7
= 7.704
Consistency Index (CI) = (λmax - n)/(n - 1)
= (7.704-7)/6 = 0.117
Consistency Ratio (CR)= CI/RI
= 0.117/1.32
= 0.089 is less than 0.1

In this analysis, strategy development (0.291) and competitive process (0.147) have emerged as two important factors these factors for improving competitiveness of the organization. Singh et al. (2008) have also observed strategy development and effective processes as most critical factors for improving competitiveness. After these factors performance of the organization, assets and setting of competitive priorities play important role for competitiveness of the organization. Important finding of this analysis is that pressures and constraints are least important factors. It implies that if an organization can manage its resources effectively it can overcome on various pressures and constraints and sustain its competitiveness.

Conclusions

As the two wheeler OEMs are continuously reducing price of their product and doing proliferation

in product, they are facing tough challenge to compete in the market. In most of the previous studies a qualitative approach has been adopted. This study has tried to adopt both qualitative and quantitative approach. Initially present study has tried to analyze different competitiveness issues with the help of a case study and then it has tried to quantify competitiveness with the help of Cleveland (1989) model. With the help of this model, organizations can quantify their competitiveness and compare their position with respect to their competitors.

AHP analysis has been done to prioritize different competitiveness issues. Strategy development and competitive processes have emerged as most critical factors for competitiveness improvement. Therefore other organizations should also focus on effective strategy development and improving process capability of different operations to sustain their growth in the market.

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