WORLD CLASS MANUFACTURING & GLOBAL COMPETITIVENESS

Consequent with the economic liberation envisaged through globalization of industrial collaborations, organizations, especially in developing countries are at present in the midst of revolutionary transformation: that of competition shifting from the ‘industrial age’ to an information age. The emergence of the information era coupled with rapid changes in industrial technology have made the business practices, marketing strategies, customer orientation of companies in developing countries like India obsolete. So merely deployment of new technologies will not suffice. Furthermore, availability of cheap labour may not be advantageous for ensuring global competitiveness. The present paper examines the issues arising out of the globalization and suggests measures for better global competitiveness and ensuring better manufacturing excellence in Indian industry.

INTRODUCTION:

Organizations are at present in the midst of a revolutionary transformation: that of competition shifting from industrial age to information age. During the industrial age, companies succeeded by how well they could capture the benefits from economies of scale and scope. Technology was important, but ultimately success accrued to companies that could embed the new technology into physical assets that offered efficient mass production of standard products. The emergence of the information era, which started in the last decades of the twentieth century, made obsolete many of the fundamental assumptions of industrial age competition. Consequently, companies could no longer gain sustainable competitive advantage by merely deploying new technology into physical assets rapidly. Intangible assets enable an organization to develop customer relationships and loyalty, introduce innovative products and services, produce customized high quality products and services at low-cost and with short lead times, mobilize employee skills and motivation for continuous process improvements, and deploy information technology effectively.

CHALLENGES OF THE INFORMATION AGE:

Business environment’s uncertainty has become a way of life. Consequently companies are finding it even more difficult to predict in their competitive environment. Customers are becoming partners, and unconventional competition is emerging. Business, however, must go on despite potentially dramatically new business environments that are at present not well understood.

Business environment’s uncertainty
Has become a way of life
UNDERSTANDING CUSTOMERS:

It has become important to understand customers’ needs and wants deeply and to translate these into a unique value-added business mission. Companies capturing and applying information at each point of customer contact will, therefore, be better off than those that do not. Consequently companies will have to be able to apply and integrate information technology into the entire product process (including research, design, manufacturing, distribution, marketing, and after sales service).

UNDERSTANDING GLOBALIZATION OF BUSINESS:

Globalization is defined as a process cuts across national boundaries, integrating and connecting communities in new space-time combinations (Hall. Et al, 1992). As information technology (IT) breaks down the barriers of time and location, distinctions are also breaking down between large and small companies. Small, agile firms are now effectively competing with industry giants because IT can make a consortium of small firms look, feel and get big, reaching for customers once beyond their grasp. This has given rise to intense competition blurring the boundaries between domestic and global markets.

GLOBALIZATION:

Consequently the economic activity today is becoming not merely internationalized but more significantly it is becoming increasingly globalized. ‘Internationalization’ refers simply to the increasing geographical spread of economic activities across national boundaries which as such is not a new phenomenon. Globalization of economic activity is qualitatively different. It is more advanced and complex form on internationalization which implies a degree of functional integration between internationally dispersed economic activities. Though globalization is a more recent phenomenon; however it has already emerged as the norm in a growing range of economic activity. Almost every sector of business is influenced by global forces due to globalization (Porter, 1986). Globalization is characterized by:

- tightly linked global financial market;
- global sourcing of inputs, marketing and distribution of production, and manufacturing of products and final products;
- increased pressure for improved product quality and reduced product price; and
- evolution of business toward more comprehensive and continuous global coordination and integration.

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To compete successfully in this dynamically changing environment, firms need to be able to address effectively several key strategic issues:

Cost-quality improvement through coordinated manufacturing: Global competitive pressures push strongly to reducing product delivered cost and at the same time to improve significantly the quality of the product and all aspects of customer service. A common strategy used by the firms for achieving this goal is to tighten significantly all aspects of manufacturing process, which includes coordination strategy such as ‘just-in-time’ (JIT) and overall quality-improvement programmes (Imal, 1986; Suzaki 1987).

Cost-quality improvement through concurrent engineering: Another key element is better design of the product for manufacturability. To do this integrated design teams are formed, pulling together product design, engineering and manufacturing. The objective is to design a product for manufacturability as well as for other objectives. In some cases packing and distribution, marketing and R & D functions and also brought into the concurrent engineering process (Dean and Sussman, 1989).

Order Cycle: In many industry sectors as automobile, the product is built to customer order and customer specific. The ‘order cycle’ begins when the customer places an order, and ends with the delivery of the completed product to the customer. In these sectors, therefore, a very key competitive issue is to shorten significantly the time the cycle takes, for delivering the product to the customer as soon as possible (Stalk and Hout, 1990).

After-sales customer support: Customer support after the sale is a critical issue. Customers are demanding a high level of service for maintenance including spare parts availability and technical skills in service staff. Add on products and services such as training, documentation, product upgrades, are also required. A high level of customer support capability is required, but it can also be profitable.

Design cycle: In many industries, product life becoming shorter product lives. The time it takes to conceive of a new product, design it, put it into manufacturing, and deliver it to the market with a full support network in place - the design cycle – is becoming shorter and shorter. A shorter design cycle also means a newer technology put on the market. The company that takes six years to design a new car model today must be using the 1992 technology, while the company with three design cycle may be competing with 1995 technology.

Globally-coordinated Flexible Manufacturing and R&D: Global sourcing of competent and sub-assemblies, global distribution into multiple markets, and an efficient use of a network of global manufacturing and assembly parts is leading to globally coordinated manufacturing. In this new style of ‘flexible manufacturing’ the objective is to coordinate production planning and scheduling among multiple plants in many countries and across product line, to respond to changing market and production conditions.

Global coordination of research and development is driven by the need for product development for global markets and by the recognition that unique research competency
exists in many different countries and cultures. At the same time that a company strives
to tap these competencies, it also usually wants to take a cost-effective approach in that
undesired duplication and overlap be minimized. Managing R & D in a global situation
is specially critical. For example, in the pharmaceutical industry, clinical trials and
regulatory approval applications must be undertaken in many countries relatively
simultaneously.

**INDIAN SCENARIO:**

According to a recent report from World Bank on global economy, developing countries
over the next ten years will grow by nearly 5 per cent a year compared with a rate of 2.7
per cent in the rich industrial world and by 2020 India should be the 4th largest economy
in the world. Unfortunately, contrary to this prediction, India ranks number 45 in global
competitiveness among 49 countries, according to 1996 Global Competitiveness Report
of the World Economic Forum. From 35th in 1994 to 39th in 1995, and now to 45th,
India’s decline in its competitiveness is shocking. For a country such as India which
needs high growth levels to generate enough resources to alleviate poverty levels, this is a
dangerous prognosis. It is, therefore, critically important that immediate steps be taken to
reverse this trend.

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Manufacturing is the process of adding value to raw materials and resources and is at the
heart of an economy. The last decade has witnessed fierce competition in the
international markets led by Japan and the newly industrialized countries’ major
competitive advantage. As against cheap labour experience, market share and technology
innovations are greater determinants of cost leadership than the cheap labour (Chandra
and Shukia, 1994). Superior product quality, design innovations, robust delivery
performance, customisation, and excellent after-sales service are the distinctive
manufacturing characteristics needed to gain competitive advantage. The ability to
deliver these capabilities rests on the management’s perspective on competition and the
manufacturing practices of the company.

Historically Indian industries developed management practices which suited the
restrictive industrial policies of the past. Until the early 1980s, the demand for most
manufactured goods was exceedingly the supply. Consequently, Indian manufacturers
preferred to exploit the limited and yet adequate domestic market. Since the restrictive
policy regime suited and reinforced their Inward orientation their industrial management
practices did neither emphasize consumer orientation nor the manufacturing excellence
needed in a competitive environment. The opening up the Indian economy to global
competitive forces posed new challenges and opportunities to Indian manufacturers.
Indian industries started seeking export markets which have become attractive following
the decline in the value of Indian rupee. But an industry’s competitive advantage cannot
be built nor sustained solely by the export market orientation. Development of domestic
market is a vital determinant of the competitive advantage of an industry (Porter, 1990). The size, consumer sophistication and the growth of domestic demand shape the characteristics of an industries the scale economy that is essential for cost leadership. But the quality of domestic demand rather than its quantity is more important in shaping the competitive advantage of domestic industries. Quality of domestic demand has never been nurtured by Indian manufacturers. To successfully compete with the world class manufacturers in domestic as well as global market. Indian firms will have to offer high quality product choices to domestic customers in order to create a sustainable base for national manufacturing excellence!

**MANUFACTURING EXCELLENCE:**

In the changed globalize business environment, it is no more feasible to compete only on the basis of costs without paying attention to the real customer preferences represented by other product dimensions. Consequently, many new manufacturing approaches have emerged over the recent time mostly as the reaction to dynamically changing situation on the market place, where increased competition and market globalization greatly affected the distribution of the market share and the profit margins. These new approaches to manufacturing are based on a pragmatic philosophy distilled from worldwide experience in manufacturing. Manufacturing Excellence could be attained by a combination of several approaches to manufacturing such as the following Hall, 1987).

i) Value-added manufacturing, which means do nothing that does not add value to the product or to the customer.

ii) Continuous Improvement manufacturing, which suggests that every aspect of manufacturing is dedicated to making it better in ways great and small; and

iii) Just-in-time (JIT / TOTAL Quality Control)

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World class manufacturing was the goal of achieving and /or sustaining world class competitiveness through manufacturing excellence attained through best practices. In this context, different experts have expressed the goal and necessary practices for world class manufacturing differently but always with the implicit goal of sustained competitiveness in the global market place. For example, Schonberger, who introduced the term ‘world class manufacturing’ (1986), states that world class manufacturing has the goal of continual improvement in quality, cost, lead time and customer service, as also the flexibility. Gunn (1987) suggest a number of criteria for evaluating a company’s world class manufacturer status such as inventory turnover, quality defects and lead times. According to Gunn, a company needs inventory turnovers in raw materials and work-in-process (WIP) of some 25 to 30 per year to be a Class C world-class
manufacturer, about 50 to 60 turns per year for a Class B status and on the order of 80 to 100 turns or more per year to be a Class A world class manufacturer.

Maskell (1991) states that world class manufacturing is a very broad term which generally includes focus on product quality, just-in-time (JIT) Production Techniques, Work-Force Management, and Flexibility in meeting customer requirements. Kinn (1996) characterizes world class manufacturing by three core strategies of customer focus, quality and ability (i.e. the ability to quickly, efficiently and effectively respond to change), and six supporting competencies-employee involvement, supply management technology, product development, environmental responsibility and employee safety, and corporate citizenship.

Information age has not affected merely the industrialized countries but also the developing countries. Consequently, the environment facing developing countries has also become increasingly more turbulent, dynamic and complex. A combination of external and internal factors including population growth, weak infrastructure, foreign indebtedness, asymmetric world infrastructure, foreign indebtedness, asymmetric world relations and increasing inequalities between individuals, groups and regions has prevented many developing countries from achieving significant socio-economic improvements. Some developing countries such as India have, therefore, made economic management their prime agenda. They are going through a process of restructuring their economy to emphasize competition, integration with global markets and increasing level of privatization. Consequently Indian manufacturing industry has been thrust from the protected environment of the “licence-permit-quota” to an uncertain environment of global competition and global markets.

Global competitors operating in global markets almost always tend to have world class status as defined above. Therefore, to be globally competitive, Indian manufacturers necessarily need to achieve world class performance. Oddly enough, as stated before, developing countries such as India, China and Brazil themselves constitute a huge market which attracts many world class companies from other countries to sell their products in these countries. The domestic companies in these countries, are also constrained to compete with these world class companies by virtue of their entry into the domestic market.
Thus, from Fig.1, it is evident that Indian manufacturers need to acquire the world-class status irrespective of the fact that they are operating only in the domestic market or are an exporter as well. Needless to mention though that achieving world-class performance is a great opportunity for those who can make it, and for others, a serious threat. Though to some extent the Indian manufacturers have realized this and trying to rise to the challenge, will depend on their readiness to move themselves from a protected domestic to world-class global manufacturing status quickly and confidently.

**MANUFACTURING STRATEGIES IN THE INFORMATION AGE:**

Most manufacturing companies are now experiencing rapid and continuous change in their business environment, which can be identified in terms of product change and/or in terms of process change (Luftman, 1996). Product change characterizes the demands for new goods or new services. Companies change their products because of competitor moves shifting customer preferences, or the entry to new geographical or national markets whereas process change concerns reformation of procedures and technologies of products development and services.

These two types of changes can be classified as either stable or dynamic. Stable change in slow, evolutionary, and generally predictable, while dynamic change is rapid, often revolutionary, and generally unpredictable. Taken together, these two types of changes provide a matrix of four possible combinations of ‘change conditions’ that can confront an organization defines a strategic business model appropriate to the conditions (Fig.2). This matrix of manufacturing strategies can serve as a valuable lens through which an organization can (i) assess its competitive position by understanding where it has been in the past; (ii) continuously choose a strategic business model appropriate to the present and (anticipated) future environment, and (iii) clarify how to strategically align the business and IT strategies, Infrastructure and process appropriate to the strategic model. The matrix combinations and the relevant manufacturing strategies are described below:

<table>
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<tr>
<th>Dynamic</th>
<th>Stable Product Change</th>
<th>Dynamic Process Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass Communication</td>
<td>Mass Production</td>
<td>Innovation</td>
</tr>
<tr>
<td>Innovation</td>
<td>Continuous Improvement</td>
<td></td>
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</tbody>
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**Fig.2 Manufacturing Strategies for Change**

Innovation Strategy: The focus of innovation strategy is to frequently create small volumes of new products, while constantly innovating the process required to develop and produce them. These organizations are often separate research and development
(R&D) units within mass production organizations, such as Bell Laboratories. Such organizations are inherently designed for change since product specifications and work processes are unpredictable and constantly shifting. To compete under innovation conditions, organizations decentralize decision-making, broadly define jobs, develop few rules or procedures, and subjectively evaluate performance.

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MASS PRODUCTION STRATEGY:

Throughout the twentieth century, most large organizations have competed under the conditions of relatively stable and predictable product specifications and demand. This permits them to standardize products, centralize decision-making, routines work and reward, develop and enforce standard rules and procedures, and allocate work to dedicated, specialized jobs — i.e. to mass produce goods or services. The focus of these firms is on economies of scale and low costs, and striving for the largest size and lowest cost structure in the industry. The organizational structure of such firms is often large, hierarchical, bureaucratic, and vertically integrated. Their competitive advantage and profitability are based on reduction of unit costs, and therefore change in either process or product is anathema to the mass production strategy. Consequently, the design for stability requires limiting both product variety as well as process innovation.

While mass production and innovation have been the predominant forms of competitive strategy during the 20th century, today the situation has changed with neither simultaneous stable-stable change in such a situation, two more strategies emerge as an option to manufacturing firms.

MASS CUSTOMIZATION:

Organizations in a number of industries are facing customers making increasingly unique and unpredictable product demands. However, the basic processes that these companies are instituting to meet these demands soon evolve into identifiable patterns enabling the companies to build stable but flexible platform of process capabilities. Such companies, therefore, need to be organized and managed for mass customization (Pine, 1993). It is the ability to serve a wide range of customers and to meet changing product demands through product variety and innovation, while simultaneously building on existing long term process experience and knowledge that results in increased efficiencies. The focus of these firms is on individual customer fulfillment through flexibility and responsiveness. The major distinguishing characteristic of the mass customization strategy is the capacity to produce product variety rapidly and inexpensively. This requires a set of modular process capabilities with a linkage system that allows them to be brought together instantly for any particular customer order. Consequently, instead of
centralizing all decision making for a single value chain, these organizations centralize coordination and control in the hub of a web of loosely linked processing units.

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CONTINUOUS IMPROVEMENT:

In some industries, such as automobiles and machine tools, the nature of product demand is still relatively mature, stable, large, and homogeneous. But the competition in these industries is based on dynamic process terms, i.e. the organizations are competing by achieving constant improvement in process quality, speed, and cost. The focus of organizations in these industries is on customer satisfaction through process improvement. As opposed to mass production firms, they are very customer or market focused, striving to better satisfy the market as a whole through continuous process improvement. These organizations manage rapid innovation and use of new process capabilities and therefore require systems and structures that facilitate long-term organizational learning about product but simultaneously achieving radical changes in the processes. To make process innovation efficient, these organizations employ cross-functional teams that collaborate to improve processes or plan for product enhancement. The members of these teams then turn to their function specific transformation. In this sense the teams of continuous improvement firms need to be as process-innovation’ organizations and as process efficient as ‘mass production’ firms.

MANUFACTURING CHALLENGES OF THE INFORMATION AGE:

Time-based Competition

Time is the primary competitive motive of business in the 21st century. It does not mean, however, that other motives such as cost, quality and service can be ignored. In fact these are prerequisites to sustain competitiveness. But the winning factor is provided by time (Stalk 1988) and enhancement to the basic products. Reducing time is not critical in and of itself – it is the benefits achieved through time reduction in the form of greater cash flow, less inventory, quicker customer response, and ultimately, greater profits, which make time-based competition worthwhile (Handfield, 1995). Moreover, time-based competition worthwhile (Handfield, 1995). Moreover, time-based competition does not just refer to manufacturing but to the entire product / value supply chain, which includes product development, order processing, supplier delivery, reproduction, manufacturing, final assembly, and distribution. Thus, in the manufacturing environment, time-based competition becomes the highest priority to gain responsiveness and flexibility (‘Fig.3) (Meyer, 1990).
Responsiveness and flexibility have several important dimensions (Table 1). One is product mix, the need to support maximum variety in end products with minimal disruption to the manufacturing operations. Other relate to upgrading of plant and equipment in order to start product quickly. The driving force behind this priority setting is the need and the wish to respond to virtually any customer request just-in-time. Flexibility, on the other hand, is the response of a system to environmental uncertainties ("the unknown customer"). Thus, the 1990s which will no longer be pushed forward by technology but will be controlled by information feedback. This leads us to the challenge industries are facing today: how to manage knowledge.

Table 1 : Flexible Manufacturing Parameters for Meeting Business Objectives

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<tr>
<th>Business Objectives</th>
<th>Flexibility</th>
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<tbody>
<tr>
<td>Product Innovation</td>
<td>Product Technology</td>
</tr>
<tr>
<td>Product diversity</td>
<td>Product mix</td>
</tr>
<tr>
<td>Customer requirement</td>
<td>Design</td>
</tr>
<tr>
<td>Market Share</td>
<td>Volume</td>
</tr>
<tr>
<td>Meeting delivery dates</td>
<td>Routing, Sequencing</td>
</tr>
</tbody>
</table>

MANAGING KNOWLEDGE:

In the 21st century, the productivity and, even more important, the effectiveness of managers and white-collar workers will become critical to long-term survival. The effectiveness of these experts depends on their smooth integration into the organization. Therefore, in the era of advanced specialization, integration of dispersed knowledge will
become progressively more difficult to accomplish and more costly to achieve. Knowledge will become scarce and the most crucial and expensive economic resource.

**PROBLEMS IN THE MANUFACTURING INDUSTRY:**

**Coordination**

Once a company has defined its manufacturing strategy, it has to initiate mechanisms for managing product complexity as well those for managing demand uncertainty in the form of uncertain orders, both perhaps at the same time. The challenge of managing product complexity is to improve productivity (goal of ‘mass production’ strategy) whereas the challenge of market uncertainty is to improve flexibility (goal or ‘mass customization’ strategy) (Meyer, 1990). Product complexity is managed by breaking down a manufacturing task into a number of sub-tasks and operations. Executing these sub-tasks and operations in parallel improves productivity. But if different sub-tasks are performed by different workers (‘division of labour’), then the productivity improvement is restricted by coordination costs which may otherwise exceed the productivity gains. This is also true for the expert knowledge, which is the other resource required to execute operations. Thus a basic problem in manufacturing is the problem of coordination which could be stated as follows:

- After exploding a manufacturing task into thousands of sub-tasks, how difficult and costly integrated manufacturing and effective knowledge management.

Unfortunately, there have been many discussions on national infrastructure and macroeconomic policies in the national media but very little attention has been paid in designing policies that map managerial practices to manufacturing excellence of world class status. While macro-economic factors affect the investment climate and the extent of resources available to enhance productivity, they fall to define and control the parameters of competition, viz. cost, quality, delivery and flexibility (Chandra and Shukla, 1994). The economic reforms in India have already started opening up new challenges and opportunities before the Indian industries. Whether the Indian firms will be able to capitalize on these opportunities and elevate themselves as viable global competitors, shall depend primarily on their dynamism and ability to transform themselves into world class manufacturers – the sooner, the better and perhaps safer!
REFERENCES


