Organizational Culture and its Impact on Continuous Improvement in Manufacturing

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ABC	Activity-based costing
ABM	Activity-based management
ACN	Anticipating customer need
AGV	Automated guided vehicle
AHP	Analytical hierarchical process
AM	Agile manufacturing
AMC	Actual manufacturing cost
AP	Availability of the process/machine
BCMS	Basic components of manufacturing system
BM	Benchmarking
BPR	Business process reengineering
C	Cost
CAD	Computer-aided design
CAM	Computer-aided manufacturing
CAPP	Computer-aided process planning
CE	Concurrent engineering
CEO	Chief executive officer
CI	Continuous improvement
CII	Confederation of Indian Industry
COH	Cohesion
CON	Controlling
CPs	Clarifying policies
CP	Collaboration planning
CPIs	Cultural performance indicators
CR	Consistency ratio
CRA	Customer requirement adherence

CRM	Customer relationship management
CRQ	Customer required quantity
CSA	Customer schedule adherence
CTM	Commitment of top management
CVF	Competing Values Framework
D	Delivery
DEP	Developing people
DPMO	Defects per million opportunities
DT	Downtime
EAW	Expecting accurate work
EE	Employee empowerment
EMS	Environment management system
EP	Encouraging participation
ES	Emphasizing speed
et al.	And others
E	Environment
EV	Eigenvalue
F	Flexibility
FA	Factor analysis
FC	Focus of customer
FG	Finished goods
FMS	Flexible manufacturing system
FOCE	Focus on competition with overall economic performance
FR	Formal rules
GEM	Global Excellence Model
I	Innovation
ICR	Integrated customer relationship
IFs	Imperative factors
IOC	Interorganizational communication
IPEE	Inspiring people to exceed expectation
IS	Inventory strategy
ISC	Initiating significant change

IVN	Innovation
JH	Jishu Hozen
JIPM	Japan Institute of Planned Maintenance
JIT	Just-in-time
LM	Lean manufacturing
M	Morale
Max	Maximum
MEM	Measurement, examine and manage
MHR	Management of Human Resources
Min	Minimum
MIN	Minutes
MLMO	Market and sales development and growth and focus market share
MMT	Material movement time
MoP	Measures of performance
MRP	Material requirements planning
NVA	Non-value-added
OC	Organizational culture
P	Productivity
PCA	Principal component analysis
Pcs	Pieces
PD	Partner development
PM	Planned maintenance
PMP	Performance measurement planning
PPM	Parts per million
Q	Quality
QM	Quality maintenance
QPM	Quality process management
QS	Quality system
RI	Relative index
RM	Raw material
ROI	Return on investment

S	Safety
SCM	Supply chain management
Sec	Seconds
SHE	Safety, Health and Environment
SHWE	Showing Hard Work Ethic
SMED	Single-minute Exchange of Dies
SOP	Sales and operations planning
SPFS	Standardized Product and Process Flow Strategy
SPSS	Statistical Package for Social Service
SQC	Statistical quality control
SS	Six Sigma
TPLM	Total productive lean manufacturing
TPM	Total productive maintenance
TPT	Throughput time
TQM	Total quality management
TRU	Trust
TTF	Throughput time with flexibility
UK	United Kingdom
USFC	Unsafe condition
VA	Value-added
VAR	Value-added ratio
VAT	Value-added time
WCM	World class manufacturing
WCMS	World class manufacturing system
WIP	Work-in-process/progress

About the Authors

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Chapter 1

Introduction

1.1 Impact of Globalization

Consequent to globalization, in recent times, manufacturing companies have been passing through a critical phase of high competition. Under these circumstances of stiff competition, the consumer is the ultimate decision-maker for any product based on their dependability, availability and overall value that the consumer perceives. Hence, in order to win the customer's favour, it is imperative that each company is compelled to meet and beat the best ones from anywhere in the world. Traditionally, product pricing was based on the manufacturing costs and the profits were fixed by stakeholders commonly known as cost-based pricing. However, during post globalization, customers, being interested in continuous price reduction, fix the price on the basis of maturity of the product cycle, that is, introduction, growth, maturity or decline. Customers decide the price reduction in the scale of 5, 4, 3, 2 and 1. That is, at the end of the first year, they want 5% reduction from its initial price; at the end of the second year they want 4% reduction, and so on. In this manner, customers fix the product price and the stakeholders fix the profit either keeping constant or in increasing trend. As shown in Expression 1.1 (Anantharaman & Nachiappan, 2006; Ravichandran, 2005), cost is the only parameter to be controlled and managed by the managers of the organization to decide upon the price of the product – 'Price-based costing'.

Once design is frozen and a product is industrialized, usually major cost sits on manufacturing activities as input material and conversion cost alone account for 80–85% of a product cost. Serious cost reduction is necessary to reduce the price and to remain competitive in the global market, and this can be accomplished by taking measures to improve the manufacturing system of the product (Farsijani & Carruthers, 1996). Therefore, it is now increasingly necessary for engineers and managers to give more attention to improving the process of manufacturing in order to remain relevant. Furthermore, in contemporary highly challenging environment, an economic production system has been identified as a crucial factor for competitiveness (Pintelon, Pinjala, & Vereecke, 2006).

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Expression 1.1 Cost Equation.

Cost-based Pricing:				
Cost	+	Profit	=	Price
Manufacturing cost	Profit fixed by stakeholders		Market is price taker. Market has no influence on price	
Price-based Costing:				
Price	−	Profit	=	Cost
Global market expects decreasing price	Stakeholders require increasing returns		Continuous pressure to reduce by effectiveness in manufacturing	

1.2 Manufacturing

Manufacturing operation is one of the prime strategic functions of any business (Yamashina, 2000). It is an economic term that refers to making goods and offering services to satisfy human wants (Black, 2002). It implies value created by applying useful mental or physical labour. It is a process of adding value to the raw materials and resources, and therefore, it should be considered as the heart of economy in an organization. It is an essential process of creation with a purpose (Sinha, 1997).

The original meaning of 'manufacture' is to make things by hand. However, at present, the meaning has quite widened. 'Manufacturing' is the conversion of a design into a finished product. Production has a narrower sense, namely, the physical act of making the product. Manufacturing has a history extending several thousands of years and comprises the following three important features:

- *Providing basic means of human existence*: Without manufacturing or production of goods, a human being cannot live, and this is increasingly so in modern society.
- *Creating wealth of nations*: Manufacturing creates the wealth of a country or a nation.
- *Promoting human happiness and world peace*: An affluent and prosperous country can provide security, welfare and happiness to its people. Such a country no longer needs to invade other countries or to wage war and consequently, manufacture of weapons will stop, and it will result in world peace.

The overall manufacturing and its process flow has been illustrated in Fig. 1.1. Inputs like material and energy go through manufacturing process and get transformed into finished products for customers.

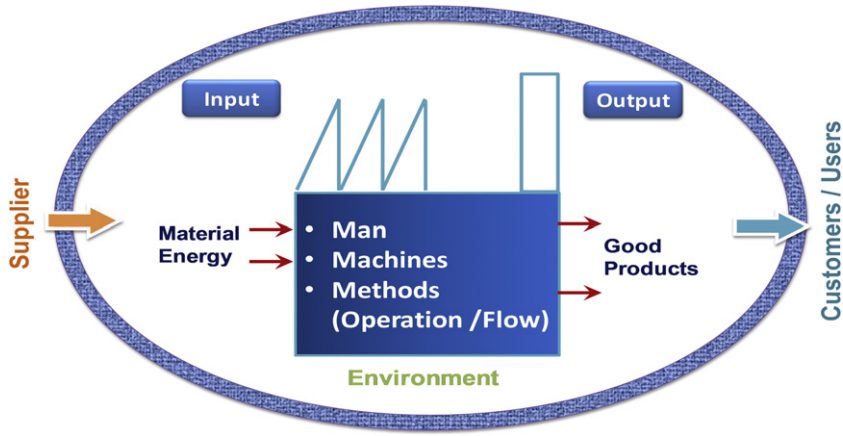

Fig. 1.1. Manufacturing and Its Components.

If the products or services of a manufacturing system have to reach customers, it has to be flexible enough to comply with changes tailored to meet the customers' demands and desires (taste). The arrangement and operation of machines, tools, materials, people and information to produce a value-added physical entity or service is characterized by a measurable parameter called performance measure (Cochran & Dobbs, 2002). Depending on the maturity of manufacturing systems in an organization, manufacturing excellence can be ranked at various levels. World class manufacturing (WCM) level is considered as the highest level of manufacturing excellence. The following section explains more about WCM.

1.3 World Class Manufacturing

In the era of globalization with major players from all over the world, the term world class is appropriate. WCM is a term widely recognized in manufacturing, encompassing a wide range of activities. WCM implies that it has the ability to compete in globally competitive market. It is considered the best system in the world in terms of production and operation capability. The term WCM implies the pursuance of best practices in manufacturing (Miller, 1991).

Schonberger (1986) has described WCM as analogous to the Olympic Games motto – *citius*, *altius* and *fortius* (faster, higher and stronger). It is described as a collective term for a number of production processes and organizational strategies, which have flexibility as their primary concern (Haynes, 1999). Gunn (1987) strongly emphasizes on the role of technology in WCM, and Hall (1983) stresses that WCM is a fundamentally different way of operating an organization. Giffi, Roth, and Seal (1990) view quality and customer as the primary focus of WCM, supported by a combination of manufacturing strategies and capabilities, organizational facts and human assets. Hayes and Wheelwright (1985) emphasize that

it is necessary to have the capability to be a superior competitor to define world-class manufacturing. Fujio Cho, chief engineer of Toyota Corporation, states as follows: 'Waste is anything other than the minimum amount of man, machine, material, parts and space which are absolutely essential to add value to a product'. Womack, Jones, and Roos (1990) have stated that WCM uses less of everything – 'half the human effort, manufacturing space, tools and money'. Also, it requires less than half the inventory on site, leads to a few defects and produces a greater and ever-growing variety of products.

1.3.1 Objectives of WCM

WCM rediscovers the vital role played by zero in manufacturing management. When the manufacturing companies march towards perfection (the zero stage), a whole new range of exciting possibilities are thrown open like zero break down in maintenance, zero defects in process, zero accident and so on (Fig. 1.2). The zero target demands a radical change in the mind-set of people about the operational life (Beck, 1989).

Experience suggests that the means adopted to achieve these ends are vital as the ends themselves. In the pursuit of zero approach, Japanese firms have graduated from Parts per Million (PPM) defects scale to Parts per Billion (PPB). It can be achieved by the implementation of CI tools in manufacturing.

1.4 Continuous Improvement

Continuous improvement (CI) is defined as a systematic effort to seek out and apply new ways of doing work by actively and repeatedly making process improvements. Process is nothing but sequences of tasks aimed at creating value-adding transformations of inputs – material and information – to achieve intended outputs (Upton, 1996). CI involves establishing customer requirements (internal or external), meeting the requirements, measuring success and continuing to check customers' requirements to find areas in which improvements

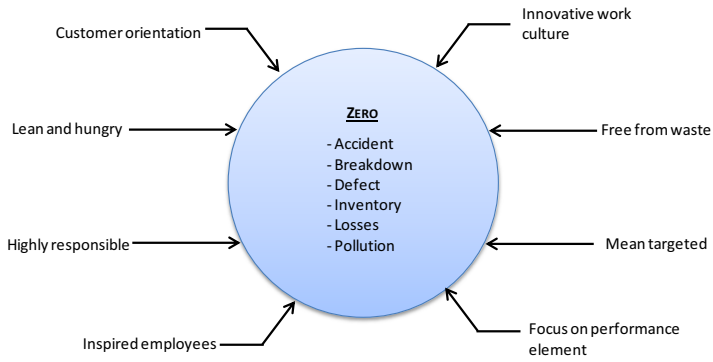

Fig. 1.2. Goals of WCM.

can be made (Chang, 2005). CI is an ongoing activity aimed at raising the level of organization-wide performance through focused incremental changes in processes (Bessant & Caffyn, 1997; Wu & Chen, 2006). CI initiative implies bundles of practices, such as prescribed sequences of steps for carrying out projects and sets of tools and techniques commonly used to execute these projects (Handel & Gittleman, 2004; Pil & MacDuffie, 1996). Furthermore, several studies also identify the importance of CI, as a part of quality management practices, in the sense of its contribution to the organizational/manufacturing performance (Cua, McKone, & Schroeder, 2001; Douglas & Judge, 2001; Kaynak, 2003; Sila, 2007; Terziovski & Samson, 1999).

Companies aim to achieve continuous improvement capability through the deployment of continuous improvement tools such as lean management and Six Sigma (Voss, 2005). The underlying foundations are seen to be a culture for innovation, focusing on critical processes and the involvement of employees, together with the integration of improvement activities throughout the organization.

1.5 WCM Awards and Winning Criteria

From the growth of technology and shifting customer expectations to the emergence of new markets and global competition, it is clear that what it takes to be successful today is different from what it took just a decade ago – and certainly different from what it was when the US Congress passed the Malcolm Baldrige National Quality Improvement Act in 1987. The purpose of the Act and the awards program it spawned was to enhance US competitiveness by encouraging companies to focus on Quality and Manufacturing Performance Excellence. It did this by establishing criteria for evaluating improvement efforts, identifying and recognizing role-model companies and disseminating and sharing best practices (CI tools being adopted in that organization).

After all, global companies can source from anywhere in the world. Transparency makes it harder for companies to hide mistakes. The era of information-driven globalization is characterized by frequent, rapid and sometimes unpredictable change, both done by leaders and done to them by events in the external world. Globalization increases the speed of change, as more competitors from more places produce surprises. Currently, with respect to manufacturing companies, the GEM council awards are of the highest repute worldwide, and the world leaders in their respective fields such as Cannon (copier), Bridge stone (tyre) and Toyota (automotive) have received the GEM council awards.

1.5.1 Global Excellence Model (GEM) Council

1.5.1.1 . About the Organization

The GEM Council members are administrators of business excellence programmes from the United States, Europe, Japan, Australia, India, South America and Singapore. The Council meets regularly to share knowledge and experiences, explore opportunities for collaboration and review the criteria to keep them current and relevant. The details about worldwide (across 75 countries) award

administrating companies and the corresponding names of awards are listed in Table 1.1 (given as in alphabetical order of the country in the world). The Manufacturing Excellence Award may recognize recipients who demonstrate excellence against the award guidelines and evaluation criteria.

1.5.1.2 Awards Assessment Process

The process begins when an organization submits an award application. The application and supporting documents are reviewed for completeness and a site visit is scheduled and business excellence assessors appointed. The assessors will evaluate the award application and after that site visit is conducted to assess the organization based on the manufacturing excellence worldwide standards. The site visit generally lasts from 1.5 to 2 days. After the site visit, the assessors review the findings, verify the company's achievement report, write the feedback report and make recommendations on the outcome of the assessment. Recipients of the Manufacturing Excellence Award are selected based on the combined results of the achievement report review and site visit feedback. The governing council (CEOs of world leading organizations and business experts) approves the award recipients. All applicants will receive a feedback report highlighting their strengths and areas of improvements in manufacturing. Based on the country, the award is given in various names but the assessment procedure is of the same kind.

1.5.1.3 Assessment Criteria

The assessment for award is made on the basis of nine parameters, namely, productivity, cost, quality achievement, morale (employee empowerment), safety, environment, flexibility and delivery (time). The primary focus of the award is to acknowledge CI being adopted for transformation process and for creativity. This award supports vision, mission and values of inspiring commitment to enterprise excellence through shared learning and access to best practices. The goal is lead to eliminate all non-value-added processes, which requires attention to the three M's: waste (MUDA), unevenness, fluctuation, and variation (MURA), and overburdening people or equipment (MURI). The three M's should be viewed as fitting together as a whole system. It is important that the achievement report outline the role and relationship of all three M's. Examples of an organization's accomplishments and results can be presented to document improvement (such as setup time reduction, lead time reduction, NVA elimination and saving nature).

1.5.1.4 Timeline for the Award

The timeline is the sequence of activities to be carried out for getting the award and is presented in Table 1.2.

In India CII and EXIM bank joined together in 1994 (refer Table 1.1) for administrating the GEM procedure for awarding Indian manufacturing companies for promoting excellence among them. The award has been named as 'CII-EXIM' award for business excellence.

Table 1.1. Worldwide Manufacturing/Business Excellence Awards.

No	Country	Name of the Award	Administrative Companies
01	Argentina	National Quality Award of Argentina (Premio Nacional a la Calidad)	Foundation for the National Quality Award (FNQA)
02	Aruba	Aruba Quality Award	Aruba Quality Foundation
03	Australia	Australian Business Excellence Award	SAI Global
04	Austria	Austrian Quality Award	Austrian Foundation for Quality Management (AFQM)
05	Belgium	K2 Award	Flemish Centre for Quality Management (VCK)
06	Brazil	Brazil National Quality Award	Brazilian Foundation for the National Quality Award
07	Brunei Darussalam	Brunei Civil Service Excellence Award	Brunei Darussalam's Civil Service
08	Canada	Canada Awards for Excellence	National Quality Institute of Canada
09	Chile	National Quality Award of Chile (Premio Nacional a la Calidad)	National Center of Productivity and Quality
10	China	China Quality Award	China Association for Quality
11	Colombia	Colombia National Quality Prize	National Government of Columbia
12	Costa Rica	Costa Rica Excellence Award	Costa Rican Chamber of Companies
13	Cuba	National Quality Award of Cuban Republic	Ministry of Economy and Planning
14	Cyprus	ECO-Q Recognitions	ECO-Q Magazine
15	Czech Republic	Quality Award of the Czech Republic	Czech Quality Award Association (CQAA)
16	Denmark	Danish Quality Prize (Danske Kvalitetspris)	Center for Ledelse
17	Egypt	The National Award for Excellence in Quality	Industrial Modernization Centre (IMC)
18	Estonia	Estonian Quality Award	Estonian Centre for Excellence (ECE)

Table 1.1. *(Continued)*

No	Country	Name of the Award	Administrative Companies
19	Fiji	Fiji Business Excellence Award	Training and Productivity Authority of Fiji
20	Finland	Finnish Quality Award (Suomen Laatupalkinto)	Finnish Center for Excellence
21	France	French Quality Award (Prix Francais pour la Qualite)	Mouvement Francais pour la Qualite (MFQ)
22	Germany	German National Quality Award (Ludwig-Erhard-Preis)	German Society for Quality (DGQ)
23	Greece	Athens Chamber of Commerce and Company Awards	Athens Chamber of Commerce and Company
24	Greece	ECO-Q Recognitions	ECO-Q Magazine
25	Hong Kong SAR	Hong Kong Management Association Quality Award	Hong Kong Management Association (HKMA)
26	Hungary	Hungarian National Quality Award	The Hungarian Quality Development Center (HQDCIT)
27	Iceland	Icelandic Quality Award	Icelandic Association for Quality
28	**India**	**CII-EXIM Bank Award for Business Excellence Rajiv Gandhi National Quality Award (RGNQA)**	**Confederation of Indian Company and Export-Import (EXIM) Bank of India Bureau of Indian Standards**
29	Indonesia	Indonesian Quality Award	Indonesian Quality Award Foundation (IQAF)
30	Iran	Iran National Quality Award (INQA)	Institute of Standards and Industrial Research of Iran
31	Ireland	Irish Business Excellence Award	Excellence Ireland Quality Association (EIQA)
32	Israel	Israel National Industrial Quality Award	The Israek Standards Institute
33	Italy	Italian Quality Award (Premio Qualita Italia)	Associazione Premio Qualita Italia (APQI)
34	Japan	Japan Quality Award	Japan Productivity Center