Chapter 1

INTRODUCTION

Chapter Objectives: The aim of this chapter is to describe the need for intangibles and to identify a few intangibles for achieving higher performance levels of manufacturing organizations and establish connectivity among those identified intangible factors and organizational performance. The chapter gives the first hand information about what has been achieved in the different stages of research work.

1.1 Introduction.
Enhancing performance in manufacturing organizations supports it in achieving its goals. Organizations have to strive hard for customer and employee satisfaction which in turn affect organizational performance. Performance is displayed and is dependent on a host of tangible and intangible factors. To meet the stiff or cut throat competition, the firms must constantly strive hard to improve their performance. In order to develop sustained competitive advantage, the firm must be able to create value in such a manner as may be difficult for the competitors to follow or imitate. To improve the performance and to create the competitive advantage, the human resource function must focus on other sets of priorities. Human resource cost benefits promote operating efficiency, increase innovation and revolution ability and increase organizational performance benefits Dyer (1983). Pfeffer (1998) stated and defined seven practices which include:

- Employment security
- Selective hiring.
- Self managed team
- Provision of high pay contingent on company performance.
- Intensive training
- Reduction of status difference
- Sharing of information
Strategic Human Resource Management (SHRM) approach helps to cope up with environmental changes Cook & Ferris (1996). Further, Gomez Mejia et al. (1995) indicated that Strategic approach to Human Resource Management (HRM), directly or indirectly benefits the company because:

- It changes Passivity into initiative
- Transmits organizational goals clearly, and encourages its employees.
- Initiates involvement of line managers.

Welbourne & Andrews (1999) derived from Population ecology theory that Strategic Human Resource Management (SHRM) approach positively influences performance of an organization by:

- Generating structural cohesion.
- Employee generated synergy.

There is a need for global standard for measuring these intangibles and standards must be set or made with respect to employee satisfaction, customer satisfaction and loyalty as well as the satisfaction of the stake holders. The aim of this work is to describe the need for understanding the significance of intangibles for performance enhancement of an organization.

1.2 Performance enhancement. Organizational performance comprises of the actual outputs or results of an organization as measured against the intended outputs or goals and objectives. Specialists in the fields are concerned with organizational performance including strategic planners, operations, finance, legal, and organizational development. Many, if not most companies, are falling short in developing a truly high performing organization in today’s increasingly complex and chaotic business environment. Organizational issues and ineffectiveness are so severe that there are huge gaps between aspirations and actual organizational performance. Executives are completely aware of the unprecedented challenges and are struggling to find the effective way to drive lasting step for improvement in organizational performance. There is no simple solution. Successful organizational performance enhancement program calls for holistic approach towards solving organizational issues that are interrelated. It has become widely held promise that people provide organizations with important source of sustainable competitive advantage and that the effective management of human capital, not physical capital, may be the
ultimate determinant of organizational performance. The value of human capital may be especially apparent in modern manufacturing organizations that have invested heavily in production innovations such as advanced technology, statistical process control, and computer numerically controlled machine tools. Such initiatives tend to depend heavily on the employees' skills and commitments as key components in value creation processes. Accordingly, it is instrumental for manufacturing firms to harness productive potentials of the employees in order to achieve superior performance. A Superior Performance Management system must be developed to ensure achieving the targeted performance. Continuous improvement and healthy competition culture must be embedded in the organization to drive lasting step-improvement in performance. Recently, in strategic management literature, the concepts of Intellectual capital are gaining currency to explain company's long-term competitive advantage and improved performance. Employee involvement through team building, employee empowerment and cultural change enhances the organizational performance. For acquiring higher performance levels, an environment and culture is to be created in the organization which is capable of providing physical and mental comfort and health, safety and security facilities etc. Such an environment is called "Ergonomically enabled environment" and becomes one of the enablers of the enhanced performance besides many others.

1.3. Components of Intangibles. Organizations have begun to recognize that technology-based competitive advantages are transient and that the only truly sustainable competitive advantages they have are their intangible resources. The interest in intangibles has grown rapidly in numerous fields, including economics, accounting and strategic management. The literature on intangibles exploded throughout the 1990s Johanson et.al, (1999) and many firms, as well as influential organizations embraced intangibles whole heartedly onto their agenda. During the last almost three decades some new determinants of organization's performance have been coined out. This is the outcome of the needs felt for the attainment of the organization's competitiveness and growth. An organization's performance is thoroughly linked to several intangible factors. Fig 1.1 refers to a few of such factors (six in this case) have been selected to link to organizational performance and understand their role.
1.3.1 Ergonomically enabled environment. In order to develop sustained competitive advantage, the firm must be able to develop ergonomic culture by adopting the principles of ergonomics and house the people in a comfortable environment. The science of ergonomics refers to the complex relationship between the worker and the work, work environment and workspace which permeates every aspect of work place Sluchak (1992). A good fit between the worker, work environment, work space, worker’s comfort, safety and healthcare, productivity and efficiency are the chief concerns of ergonomics that result in better performance. Ergonomics is inter-disciplinary in nature and embraces several scientific fields, like psychology, biology, anthropometry, biomechanics, and engineering etc; besides a few more. It is suggestive of trimming organizational costs associated with several work related injuries and illnesses, chief of which are like Cumulative Trauma Disorder (CTD), Musculoskeletal Disorders,(MSD), Carpel Tunnel Syndrome (CTS), etc. A few of the several reasons which record for these Repetitive Strain Injuries (RSI), can be e.g. poor or unnatural postures, static postures, extraordinary effort used to perform the task, repetitive movement at high frequency vibrations, working at extremely low temperature environmental conditions etc.
There can be several other such conditions as may be responsible for causing repetitive strain injuries. Sometimes the organizations have to pay huge amounts as compensations on account of health disorders and this record for the direct revenue loss to the organization.

1.3.2. Information dissemination and knowledge management. As the economies are moving into information era, large warehouses of information are now available from various sources, like Internet, intranet, wireless, satellites, conferences, business news channels etc, it is essential to handle complex information and knowledge intelligently and responsibly. Nelson & Winter (1982) define knowledge as being comprised of codified, public, and easily communicated knowledge (termed information), including tacit knowledge Polanyi (1983).

Further, the knowledge-state is split into technological and economic competence. Economic competence is defined as the ability of a firm to create and exploit business opportunities Carlsson & Eliasson (1991).

A strategic use of knowledge management must address the factors like: individual, organization and technology simultaneously. Several steps and stages are involved between the target setting and achieved results. Heading for evaluation, implementation or application of knowledge results into improved product quality, service and performance. Several tangible and intangible factors contribute to the organizational growth. An efficient utilization of Selective Dissemination of Information (SDI) and the principles of knowledge management must be done in formulation of such policies as may lead to:

- Creation good healthy environment
- Environment conducive to physical and mental health.
- Improved work procedure.
- Good employer-employee relations
- Improved organizational performance.
- Monetary gains to individual and organization

Baker et.al, (1997) define knowledge in the form of simple formula,

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\text{Knowledge} = \text{Information} + [\text{Skill} + \text{Experience} + \text{Personal Capability}]
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Bender and Fish (2000) consider that knowledge is in the head of an individual (the mental state of having ideas, judgments, talents, root causes, relationship, perspectives and concepts). Disseminated information, when critically analyzed and filtered, becomes Selective Disseminated Information (SDI). SDI, after a careful analysis by the intellectual assets of organization becomes usable information and knowledge and value is created. Value creation is presented often after the development of new products and services that increase the utility that customers obtain from them. When a firm sustains profits that exceed the average for its' industry, the firm is said to possess “Competitive advantage” over its rivals, the goals of which business is to achieve competitive advantage. A sustainable competitive advantage finally is due to improved performance. Information security is a matter of serious concern for an organization. An information leakage can change the entire scenario and put things totally out of phase. Knowledge is fluid in nature and must be secured and shielded.

1.3.3. Employee worth index: Since the inception of the organizational system, efforts are always on to measure the human dimensions of employee’s worth and organizational performance. In the “Loyalty Effect”, Frederick Reichheld points out that “Companies know what [their] employees cost but not what they are worth” Reichheld (1996). The concept of “evaluating employee’s worth” is somewhat analogous to “measuring customer satisfaction”. Being an intangible, it is extremely difficult to quantify or measure it. An organization looking for providing customer satisfaction can only do so, if it recognizes employees’ worth and appoints the employees with certain core values. Most of the organizations often say that, “people are our greatest assets”. But it remains only to say so. Most still believe, though perhaps not consciously, what nineteenth century employers believed: “people need us more than we need them” Drucker (1995). Judging the worth of the employees by productivity measurement or measure of “Return on Investment” are not enough, as these are influenced by the systems, technology, procedures and other factors beyond employee’s control. The employee’s worth can be enhanced by developing them into value added employees by adding certain core values amongst the employees. These value added employees always enhance the organization’s reliability as well as performance.
1.4 High Reliability Organization and performance index: The effects of organizational culture on system reliability cannot be understated. System reliability is critical for the success of most of the organizations, regardless of whether they are in manufacturing, service, government, education, non-profit, or otherwise. The level of reliability that is achieved by any system must meet the requirements of its users in all foreseeable contexts. Strong cultures, defined as "a set of norms and values that are widely shared and strongly held throughout the organization" enhance firm performance and reliability. One of the key consequences of a strong corporate culture is that it increases behavioral consistency across individuals in a firm. Organizational culture defines a normative order that serves as a source of consistent behavior within the organization. In this sense, organizational culture is a social control mechanism. Highly variable performance may increase the frequency of risk-taking behavior, which is the indicator of poor reliability of the organization.

Firms with highly variable cash flows find themselves at a competitive disadvantage, for two reasons. First, highly variable cash flows imply that there will be periods when a firm will under invest in worthwhile projects. Some projects that are attractive when there is sufficient internal capital will be unattractive during periods of internal cash-flow shortfall, if external capital is more expensive than internal capital. Such firms tend to be less reliable. Strong corporate cultures lower performance variability; strong-culture firms are less likely to suffer from underinvestment and are able to maintain their reliability. Reliability of an organization is thoroughly linked to the safety culture. Safety and reliability levels achieved by an organization can be judged by some data of the type,

- Number of accidents that have taken place over a specified period of time.
- Monetary losses to the organization in terms of compensations paid.
- Study regarding supervisory styles.
- Group norms and expectations etc. have to be made.

The study can be related to the norms of "Occupational Safety and Health Administration", (OSHA). Some observations are to be made about organizational behaviour and human resource management, e.g.
- Management’s commitment to safety.
- Vertical communication.
- Characteristics of work units eg., cooperation, team work, work group efficiency, supportiveness, goal emphasis, working environment, psychological environment, condition and soundness of equipment etc.,
- Job related factors like, overloading, nature of tasks, involvement of challenge in task and task clarity etc.,
- Safety related factors e.g. accident investigation procedure and employee recognition.

1.5. **Intellectual capital (IC)** - Intellectual Capital is a composite of Human Capital, Structural Capital and Relational Capital. Fig.1.2 represents the constituents of Intellectual capital. Roos *et al.* (1997), has divided Intellectual Capital into two main categories namely, Human capital and Structural capital. Edvinsson and Malone (1997) also divided IC into two main categories i.e., Human capital and Structural capital. It should be able to encourage the management of an organization to explore the dynamics of their strategic options and consequences of their decisions overtime, a prime benefit of system’s thinking, Senge (1990).

A severe drawback of IC is that it does not explain the relationship between the different elements of IC models. Intellectual capital is highly problematic to control due to its intangible nature, Zhao & Fink (2003). Knowledge is the creation of intellectual capital and can be:

- Client specific or client oriented.
- Technology related.
- Routines or procedures for organization or,
- Culture related knowledge.

All knowledge can be ‘tacit’ or ‘explicit or codified’ and constitutes ‘Intellectual capital’. Technology related developments or product or service modernization is absolutely necessary in response to the user’s requirement or changing needs or demands of the customers. Any change of technology must be incorporated after a careful “utility analysis” and study of “economics of change”. While considering the implementation of the suggested changes an impartial implementation of organization’s competencies i.e., knowledge, skills, aptitude and
attitudes must be carried out besides the economic feasibility. Competencies must be studied at individual level as well as at organization level.

Measuring routines and following of the procedures is essential for growth of healthy organizational culture. Such things leave no room for criticisms or charges of partiality etc. Any dissatisfaction bred out by the employee’s leads to the negative impact on the organization. Some system must be designed to measure the routines to maintain a control on system’s working.

The organization culture is the general pattern of behaviour, shared beliefs and values that the members of an organization have in common. Culture can be inferred from what people say, think and do within the organizational setting. Culture involves learning and transmitting knowledge, beliefs and patterns of behaviour over a period of time, which implies that an organization culture is fairly stable and does not change fast. Top managers create climate for enterprise. Their values influence the direction of the firm. Value is defined as permanent belief about what is appropriate and what is not; that guide their actions and behaviors of the employees in fulfilling the aims of the organization. Value can be thought of as a kind of ideology that permeates in every day’s decisions. In many successful companies value driven corporate leaders serve as role members, set their performance standards, motivate the employees and make the company very special.

Fig: 1.2 Constituents of Intellectual Capital

1.5.1 Human capital: Jorgenson Dale and Barbara Fraumeni (1995) found that the stock of human capital in the U.S. economy dwarfs that of physical capital and has grown markedly over time. Hall Bronwyn (1990), Griliches Zvi (1981), and Baruch Lev and Theodore Sougiannis (1996) found evidence that research and development (R&D) assets
bring benefits in the form of positive marginal product and market valuation. Timothy Bresnahan, Brynjolfsson and Hitt (2000) have found that certain organizational practices, when combined with investments in information technology (IT), were associated with significant increases in productivity in the late 1980s and early 1990s.

1.5.2 Structural capital: It is the property of an organization and forms an essential part of Intellectual Capital of the organization. It is the knowledge residing in the structures created to provide support to the staff in their intellectual work. It enables the knowledge to be developed for utilization at organization level. Structural set up can hold ‘tacit’ knowledge in the form of codified knowledge. By leveraging the human capital and making it useful for the whole organization, employees create ‘structural capital’ Ordonez de Pablos (2004) & Bontis (1998).

Containers of Structural Capital can be, for example:

(a) Patents of the firm.
(b) Models
(c) Templates.
(d) Computer systems.
(e) Other administrative processes.
(f) Culture and atmosphere.

1.5.3 Relational capital. Relational, capital also called “External Capital,” is essentially an offshoot of Intellectual capital. Capacity or capability to establish and use the external relationships or relational capital for strategic purposes is a great field of research and study. Fig.1.3 shows the role of relational capital and its constituents in achieving higher organizational efficiency. An intangible asset that is based on developing, maintaining and nurturing high-quality relationships with any organization, individual or group that influences or impacts the business including: customers, suppliers, employees, governments, partners, other stakeholders and, sometimes, even competitors. An organization with strong relational capital has a wide network of these relationships which are managed well and consistently nurtured. In addition to this organization have healthy ties with all of its key stakeholders as opposed to focussing on just one stakeholder group.
It is the strength of all the relationships that build a long-term competitive advantage that is difficult for competitors to replicate. It helps in closer and smoother interaction between the customer and suppliers. It is important to visualize the importance of casual relationships. These are essentially the communication tools. This creates a sense of loyalty between them and better and more amicable business terms are settled between them. It helps in the attainment of sustainable competitive advantage. Supported by the structural capital, it can help in value addition.

Figure: 1.3 Constituents of Relational Capital.

1.6 Effects of intangibles on organizational performance escalation: From economic point of view, intangible investments are any expenditure not immediately embodied in physical matter, which are intended to generate long term benefits. Because of the elements of uncertainty associated with intangibles, the accounting becomes the obvious problem

1.6.1 Other intangible assets and human machine interaction. There are several other intangibles like organizational capital and process capital etc. which directly help in performance enhancement by improving the Return on Investments Factor. Human
machine interaction is the study of interaction between people / users and machine. It is often regarded as the intersection of machine science, behavioral sciences, design and several other fields of study. Interaction between users and machine occurs at the user interface or simply interface, which includes both software and hardware. Today the Human-machine interfacing systems tend to mimic the real world environment driven by the combination of technology advances and applications of demands Robertson et.al, (1993). Human-machine interfacing is the mediation between the man and machines. The system takes care of the entire communication process responsible for provision of ‘machine knowledge’, ‘functionality’ and ‘available information’ in a way that is completely understandable by the machine. Since the system is becoming more popular, it is being tried to make it more user-friendly. Due to the significant advancements in technology, there have been several types of interface designs to make them more user-friendly. Human being itself is an extremely complex system which is really quite difficult to understand because of the several factors like cognitive power, emotions and mind etc, residing in human body. Besides, there are several other complexities in it.

1.7 Objectives of study: The research is intended to understand the significance of the intangibles in enhancing organization’s performance and profits by earning higher Returns on Investments (ROI). Further, it is expected to create awareness in the corporate sectors and business houses about non-financial investments and how these help in earning goodwill, reputation and creating good relation between the employers, employees and the stakeholders.

The current work has dealt with the following, having identified a few important intangibles which prominently affect organizational performance and vehemently discusses:

- The role of ergonomically enabled environment and how does it help in preventing health disorders, and saves dollars to the company that it may have to pay as compensation. Identification of a few intangibles and development of a model by integration of these intangibles.
- Selective dissemination of information and it’s transformation into useful and codified knowledge. Utilization of the principles of knowledge management to
affect knowledge based economy for improved organizational performance and profits. Development of a model for knowledge creation and for competitive advantage using the principles of knowledge management.

- Assessment of employee's worth and its mathematical modeling for determination of Employee Worth Index (EWI) using graph theoretic approach. The index can be used for grading or comparison or sensitivity analysis of various parameters affecting performance.

- Employee reliability, System reliability and creation of 'High reliability organization' and determination of 'High Reliability Organization Performance Index', (HROPI), for attainment of higher performance levels.

- 'Intellectual Capital and determination of Intellectual Capital Value Index' (ICVI) by mathematical modeling using graph theoretic approach.

- Study of the 'Effects of intangibles' on organizational performance and determination of Return on Investment Factor (ROIF).

1.8 Organization of the thesis: The thesis has been arranged in nine chapters. The salient features have been described as under, chapter wise.

First chapter: It throws some light on organizational performance enhancement, the importance of various intangibles and their components like, ergonomically enabled environment, Information & Knowledge and information security, Employee Worth Index, Reliability and performance of high reliability organizations, Intellectual Capital and its' components, other intangibles and human machine interaction, Objectives of study and at the end 'Organization of thesis'.

Second chapter: This chapter deals with the historical background of research on intangibles, study on performance, study related to Ergonomically enabled environment , Information dissemination and knowledge management, knowledge characteristics, information and knowledge security and knowledge based view. Introduction to graph theory and its use for mathematical modeling of Employee's worth index determination, creating high reliability organizations and their performance evaluation by mathematical modeling. Study on human reliability development, system reliability development and organization reliability development. Study related to Intellectual capital (IC),
performance modeling, and evaluation of Intellectual Capital Value Index on the basis of
the components and sub-components of IC. Study on other intangibles and other
intangible assets of the organization which help in raising Returns On Investments (ROI),
human-machine interaction, retaining the key staff and finally the concluding remarks.

Third chapter: This chapter attempts to integrate the various enablers of ergonomic
environment, for development of a model taking for example Physical environment,
Human machine interaction, Policies and procedures and Psychological environment for
enhanced organizational performance. Utilization of the principles of ergonomics for
human comforts and protection against physical /organic disorders to enable organizations
achieving higher performance levels.

Fourth chapter: It discusses the applications of information management for
performance enhancement and how the Selective Dissemination of Information (SDI) is
done to acquire useful knowledge or tacit knowledge. A model has been developed for
getting competitive advantage by the use of Selective Dissemination of Information (SDI).
A relationship between the Information flow, Capturing organizational learning and
Leveraging knowledge, has been established for sustained business value to enhance
organizational performance.

• Sahai-Grover ICESIA model for knowledge creation has been developed that leads
to higher performance levels as knowledge is key and dominant.

• Knowledge security is essential and how knowledge must be protected. Role of
knowledge assets and acquisition of knowledge based economy in organizational
performance enhancement. Finally the concluding remarks.

Fifth chapter: It discusses the core values and their significance. Quantification of
"Employee’s worth" on the basis of certain core values (five selected in this case) has
been done. “Graph theoretic approach” has been applied to develop a model and express
the employee’s worth by a single numerical index. The matrix written for core values has
been named as “Sahai-Grover Core Value Matrix” (SGCVM). Core values have been
quantified on some suitable scale used by Grover et.al, (2006). Core values have also been
represented on digraph showing their Inheritances and inter-dependence. Permanent
function of the Sahai-Grover core value matrix represents the “Employee’s Worth by a
single numerical index. The index so generated has been named as “Sahai-Grover Employee worth Index” (SGEWI).

Sixth chapter: The study lays stress on creating High Reliability Organizations” (HROs) for superior performances. Inter-relationships / interdependencies between ‘Individual development’, Cultural development’ and ‘Organizational development’ have been studied. Importance of safety in enhancing the organization’s and system’s reliability has been discussed. Mathematical model has been developed and “High Reliability Organization Performance Index” has been calculated by the application of Graph theory. The index so calculated has been designated as “Sahai-Grover High Reliability Organization Performance Index” (SGHROPI). This index can be used for comparison, grading or sensitivity analysis of organizations.

Seventh chapter: It deals the quantification of the various components of Intellectual capital, correlation amongst them and their quantification and mathematical modeling. It also attempts to measure and express the Intellectual capital Value of an organization by a single numerical index using graph theoretic approach. Some already existing models have been studied. A new technique for mathematical modeling by the application of Graph theory has been utilized.

Eighth chapter: This chapter is an attempt to develop models of relationship capital, innovation capital, organizational capital and process capital. To establish a relationship or connectivity between them and study their effects on Return on investments etc., with enhanced organizational performance, a factor based on Return On Investments has been developed and has been named as “Sahai-Grover Return on Investment Factor”, (SGROIF).

Ninth chapter: It concludes and highlights the salient features of the study and finally suggests the organizations to understand the need for the considerations for utilization of intangible resources of the organization and achieve higher performance levels and higher Returns on Investments, (ROIs). All these approaches when integrated, take an organization to higher performance levels to keep the employers, employees as well as the stakeholders fully happy and satisfied. It also increases employees’ stability and confidence of the employer and employees in each other and in the organization.
1.9 **Scope for future research.** The methodology of research holds wide promise to reduce the element of subjectivity and to determine more objectively the effect of intangibles on organizational performance. This analytical approach can be applied at sub levels to objectively quantify or evaluate each sub level and extended it up to final level. For industries and organizations it may find tremendous application for classification or grading of the employees or for their sensitivity analysis. It is possible to carry out the utility analysis of the intended employees on the basis of desired attributes in the likely new incumbents. It can also be used to compare people with ethnic differences on the basis of their various attributes. Further research can be done in assessment of the Intellectual capital worth of various organizations. It can also help in ranking of the organizations on the different basis of comparisons.