Evolution of Management Systems

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Abstract

Systems theory has had a significant effect on management science and understanding organizations. Management Systems are systematic frameworks designed to manage an organization's policies, procedures and processes and promote continual improvement within. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees to accomplish its objectives through the application of available resources. This paper provides an overview of the evolution of management system with emphasize over the phases of development. It examines the early philosophical viewpoints which laid the foundation for the development of management system. It traces the evolution of management system from the pre-industrial revolution through the two world wars to the era of rapid economic growth of the 1960s to the 1980s and 2000 onwards. In recent years, management system has become more multi-faceted where emphasis has shifted from behavioural science to organisational structures and quality assurance. With rapid globalization and increasing importance of cultural awareness, the paper concludes that more research will be needed in the area of cross-cultural and multi-national system of management. This paper examines the evolution of management theories, philosophies and thoughts. It views management as a philosophy and practice that have existed even prior to the industrial revolution. The study discusses management system evolution in the early stages of evolution, paradigm shift from internal into extended process, radical business focusing, recycling process and global sourcing and evolutionary spiral. By relying on secondary data gathered from related literatures, the paper identifies factors influencing the evolutionary development of Management system. The research paper undertakes to pursue the following objectives: - **1.**To studies the stages of evolution of Management System **2.** To study the early stage in terms of: a. Final Product, b. Partitioned process and c. Integrated process. **3.** To study the paradigmatic shift from internal process expanded into the extended process, **4.** To study radical business refocusing, **5.** To study the recycled process and global sourcing, **6.** To study the evolutionary spiral of the six management system.

Key Words: - Management System, Spiral, Recycled process, Extended Process, Final product and Partitioned Process.

1. Introduction:-

System is an organized entity made up of interrelated and interdependent parts. Systems theory has had a significant effect on management science and understanding organizations. First, let's look at "what is a system?" A system is a collection of part unified to accomplish an overall goal. If one part of the system is removed, the nature of the system is changed as well. A system can be looked at as having inputs, processes, outputs and outcomes. Systems share feedback among each of these four aspects of the systems. **Systems theory** is the interdisciplinary study of systems. A system is a cohesive conglomeration of interrelated and interdependent parts that is either natural or man-made. Every system is delineated by its spatial and temporal boundaries, surrounded and influenced by its environment, described by its structure and purpose or nature and expressed in its functioning. In terms of its effects, a system can be more than the sum of its parts if it expresses synergy or emergent behavior. Changing one part of the system usually affects other parts and the whole system, with predictable patterns of behavior. For systems that are self-learning and self-adapting, the positive growth and adaptation depend upon how well the system is adjusted with its environment. Some systems function mainly to support other systems by aiding in the maintenance of the other system to prevent failure. The goal of systems theory is systematically discovering a system's dynamics, constraints, conditions and elucidating principles (purpose, measure, methods, tools, etc.) that can be discerned and applied to systems at every level of nesting, and in every field for achieving optimized equi-finality. General systems theory is about broadly applicable concepts and principles, as opposed to concepts and principles applicable to one domain of knowledge. It distinguishes dynamic or active systems from static or passive systems. Active systems are activity structures or components that interact in behaviours and processes. Passive systems are structures and components that are being processed. Inputs would include resources such as raw materials, money, technologies and people. These inputs go through a process where they're planned, organized, motivated and controlled, ultimately to meet the organization's goals. Outputs would be products or services to a

market. Outcomes would be, e.g., enhanced quality of life or productivity for customers/clients, productivity. Feedback would be information from human resources carrying out the process, customers/clients using the products, etc. This overall system framework applies to any system, including subsystems (departments, programs, etc.) in the overall organization.

Management Systems are systematic frameworks designed to manage an organization's policies, procedures and processes and promote continual improvement within. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees (or of volunteers) to accomplish its objectives through the application of available resources, such as financial, natural, technological, and human resources. A **management system** is a set of policies, processes and procedures used by an organization to ensure that it can fulfill the tasks required to achieve its objectives. These objectives cover many aspects of the organization's operations (including financial success, safe operation, product quality, client relationships, legislative and regulatory conformance and worker management). The implementation of a proven and effective Management System, such as ISO 9001 Quality Certification, can help a business to improve operations, manage risk and promote stakeholder confidence. For instance, an environmental management system enables organizations to improve their environmental performance and an occupational health and safety management system (OHSMS) enables an organization to control its occupational health and safety risks, etc. A complete management system covers every aspect of management and focuses on supporting the performance management to achieve the objectives. The management system should be subject to continuous improvement as the organization learns. The management system may include such factors as *Leadership Involvement & Responsibility, Identification & Compliance with Legislation & Industry Standards, Employee Selection, Placement & Competency Assurance, Workforce Involvement, Communication with Stakeholders (others peripherally impacted by operations), Identification & Assessment of potential failures & other hazards, Documentation, Records & Knowledge Management, Documented Procedures. Project Monitoring, Status and Handover, Management of Interfaces , Standards & Practices , Management of Change & Project Management , Operational Readiness & Start-up , Emergency Preparedness, Inspection & Maintenance of facilities , Management of Critical systems , Work Control, Permit to Work & Task Risk Management, Contractor/Vendor Selection & Management, Incident Reporting & Investigation , and Audit, Assurance and Management System review & Intervention* In its most basic sense, a management system is how organizations ensure things get done. Those organizations that hold regular staff meetings, those are part of its management system. Taken as a whole, all of the processes, formal and informal, that enable the organization to deliver its products or services, make up its management system. Management systems can be simple or complex, ongoing or ad hoc, standard across the organization or distinct to individuals. And of course, different management systems can result in varying degrees of effectiveness. Obviously, what works for one organization may not be optimal for another. What's more interesting, however, is that the management system that got the organization to where it is, may not be the right one to get the organization where firm want it to be in the future. As organizations evolve so should their management systems. An informal, ad hoc system may work just fine for a start-up with 3 employees working out of a garage. The same system, however, is unlikely to result in the effective communication, consistency, and knowledge sharing required to successfully scaling that same company.

2. Review of Literature:-

Systems theory is consisting of a wide field of research with different conceptualizations and areas of focus (***e.g. Boulding, 1956; Maturana and Varela, 1975; Senge, 1990***). Specifically, a vision of organizations as systems with the aim of analyzing the relationship between organizations and their environment has been explored ***(e.g. Burns and Stalker, 1961; Lawrence and Lorsch, 1967; Aldrich***, 1979). Systems are everywhere, whether it is in nature, in science, in society, in an economic context, and within information systems. A distinctive characteristic of systems theories have been evolved across various disciplines and that scholars working from a systems theory perspective build on the knowledge and concepts developed within other disciplines. These include natural and ecological sciences (organic aspects, homeostasis and equifinality; ***Hannan and Freeman, 1977***), chemical and biological disciplines (autopoietic aspects; **Maturana and Varela, 1975**), sociology and psychology (cognitive aspects; ***Clark, 1993***), and information technology (cybernetic aspects; ***Beer, 1975***). Because of it, there are several kinds of systems perspectives. There are service systems (from Service Science, Management, Engineering and Design - SSMED), viable systems (from Viable Systems Approach - VSA), smart systems (from systems thinking), reticular systems (from network theories), living systems (from natural sciences), economic systems (from economics), social systems (from sociology), institutional systems (from law), technological systems (from cybernetics), conceptual systems (from psychology), and ecosystems (from ecology). ***Von Bertalaffy (1956***) defines a system as *a complex of interacting elements* and fosters systems thinking in all disciplines in order to find general principles valid to all

systems. It introduces "system" as a new scientific paradigm contrasting the analytical, mechanical paradigm, characterizing classical science ***(von Bertalanffy, 1950***). *Open system theory (OST)* outlines the relationships between the organizations and the environment in which they are involved. This focus reflects on organizations' ability to adapt to changes in environmental conditions (**Boulding, 1956; Katz and Kahn, 1978**). This theory assumes that entities able of processing information about own specific environment show more adaptation skills to shifts in contextual conditions (***von Foerster, 1981). Katz and Kahn (1978***) apply the concept of open system to the organization in which organization is seen as a system built by energetic input-output where the energy coming from the output reactivates the system. ***Emery and Trist (1960)*** address organizations as socio-technical systems by underlining the two main components of the firm seen as a system. According to ***Golinelli et al., 2002; Golinelli, 2008; Barile***, 2006 explained in cybernetics that the system and the environment present different levels of complexity, as the environment has degrees of complexity that are not perceptible to the system. On the other hand *Viable System Model* outlines a system in cybernetics, the system and the environment present different levels of complexity ***(Golinelli et al, 2002; Barile, 2005). Katz and Kahn (1966)*** apply the concept of open system to the organization in which the organization is seen as a system built by energetic input-output where the energy coming from the output reactivates the system.

Emery and Trist (1960) address organizations as socio-technical systems, underlining the two main components of the firm seen as a system. In the 1970s ***Maturana and Varela, 1975***., made an important contribution to systems theory came from a different set of new principles, i.e., auto-learning, auto-organization, and auto-poesies. ***Von Foerster 1***981 explained Auto-organizing systems finalize their energies to organize themselves; they reduce internal entropy to increase external entropy. ***Nonaka and Tacheucki***, 1995 explained that the firm is seen as a learning system and as having a set of skills and competences that enables it to produce its own knowledge. **Vicari** stressed in 1992 that the firm is then a cognitive system establishing its existence, creating information and activating skills in order to produce knowledge through continuous leaning processes. From this approach the firm is seen as a holistic system, characterized by a high degree of integration between the factors intervening in the process of value creation **(Grant, Shani and Krishnan, 1994**). The firm's value can be expressed as the "potentiality of existence, development, evolution***" (Vicari, 1992).*** When discussing quality issues, it is necessary to focus on the link between TQM and *systems thinking* (**Kim, 1990; Senge and Sterman, 1990; Kim and Burchill, 1992**). In **TQM**, the systemic conception of the firm is strengthened by its emphasis on the importance of the relationships of the parts to the goal to be reached **(Mele and Colurcio, 2006**). If the organization is the system at the micro level, then the environment is the system at the macro level. In the systems approach, the decision maker, by analyzing the structure of his own system and the structure of supra-systems, employs attenuating and amplifying actions of the kind needed for survival, thus modifying the borders between the system and the individual supra-systems (viability). **Brownlie (1994)** highlights two conceptualizations of the environment: the objective environment and the enacted environment. According to the viable system model (**Christopher, 2007**), competitive firm behavior is strictly linked to the ability to identify and manage functions and relationships, thereby establishing communication channels, organizing information flow, and rationalizing and harmonizing a firm's development aligned with all external relationships. According to the viable systems approach ***(Barile and Polese, 2010a***), any organization has to be able to preserve its viability and stability, creating its own internal environment that is able to respond effectively to external stimuli at all levels *(viability)*. Networked systems can be described based on three parameters: variety (possible variance that a phenomenon may present to the observer), variability (variety observed over time) and indeterminacy (the ability to fully understand a phenomenon) (**Barile, 2009; Golinelli, 2010**). Starting from these distinctions, it is possible to address the relative concept of *complexity*, which can be very useful in interpreting Service systems, since these are complex adaptive systems (***Gell-Mann, 1994; Holland, 1999).***

3. Importance of the study/Need of the study:-

Managing an overall organization is typically a cyclical and systematic approach of clarifying its purpose and priorities (via strategic planning), assessing the current activities in the organization, changing and re-organizing the organization if needed to more effectively address priorities, and then continuing the management the performance of the organization toward those priorities. Every business has three basic challenges that threaten their success:

1. Comply with customer requirements and government regulations and standards
2. Protect the organization through embedding quality and instituting best practices
3. Grow the organization, extending the customer reach and satisfaction, thereby increasing revenue

Management systems allow organizations to meet these challenges by instilling best practices and validating, through certification, that they are properly established in the company. The management system has been evolved over the years to meet these above challenges.

4. Objectives of the study:- Effective Management System can help a business to improve operations, manage risk and promote stakeholder confidence, comply with the customers requirements, consistent with the government regulations and standards, quality improvement and apply best practice of standards, and maintaining quality standards'. Management Systems are systematic frameworks designed to manage an organization's policies, procedures and processes and promote continual improvement within. Management includes the activities of setting the strategy of an organization and coordinating the efforts of its employees (or of volunteers) to accomplish its objectives through the application of available resources. The aim of this paper is to provide an overview of evolution of management systems. In particular, focus is given to those that make a specific reference to management. The research paper pursues the following objectives:-

1. A brief review of the stages of evolution of Management System
2. To understand the basic concepts of the early stage in terms of: 1. Final Product, 2. Partitioned process and 3. Integrated process.
3. The managerial application of management systems:-
   A) To review the paradigmatic shift from internal process expanded into the extended process
   B) To review radical business refocusing
   C) To review the recycled process and global sourcing
   D) To review the evolutionary spiral of the six management system.

5. Research Methodologies:-

There are two types of Secondary Research hence two types of data collected from this technique:-Internal Secondary Data consists of information gathered within researcher's firm (i.e. customer's databases and reports from past primary research) External Secondary Data consists of information gathered outside of researcher's firm (i.e. government statistics and information from media sources)

For the study purpose secondary data are used. The secondary data collected from philosophies, strategies, policies and orientation of the companies over the period of time , management experts writing work and literature review, and marketing philosophies. Secondary data have been collected and assessed to review the evolution of management system. The secondary review is based on the sales and quality aspect of the company product wise. The study uses these data for secondary purpose and for review and study the orientation of management system. These may be available in written, typed or in electronic forms, in the forms of books, research articles/paper, company's report and progress over the period of time, and management expert study Secondary data is also used to gain initial insight into the research problem. Secondary data is classified in terms of its source – either internal or external. Internal, or in-house data, is secondary information acquired within the organization where research is being carried out. External secondary data is obtained from outside sources. The library is a good place to gather free secondary data. It has searchable databases as well as handbooks, dictionaries, and books, some of which can access online. Government agencies also collect and report information on demographics, economic and employment data, health information, and balance-of-trade statistics, among a lot of other information. There are many national organizations, international agencies and official publications that collect various statistical data. They collect data related to business, commerce, trade, prices, economy, productions, services, industries, currency and foreign affairs. They also collect information related to various (internal and external) socio-economic phenomena and publishes them. These publications contain statistical reports of various kinds. Central Government Official Publication, Publications of Research Institutions, Committee Reports and International Publications are some published sources of secondary data.

6. Review of Evolution of Management system:-

'A management system is the framework of processes and procedures used to ensure that an organization can fulfill all tasks required to achieve its objectives. A complete management system covers every aspect of management and focuses on supporting the performance management to achieve the objectives. The management system should be subject to continuous improvement as the organization learns

First Stage:-

After World War II, the reigning paradigm of **product-oriented mass production** had reached its peak. Examples of management systems at that time are **linear assembly lines**, organizational hierarchies of command, product quality control and mass consumption. An **assembly line** is a manufacturing process (often called a *progressive assembly*) in which parts (usually interchangeable parts) are added as the semi-finished assembly moves from workstation to workstation where the parts are added in sequence until the final assembly is produced. By mechanically moving the parts to the assembly work and moving the semi-finished assembly from work station to work station, a finished product can be assembled faster and with less labor than by having workers carry parts to a stationary piece for assembly. Assembly lines are common methods of assembling complex items such as automobiles and other transportation equipment, household appliances and electronic goods. Assembly lines are designed for the sequential organization of workers, tools or machines, and parts. The motion of workers is minimized to the extent possible. All parts or assemblies are handled either by conveyors or motorized vehicles such as forklifts, or gravity, with no manual trucking. Heavy lifting is done by machines such as overhead cranes or forklifts. Each worker typically performs one simple operation. According to Henry Ford: The principles of assembly are these: (1) Place the tools and the men in the sequence of the operation so that each component part shall travel the least possible distance while in the process of finishing. (2) Use work slides or some other form of carrier so that when a workman completes his operation, he drops the part always in the same place—which place must always be the most convenient place to his hand—and if possible have gravity carry the part to the next workman for his own. (3) Use sliding assembling lines by which the parts to be assembled are delivered at convenient distances. Before the Industrial Revolution, most manufactured products were made individually by hand. A single craftsman or team of craftsmen would create each part of a product. They would use their skills and tools such as files and knives to create the individual parts. They would then assemble them into the final product, making cut-and-try changes in the parts until they fit and could work together (craft production). Adam Smith discussed the division of labour in the manufacture of pins at length in his book *The Wealth of Nations* (published in 1776).

The Industrial Revolution led to a proliferation of manufacturing and invention. Many industries, notably textiles, firearms, clocks and watches,[3] horse-drawn vehicles, railway locomotives, sewing machines, and bicycles, saw expeditious improvement in materials handling, machining, and assembly during the 19th century, although modern concepts such as industrial engineering and logistics had not yet been named. The pulley block was the first manufacture to become fully automated at the Portsmouth Block Mills in the early 19th century. The automatic flour mill built by Oliver Evans in 1785 was called the beginning of modern bulk material handling by Roe (1916). Evans's mill used a leather belt bucket elevator, screw conveyors, canvas belt conveyors, and other mechanical devices to completely automate the process of making flour. The innovation spread to other mills and breweries. Probably the earliest industrial example of a linear and continuous assembly process is the Portsmouth Block Mills, built between 1801 and 1803. Marc Isambard Brunel (father of Isambard Kingdom Brunel), with the help of Henry Maudslay and others, designed 22 types of machine tools to make the parts for the rigging blocks used by the Royal Navy. This factory was so successful that it remained in use until the 1960s, with the workshop still visible at HM Dockyard in Portsmouth, and still containing some of the original machinery.

The first flow assembly line was initiated at the factory of Richard Garrett & Sons, Leiston Works in Leiston in the English county of Suffolk for the manufacture of portable steam engines. The assembly line area was called 'The Long Shop' on account of its length and was fully operational by early 1853. The boiler was brought up from the foundry and put at the start of the line, and as it progressed through the building it would stop at various stages where new parts would be added. From the upper level, where other parts were made, the lighter parts would be lowered over a balcony and then fixed onto the machine on the ground level. When the machine reached the end of the shop, it would be completed. [7] During the early 19th century, the development of machine tools such as the screw-cutting lathe, metal planer, and milling machine, and of toolpath control via jigs and fixtures, provided the prerequisites for the modern assembly line by making interchangeable parts a practical reality. According to Domm, the implementation of mass production of an automobile via an assembly line may be credited to Ransom Olds, who used it to build the first mass-produced automobile, the Oldsmobile Curved Dash. Olds patented the assembly line concept, which he put to work in his Olds Motor Vehicle Company factory in 1901.

At Ford Motor Company, the assembly line was introduced by William "Pa" Klann upon his return from visiting Swift & Company's slaughterhouse in Chicago and viewing what was referred to as the "disassembly line", where carcasses were butchered as they moved along a conveyor. The efficiency of one person removing the same piece over and over without himself moving caught his attention. He reported the idea to Peter E. Martin, soon to be head of Ford production, who was doubtful at the time but encouraged him to proceed. Others at Ford have claimed to

have put the idea forth to Henry Ford, but Pa Klann's slaughterhouse revelation is well documented in the archives at the Henry Ford Museum[13] and elsewhere, making him an important contributor to the modern automated assembly line concept. The moving assembly line was developed for the Ford Model T and began operation on October 7, 1913, at the Highland Park Ford Plant,[14][15] and continued to evolve after that, using time and motion study. The assembly line, driven by conveyor belts, reduced production time for a Model T to just 93 minutes by dividing the process into 45 steps.[16] Producing cars quicker than paint of the day could dry, it had an immense influence on the world.

Quality control (**QC**) is a process by which entities review the quality of all factors involved in production. ISO 9000 defines quality control as "A part of quality management focused on fulfilling quality requirements". This approach places an emphasis on three aspects (enshrined in standards such as ISO 9001): Elements such as controls, job management, defined and well managed processes,[4][5] performance and integrity criteria, and identification of records Competence, such as knowledge, skills, experience, and qualifications Soft elements, such as personnel, integrity, confidence, organizational culture, motivation, team spirit, and quality relationships. Inspection is a major component of quality control, where physical product is examined visually (or the end results of a service are analyzed). Product inspectors will be provided with lists and descriptions of unacceptable product defects such as cracks or surface blemishes for example. The quality of the outputs is at risk if any of these three aspects is deficient in any way. Modern humans are distinguished from other species by their extensive use of tools to control and adapt to their surroundings. Early stone tools such as anvils had no holes and were not designed as interchangeable parts. Mass production established processes for the creation of parts and system with identical dimensions and design, but these processes are not uniform and hence some customers were unsatisfied with the result. Quality control separates the act of testing products to uncover defects from the decision to allow or deny product release, which may be determined by fiscal constraints. For contract work, particularly work awarded by government agencies, quality control issues are among the top reasons for not renewing a contract. The simplest form of quality control was a sketch of the desired item. If the sketch did not match the item, it was rejected, in a simple Go/no go procedure. However, manufacturers soon found it was difficult and costly to make parts be exactly like their depiction; hence around 1840 tolerance limits were introduced, wherein a design would function if its parts were measured to be within the limits. Quality was thus precisely defined using devices such as plug gauges and ring gauges. However, this did not address the problem of defective items; recycling or disposing of the waste adds to the cost of production, as does trying to reduce the defect rate. Various methods have been proposed to prioritize quality control issues and determine whether to leave them unaddressed or use quality assurance techniques to improve and stabilize production. There is a tendency for individual consultants and organizations to name their own unique approaches to quality control—a few of these have ended up in widespread use:

Table No-1 Approaches of Quality control

Approaches of Quality Control		
Terminology	**Approximate year of first use**	**Description**
Statistical quality control (SQC)	1930s	The application of statistical methods (specifically control charts and acceptance sampling) to quality control[8]:556
Total quality control (TQC)	1956	Popularized by Armand V. Feigenbaum in a Harvard Business Review article[9] and book of the same name.[10]; stresses involvement of departments in addition to production (e.g., accounting, design, finance, human resources, marketing, purchasing, sales)
Statistical process control (SPC)	1960s	The use of control charts to monitor an individual industrial process and feed back performance to the operators responsible for that process; inspired by control systems
Company-wide quality control	1968	Japanese-style total quality control[10]

(CWQC)		
Total Quality Management (TQM)	1985	Quality movement originating in the United States Department of Defense that uses (in part) the techniques of statistical quality control to drive continuous organizational improvement[11]
Six Sigma (6σ)	1986	Statistical quality control applied to business strategy[12]; originated by Motorola
Lean Six Sigma (L6σ)	2001	Six Sigma applied with the principles of lean manufacturing and/or lean enterprise; originated by Wheat *et al.*[13]

Second Stage:-

Soon afterwards, the Deming-Juran process-quality teachings spearheaded a new quality orientation (later referred to as **Total quality management)** and propelled Japan directly to the post-war process focus (process quality control, just-in-time, continuous improvement). The US responded by a painful and prolonged product-to-process transformation, ultimately leveling the playing field again by the mid 1980s.

Joseph Moses Juran (December 24, 1904 – February 28, 2008) was a Romanian-born American engineer and management consultant. He was an evangelist for quality and quality management, having written several books on those subjects. In 1941, Juran stumbled across the work of Vilfredo Pareto and began to apply the Pareto principle to quality issues (for example, 80% of a problem is caused by 20% of the causes). This is also known as "the vital few and the trivial many." In later years, Juran preferred "the vital few and the useful many" to signal that the remaining 80% of the causes should not be totally ignored. When he began his career in the 1920s, the principal focus in quality management was on the quality of the end, or finished, product. The tools used were from the Bell system of acceptance sampling, inspection plans, and control charts. The ideas of Frederick Winslow Taylor dominated. Juran is widely credited for adding the human dimension to quality management. He pushed for the education and training of managers. For Juran, human relations problems were the ones to isolate, and resistance to change was the root cause of quality issues. Juran credits Margaret Mead's book *Cultural Patterns and Technical Change* for illuminating the core problem in reforming business quality.[2]:267 His book *Managerial Breakthrough*, published in 1964, outlined the issue. Juran's concept of quality management extended outside the walls of the factory to encompass nonmanufacturing processes, especially those that might be thought of as service related Juran was one of the first to write about the cost of poor quality. This was illustrated by his "Juran trilogy," an approach to cross-functional management, which is composed of three managerial processes: quality planning, quality control, and quality improvement. Without change, there will be a constant waste; during change there will be increased costs, but after the improvement, margins will be higher and the increased costs are recouped.

(a) Total quality management (**TQM**) consists of organization-wide efforts to "install and make permanent a climate where employees continuously improve their ability to provide on demand products and services that customers will find of particular value." "Total" emphasizes that departments in addition to production (for example sales and marketing, accounting and finance, engineering and design) are obligated to improve their operations; "management" emphasizes that executives are obligated to actively manage quality through funding, training, staffing, and goal setting. While there is no widely agreed-upon approach, TQM efforts typically draw heavily on the previously developed tools and techniques of quality control. TQM enjoyed widespread attention during the late 1980s and early 1990s before being overshadowed by ISO 9000, Lean manufacturing, and Six Sigma. In the late 1970s and early 1980s, the developed countries of North America and Western Europe suffered economically in the face of stiff competition from Japan's ability to produce high-quality goods at competitive cost. Firms began reexamining the techniques of quality control invented over the past 50 years and how those techniques had been so successfully employed by the Japanese. It was in the midst of this economic turmoil that TQM took root. The exact origin of the term "total quality management" is uncertain. It is almost certainly inspired by Armand V. Feigenbaum's multi-edition book *Total Quality Control* (OCLC 299383303) and Kaoru Ishikawa's *What Is Total Quality*

Control? The Japanese Way (OCLC 11467749).It may have been first coined in the United Kingdom by the Department of Trade and Industry during its 1983 "National Quality Campaign". Or it may have been first coined in the United States by the Naval Air Systems Command to describe its quality-improvement efforts in 1985.[2] There is no widespread agreement as to what TQM is and what actions it requires of organizations; however a review of the original United States Navy effort gives a rough understanding of what is involved in TQM.

The key concepts in the TQM effort undertaken by the Navy in the 1980s include:-1."Quality is defined by customers' requirements." 2. "Top management has direct responsibility for quality improvement."3. "Increased quality comes from systematic analysis and improvement of work processes." 4. "Quality improvement is a continuous effort and conducted throughout the organization."

(b) Just-in-time (**JIT**) **manufacturing**, also known as **just-in-time production** or the Toyota Production System (TPS), is a methodology aimed primarily at reducing times within production system as well as response times from suppliers and to customers. Its origin and development was in Japan, largely in the 1960s and 1970s and particularly at Toyota. Alternative terms for JIT manufacturing have been used. Motorola's choice was short-cycle manufacturing (SCM). IBM's was continuous-flow manufacturing (CFM), and demand-flow manufacturing (DFM), a term handed down from consultant John Constanza at his Institute of Technology in Colorado.[7] Still another alternative was mentioned by Goddard, who said that "Toyota Production System is often mistakenly referred to as the 'Kanban System'", and pointed out that kanban is but one element of TPS, as well as JIT production. But the wide use of the term *JIT manufacturing* throughout the 1980s faded fast in the 1990s, as the new term *lean manufacturing* became established as "a more recent name for JIT". As just one testament to the commonality of the two terms, *Toyota production system (TPS)* has been and is widely used as a synonym for both JIT and lean manufacturing.

The exact reasons for adoption of JIT in Japan are unclear. Plenert offers four reasons, paraphrased here. During Japan's post-World War II rebuilding of industry: 1) Japan's lack of cash made it difficult for industry to finance the big-batch, large inventory production methods common elsewhere. 2) Japan lacked space to build big factories loaded with inventory. 3) The Japanese islands were (and are) lacking in natural resources with which to build products. 4) Japan had high unemployment, which meant that labor efficiency methods were not an obvious pathway to industrial success. Thus the Japanese "leaned out" their processes. "They built smaller factories ... in which the only materials housed in the factory were those on which work was currently being done. In this way, inventory levels were kept low, investment in in-process inventories was at a minimum, and the investment in purchased natural resources was quickly turned around so that additional materials were purchased." Plenart goes on to explain Toyota's key role in developing this lean or JIT production methodology. News about JIT/TPS reached western shores in 1977 in two English-language articles: one referred to the methodology as the "Ohno system", after Taiichi Ohno, who was instrumental in its development within Toyota. The other article, by Toyota authors in an international journal, provided additional details. Finally, those and other publicity were translated into implementations, beginning in 1980 and then quickly multiplying throughout industry in the United States and other developed countries. A seminal 1980 event was a conference in Detroit at Ford World Headquarters co-sponsored by the Repetitive Manufacturing Group (RMG), which had been founded 1979 within the American Production and Inventory Control Society (APICS) to seek advances in manufacturing. The principle speaker, Fujio Cho (later, president of Toyota Motor Corp.), in explaining the Toyota system, stirred up the audience, and led to the RMG's shifting gears from things like automation to JIT/TPS. At least some of audience's stirring had to do with a perceived clash between the new JIT regime and manufacturing resource planning (MRP II), a computer software-based system of manufacturing planning and control which had become prominent in industry in the 1960s and 1970s. There is more to JIT than its usual manufacturing-centered explication. Inasmuch as manufacturing ends with order-fulfillment to distributors, retailers, and end users, and also includes remanufacturing, repair, and warranty claims, JIT's concepts and methods have application downstream from manufacturing itself. A 1993 book on "world-class distribution logistics" discusses kanban links from factories onward. And a manufacturer-to-retailer model developed in the U.S. in the 1980s, referred to as *quick response*, has morphed over time to what is called *fast fashion*.

Third stage:-

At the end of the 1980s, **business process reengineering** focused on the radical redesign of the production process through the reintegration of task, labor and knowledge. As a result, lean, flexible and streamlined production processes were created, capable of fast response and internet-based integration necessary for the upcoming phase of supply chains - **business-to-business (B2B)** – as well as demand chains – business-to-customer (B2C).

(a) Business process Re-engineering (**BPR**) is a business management strategy, originally pioneered in the early 1990s, focusing on the analysis and design of workflows and business processes within an organization. BPR aimed to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors.[1] BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. According to early BPR proponent Thomas Davenport (1990), a business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasized a holistic focus on business objectives and how processes related to them, encouraging full-scale recreation of processes rather than iterative optimization of sub-processes.[1] Business process reengineering is also known as business process redesign, business transformation, or business process change management. Business process reengineering (BPR) is the practice of rethinking and redesigning the way work is done to better support an organization's mission and reduce costs. Organizations reengineer two key areas of their businesses. First, they use modern technology to enhance data dissemination and decision-making processes. Then, they alter functional organizations to form functional teams. Reengineering starts with a high-level assessment of the organization's mission, strategic goals, and customer needs.

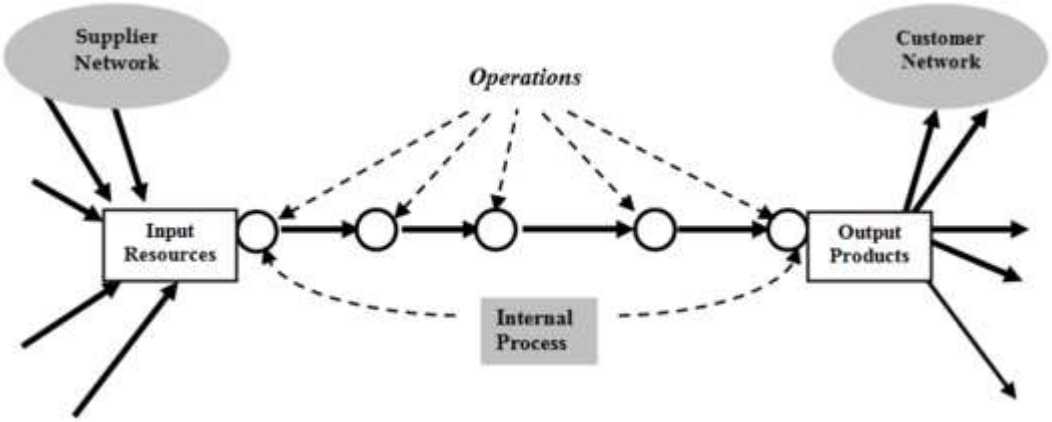
Within the framework of this basic assessment of mission and goals, re-engineering focuses on the organization's business processes—the steps and procedures that govern how resources are used to create products and services that meet the needs of particular customers or markets. As a structured ordering of work steps across time and place, a business process can be decomposed into specific activities, measured, modeled, and improved. It can also be completely redesigned or eliminated altogether. Re-engineering identifies, analyzes, and re-designs an organization's core business processes with the aim of achieving dramatic improvements in critical performance measures, such as cost, quality, service, and speed.

Re-engineering recognizes that an organization's business processes are usually fragmented into sub-processes and tasks that are carried out by several specialized functional areas within the organization. Often, no one is responsible for the overall performance of the entire process. Reengineering maintains that optimizing the performance of sub-processes can result in some benefits, but cannot yield dramatic improvements if the process itself is fundamentally inefficient and outmoded. For that reason, re-engineering focuses on re-designing the process as a whole in order to achieve the greatest possible benefits to the organization and their customers. This drive for realizing dramatic improvements by fundamentally re-thinking how the organization's work should be done distinguishes the re-engineering from process improvement efforts that focus on functional or incremental improvement. Business process reengineering (BPR) began as a private sector technique to help organizations fundamentally rethink how they do their work in order to dramatically improve customer service, cut operational costs, and become world-class competitors. A key stimulus for re-engineering has been the continuing development and deployment of sophisticated information systems and networks. Leading organizations are becoming bolder in using this technology to support innovative business processes, rather than refining current ways of doing work.[1] In 1990, Michael Hammer, a former professor of computer science at the Massachusetts Institute of Technology claimed that the major challenge for managers is to obliterate forms of work that do not add value, rather than using technology for automating it. This statement implicitly accused managers of having focused on the wrong issues, namely that technology in general, and more specifically information technology, has been used primarily for automating existing processes rather than using it as an enabler for making non-value adding work obsolete. Hammer's claim was simple: Most of the work being done does not add any value for customers, and this work should be removed, not accelerated through automation. Instead, companies should reconsider their inability to satisfy customer needs, and their insufficient cost structure. Even well-established management thinkers, such as Peter Drucker and Tom Peters, were accepting and advocating BPR as a new tool for (re-)achieving success in a dynamic world.[3] Despite this critique, reengineering was adopted at an accelerating pace and by 1993, as many as 60% of the Fortune 500 companies claimed to either have initiated reengineering efforts, or to have plans to do so.[5] Business processes as a starting point for business analysis and redesign has become a widely accepted approach and is a standard part of the change methodology portfolio, but is typically performed in a less radical way than originally proposed. More recently, the concept of Business Process Management (BPM) has gained major attention in the corporate world and can be considered a successor to the BPR wave of the 1990s, as it is evenly driven by a striving for process efficiency supported by information technology. Equivalently to the critique brought forward against BPR, BPM is now accused of focusing on technology and disregarding the people aspects of change.

(b) Business-to-business (**B2B** or, in some countries, **B to B**) is a situation where one business makes a commercial transaction with another. This typically occurs when: A business is sourcing materials for their production process for output (e.g. a food manufacturer purchasing salt).Example- Providing raw material to the other company that

will produce output. A business needs the services of another for operational reasons (e.g. a food manufacturer employing an accountancy firm to audit their finances).
A business re-sells goods and services produced by others (e.g. a retailer buying the end product from the food manufacturer). B2B is often contrasted with business-to-consumer (B2C). In B2B commerce, it is often the case that the parties to the relationship have comparable negotiating power, and even when they do not, each party typically involves professional staff and legal counsel in the negotiation of terms, whereas B2C is shaped to a far greater degree by economic implications of information asymmetry. However, within a B2B context, large companies may have many commercial, resource and information advantages over smaller businesses. The United Kingdom government, for example, created the post of Small Business Commissioner under the Enterprise Act 2016 to "enable small businesses to resolve disputes" and "consider complaints by small business suppliers about payment issues with larger businesses that they supply." The following B2B model are prominent: - 1. **Vertical B2B model**:- Vertical B2B is generally oriented to manufacturing or business. It can be divided into two directions -- upstream and downstream. Producers or commercial retailers can have a supply relationship with upstream suppliers, including manufacturers, and form a sales relationship. As an example, Dell company is working with upstream suppliers of integrated circuit microchips and computer printed circuit boards (PCBs). A vertical B2B website can be similar to the enterprise's online store. Through the website, the company can promote their products vigorously, more efficiently and more comprehensively which enriches transactions as they help their customers understand their products well. Or, the website can be created for business, where the seller advertises their products to promote and expand transactions in an intuitive and convenient way. **2. Horizontal B2B model**:- Horizontal B2B is the transaction pattern for the intermediate trading market. It concentrates similar transactions of various industries into one place, as it provides a trading opportunity for the purchaser and supplier, typically involving companies that do not own the products and do not sell the products. It is merely a platform to bring sellers and purchasers together online. The better platforms help buyers easily find information about the sellers and the relevant information about the products via the website.
Along the way, B2B has matured but despite the good momentum, it still has an immature side. The majority of the immaturity is in online price negotiation and online collaboration. These have not been fully developed. [10][11] Boston Consulting Group (BCG) conducted a survey through in-depth interviews with online traders. BCG believes that the current B2B online trading model cannot completely simulate the traditional B2B offline trading model. Almost half of the survey group indicated online transactions still need to coordinate with traditional offline communications to complete the entire transaction process. [12] The report pointed out that with the maturity of the B2B and the improvement of the price comparison mechanism, pressure on the sellers will increase. The survey found that some of the sellers already felt a lot of pressure brought on by the price comparison. This report presents another valuable analysis in the development trend of the B2B market. It pointed out that each party in the B2B market expects a simplification in each trading field. They do not expect diversification of the trading platforms. This is the same perspective as the trading platforms. The trading platforms hope to integrate instead of having more competitors.

In the above three stages of Evolution of Management Systems, the competitive advantage was derived almost exclusively from the internal resources of the firm. At the end of the 1980s, a radical fourth shift has occurred: the competitive advantage became increasingly derived from the external resources of the firm – through the extended networks of suppliers and customers.[4]



(Figure 1:- Basic scheme: product, process, external networks)

The above figure refers to the basic scheme of production and service delivery process. It represents the ***traditional linear input-process-output management system***. This system has been fixed and unchanging for centuries. The only change has been in terms of changing focus on individual components of the system, emphasizing different parts of this basic scheme. The input-process-output model has historically been the dominant approach to understanding and explaining team performance and continues to exert a strong influence on group research today. The framework is based on classic systems theory, which states that the general structure of a system is as important in determining how effectively it will function as its individual components. Similarly, the IPO model has a causal structure, in that outputs are a function of various group processes, which are in turn influenced by numerous input variables

Although the scheme itself (inputs → process → outputs) remains mostly unchallenged, there are some indications that this business model will undergo major restructurings in the future. It will become disaggregated and distributed, subjected to non-linear modularity and bringing forth new ways of making things and delivering services. Then it will become reintegrated again, tying together globally distributed components into a unified recycling whole.

1) Primarily stages:-All early stages are characterized by changing focus of attention within the unchanging, invariant scheme of Figure 1. The management system has typically focused on:

(a)Final product:-The final product is a primary focus, the production process is considered secondary. Its operations and their sequences are technologically fixed or 'given'. Product quality is 'inspected in', mostly at the end of the process. *Statistical quality control, inventory control, cost minimization, mass production, assembly line, work specialization, hierarchies of command, mass consumption, statistical mass markets and forecasting* are among the defining characteristics of this stage. **Statistical process control** (**SPC**) is a method of quality control which employs statistical methods to monitor and control a process. This helps to ensure that the process operates efficiently, producing more specification-conforming products with less waste (rework or scrap). SPC can be applied to any process where the "conforming product" (product meeting specifications) output can be measured. Key tools used in SPC include run charts, control charts, a focus on continuous improvement, and the design of experiments. An example of a process where SPC is applied is manufacturing lines. SPC must be practiced in 2 phases: The first phase is the initial establishment of the process, and the second phase is the regular production use of the process. In the second phase, a decision of the period to be examined must be made, depending upon the change in 5M&E conditions (Man, Machine, Material, Method, Movement, Environment) and wear rate of parts used in the manufacturing process (machine parts, jigs, and fixtures). An advantage of SPC over other methods of quality control, such as "inspection", is that it emphasizes early detection and prevention of problems, rather than the correction of problems after they have occurred. In addition to reducing waste, SPC can lead to a reduction in the time required to produce the product. SPC makes it less likely the finished product will need to be reworked or scrapped.

Inventory control or **stock control** can be broadly defined as "the activity of checking a shop's stock." However, a more focused definition takes into account the more science-based, methodical practice of not only verifying a business' inventory but also focusing on the many related facets of inventory management (such as forecasting future demand) "within an organisation to meet the demand placed upon that business economically." Other facets of inventory control include supply chain management, production control, financial flexibility, and customer

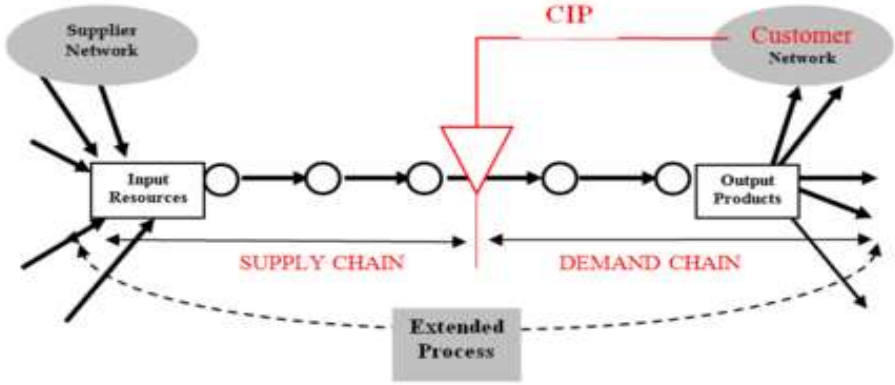
satisfaction.[3] At the root of inventory control, however, is the inventory control problem, which involves determining when to order, how much to order, and the logistics (where) of those decisions.[3] An extension of inventory control is the inventory control system. This may come in the form of a technological system and its programmed software used for managing various aspects of inventory problems[4] , or it may refer to a methodology (which may include the use of technological barriers) for handling loss prevention in a business. An **assembly line** is a manufacturing process (often called a *progressive assembly*) in which parts (usually interchangeable parts) are added as the semi-finished assembly moves from workstation to workstation where the parts are added in sequence until the final assembly is produced. By mechanically moving the parts to the assembly work and moving the semi-finished assembly from work station to work station, a finished product can be assembled faster and with less labor than by having workers carry parts to a stationary piece for assembly. Assembly lines are common methods of assembling complex items such as automobiles and other transportation equipment, household appliances and electronic goods

(b)Partitioned process:-It is the high-quality process that assures the high-quality product. The main focus was on improving of process operations. Quality of the process was understood as the quality of its operations. Powerful new concepts of Total Quality Management (TQM), Continuous Improvement Process (Kaizen) and Just-In-Time (JIT) systems have characterized this stage. Although the operations were being improved, the process architecture and structural sequencing were kept intact and remained technologically 'given'. **Total quality management** (**TQM**) consists of organization-wide efforts to "install and make permanent a climate where employees continuously improve their ability to provide on demand products and services that customers will find of particular value." "Total" emphasizes that departments in addition to production (for example sales and marketing, accounting and finance, engineering and design) are obligated to improve their operations; "management" emphasizes that executives are obligated to actively manage quality through funding, training, staffing, and goal setting. While there is no widely agreed-upon approach, TQM efforts typically draw heavily on the previously developed tools and techniques of quality control. TQM enjoyed widespread attention during the late 1980s and early 1990s before being overshadowed by ISO 9000, Lean manufacturing, and Six Sigma. A **continual improvement process**, also often called a **continuous improvement process** (abbreviated as **CIP** or **CI**), is an ongoing effort to improve products, services, or processes. These efforts can seek "incremental" improvement over time or "breakthrough" improvement all at once.[1] Delivery (customer valued) processes are constantly evaluated and improved in the light of their efficiency, effectiveness and flexibility. Some see CIPs as a meta-process for most management systems (such as business process management, quality management, project management, and program management). W. Edwards Deming, a pioneer of the field, saw it as part of the 'system' whereby feedback from the process and customer were evaluated against organisational goals. The fact that it can be called a management process does not mean that it needs to be executed by 'management'; but rather merely that it makes decisions about the implementation of the delivery process and the design of the delivery process itself. A broader definition is that of the Institute of Quality Assurance who defined "continuous improvement as a gradual never-ending change which is: '... focused on increasing the effectiveness and/or efficiency of an organisation to fulfill its policy and objectives. It is not limited to quality initiatives. Improvement in business strategy, business results, and customer, employee and supplier relationships can be subject to continual improvement. Put simply, it means 'getting better all the time'.' "

(c)Integrated process:-The focus of attention shifted from operations (circles) to linkages (arrows) – thus changing the process architecture itself. The reengineering of the process, re-integrating individual components into effective, more autonomous and even self-manageable wholes, has characterized this stage. The production process became a business process and therefore subject to qualitative redesign and reengineering (BPR). Discontinuous improvement and process innovation replaced the piecemeal continuous improvement. Traditional vertical hierarchies of command have flattened out into more horizontal, process-oriented networks. Mass customization, disintermediation, knowledge management and autonomous teams have started emerging. BPR seeks to help companies radically restructure their organizations by focusing on the ground-up design of their business processes. According to early BPR proponent Thomas Davenport (1990), a business process is a set of logically related tasks performed to achieve a defined business outcome. Re-engineering emphasized a holistic focus on business objectives and how processes related to them, encouraging full-scale recreation of processes rather than iterative optimization of sub-processes.[1] **Mass customization**, in marketing, manufacturing, call centres and management, is the use of flexible computer-aided manufacturing systems to produce custom output. Such systems combine the low unit costs of mass production processes with the flexibility of individual customization. Mass customization is the new frontier in business for both manufacturing and service industries. At its core is a tremendous increase in variety and customization without a corresponding increase in costs. At its limit, it is the mass production of

individually customized goods and services. At its best, it provides strategic advantage and economic value. **Knowledge management** (**KM**) is the process of creating, sharing, using and managing the knowledge and information of an organisation.[1] It refers to a multidisciplinary approach to achieving organisational objectives by making the best use of knowledge. Knowledge management efforts typically focus on organisational objectives such as improved performance, competitive advantage, innovation, the sharing of lessons learned, integration and continuous improvement of the organisation. These efforts overlap with organisational learning and may be distinguished from that by a greater focus on the management of knowledge as a strategic asset and on encouraging the sharing of knowledge. KM is an enabler of organisational learning.

2) Extended process: - The following figure refers to the paradigmatic shift from internal processes expanded into the extended process – including supplier networks and alliances as well as customer self-service, mass customization and disintermediation – as the increasingly external sources of competitive advantage.

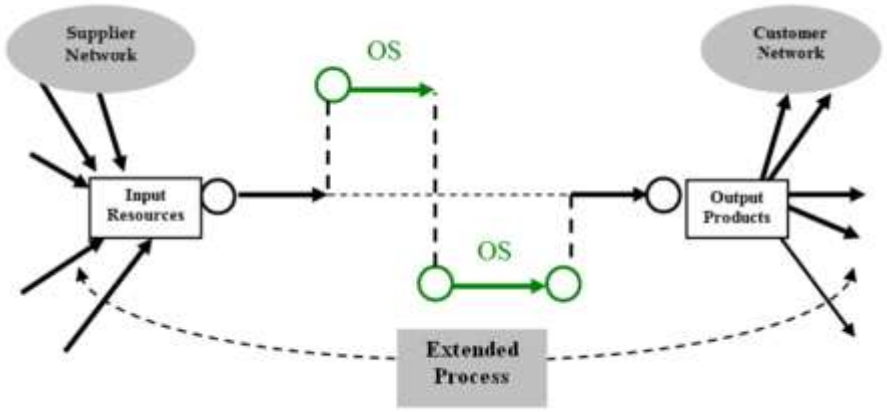


(Figure **2:- Extended process and Customer Intervention Point)**

In this recently peaked stage, networks of suppliers and communities of customers have extended the internal process into a functional and competitive whole. Both internal and external sources of knowledge and competitiveness have formed new core competencies. Supply and demand chains management have emerged, in dependence on shifting CIP (Customer Intervention Point). Intranets and extranets have provided a communication medium for B2B and B2C exchanges. Quality has become bundled together with cost, speed and reliability. Today, powerful processes of global sourcing bring forth and foster a new set of relationships with customers and suppliers. The firm starts disaggregating its production processes, transferring, leasing or selling selected pieces off to a higher-added value operator or coordinator. Any firm can be only as good as is the network of which it is a part. Consequently, the firm has disaggregated and became a network. An **intranet** is a private network accessible only to an organization's staff. Often, a wide range of information and services are available on an organization's internal intranets that are unavailable to the public, unlike the Internet. A company-wide intranet can constitute an important focal point of internal communication and collaboration, and provide a single starting point to access internal and external resources. In its simplest form, an intranet is established with the technologies for local area networks (LANs) and wide area networks (WANs). Many modern intranets have search engines, user profiles, blogs, mobile apps with notifications, and events planning within their infrastructure. [6] Intranets began to appear in a range of larger organizations from 1994. An **extranet** is a controlled private network that allows access to partners, vendors and suppliers or an authorized set of customers – normally to a subset of the information accessible from an organization's intranet. An extranet is similar to a DMZ in that it provides access to needed services for authorized parties, without granting access to an organization's entire network. An extranet is a private network organization. Historically the term was occasionally also used in the sense of two organizations sharing their internal networks over a VPN. **Global sourcing** is the practice of sourcing from the global market for goods and services across geopolitical boundaries. Global sourcing often aims to exploit global efficiencies in the delivery of a product or service. These efficiencies include low cost skilled labor, low cost raw material and other economic factors like tax breaks and low trade tariffs. A large number of Information Technology projects and Services, including IS Applications and Mobile Apps and database services are outsourced globally to countries like Pakistan and India for more economical pricing.

3) Distributed process

This emerging stage represents the most radical business refocusing so far. Through the global sourcing, sections and components of the internal process are being outsourced to external providers and contractors in search of the highest added value contribution. Long-term alliances are formed and companies are transforming themselves into networks. Network cooperation is replacing corporate competition: ***coopetition*** is a neologism coined to describe cooperative competition. Coopetition is a portmanteau of cooperation and competition. Basic principles of co-opetitive structures have been described in game theory, a scientific field that received more attention with the book *Theory of Games and Economic Behavior* in 1944 and the works of John Forbes Nash on non-cooperative games. Coopetition occurs both at inter-organizational or intra-organizational levels. They conceptualized that, at inter-organisational level, coopetition occurs when companies interact with partial congruence of interests. They cooperate with each other to reach a higher value creation if compared to the value created without interaction and struggle to achieve competitive advantage. At the intra-organizational level, coopetition occurs between individuals or functional units within the same organization. Based on game theory and social interdependence theories, some studies investigate the presence of simultaneous cooperation and competition among functional units, the antecedents of coopetition, and its impact on knowledge sharing behaviors. The majority of companies (also the educational and training institutions) could still be the leading global players in this incessant and accelerating paradigm shifting. Globally distributed process ushers in new forms of organization, coordination and modular integration.

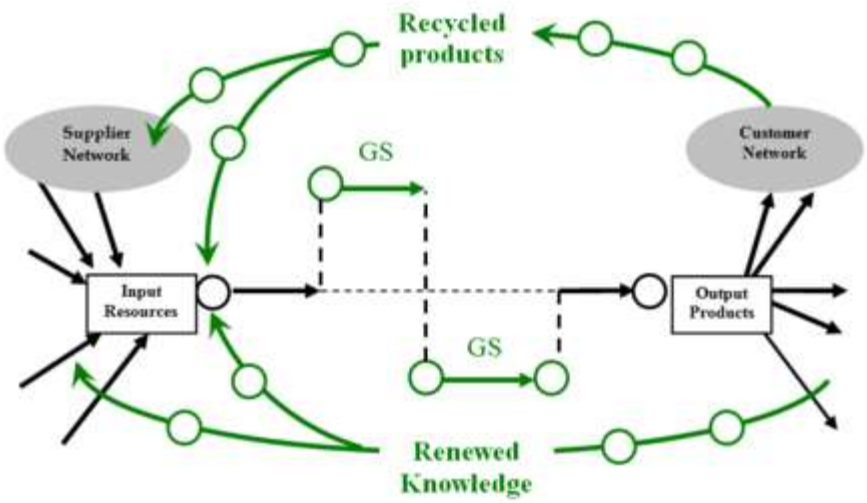


(Figure 3:- Distributed process and Outsourcing)

Different parts of the extended process are geographically distributed and often spatially remote. In Figure 3, this distribution is represented by sections OS of the process which have been outsourced to higher added-value providers.

Although the Stage 5 (Figure 3) represents the most radical business refocusing emerging so far, still rapidly emerging kernels of the next stage (Figure 4) is taking shape. The evolutionary process, driven by relentless global search for maximum added value, is clearly accelerating. Management systems paradigm or business model, after a century of relative invariance, is becoming a new dynamic source of competitive advantage. Radically distributed supply and demand chains of Stage 5 will clearly have to be coordinated and reintegrated on a global scale. Reintegration processes are proceeding under increasing environmental pressures. The search for added value, after exploring traditional global resources, is now turning towards reuse, recycling, recovery and remanufacturing as new sources of maximizing added value. Innovation in business models will become a norm.

4) Recycled process:- The following figure refers to closed-loop management system and it represents the Stage 6 of the **Evolution of Management Systems**. The new loops in the figure are not just traditional information feedback loops, but real business processes of collection, disassembly, reprocessing and reassembly activities (operations).[11] The conventional open-ended linear processes are being redesigned towards closure.



(Figure 4:- Recycled Process and Global Sourcing)

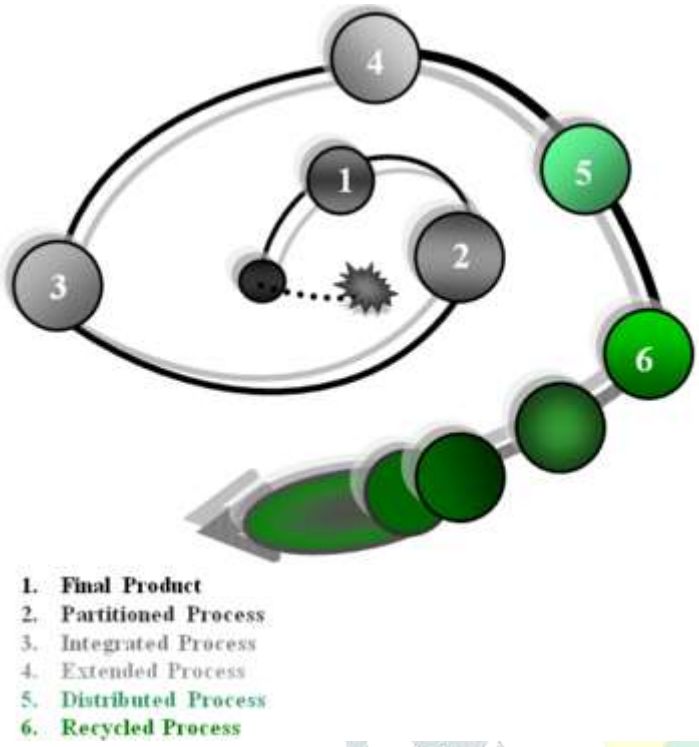
During the process of utilizing added value, the asset-recovery practices expand quickly to a majority of products and services (Dell, IBM, Xerox). New products are being designed for extended life spans and multiple profit cycles. Reverse logistics and reverse logistics management (RLM) are adding new loops to the traditionally unidirectional processes of supply chains.[9] Old supply chains have become demand chains and now reverse value chains, demonstrating that value can be added in both directions: through the forward pass of production as well as through the backward pass of recovery and remanufacture. Concepts of easy disassembly, durability, reuse and recycling are built in into equipment design.[10]

New loops of recycled products and materials, **energy recover**y and knowledge renewal are being created within **global-sourcing (GS) networ**ks. **Energy recovery** includes any technique or method of minimizing the input of energy to an overall system by the exchange of energy from one sub-system of the overall system with another. The energy can be in any form in either subsystem, but most energy recovery systems exchange thermal energy in either sensible or latent form.

Product reuse/remanufacture relies on a high residual value which gives a good head start for added value maximization. The system becomes organizationally closed and potentially long-term sustainable or even trans-generations self-sustainable. The "openness" and customization of the product design, upgradeable products, flexible product platforms, mutability and waste-free strategies are being implemented.[13] However, in this latest stage, new employee skills and managerial knowledge, as well as essential mass customization mindset are yet to be produced, maintained and renewed. Eliminating non-value added resources is still necessary. Integrating production system elements and work functions still needs time to evolve. **Reverse logistics** is for all operations related to the reuse of products and materials. It is "the process of moving goods from their typical final destination for the purpose of capturing value, or proper disposal. Remanufacturing and refurbishing activities also may be included in the definition of reverse logistics."[1] The reverse logistics process includes the management and the sale of surplus as well as returned equipment and machines from the hardware leasing business. Normally, logistics deal with events that bring the product towards the customer. In the case of reverse logistics, the resource goes at least one step back in the supply chain. For instance, goods move from the customer to the distributor or to the manufacturer. When a manufacturer's product normally moves through the supply chain network, it is to reach the distributor or customer. Any process or management after the delivery of the product involves reverse logistics. If the product is defective, the customer would return the product. The manufacturing firm would then have to organize shipping of the defective product, testing the product, dismantling, repairing, recycling or disposing the product. The product would travel in reverse through the supply chain network in order to retain any use from the defective product. The logistics for such matters is reverse logistics

5) Evolutionary spiral:-Evolutionary process depicts slow process of change from one form or level to a better or higher one, or that brings into being a superior or new order. Evolution does not occur in a straight, steady progression but is marked by false starts and dead ends, random leaps in different directions, and long periods of no fruitful activity. Evolutionary development is based on the idea of developing an initial implementation, exposing this to user comment and refining it through many versions until an adequate system has been developed . Specification, development and validation activities are interleaved with rapid feedback across

activities. There are two fundamental types of evolutionary development: 1.Exploratory development:- The objective of the process is to work with the customer in order to explore their requirements and deliver a final system. The development starts with the parts of the system that are well understood. The system evolves by adding new features proposed by the customer. 2. Throwaway prototyping:- In this case the objective of the evolutionary development process is to understand the customer's unclear requirements, namely to validate and derive the requirements definition for the system. The prototype concentrates on experimenting with the customer requirements that are poorly understood.



Evolutionary spiral of the six management systems (SMS) are indicated in Figure. It is appropriate to notice that six-management-system evolution is progressing in an accelerated fashion, the periods of stasis are getting shorter and revolutions are occurring faster. The spiral model is similar to the incremental development for a system, with more emphasis placed on risk analysis. The spiral model has four phases: Planning, Design, Construct and Evaluation. A software project repeatedly passes through these phases in iterations (called Spirals in this model).

Individual management systems are beginning to overlap and their boundaries are getting blurred. An era of continuous change in business models and management systems emerges: the search for competitive advantage (one over the other) becomes relentless, strenuous and resources depleting. Cooperation networks have to merge into larger entities, reducing competition and expanding collaboration. The search for collaborative advantage (for both jointly) will become the new mode of economic behavior.

Conclusion: - Evolutionary process depicts slow process of change from one form or level to a better or higher one, or that brings into being a superior or new order. Management as Science was developed in the early 20th century and focused on increasing productivity and efficiency through standardization, division of labour, centralization and hierarchy. A very 'top down' management with strict control over people and processes dominated across industries. Due to growing and more complex organisations, the 1950's and 1960's saw the emergence of functional organisations and the Human Resource (HR) movement. Managers began to understand the human factor in production and productivity and tools such as goal setting, performance reviews and job descriptions were born. In the 1970's we changed our focus from measuring function to resource allocation and tools like Strategic Planning (GE), Growth Share Matrix (BCG) and SWOT were used to formalize strategic planning

processes. After several decades of 'best practice' and 'one size fits all' solutions, academics began to developing contingency theories. As the business environment grew increasingly competitive and connected, and with a blooming management consultancy industry, Competitive Advantage became a priority for organisations in the 1980's. Tools like Total Quality Management (TQM), Six Sigma and Lean were used to measure processes and improve productivity. Employees were more involved by collecting data, but decisions were still made at the top, and goals were used to manage people and maintain control. Benchmarking and business process reengineering became popular in the 1990's, and by the middle of the decade, 60% of Fortune 500 companies claimed to have plans for or have already initiated such projects. TQM, Six Sigma and Lean remained popular and a more holistic, organisation-wide approach and strategy implementation took the stage with tools such as Strategy Maps and Balance Scorecards. Largely driven by the consulting industry under the banner of Big Data, organisations in the 2000's started to focus on using technology for growth and value creation. Meanwhile, oversaturation of existing market space drove to concepts such as Blue Ocean Strategy and Value Innovation. It's 2013. Globalisation, advances in technology and increased diversity have put organisational challenges into hyper drive. Top down control is a thing of the past. Succeeding in today's environment requires a management style that inspires and is participatory. Evolutionary spiral of the six management systems (SMS) consists of final products, partitioned process, integrated process, and extended process; distribute process, and recycled process. It is appropriate to notice that six-management-system evolution is progressing in an accelerated fashion, the periods of stasis are getting shorter and revolutions are occurring faster. The **final product** is a primary focus, the production process is considered secondary. Its operations and their sequences are technologically fixed or 'given'. Product quality is 'inspected in', mostly at the end of the process. *Statistical quality control, inventory control, cost minimization, mass production, assembly line, work specialization, hierarchies of command, mass consumption, statistical mass markets and forecasting* are among the defining characteristics of this stage. **Partitioned process** is the high-quality process that assures the high-quality product. The main focus was on improving of process operations. **In Integrated Process** focuses on attention shifted from operations (circles) to linkages (arrows) – thus changing the process architecture itself. The reengineering of the process, re-integrating individual components into effective, more autonomous and even self-manageable wholes, has characterized this stage. **The extended process** refers to the paradigmatic shift from internal processes expanded into the extended process – including supplier networks and alliances as well as customer self-service, mass customization and disintermediation – as the increasingly external sources of competitive advantage. This **distributed emerging** stage represents the most radical business refocusing so far. Through the global sourcing, sections and components of the internal process are being outsourced to external providers and contractors in search of the highest added value contribution. Long-term alliances are formed and companies are transforming themselves into networks. Network cooperation is replacing corporate competition. The ***recycled process*** refers to closed-loop management system and it represents the Stage six of the Evolution of Management Systems. The new loops in the figure are not just traditional information feedback loops, but real business processes of collection, disassembly, reprocessing and reassembly activities (operations). The conventional open-ended linear processes are being redesigned towards closure.

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