

A Comparative Analysis of Total Quality Management and Business Process Reengineering: Grounded Theory Approach

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Abstract— This research study explored the two important organizational practices which enhance the quality and productivity of the organizations- the Total Quality Management and the Business Process Reengineering; their interrelationship and their impact on organizations. Several theories and definitions in relation with these two concepts, their components and the organizational practices have been systematically reviewed. One of the distinguished qualitative methods – the “Grounded Theory Approach” has been constituted in order to understand the relationship and differences between the two concepts and develop a theoretical foundation. The researcher found that the Total Quality Management is a disciplined management philosophy built on a number of tools and techniques from diverse fields that have been successfully used to continuously improve an organization’s management and product- oriented processes in order to satisfy internal and external customers and enhance the efficiency. On the other hand the Business Process Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements. Therefore, the findings of the study justified that the Total Quality programs are complementary to Reengineering efforts. Both are focused on customers and require visionary leadership. However, the truly significant difference between Total Quality Management and Business Process Reengineering is the degree of change that can be achieved from the two approaches are Total Quality Management involves incremental, continuous change and Business Process Reengineering involves radical change.

Keywords- Business Process Reengineering, Continuous Improvement, Grounded Theory, Information Technology, Radical Change, Total Quality Management

I. INTRODUCTION

Total Quality Management (TQM) is a philosophy in which all employees in the organization consider quality to be part of their responsibility. The TQM concept is more compatible with the network approach to organization in the every node in the network, every team, takes on quality as an agenda item. On the other hand, Business Process Reengineering (BPR) means fundamentally redesigning how the enterprise works - its procedures, control mechanisms, reporting relationships, decision makers, compensation criteria, and so forth - and generally making Information Technology (IT) an integral part of operations. The goal is to rid the firm of ways of working that were appropriate for the paper-based world, and replace them with work modes that leverage the attributes of IT.

BPR is, in computer science and management, an approach aiming at improvements by means of elevating efficiency and effectiveness of that exist business process within and across organizations. The key to BPR is for organizations to look at their business processes from a "clean slate" perspective and determine how they can best construct these processes to improve how they conduct business.

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 reengineering 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].

The main objective of this research is to identify the relationship between the concepts of TQM and BPR since both the concepts are the inevitable transformation tools in contemporary organizations and they use many similar processes in implementing their tasks.

II. HISTORICAL OVERVIEW

A. Quality

Quality has been announced with the product that a customer receives. This is very laudable but placing a high quality product or services in a market place does not on its own, guarantee either sales or business success. To this end, quality and total quality must be placed in the context of a business environment [2].

TQM is an enhancement to the traditional way of doing business. It is a proven technique of guarantee survival in world class competition. Only by changing the actions of management and culture, the entire organization be transformed. TQM is for the rest part common sense. Analyzing three words: *Total*- Made up of the whole; *Quality*- Degree of excellence a product or service and the *Management*- to monitor control and support for maintaining this process. The overall TQM incorporates customer satisfaction, employee involvement, continuous process improvement, and supplier partnership and performance measures.

Prominent researchers identified the following elements of TQM: Top Management commitment; Customer focus; Process focus and improvement; measurement; Continuous improvement; supplier teaming; Teams; Benchmark; Employee involvement and empowerment; Inventory Management; Quality cost; Communication and Training [3].

It is understood that productivity and quality are vitally interrelated. "Effort of improve quality, if effective and efficient, can have significant impact on productivity". The directivity that results from reducing the number of defective products and saving in the wastage resources utilized in producing them [4].

Through the secondary improvement in quality or productivity that often occurs from efforts to improve the other.

Quality and productivity are linked by the employee morale. High employee motivation is essential in most process to both a high level of quality and productivity.

Quality and productivity have a synergetic relationship. The linkage between quality and productivity exists along the following dimension:

1. Technology Based: The increased innovations in technology designing and developing new machines and product line mechanization are primarily aimed at producing more with the shortest time less wastage.

e.g., CAD, CAM, Integrated CAM, Robotics, Laser Beam Technology, Energy Technology, Group Technology, Computer Graphics, Simulation, Maintenance Management, Rebuilding Old Machinery and Energy Conservation.

2. Employee Based:

Financial Incentives, Group Incentives, Fringe Benefits, Promotions, Job Enrichment, Job Enlargement, Job Rotation, Worker Participation, MBO, Skill Enhancement, Learning Curve, Working Condition Improvement, Communication, Zero Defects, Punishment, Recognition, Quality Circles, Training, Education, Role Perception, Supervision Quality.

3. Product Based:

Value Engineering, Product Diversification, Product Simplification, R&D, Product Standardization, Reliability Improvement, Advertising & Promotion.

4. Task Based: essential to focus on work processes.

Method Engineering, Work Measurement, Job Design, Job Evaluation, Job Safety Design, Ergonomics, Production Scheduling, Computer Aided Data Processing.

5. Material Based: reduce the wastage and better utilization.

- - Inventory Control, Material Requirement Planning, Materials Management, Quality Control, Material Handling and Recycling.

The five well known TQM tools are:

- *Taguchi method* - Taguchi refers to experimental design as "off-line quality control" because it is a method of ensuring good performance in the design stage of products or processes. Some experimental designs, however, such as when used in evolutionary operation, can be used on-line while the process is running.
- *Pareto Charts*- method of organizing errors, problems, or defects to help focus on the "critical factors" in problem-solving efforts.

- *Process Charts* – are designed to help us understand a sequence of events through which a product travels. The process chart graphs the steps of the process and their relationships.
- *Cause and Effect Diagrams* – One of many available tools helpful in identifying possible causes of quality problems.
- *Statistical process control* is concerned with monitoring standards, making measurements and taking corrective actions as a product or service is being produced

TQM is an approach to improving the effectiveness and flexibility of business as a whole. It is essentially a way of organizing and invading the whole organization, every department, every activity, every single person at every level [5].

TQM is an approach for continuously improving the quality of goods and services delivered through the participation of all levels and functions of the organization [6].

B. Related works on BPR

There are several definitions for BPR by different authors. However, Hammer is the first proponent and he claimed that 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 processes in order to maximize customer value, while minimizing the consumption of resources required for delivering their product or service [7]. A similar idea was advocated by his successors [8].

BPR encompasses the envisioning of new work strategies, the actual process design activity, and the implementation of the change in all its complex technological, human, and organizational dimensions [9].

Business Process Reengineering (BPR) is a holistic process that can lead to complete organization transformation and stabilization. IT is the enabler of most BPR projects. A Business Process is a collection of activities that take one or more kinds of input and create an output of value to the customer. For example accepting an application for a loan, processing it and approving (or rejecting) it is a business process in a bank [10]. There are several other definitions for BPR by different authors.

BPR is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in measures of performance such as quality, cost, speed and services. BPR can be introduced in one, a few or all organizational processes [11]. They argued when old methods are not working, organizations face environmental processes under three Cs – Customers, Competition and Change. At that time there is a necessity for BPR.

Public sector reengineering has been defined by the National Academy of Public Administration as a radical improvement approach that critically examines, rethinks and redesigns mission, product and service processes within a political environment. It achieves dramatic mission performance gains from multiple customer and stakeholder perspectives. It is a key part of a process management approach for optimal performance that continually evaluates, adjusts or removes processes [12].

C. Methodologies and Framework for BPR

Several methodologies and framework for BPR implementation have been developed since 1993. One example is the product process change matrix [13]. It can help managers to do the following.

- (a) Assess their competitive position by understanding where their firms have been in the past.
- (b) Build a vision of where their firms must be in the future.
- (c) Create a transformation strategy to turn that vision into reality.

Frye and the successors have provided other methodologies [10]. It is the major enabler; without IT, BPR rarely succeeds.

It was further argued that IT can break old rules that limit the manner in which work is performed. BPR creates new architecture for business and management processes. It involves the redrawing of organizational boundaries, the reconsideration of jobs, tasks and skills. It literally means “rethinking everything” [11].

They identified the characteristics of BPR as follows:

- Several jobs are combined into one.
- Employees make decisions; (Empowerment of employees) Decision making becomes part of the job.
- Steps in the business process are performed in a natural order, and several jobs get done simultaneously.

- Processes may have multiple versions. This enables the economies of scale that result from mass production, yet allows customization of products and services.
- Work is performed where it makes the most sense, including at the customers' or suppliers' sites. Thus, work is shifted, if necessary, across organizational even international boundaries.
- Controls and checks and other non-value added work are minimized.
- Reconciliation is minimized by cutting back the number of external contact points and by creating business alliances.
- A hybrid centralized / decentralized operation is used.
- A single point of contact is provided to customers, called a "case manager" or a 'deal structurer.'

D. Principles for guiding Business Process Reengineering

In his ground-breaking 1990 article on Reengineering, Michael Hammer presents seven principles for business reengineering. They are lessons he has learned about how to think about business processes in new ways [7]. Hammer notes that to succeed at reengineering, the organization must challenge its old rules and assumptions, such as "customers do not repair equipment," or "invoices are necessary to pay bills," or "local warehouse are needed to provide good customer service." The lessons he has learned are as follows.

Organize around Outcomes, Not Tasks.

Many business processes have become complex because they link specialized tasks and paper files- which only one person at a time can use. Focusing on the desired outcomes helps people consider new ways to get the work done. For instance, one person at a workstation can do the tasks formerly split among ten or twenty who each handled only one piece.

People who Use the output should perform the Process.

It means that the people who need, say, supplies should be able to order them through an on-line purchasing system themselves. Why have intermediaries when none are needed? Once the database of approved vendors is established, people can use it to perform their own ordering.

Include Information Processing in the "Real" Work that Produces the Information.

This means that those who produce the information should also process it. Again, following this principle eliminates the specialization so prevalent in business - where one group collects data and others process it. As an example, at Ford, the receiving department produces the information about the goods it has received, and it also processes the payment information rather than passing it to the accounts payable department.

Treat Geographically Dispersed Resources as if they were centralized.

By using networks and common systems, companies can simultaneously get the benefits of centralization economies of scale and decentralization (flexibility and responsiveness). For instance, a central purchasing department can negotiate contracts, and local departments can draw on the database for their ordering.

Link Parallel Activities rather than integrate them

These lessons recommend coordinating similar kinds of work while it is in process rather than after completion. For instance, groups building the various subsystems of a product can use a collective database and workstations to coordinate their work while working in parallel and shortening product development. Or dispersed bank departments can keep track of each other's dealings with common customers in the same way.

Let "Doers" be Self-Managing. By putting decisions where the work is performed, and by building controls into the process, companies can compress themselves both vertically and horizontally, says Hammer. They no longer need to separate the workers from the managers, because decision aids, such as expert systems, can be given to doers.

Capture Information once and at its Source

Since it is no longer difficult to transmit information, departments and functions do not need to collect it themselves; they can share what others have collected.

As his final recommendation, Hammer urges management to think big -take seventy-eight days out of an eighty-day cycle, cut overhead by 75 percent, eliminate 80 percent of the errors, and so forth. These are not unrealistic goals for many companies, he believes.

E. Steps in Business Process Reengineering

1. Develop the business vision and process objectives.
2. Identify the processes to be redesigned.
3. Understand and measure the performance of existing processes.
4. Identify the opportunities for applying IT.
5. Build a prototype of the new process.

Business Processes Reengineering affects Information services in two ways.

1. To the redesign of computer based systems that can no longer be kept alive by ordinary maintenance such system are called legacy systems because they are too valuable to discard but represent a drain on its resources.
2. When a firm applies Business Processes Reengineering to its major operations, the effort invariably of computer based systems.

Information Systems has devised three techniques for applying BPR. These techniques are known as the **3Rs** - Reverse Engineering, Restructuring and Re-engineering.

Reverse Engineering

It is the process of analyzing a system to identify its elements and their interrelationships as well as to create documentation in a higher level of abstraction than currently exist. Reverse engineering is applied to a system when there is a need to prepare new documentation.

Restructuring

It is the transformation of a system into another form without changing its functionality. A good example is the transformation of a program written during the early years of computing, when there were few programming standards into a structured format of hierarchical modules.

Re-engineering

Re-engineering is the complete re-design of a system with the objective of changing its functionality. It is not a clean slate approach because the knowledge of the current system is not completely ignored. That knowledge is gained by first engaging in reverse engineering. Then the new system is developed in the normal manner. The name forward engineering is given to the process of following the System Development Life Cycle in the normal manner where engaged in BPR.

III. MATERIALS AND METHODS

In this research study, one of the distinguished qualitative methods – the “Grounded Theory Approach” has been constituted in order to understand the relationship between the two concepts TQM and BPR. The basic idea of the grounded theory approach is to read and re-read a textual database and discovers or labels variables (called categories, concepts and properties) and their interrelationships. The ability to perceive variables and relationships is termed “theoretical sensitivity” and is affected by a number of things including one’s reading of the literature and one’s use of techniques designed to enhance sensitivity [14]. Various theories developed by different researchers regarding the concepts of TQM and BPR and the relevant literature have been systematically evaluated; their interrelationships and the differences have been identified; the findings have been derived and based on the findings, the theory has been finally grounded for these concepts.

IV. RESULTS AND DISCUSSION

A. Implementation of TQM

There are six **Cs** identified essential for the successful implementation of TQM.

- There must be a quality improvement **commitment** from all employees of the organization.
- Organization must follow a modern quality improvement **culture** on a constant basis.
- **Continuous improvement** must take place in all policies, procedures, and activities laid down by management for the organization.
- **Cooperation** and experience of employees must be utilized to improve strategies and enhance performance.
- Focus on **customers' requirements** and satisfactions of their expectations are very important for long-term survival of the business.
- Effective **control** must be laid down to monitor and measure the real performance of the business.

B. Implementing TQM in Service Industries

There is a quality plan known as “Quality Journey” and it is considered as in the name for two reasons: To ensure that the processes are continuously meeting specific requirements in terms of standards and measures and; To ensure that all customers are satisfied even their expectations change over time. Standards are yardsticks for measuring performance, quality, and duration. Normally companies are concerned with two types of standards: output standards and process standards:

Phase One - Define Vision and Mission

Phase Two - Document Processes

Phase Three - Establish Measurements

Phase Four - Control Processes Based on Measurements

Phase Five - Implement Continuous Improvement

C. Implementing Reengineering

There are several methodologies for executing BPR. Researchers conducted a comparison of some major methodologies. The key activities of reengineering can be organized into three phases – called as re-engineering. i.e., *redesign*, *retool* and *re-orchestrate* [15].

Redesign means improving cross functional activities breaking rules or using breakthrough thinking. The key for retool is an assessment of what the ideal architecture would be for an organization in terms of hardware and software, as well as appropriate information architecture. During this stage it is very important to benchmark the technology being used in the organization against what the best competitors are using. It is also imperative to find out what the latest technologies are and determine in what direction the organization needs to go. A large variety of IT tools can be used to support BPR and Organizational Transformation such as simulation tools, flow diagrams, work analysis, Application development, other tools which support Inter Organization Systems and virtual corporation, integrated tool kits – e.g., Enterprise Resource Planning (ERP) – SAP (Systems Applications Products). ERP is a software architecture that facilitates the flow of information among different functions within an enterprise. Similarly ERP facilitates information sharing across organizational units and geographical locations. It enables decision makers to have an enterprise – wide view of the information they need in a timely, reliable and consistent fashion. SAP is the vendor or brand name of the system which captures 55% of worldwide market share [10].

A work flow system is a powerful business process automation tool that places system controls in the hands of end-user department.

The final 'R' is Re-orchestrate. Re-orchestration brings about the organizational change necessary to achieve BPR. It is important to note that there are really two levels of reengineering. There can be an overall Organizational Transformation from traditional hierarchical to a networked type organization. The other can be more isolated, specific reengineering efforts pertaining to one (or a few) cross functional organizational process. In the two levels stated above, the following key principles of orchestration are applicable.

- Visible and passionate leadership is necessary to achieve organizational commitment.
- A reengineering effort must be consistent with the underlying beliefs and values of the organization.
- Business process change must be balanced with simultaneous cultural change.
- Incentives must be developed for the reengineering change.
- Accountabilities must be changed to support the new process.
- Reengineering must be conducted with zeal.
- During reengineering Senior Management must communicate, communicate and communicate.
- Organizational participants must be able to be comfortable with ambiguity.
- Obstacles that stand in the way of change must be removed.
- Success must be celebrated and rewarded.

As indicated earlier, the BPR is a surgery. It is a major decision and very expensive one. Unfortunately, there are sometimes unsuccessful surgeries. The failure rate of BPR is very high (some estimate as 75 to 85 percent). One main reason for such failures is the inability to properly align BPR and IT, and the large expenses that are necessary to reengineer the information infrastructure and applications to support the few processes. Also, organizational resistance can be a large factor.

Implementing Organizational Transformation by use of IT may involve unethical or even illegal actions. Companies may need to use IT to monitor the activities of their employees and customers and so they may invade the privacy of individuals. When using Business Intelligence (BI) to find out what the competitors are doing; competitors' employees to reveal information, or using software, which is the intellectual property of other companies (without the knowledge of these other companies).

It is important and interesting to remember that almost all major BPR projects use IT. But in most cases the technology plays a supportive role, and the primary role is organizational and managerial in nature. On the other hand, without IT, most BPR efforts do not succeed [10].

Moreover, the research findings on the BPR success among the public sector of Sri Lanka highlights the commitment and support shown by Top management, Organization readiness, and enablers like the role of consultant, IT and the change management are the success factors [16].

Another study on the effect of IT on TQM in manufacturing organizations in Sri Lanka revealed that there is a supportive role played by IT in organizations and the level of IT usage on TQM dimensions make direct influence on quality performance of organizations especially from the top management support. They further concluded the following:

- Levels of IT usage on TQM dimensions make direct influence on quality performance of the organizations, especially from the top management support.
- IT plays supportive roles on administrative, production and decision support areas.
- Higher IT practices of the organization link with the overall TQM practices of the organizations in a positive way [17].

The researchers further considered the TQM by incorporating Malcolm Baldrige criteria for performance excellence and several other researches done to identify the key dimensions of TQM which have been derived into eight as Top Management support, Customer Relationship, Work force Management, Employees attitude and behavior, Product Design Process, Process Flow Management and Quality Data and Reporting [18].

Another study on TQM towards organizational effectiveness also supported this finding [19]. Further, researchers claimed in their identical study on TQM and Organizational Performance that TQM focuses on continuous process improvement within organizations to provide superior customer value and meet customer needs. TQM a popular guideline for organizational management is adopted for developing strategic info- maps and info- charts for an information organization [20].

V. CONCLUSIONS

From various research findings and the theories developed by the predecessors, the researcher has concluded that both the TQM and BPR have their own uniqueness which influences the effective functioning of modern organizations. TQM is a philosophy in which all employees in the organization consider quality to be part of their responsibility. The TQM concept is more compatible with the network approach to organization in that every node in the network, every team, takes on quality as an agenda item. TQM programs have yielded a significant increase in quality. However, to sustain a competitive advantage, organizations often go beyond TQM to BPR in order to achieve dramatic improvements through radical change in management of organization. In other words TQM programs tend to achieve incremental improvements whereas BPR efforts achieve dramatic improvements. Both the concepts have the similarities in several aspects. Both have a strong customer focus and require strong visible consistent leadership from the top. They both use the problem solving methods. Consequently, both the TQM and BPR programs follow procedural steps in implementing the process and succeed on it. The six Cs for successful implementation of TQM as stated earlier in this paper are similar to BPR as well. Moreover, information Systems (IS) play four key roles in TQM. These roles are to provide feedback, to provide better quality processes through the use of IT, to ensure the quality information systems are built and to facilitate communication among the TQM team members.

Therefore, the researcher has developed a strong theoretical phenomenon by thoroughly analyzed these two concepts that the TQM programs are complementary to BPR efforts. They involve cross-functional efforts and measurement plays a key role in assessing progress. However, the truly significant difference between TQM and BPR is the degree of change that can be achieved from the two approaches those are TQM involves incremental, continuous change and BPR involves radical change. Finally the researcher strongly argues both the concepts are interrelated and interdependent on each other though they have their own uniqueness.

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