

## **Employee and Customer Involvement: The Driving Force for Six-Sigma Implementation**

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*The paper highlights the importance of employee/customer involvement in six-sigma implementation. For six-sigma a company not only needs a certain pool of resources, it also needs organizational competencies in terms of a motivated workforce and involved customers. Employee involvement leads to low worker role ambiguity, removal of cultural bottlenecks, worker empowerment, and worker motivation to innovate – an essential component of six-sigma. It brings the customers inside the company to determine the process requirements for resolving issues related to ‘Critical to Quality (CTQ).’ The paper draws heavily from literature to justify the hypothesis, and confirms it through a case analysis. At the study company management played a leadership role from the very outset of launching its six-sigma program, used participatory management to involve its employees and customers, and provided a platform for everyone in its value chain to come together. The company was successful in creating a culture of participation by providing a compelling mission, a structure that emphasizes flexibility and independence, incentives for participation and a lack of punishment for risk taking, and customer involvement in implementing its projects.*

### **INTRODUCTION**

Six-sigma is both a strategic and a tactical approach to improve profitability by reducing product defects/waste and quality costs through process improvements. It appeals to reason more because it is a comprehensive yet flexible system to achieve business excellence. Unlike TQM, that attempts to improve everything simultaneously, six-sigma takes a staggered improvement approach that uses customer preferences, non-intuitive data driven methodology, statistical

evidence of quality, diligent attention to detail, and above all, uses economic justification for each improvement effort. Six-sigma adopters must understand that it is lot more than just use of tools and techniques. The approach integrates strategic issues, and tactical issues such as technology, statistical tools and techniques, people, and training. Six-sigma will appeal to companies that are focused on developing distinctive competencies, i. e., niche building, in a competitive business environment. However, Banuelas & Antony (2002) report that less than ten percent of the adopters of six-sigma are going to do it in a way that will affect their balance sheet in any significant way, and stories of less than stellar performance abound in the literature. It is generally accepted that failures in quality improvement programs are not because of basic flaws in the principles of quality concepts, but are due mainly to lack of competency in implementing the system (Boerstler, Foster, O'Connor, O'Brien, Shortell, Carman, & Hughes, 1996; Brannan, 1998; Shin, et al., 1998; Zabada, Rivers & Munchus, 1998). Authors such as Ericksen & Mikkelsen (1996, p. 58) and Sanchez et al. (1996, p. 8) offer the opinion that competencies are pools of resources that enable a company to perform specific functions, they also emphasize that the competencies must have an organizational component, without the organizational component deployment of other resources may not be effective. An integral part of the organizational component involves ways to improve process performance through employee and customer participation (Esrig-Tena & Bou-Llusar, 2005). The paper is focused on investigating the impact of employee participation and customer involvement in six-sigma implementation, and tests their significance through a case study.

## **STRATEGIC & TACTICAL REQUIREMENTS FOR SIX-SIGMA**

Those who have implemented and practiced six-sigma agree that the most important factor is continued top management support and enthusiasm (Henderson and Evans, 2000). People in the highest level of the organization must drive six-sigma. In six-sigma success stories like Ford, Motorola, Dow Chemicals, GE, and Allied Signal (Gabor, 2001, Antony & Banuelas, 2001, Motwani et al., 2004) the CEOs are the ones who have made it possible. All of them support, participate and are actively involved in company-wide six-sigma initiatives. Top management must take charge of linking the six-sigma initiative to business strategy, customer requirements, workforce participation, and to suppliers. On the local front, i. e., within the company, management should initiate change in the organizational infrastructure, cultural change, communication and training.

In order to implement six-sigma, some organizational characteristics need to be already in place. For instance, company must establish a data driven decision making process based on an objective measurement criteria to monitor processes and outcomes. To achieve this, Strategies should be developed for defining data requirements and information systems support along with strategies for effectively dealing with the cultural barriers. Management must also create a cadre of process leaders/owners who will help develop best-of-breed practices based on cross-functional coordination and teamwork. As opposed to TQM, six-sigma enables a company to focus on small segments/functions within the enterprise, therefore, success of six-sigma depends on selection of the appropriate improvement projects. Six-sigma projects must be targeted for process and product improvements that have a direct impact on both financial and operations goals. Even if the initial efforts focus on fairly narrow problems, their impact on the whole business should be clear. It needs to be clear how projects and other activities link to customers, core processes and competitiveness (Pande et al., 2000).

Successful implementation of six-sigma requires certain competencies, and organizational effectiveness in implementing these competencies. According to Dean & Bowen (1994), Sitkin, Sutcliffe, & Schroeder (1994), Kanji (1996), Wilkinson, Redman, Snape, & Marchington (1998), and Oakland (2000) a company needs to bring together four sets of principles and practices to cause a quality initiative to succeed. These are customer focus, continuous improvement, employee fulfillment, and viewing the organization as part of a value chain; Esrig-Tena & Bou-Llusar (2005) labeled them as the competencies associated with quality management. According to these authors a company not only needs to have certain assets and resources to implement a quality program, it must also have the ability to integrate the assets and resources to orchestrate a cohesive implementation of the program. This is where a customer driven quality program and employee participation can be significant determinants of success of the project. All quality programs emphasize leadership, but in six-sigma this emphasis is more institutionalized than other programs. As six-sigma is more process focused it goes through a more regimented leadership structure by creating a class of in-house process experts. These process leaders in turn help create process management essentials, i. e. process organization, satisfying the internal or external customers, and statistical analysis of process data for process control and capability. The next two sections present a literature review of the importance of employee participation and customer involvement in six-sigma implementation.

## **EMPLOYEE PARTICIPATION**

Involving employees in decision making to improve productivity and competitiveness seems to have many advantages for the individual as well as the organization (Stanton, 1993; Sashkin, 1984, 1986; Lindsay, Curtis, & Manning, 1989; Downey-Ennis, Harrington, & Williams, 2004)). In six-sigma, employee participation is a precondition for increased employee satisfaction, higher levels of motivation, improved organizational performance and effectiveness, and better implementation of organizational change. Pojidaeff (1995) report that according to Deming, "People are born with intrinsic motivation, self-esteem, dignity, curiosity to learn, joy in learning....a corporate commitment to quality that is not based on intrinsic motivation is a house built on sand." The traditional management is based on hierarchical structures, and managers are fearful that a change in the work environment will render them powerless. We need to understand that six-sigma can become successful only when there is workforce participation for process improvement and innovation. However, this participation in six-sigma is more structured than TQM that assumed total participation throughout the organization resulting in cynicism and poor motivation (Huq, 1995).

Six-sigma takes an innovative approach to process management, for which employee empowerment is of paramount importance. It is consistent with the concept of "empowered organization," one where managers supervise more people than in a traditional hierarchy and delegate more decisions to their subordinates (Malone, 1997). Managers (black belts & green belts) act like coaches and help employees solve problems. Employees, Malone concludes, end up having increased responsibility. According to Keller and Dansereau (1995) when superiors empower subordinates by delegating responsibilities to them it leads to more satisfied subordinates, and higher levels of performance. In a similar study surveying 393 middle managers of Fortune 500 corporations, Spreitzer (1996) found that employees who are empowered have low ambiguity about their role in organizations. The leaders in empowered organizations have a wider span of control which leads to more autonomy for the employee.

Empowered employees feel that their organization provides them sociopolitical support, that they have greater access to information and resources than in traditional organizations, and that their work climate is participatory. Six-sigma requires an empowered organization, where employees are able to fully participate as teammates to take bold initiatives, and have the authority to make strategic decisions (Garfield, 1993). Management's job from the six-sigma perspective is to create a culture of participation by providing a compelling mission, a structure that emphasizes flexibility and independence, incentives for participation and a lack of punishment for risk taking. Mallak and Kurstedt (1996) believe that empowerment should be integrated into an organization's culture in a progressive manner. Six-sigma offers that progressive empowerment. That is, initially a process member follows the process black belt's lead, then that person models his/her behavior after that of the black belt, next he/she develops an understanding of empowerment themselves and begins to act accordingly, and finally the individual becomes a leader and a model for others.

Based on an analysis of 450 published articles on participatory management Stanton (1993) report that employee participation will enhance productivity through intervening motivational processes, he concludes that enhanced job satisfaction will increase employee involvement, something integral to the success of six-sigma. Although, a number of researchers as well as executives have questioned (Stanton, 1982; Beehr & Gupta, 1987) the universal applicability of participative management arguing that employees often need directions and lack necessary self-discipline for it to work. However, the principles of six-sigma make it clear (Huq, 2006) that a company needs certain competency to implement it successfully. In addition, six-sigma approach only invites competent people in the organization to get involved with the initiative, as opposed to TQM that tried to involve everyone in the company. This is indeed a big strength of six-sigma and a convenience presented for participatory management. As it is a structured data driven approach, employees have the clear guidelines to follow; and the six-sigma training helps develop individual competence – a critical moderator variable for participatory management. However, employees working in teams not only need to conform to six-sigma etiquettes, they must also be passionate about it because process improvement efforts not only require a deep understanding of the process, it also requires innovation. The authors Eisenberger et al. (1990) found that perceived organizational support is positively related to innovation. They found that employees with high perceived support have greater affective attachment to the organization that finds expression in terms of greater number of constructive employee proposals to aid the organization. Mowday et al. (1982) report similar results, they state that strong employee involvement in the organization result in performance that goes beyond the normal call of duty.

Oliver (1996) has suggested that quality programs can be successfully implemented when employee rewards and incentives are based on team performance. If a firm's culture refuses to accept changes required by six-sigma, then such an initiative will fail regardless of the desires and efforts of top management. In the end, the only way to bring about lasting change that will support the six-sigma initiative is to create a working culture where employees can utilize six-sigma practices more effectively. It is easier for a firm to create such a culture when employees have the proper motivation. The reason GE, Motorola, Du Pont (Motwani, 2004) were successful with six-sigma because these companies created a quality culture through employee participation. If elements of the culture and work processes assure employees, give them worth and provide them with opportunities that enforce positive psychological well-being, employees will exhibit optimal performance. We need to understand that a quality culture develops not by just assuring employee participation at the shop floor level, but also at the strategic and tactical

planning level. For example, Milliken (1996) shares insights about Eastman Chemical Company, a Baldrige winner, on how to motivate employees. He comments that a company cannot empower employees who: don't care; don't have authority; don't have appropriate skills. Along similar lines, the Dana Commercial Credit Corporation (DCC), another 1996 Baldrige winner, subscribes to the importance of employee empowerment for business results. Both of these companies solicit employee participation starting from process level to tactical and strategic decision levels. Both of these companies place great emphasis on involving employees in setting their own goals and judging their own performance; encouraging employees to take ownership of their actions; encouraging employees to identify with the whole company and to become shareholders. Six-sigma provides the ways and means to achieve these goals and objectives by employing cross-functional teams so that employees understand their jobs, systems, and their roles in quality improvement. These cross-functional teams continuously evaluate systems and processes to ensure that customer expectations are met. The cross-functional teams also help identify the implementation barriers, and their removal. As in the case of TQM, these teams span an entire scope of activities - starting from process management to tactical decisions, to strategic decisions.

Six-sigma is a strategic choice that focuses on coalition building with employees, departments, and functions; it can be surmised that a great deal of management time may be spent dealing with employee resistance and resolving interdepartmental problems. Internal marketing has been proposed to overcome such barriers, and to maximize employee participation and cross-functional coordination (Davis, 2001). Internal marketing should focus on how to persuade, influence, and convince the workforce to adopt the standard required by six-sigma, and the good thing about six-sigma is that management do not need to convince everyone. Management must first obtain employee support for the strategic decision to implement six-sigma which in turn will support external marketing, then management should sell the concepts on company well-being to the employees through the human resources department (Collins & Payne, 1991), and finally, marketing of services between departments or organizational units, i. e., to internal customers.

## **CUSTOMER INVOLVEMENT**

Continual customer feedback is extremely important for offering quality products and services, it can be obtained through QFD, sample survey, opinion polls, or by soliciting individual customers' opinion on preferred product quality and service dimensions. Organizations need to be able to identify and measure those attributes and factors that are important to the customer (Kuei & Madu, 2003). It is not a one-time concern, there should be a built-in system to solicit continuous feedback because market and customer preferences change with technology and the competitive environment. If possible, customer should be brought inside the company to become an integral part of the product development and improvement efforts. The customer should be assured that the company has a capable process that can satisfy their quality requirements. In quality assurance programs this is a standard practice where suppliers of industrial parts and components allow the customer company's personnel to study their processes and quality systems documentation for becoming a certified supplier, ISO 9000/2000 is a surrogate parallel process for being labeled as a certified supplier although it does not assure quality. The seller can guarantee quality to the buyer only through demonstrated achievement of process capability statistics. In these times of integrated supply chains, satisfying a customer

implies satisfying the customer's customer. One has to keep in mind that customer satisfaction does not change easily, so it will not change rapidly. Therefore, customer satisfaction is a lagging indicator, not a current one or a leading one. It usually reflects what the customer has experienced over a long period of time, perhaps over years, and surely, indication of past satisfaction is not a guarantee for future customer satisfaction. Variations in the market dynamics, and the competitive environment changes customer expectations. Therefore, past satisfaction ratings are no substitutes to continual feedback and monitoring, that has the potential to uncover any lurking problems with the company offerings.

Customer research is a critical component in Six Sigma. Six Sigma introduces a concept called 'Critical to Quality' (CTQ) in which only process, outcome, or service characteristics vital to customer satisfaction are investigated for improvement (Black 2006). Morgan (2006) has identified three key elements in achieving Six Sigma performance related directly to the customer: focus on the customer and identify their critical to quality (CTQ) factors; ensure that processes are designed to meet the CTQ's; ensure there are measurements to understand how well the customer requirements are being met and the customers' perception about how well they are being met. Morgan (2006) opined that customer requirements may pertain to speed, accuracy, completeness, size, and position, while Kuei and Madu (2003) assert that quality performance should be measured on the basis of product quality, environmental safety, integrity, and social responsibility.

A key focus of six-sigma, similar to other quality management approaches, is to solve problems in order to fulfill customer requirements. However, as opposed to other approaches six-sigma takes a structured piece-meal approach for better management and optimization of the initiatives by selecting them in an economically justifiable manner. To apply six-sigma correctly problems must be stated formally, based on product/service symptoms [Key Process Output Variables (KPOV's)], and the right process input variables [Key Process Input Variables (KPIV's)], only then DMAIC (Define, Measure, Analyze, Improve, Control) approach can be applied. Product/service problems or symptoms can be identified by getting detailed feedback from the customers that will lead to development of systems and procedures to improve and sustain process performance. Johnson (2006) found that design for six-sigma (DFSS) works very well in a time-bound, deadline driven R & D systems engineering environment. Not only does it improve R & D process, Six Sigma enhances execution of business strategies and accelerates innovation, and in some cases amplify the impact of strategic paradigm shifts.

To innovate and offer exciting products six-sigma adopters must have direct customer contact, and collected information on customer preferences on product/service dimensions should be incorporated into product and service designs. This is not a new idea that is pertinent only to six-sigma, the entire quality management literature mirrors this customer orientation concept (Deming, 1986; Juran, 1969; Garvin, 1983). However, six-sigma being a data driven non-intuitive approach takes a more structured course to incorporate the matrices of customer requirements in design and process improvement efforts. Customers determine which dimensions of quality are significant (Garvin, 1988), and therefore, are the key suppliers of product/service design information. Bringing the customer inside the company not only meets this design requirement, it delights the customer in perceiving that the seller is serious about quality and customer loyalty. Although most companies today incorporate customer satisfaction as a key goal in their mission statements, involving the customer in the design/redesign phases of product development has remained ever elusive with most companies, six-sigma offers a platform for achieving this goal.

If quality is to be used as a competitive leverage for market share and customer loyalty, then six-sigma activities must extend beyond the traditional firm boundaries and should include the entire value chain. Such ideas, on a limited scale for quality assurance, were originally espoused by Bowen & Jones (1986) and Bowen et al. (1989). Today customers are more knowledgeable and their levels of sophistication enable them to articulate the differences between their product/service expectations and experiences in more enhanced detail. Six-sigma implementers must adapt to meet these changing conditions, and recognize the fact that these mature customers can also make significant contribution to production activities. Key to success in six-sigma lies in converting the customer oriented statements into customer oriented actions.

## **AN EMPLOYEE/CUSTOMER CENTRIC COMPANY**

In this paper we study a global company in heavy industries, i. e. shipbuilding, power, oil and gas exploration, pulp and paper, engineering, and construction, that mandated implementation of six-sigma in its diverse business units spread on three continents. It started specializing in hydropower and eventually through acquisitions and internal growth created a diversified portfolio. With the diversification and expansion of the company, the leadership stressed the importance of standardizing processes and the value of company intellectual property – its people and its value chain that includes its clients and suppliers. As an example of management support for participative management, we review here some of the six-sigma quality improvement initiatives promoted by the company leaders and one of the employee/customer driven projects using the six-sigma tools. Our study covers only the US segment of the company on management actions to improve process performance through participative management.

The company decided on an aggressive acquisition strategy to sustain growth. This resulted in a broad business portfolio, however, the assimilation of the acquired businesses were slow because of inadequate management strength. The company had to raise additional necessary capital to pay for the short term losses through direct debt issues, and renegotiated its debt by selling some of its business units. The result was a financially strong company with four focused business areas: oil and gas, engineering and construction, pulp and paper, and shipbuilding. On the process side the company recognized its challenges, and to overcome those challenges it decided to utilize its past experiences by soliciting every employee's input and opinion. Management conducted company-wide surveys gathering necessary data to analyze and assess the organization's process health in its US unit. The company had the goal to utilize the knowledge, strength, experience, and input of all employees, and labeled the course of action as the "people survey." It gathered and analyzed all process information and disseminated the same to all employees and to all management levels. The people survey provided the basis for work improvement throughout every group's business unit, it supported workforce culture development based on company values and leadership, the people survey also provided the key indicators reflecting company's work environment, and organizational effectiveness. Every employee contributed to the final outcome by expressing his or her opinion that is compiled and analyzed by the regional managers. Mid-management recommendations were sent to the executive management team for further analysis and development of a company change management strategy. The feedback from the employees helped establish common processes for all company business areas, setting joint models for project execution, integrating processes within the newly acquired companies, and implementation of six-sigma tools.

The study company also solicited client and supplier inputs on a regular basis. A survey of top company clients was administered to evaluate the company's technical expertise, operations, and project performance. The most recent evaluation included Oil, Gas, and Energy. The survey assessed the client's satisfaction with the company projects and performance. Sixty clients responded representing 41% of all clients surveyed. Seventy-seven percent of the respondents were direct clients working with oil, gas, or energy or those that worked with the group in the past two years, making their opinions the most valued and relevant in assessing the organization. Such feedback was designed to determine customer satisfaction, the CTQ (Critical-To-Quality) factors, and to gather information about clients' perception of the company in relation to the competition. In particular, the client survey focused on general level of satisfaction, client project and service performance evaluation, client perception of company technical expertise, their project delivery performance, and client assessment of company weaknesses and areas needing improvement. Client input was compiled and reviewed by business unit presidents and utilized to strengthen the company brand. The goals of this analysis include fine-tuning the business development efforts, improving the delivery of the projects and services through problem solving and process improvements, and further focusing and refining the strategy of the company. Based on these responses, the company management made strategic changes in its organizational structure and process management approaches to distinguish itself from the competition.

These feedbacks – from employees, clients and suppliers – helped strengthen strategic planning, and clarified for top management the leadership direction, resulting in:

- Composition of a clear vision of how the company should position itself against the competition
- Segmentation of the market for developing focused operations
- Development of the systems and procedures to achieve efficiency and effectiveness, and
- Development of the infrastructure to achieve process capability and cost containment.

With the customer focus in mind, the following improvements were implemented going forward:

- Quality relationship to align company management with client management to receive continuous meaningful feedback
- Capture market share versus competitors
- Focus on “as delivered” profits versus “as sold” profit
- Create and execute specific action plans for top five clients.

At the process level, execution excellence was aimed at each operating group and business unit. The company middle management designed a Project Execution Model (PEM) for systematic implementation of the suggested improvements obtained through employee and customer feedback. The PEM addresses the planned changes at three levels: 1) Strategic, 2) Control and 3) Execution. Every level of the PEM model contains governing documents and tools that are available to all employees throughout the company's worldwide web. The executive management team fully supported the initiative for change management, process improvement, and continuous improvement. To achieve company wide acceptance of the PEM model, teams were created to lead the change efforts and implementation. In addition, the company developed excellent web based extensive educational tools that are available on the company intranet. The strategic implementation team also visited the business units to educate/motivate all employees. Two corporate universities were created to serve the employees

in the United States. Every employee is invited to take advantage of the company training. During annual reviews, every employee develops an educational plan based on interest, growth potential, and chalks out a corporate university attendance schedule. Six-sigma is one of the topics taught at the corporate university in Houston.

At the very outset of their program top management decided that it will make every attempt to move away from the traditional *management by results*, i. e., management proclivity to focus on process yield, gross margin, ROI and so on. In such an approach emphasis is placed on a chain of command with a hierarchy of standards, objectives, controls, and accountability. In the past these objectives were translated into work standards or quotas that guided the performance of the employees. Management realized that use of such numerical goals in the past caused short-term thinking, misdirected focus, internal conflict, and poor customer service. Management decided that to exceed customer expectations every work process should be studied and constantly improved, and for that the work structure must change that will empower the employees with freedom to be innovative yet provide management with enough control. Clearly, the company Executive Management Team (EMT) was committed to change management process using pioneering strategies and following through on implementing the suggested improvements. Led by the executive management team, the change process is executed by dividing the Project Execution Model (PEM) into small segments and implementing these segments using the Six Sigma principles. The process starts with the proposal for a six sigma initiative in one of the PEM segments, and careful evaluation of the project. A project development team develops the outline and briefly describes the project to the EMT for review, evaluation and comments seeking approval. The EMT makes the decision about whether to proceed or not with the project using a comparative analysis of all projects that uses information about project impact on customer satisfaction, resource requirements, technical and organizational complexity, cost saving potential, and process improvement potential. Using a rating scheme, projects that attain the highest score are selected and authorized for implementation. At the end of 2006, the EMT and project development team identified the “Tendering Archiving process” as a six sigma candidate project for the company Engineering & Technology Group. The following section presents the tender archiving as a process improvement project using six-sigma principles.

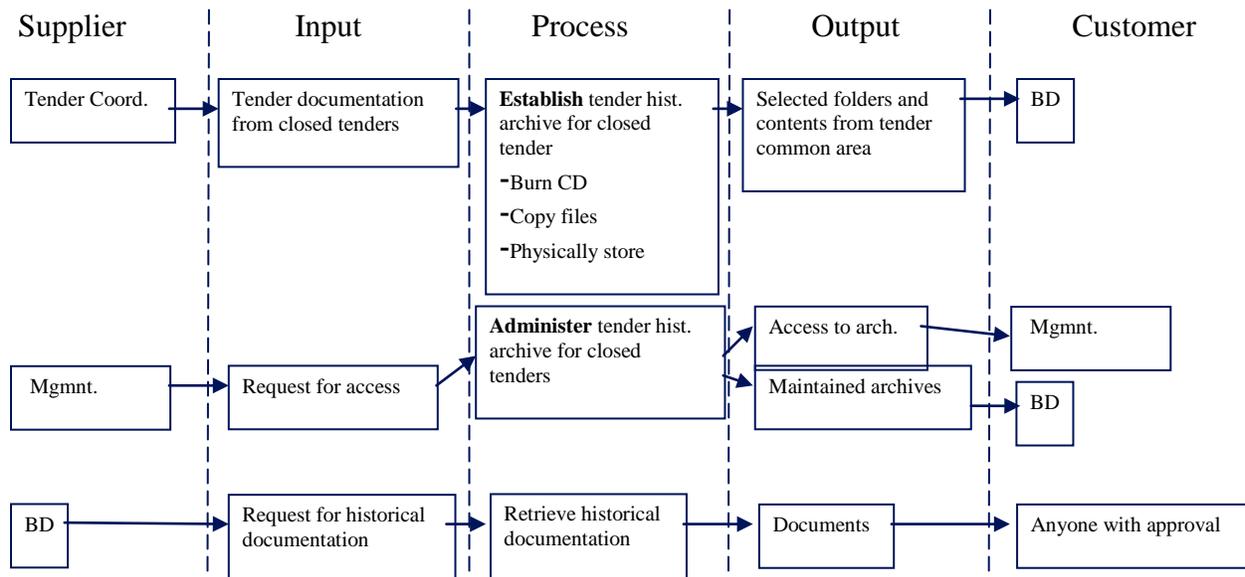
## **AN EXAMPLE SIX-SIGMA PROJECT**

In the first phase of the project the most crucial activity was to select the team and the team leader who will lead the project activities, and determination of the training needs of the team members. The company was fortunate to have a black belt in its engineering design department to lead this six-sigma initiative, other members of the team underwent six-sigma training at their corporate university and were tested on their six-sigma knowledge. It was decided that the team will use DMAIC (Define-Measure-Analyze-Improve-Control) acronym throughout the project implementation phase. The team realized that problem definition is the key to innovation, and measuring the process performance is the key to the six sigma methodology. The collected measurements, i. e., defect per million of opportunities (DPMO), were then used to calculate the sigma value, and sigma values provided the direct measure of process capability. The project involved archiving the tender documents for easy access. An important aspect of this project was to make completed tenders available for possible re-use – thereby reducing the cycle time for tender preparation - and to make them available as learning tools for future bidding opportunities.

Extensive effort and team-work goes into the preparation of each tender and proposal. The Project Development and the Tender Group develop strategies for each new proposal. Every project is unique; however steps, templates, processes and strategies developed during each tender preparation can be useful for future project development and tendering. Many a times these prepared tenders do not have a common organizational structure, and most often they are not accessible by others because they are stored in personal drives of their preparers. Using the six sigma program, the team attempted to solve the problem of organizing, storing and archiving the tendering documents. In addition, these documents have to be secure because they provide the company some competitive advantage if they are protected from competition. The goal for the project was to develop a new electronic archiving system and create as well as document the procedures. This had to become a routine standard for all tenders. The tender archiving project was more about use of technology than the processes. However, the team established several underlying processes that shall enable the project to remain on task and evaluate progress. These processes were used as a guide throughout the project for all involved in the tendering group. It was anticipated that these processes will change with the changes in technology. The team completed the SIPOC (Supplier, Input, Process, Output, Customer) model for each of the four processes and mapped them. The project involved the following four processes (where BD - represents Business Development, Mgmt. – represents company management, and CD – represents computer disk):

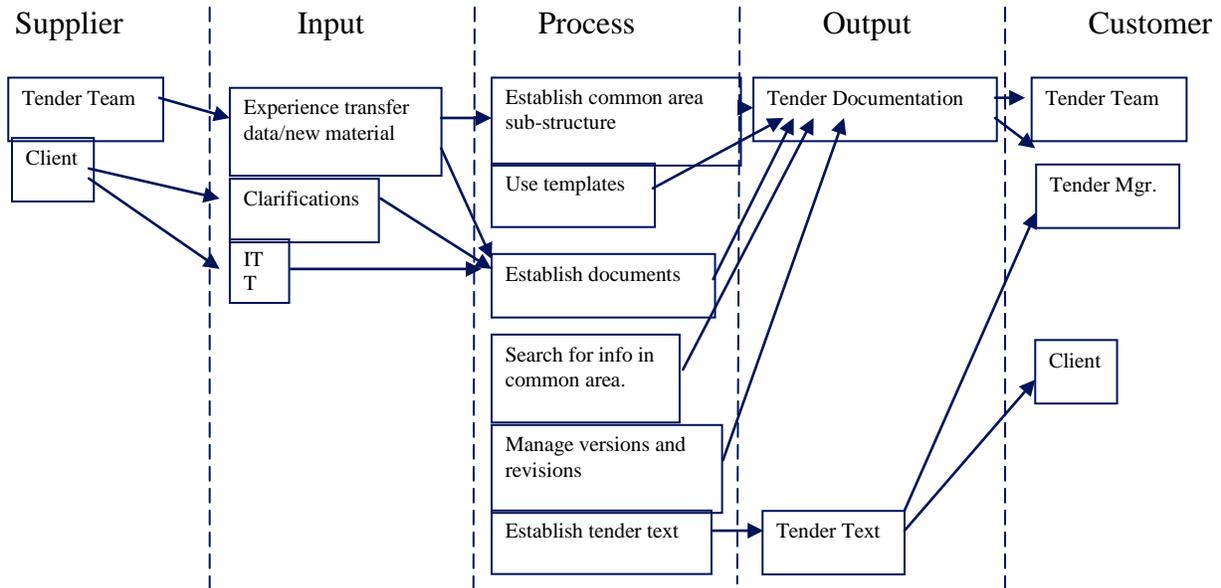
**FIGURE 1**  
**Process P1 -- Create and Maintain the Common Area for Tenders**

1. Starting Point: Bid no Bid decision completed
2. Ending Point: Bid and Proposal Group has correct access to the Tender Common Area



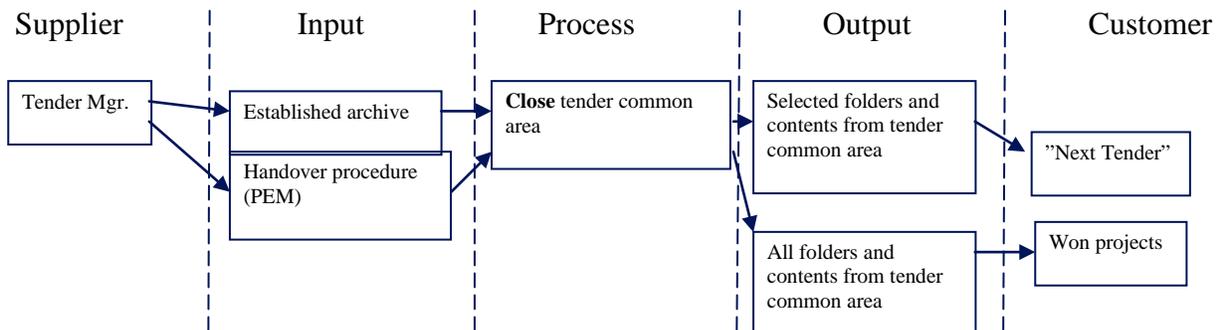
**FIGURE 2**  
**Process P2 - Storage and Retrieval of Information from the Tender Area**

1. Starting Point: Common Area for Tender Established and available
2. Ending Point: Tender/Proposal is complete



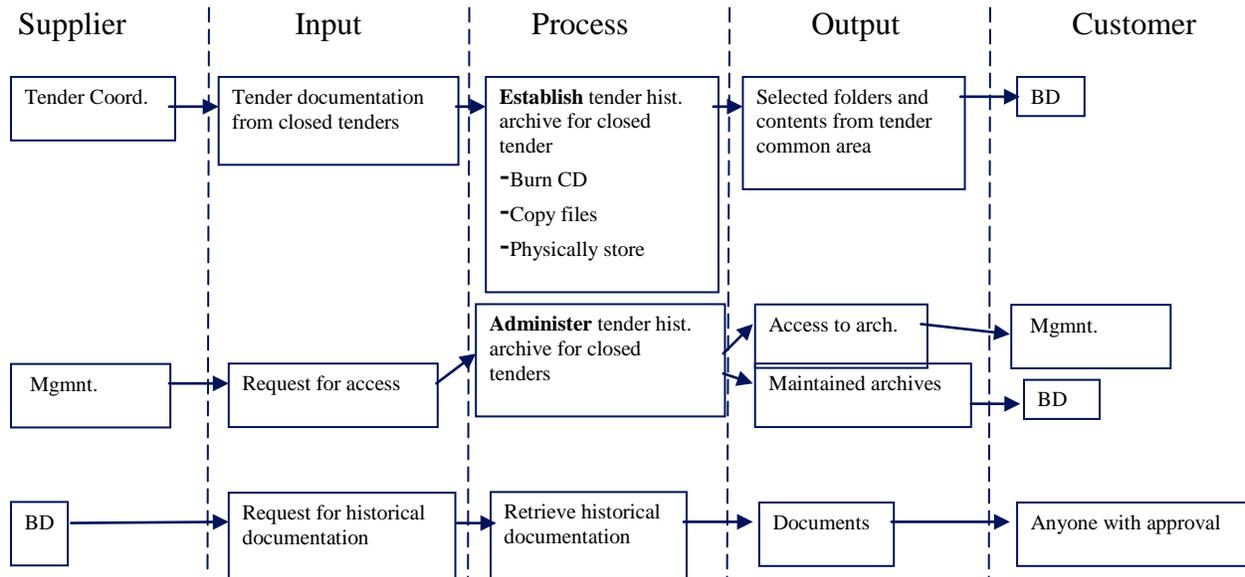
**FIGURE 3**  
**P3 – Security and Access Privileges for the Tender Common Area**

1. Starting Point: Tender is delivered to customer and all clarifications are complete
2. Ending Point: Tender is closed



**FIGURE 4**  
**P4 – Create, Maintain and Usage of the Tender Historic Data**

1. Starting Point: All Completed tender files are copied and stored
2. Ending Point: Archived historic documents are retrieved



After determining the boundary of the processes, the next step was to measure and analyze the processes. The goals of this project were to streamline tender preparation, cycle time reduction, standardizing the templates that reflect customer requirements, measurement system and gage capability study, and determination of process capability. As mentioned earlier, this paper focuses only on employee involvement and customer participation in achieving the six-sigma objectives, we will limit ourselves to only these two aspects of the project. The six-sigma team entrusted with this project is a cross-functional team that comprised of people from business development, management, accounting and finance, engineering design, marketing, and research and development. In addition, the group decided to solicit inputs from its customers/clients. As many of the tenders relate to large construction, shipbuilding, engineering, and hydropower projects customer inputs and suggestions can help the process in a significant way. Client input is compiled and reviewed by business unit presidents and utilized to strengthen customer relationship. This has enabled the company to fine-tune the business development efforts, better tendering process, improving the delivery of the projects and services, and further focusing and refining the strategy of the company.

The EMT expected every employee to take personal responsibility for ensuring that everyone's work reflect the company values, and project the company goals effectively and in an appropriate way to achieve a consistent, professional and powerful brand identity. The EMT also established Operations Management Quarterly Meetings (OMQM), the meetings purpose was to ensure that all business units are in sync with the company business strategy and are working towards achieving the individual project objectives. Each business unit makes their individual presentations about their project progress and solicit feedback from the EMT and other members

of the company community. The meeting also arranges roundtable discussions and brainstorming sessions regarding action items. The meeting has also organized support groups from finance, marketing, accounting, legal, engineering, design, sourcing, and human resources. These support groups work as advisory support to the six-sigma project teams. This meeting not only brings everyone together for the intra-company conference, it also recognizes outstanding achievements, significant new ideas, best-of-breed practices, and best-in-performance. The meeting has helped create a culture of excellence in the company.

The EMT anticipated that people entrusted with a project will develop a deeper understanding of the involved processes, and breakthrough improvements will come from innovation. The corporate university training programs, roundtable meetings, brainstorming sessions, and intra-company conferences – for review and presentation of six-sigma project progress – ensured widespread dissemination of such knowledge. As mentioned earlier, six-sigma not only requires employee knowledge and expertise, it also requires company ability to integrate the assets and resources to orchestrate a cohesive implementation of the program. All these resulted in generation of collective enthusiasm for six-sigma, and employee empowerment eventually led to an “empowered organization.” This company has succeeded in creating a culture of participation by providing a compelling mission, a structure that emphasizes flexibility and independence, incentives for participation and a lack of punishment for risk taking, and customer involvement in implementing its projects.

Brainstorming sessions, roundtable meetings with support groups that included the major customers, and diligent attention to detail by the project team resulted in simplification of the archiving and retrieval processes and significant transaction reduction. Simulation analysis of past process and improved process performances showed significant reduction in archival and retrieval process lead times. At the time of writing of this paper, based on process capability analyses, the company was still short of six-sigma performance. However, the project team is optimistic that they will be able to achieve their target performance within two years.

## **DISCUSSIONS AND CONCLUSIONS**

The paper investigated the elements of participative management, i. e., employee participation and customer involvement, in implementing a six-sigma quality program. According to Dean & Bowen (1994), Sitkin, Sutcliffe, & Schroeder (1994), Kanji (1996), Wilkinson, Redman, Snape, & Marchington (1998), Oakland (2000), and Esrig-Tena & Bou-Llusar (2005) these are integral parts of the competencies needed for implementing a comprehensive quality program. For six-sigma a company not only needs the assets and the resources, it also needs the ability to organize the assets and resources for a cohesive implementation of the quality improvement project. Literature [(Motwani, 2004), (Milliken, 1996), (Oliver, 1996)] suggests creation of a quality culture through employee participation and customer involvement. Published literature and the case analysis bring out the following features of a successful six-sigma program:

- Top management must take charge of the initiative. Implementation of six-sigma must be linked to business strategy, customer requirements, workforce participation, and to suppliers. Simply put, it must be presented to the workforce as a means to remain competitive, for that management should initiate change in the organizational infrastructure, culture, communication and training.
- Six-sigma is a data driven methodology and for breakthrough improvements it focuses on innovation. At the very outset of the program top management must entrust teams/groups

to develop strategies for defining data requirements and information systems support along with strategies for effectively dealing with the cultural barriers.

- As opposed to TQM the strategies for changing workforce culture in six-sigma do not have to be pervasive. The leadership structure of six-sigma ameliorates the challenge for management, the six-sigma process leaders create the process management essentials, process organization, work standards, and worker behavior towards the process.
- Six-sigma becomes successful only when workers are involved, motivation and empowerment are an essential part of that. The study company accomplished that by doing the “people survey,” essentially that made every employee feel important. Further, management decision to involve all classes of employees in soliciting strategic, tactical, and control decision ideas for six-sigma represented true implementation of participatory management.
- Participatory management in the study company led to low employee ambiguity about their role in the company. They felt that they have a wider role to play and a wider span of control, this meant more autonomy for the employees, an essential element for innovation. They felt that their company provides them sociopolitical support.
- At the study company, they understood that a six-sigma project may entail an entire value chain or part of a value chain that may involve various functions/units within the company, its suppliers, partners, and customers, so cross-functional coordination is an essential part of the project. Cross functional teams also help employees understand their jobs, systems, and their roles in quality improvement. The approach enabled teams at the study company to continuously evaluate systems and processes to ensure that customer expectations are met, and also help identify the implementation barriers, and their removal.
- Management’s internal marketing of six-sigma at the study company not only involved communication of competitive priorities, strategic choices, and participative management, it also involved offering a platform to publicize improvement strategies, best of breed quality practices, project progress feedback, and to celebrate success. Management accomplished that through its intra-company Operations Management Quarterly Meetings (OMQM). This alone contributed significantly towards implementation of a quality culture.
- The study company brought its customers inside the company to determine the process requirements, the measurements needed, and customers perception of how well their requirements are being met. This is consistent with the approaches suggested in the literature for determining issues “Critical to Quality.”
- The study company realized that customer satisfaction is not a one-time issue, there should be a built-in system to solicit continuous feedback because market and customer preferences change with technology and the competitive environment. They achieved it by not only involving their customers at the six-sigma project team level, but also at the executive management team level.
- When the customer is brought inside the company and invited to participate in idea generation to final production of a product or service, it delights the customer. From customer point of view, this is a sure testimony of producers commitment to customer service and quality. Like the study company, every company should practice it if they want effective six-sigma implementation.

Evidence from literature and the case study suggest that employee/customer participation is a necessity for six-sigma implementation. Six-sigma becomes effective only in cases where a firm has the experience and the technical competencies at the corporate and individual levels, and has mastered the ability to apply them in a coordinated manner. Many senior management teams have produced an inspiring vision and very pragmatic high level objectives, but then struggled to deploy these to lower levels effectively (Caulcutt,2001). The deployment of objectives is not a trivial task. The study company was able to deploy its objectives by involving its employees through 'people survey,' and through its intra-company Operations Management Quarterly Meetings (OMQM). It restructured its internal organization to better identify and improve processes by empowering its employees in a manner that encourages continuous improvement. It created cross-functional teams of employees, customers, and value chain members that took charge of their operations in a manner that encourages continuous learning and personal responsibility. Pfeifer et al. (2004) and Motwani et al. (2004) have shown that companies with established quality systems can easily integrate six-sigma because they fulfill the prerequisites for six-sigma. However, companies must exercise prudence in involving its employees and customers so that they become partners in this quality improvement effort.

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