



ChemTech

International Journal of ChemTech Research

CODEN (USA): IJCRGG ISSN: 0974-4290

Vol.8, No.8, pp 215-226, 2015

A Case Study on Improvement of a Cellulose Fibre Reinforced Mill Board Industry through a Quality Initiative and Simple Enterprise Transformation Methodology

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Abstract: The state of Small scale Cellulose fibre reinforced mill board industries can be called a state of chaos in Vellore, Tamilnadu (India). They are struggling to keep themselves alive in a highly competitive market. The demand for the product is high and lures entrepreneurs to enter the arena but the market witnesses an equal or higher number of closure of the industries as that of the entrants, putting the state of such industries in complete chaos and turmoil. The reasons are many and an attempt has been made to look into the reasons, causes and problems faced by the Cellulose fibre reinforced mill board manufacturers and also help one such unit in Vellore, to overcome its problems through a simple enterprise transformation methodology, using simple and easy to use tools and techniques which has helped it to recover its losses and regain its market share.

Keywords: Cellulose fibre reinforced mill Board, Enterprise transformation methodology, Small scale industry.

Introduction

Cellulose fibre reinforced mill board is the technical name for thick hard boards made of waste paper and cellulose. These boards find a variety of applications in the stationary, printing and packaging industry. The market scenario at Vellore, Tamilnadu is evident that there is a good demand for the product and a small number of new industries are setup for the manufacture of Cellulose fibre reinforced mill board every year. An investigation revealed that in the last ten years, about 90 percent of the new entrants did not survive for more than 3 years despite a good market demand. These manufacturers are faced with problems of production, productivity and quality improvement. Hence an attempt has been made to look up to a quality improvement process and a simple enterprise transformation methodology to come to the rescue of an ailing small scale unit. The initiative needs to focus on improving quality and a transformation methodology which is simple to implement and does not require too many inputs. The results have been significant and improvements are many. The industry had started operations in the year 2008 and had been facing several problems since its inception. A simple quality improvement process and a simple methodology for enterprise transformation were implemented and that resulted in significant improvements.

Literature review

An enterprise is made of people, process, resources and technology and when aligned with the strategies formulated to achieve the vision envisaged, the enterprise reaches the desired state from the current state. While there is very little literature on enterprise transformation methodology, quite a few frameworks have been developed and lot of research has been done on business and organizational transformation under concepts like strategy changes, business process reengineering, lean transformation, six sigma etc. Further

search revealed that there was very little work done on enterprise transformation methodology for small industries while a decent amount of work has been done for large scale industries.

Hans Roehm, Graig and Atanu Chaudhuri (2009) claimed that finance is the most critical element through which enterprise transformation can happen. Their model comprises of three steps namely design, develop and exploit involving creation of goals and plans for creating financial capabilities, lay a financial foundation and identify and prioritize high-impact areas for improvement respectively.

Transmeth, a transformation methodology developed by Eileen M. Van Aken, Dirk Van Goubergen, and Geert Letens(2003) states that their methodology is a continuous in nature involving understanding the need for transformation, analysing then current situation, setting the direction, defining the improvements, deploying them and reviewing the progress. Creation of required infrastructure for the transformation process is the pivot on which the methodology revolves.

The Transform Enterprise Methodology by Ryan Underdown (1997) is a four step methodology for small enterprises comprising of creating a vision and strategy, succeeded by creating a desired culture, integrating and improving the enterprise followed by developing technology solutions. The focus is on creating right culture and using technology to transform while, concentration on the components, process and resource have been less.

McAdam (1996) devised a methodology to start with critical process identification, further with understanding the process, model and analyze the process, followed by redesigning the process, implement new process, assess the new one and review it. This is elaborate revolving around process improvement.

Kotter's eight step methodology (1996) starts with creating a sense of urgency, providing guidance, having a vision, communicating it, empowerment, gaining short term wins, never letting up and incorporating it into the culture. The model focuses on process vision and culture while a holistic approach would have been better.

Klein's methodology (1994) is also of five steps beginning with preparation, followed by identification, vision creation, understanding current process and designing a new process. This also aims at process improvement.

The Burke and Litwin model (1992) explains how internal and external factors have an impact on the enterprise and it describes how assessment and environments play a role in transformation. It demonstrates how environmental and assessment should be linked to achieve transformation.

Harrington's Business process improvement methodology (1991) a five phased approach to improve business process comprises of planning and analyzing the process to be followed by streamlining and implementing the new process to be succeeded by continuous improvement. The focus here is on process improvement while the other components have been ignored.

Research Objective

The primary objective is to improve the quality of the board and increase the customer satisfaction level and the next objective is use a simple enterprise transformation methodology for improving the performance of the Cellulose fibre reinforced mill board industry through increased production and lowered defects. Since such industries are cash strapped, the secondary objective is to keep the implementation cost low and implement as quickly as possible to prevent the industry from perishing.

Methodology

The unit had begun operations in the year 2008 and was doing well till 2011. But after that the sales started falling, employees began leaving and profits started dwindling. In essence the enterprise started heading towards a slow and painful death. The need for transformation was evident and felt by the management of the enterprise. Being a small unit, it could not afford the luxury of pumping in money towards transformation though a transformation was unavoidable to save the unit. The management approached the authors and thus

was born a simple methodology which was not just simple but affordable too. It relied on simple to understand and simple to use tools.

An enterprise transformation methodology which is named as “Sentramet”, an abbreviation for Small Enterprise Transformation Methodology, developed by the researchers was put in place for transformation. The methodology is shown below in fig-1.

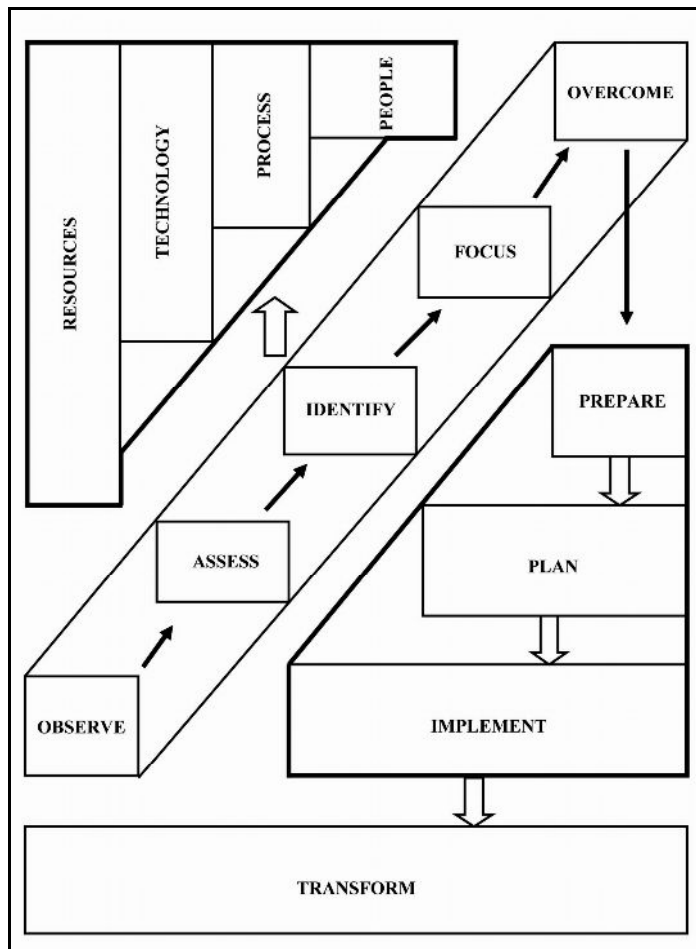


Fig-1: The Small Enterprise Transformation methodology (Sentramet)

Observe:

The process began with observing the enterprise which revealed that like every conventional enterprise it comprised broadly of people, process, technology and resources. This process not only looked inside but also outside the enterprise revealed that the Cellulose fibre reinforced mill board market was a buyer’s market unlike the conventional seller’s market and to make changes and implement the “sentramet” a thorough understanding of the process was required. Hence the process was mapped which is shown in fig-2

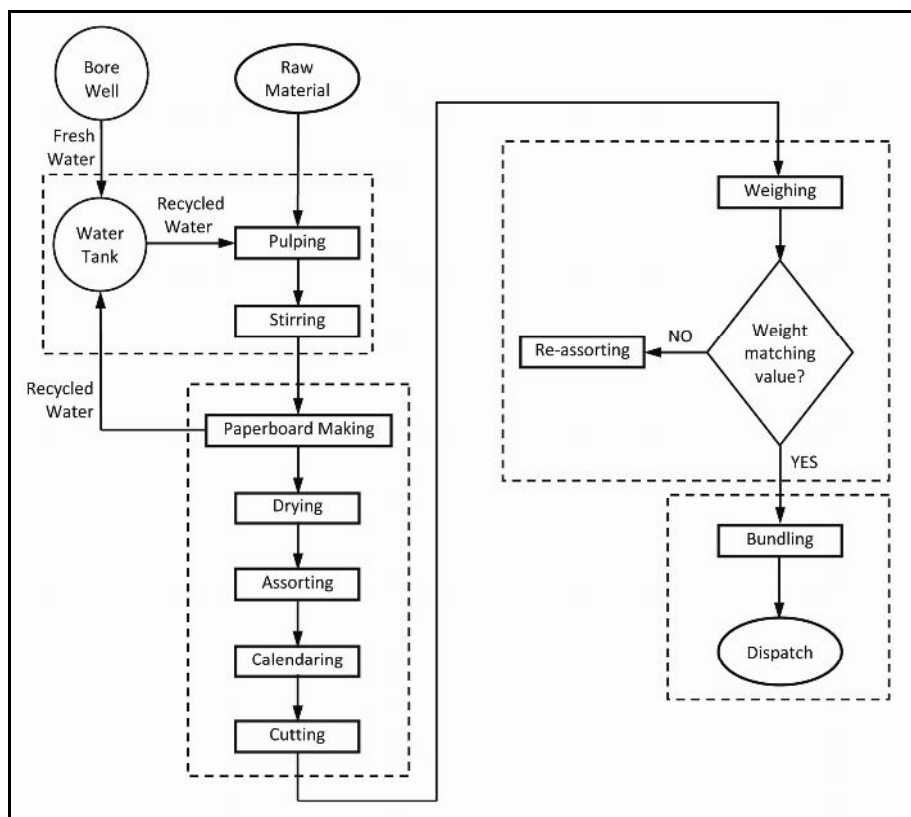


Fig- 2 : Process map of the board making process

A look into the technological side of the unit led to an understanding that most of the jobs were done manually. It was clear that there was not much of a technological component involved which meant that there was a huge gap to bridge using technology. The work was furthered with observing the resources that existed inside and outside the organization.

Assess:

This phase is more of a measurement phase starting with assessing people. During the assessment it was evident that only a few people were critical to the process and the dependency was heavy on these people for the jobs to be completed. The two crucial operations, wet board-making and dry-board assortment, depended heavily on people with experience and expertise. Secondly the employees were assessed for their skill and a skill matrix was created.

Much assessment could not be carried out on the technology front as it was a simple and mundane process where much of the work was done manually with the help of simple machines. This was taken forward by assessing the resources such as raw material, water, labour, machinery, land, finance, electricity and transportation. The assessment proved to be an eye opener for change. It was found that the raw material and water quality played a major role in deciding the board quality. Skill of labour impacted the production. It was discovered that some of the major and common problems faced by these small units are (a) Availability of finance, (b) Raw material procurement, (c) Lack of access to technology, (d) Lack of infrastructure and (e) Underutilized capacity.

With the support of a balanced scorecard the key performance parameters were analysed with respect to various areas of the enterprise. Financial parameters are the ones that are given a lot of importance in small industries and this has been vouched for by several researchers. Small firms are likely to place greater emphasis on financial measures in their performance measurement system as these firms do not have the same pressures as large firms to meet the requirements and expectations of different stakeholder groups (Ali Gaber Saleh Mahmoud, 2014.) In addition, Hvolby and Thorstenson (2001) indicated that financial measures are also likely to be more appealing to small firms as these measures are available at a minimum cost and effort, generally relying on information which is readily provided by their financial accounting system. Hence it was clear that

the reliance on financial parameters was heavy to measure the performance of the small unit. The Balanced Scorecard compels the firm to align its performance measurement and controls from the customers' perspective, internal business processes, and learning and growth perspectives and investigate their impact on the financial indicators (Manoj Anand et al, 2005). The Balanced Scorecard protects the managers from information overload by limiting the performance measures to only four perspectives, namely, customer, financial, internal business, and learning and growth. It also safeguards from sub-optimization in the decision-making process by forcing the managers to consider the four perspectives of business performance to have a complete picture. (Manoj Anand et al, 2005).

Joshi (2001) conducted a survey of 60 large and medium scale manufacturing industries in India and found that there is an extensive use of financial measures in performance evaluation. He also found a moderate use of on-going suppliers' evaluation and customer satisfaction surveys and a minimal use of non-financial measures in performance evaluation. In the Indian context, the general perspectives considered while using the Balanced Score card suitable for Small enterprises were in terms of Finance, Customers, Suppliers, Employees, Competition, Internal business, and Innovation and Growth as given in table-1.

The manufacturing Enterprise Solutions Association (MESA) has come out with the commonly used important metrics through a research survey and the combined list is as under.

Table 1: Combined list of KPIs

Sl.	List of KPIs	Perspective
1	Return on investment	Financial Perspective
2	Working capital requirement	
3	Cash flow return on investment (CFROI)	
4	Internal Rate of Return	
5	Economic Value Added (EVA)	
6	Total Manufacturing Cost per Unit (Board)	
7	Manufacturing Cost as a % of Revenue	
8	Net Operating Profit	
9	Return on assets	
10	EBITDA	
11	Energy cost per unit	
12	Average Unit Contribution Margin	
13	Productivity in Revenue per Employee	
14	Current ratio	
15	Growth rate in tangible assets	
16	Product quality	Customers' Perspective
17	Service quality	
18	On-time delivery	
19	Changeover time	
20	Customer fill rate	
21	Brand image and reputation	
22	Suggestions and feedback from customers	Suppliers' Perspective
23	Inbound logistics cost	
24	Average payment period to suppliers	
25	Number of suppliers	
26	Supplier incoming quality	
27	Product improvements through Supplier	
28	Inventory carried by the supplier	Employees' Perspective
29	Sales per employee	
30	Employee cost	
31	Attrition rate	Internal Business and Manufacturing
32	Unit cost of product	
33	Defect rate	

34	Yield	Perspective	
A 35	Customer rejects		
36	Throughput		
37	Overall Equipment Efficiency		
38	Capacity utilization		
39	Downtime in Proportion to Operating Time		
40	Scrap as a percentage of Raw material		
41	Number of employee training hours		
42	Ratio of skilled employees to total employees		
43	Market share		Innovation and Growth Perspective
44	Growth in Sales		
45	Percentage of sales from new products		
46	Percentage of sales from new customers		
47	Raw material substitutes		
48	Number of employee suggestions		
49	Vendor development		
50	Cycle time		

Identify:

Before tackling a problem, it is important to ascertain that a problem exists. Hence the problems were identified first. Analysis and discussions with customers pointed out that there was a lack of stiffness and surface smoothness on the boards, where stiffness is usually measured by the force required to bend a strip of board to a known angle and Smoothness is concerned with the surface contour of the board. It is the flatness of the surface under testing conditions which considers roughness, levelness, and compressibility. The terms "finish" and "pattern" are used in describing the contour or appearance of paper surfaces. Smoothness also gives eye appeal as a rough board is unattractive. Further during this phase the various reasons and the root causes for the various problems and shortcomings of the industry were identified. Subsequently the underperforming parameters were identified from the previous phase. With the data in hand, the root causes for the various problems encountered and the underperformance were identified. The major problems identified are given below.

People related problems:

High absenteeism is a very common occurrence in small units and so was it at the Cellulose fibre reinforced mill board unit. Availability of skilled labour was very difficult due to inability to pay high salaries and unwillingness to work in small units added to the issue. Further, everyone reported to the proprietor of the unit, so the absence of the owner did not let the people to take a decision and proceed further in case of a breakdown or any other problem. There was a lack of hierarchy in the unit and hence there was no responsibility, accountability and answerability except to the owner and in his absence there was no control over them. Senior employees were not satisfied and there was no respect among the newbie as they were not supervised by anyone. Indiscipline was a prevalent phenomenon which led to inability in proper production planning and delay in delivery commitments.

Process related problems:

A majority of the activities were done manually and this was time a consuming affair. The process of assorting the boards as per grades was a complete judgemental affair. Employees had to be acquiring this skill to assort by trial and error and gain expertise through experience. Repeatability took a hit and hence the next process was delayed when there were flaws in the assorting process as the board count did not match with the weight. Further, it was identified that the pulp content in the recycling water was between 25 to 30 percent of the input resulting in loss of yield. Vibratory screen downtime, too much of wetness in the boards were the other problems encountered in the process. It was found that the boards made were not up to the expectations of the customers in terms of stiffness and the products could not be delivered on time to the customers.

Technology related problems:

Though it was a technical process, there was not much of technology involved in the Cellulose fibre reinforced mill board making process. As mentioned earlier the process was simple and mundane. But it was clear that even if technology existed, the enterprises did not have the financial resources to buy the latest technology nor did they have the knowledge of the latest technology. The fact is that money to even upgrade to the latest technology was also unavailable. It was concluded that automation was possible but to a small extent only.

Resources related problems:

The unit had a connected power load of 75 HP. But being located in a rural area, the supply was erratic. Inadequate credit facilities and lack of capital for business development stayed as a huge deterrent and pain for the small industries. They were tapping only local resources for raw material and this led to inadequate raw material availability, poor quality and irregular supply. The point to be noted is that all the resources mentioned are the lifeblood of the unit. And the result was a dissatisfied customer base complaining of lack of good surface finish and stiffness of the board.

Focus:

Focus is necessary to perform assessment and analysis and transform it into meaningful, productive and responsive actions. This was a relatively less time consuming phase where a brainstorming session happened to narrow down on important tasks to be performed and trouble shoot the bottlenecks

People focus:

On a general note, high absenteeism was a major issue that needed to be addressed. Further the area of focus was narrowed down to specific people. After the identification and segregation of people based on inputs from the assess phase was done, an implementation plan was chalked out. It was clear that people had to be empowered, given responsibility and were answerable to higher authorities. Further it was evident that proper and clear top-down as well as bottom-up communication had to take place.

Process focus:

The areas of the process which were lagging behind where focus was needed were the recovery of pulp loss through the mesh and the assorting of the boards correctly without difficulty. The assorting also had to be fool proof so that rework could be avoided.

Technology focus:

The possibility of involvement of technology was only through automation in areas such as board making, drying and packing.

Resource focus:

The resources which required immediate focus were found to be continuous power supply and availability of raw material. To solve the power problem, the focus was on the pulping machine, stirrer and Cylinder mould machines as these were the ones with which production could be carried out without interruption. Secondly the focus in terms of raw material turned towards nearby larger cities. The city of Chennai, being close was the best option. Suppliers were contacted and the raw material problem was taken care of. A list of problems was prepared and the elements of the problems were listed to help in representing priorities, order and sequences and a Pareto analysis was performed to find the problems that needed priority. There was a clear picture of the various problems and only the most crucial ones were chosen first and tackled and are mentioned below.

Overcome: This was the solution providing phase cum implementation and barriers removal phase.

People related:

To tackle the problem of high absenteeism, the employees were educated on the effects it would have on the enterprise and as a motivator employees were awarded a 2 day wage as bonus if they did not absent themselves during the full month. Absenteeism without prior information was attached with a penalty of loss of one day wage. Thus a reward and penalty clause was brought into effect to change the culture in the enterprise. The employees were provided training and empowerment of employees was on the top of the agenda. A hierarchy was put in place, responsibilities were allocated and department heads cum reporting heads were nominated. The communication stream ladder was streamlined. Heads were asked to conduct weekly meetings on a regular basis and feedback and outputs from the meetings were discussed with the top management. This gave way for a tremendous change in the enterprise. Subordinates learned to report to and respect superiors. Work did not slow down or stop in the absence of the top person. The morale of the employees went up and absenteeism decreased.

Process related:

The pulp loss was first attended to. The mesh size of 80 (pores per square inch) was currently being used. This meant that a simple solution of reducing the pore size i.e. increasing the mesh size to the next available sizes of 100, 120 or 150 could be done. On application through trial and error the mesh size of 120 was found to be giving the best results as higher number did not let the filtered water to pass through and overflowing sideways happened. This resulted in a loss of 10% to 12% instead of 25% to 30 % and this was a considerable increase of raw material recovery. Secondly a simple system for assorting was put in place. The boards were weighed by introducing a small digital weighing machine after the calendaring process was completed and this helped in accurately deciding as to which category the board would fit. To help categorize the board, a standard chart containing predetermined values of weight to number of boards was put in place on the wall nearby. This helped even an unskilled worker without any experience to assort the boards accurately and quickly. Thus the need for skilled personnel was eliminated, speed of assorting increased over a period of time and accuracy increased along with customer satisfaction. The vibratory screen performed a filtration operation which was replaced by a filter just under the blades of the pulping machine and the usage of the vibratory screen was eliminated resulting in elimination of 2 Hp of power. A thin woollen mat was introduced between the mesh and the couch drum of the cylinder mould machine (board making machine) to help squeeze out the excess water in the board. This reduced the tearing of wet boards while producing the boards (defective production) by 25-35%.

Technology related:

The availability of technology in the market for the product was low. Possibility of automation was remote and automation could be done here and there only. Search and discussions with experts in the field of board making revealed that there were solar dryers available to dry boards. But due to lack of funds it was decided to install them later. With small investments, a packing machine was installed which reduced the time taken for bundling and packing greatly and one of the cylinder mould machines was automated with the limitation of its capability to produce only three sizes of thin boards. But this resulted in a considerable increase in production and freeing up of two employees who worked on the machine.

Resource related:

The availability of funds to overcome the problems once again proved to be the real issue. The largest barrier towards obtaining resources and overcoming resource related issues was finance which needed to be addressed effectively. Lack of access to funds caused immense struggles in overcoming barriers in terms of resources and acted as a huge deterrent. The help of a financial consultant was sought and proper steps were taken to increase the creditworthiness of the enterprise. This resulted in easy access to bank loans. A mini diesel generator was installed and the Pulping machine, Stirrer and Cylinder mould were connected to the D.G. set so that production did stop even during power failures. A consultation with experts in the field revealed that the TDS content of the water had an impact on the board surface finish and high fibre content would improve stiffness and surface finish. The TDS in water was decreased using an industrial RO system resulting in a better surface finish and the waste pulp from kraft paper mills and white paper mills were added to the raw material to obtain increased stiffness.

Transformation:

The actual transformation begins at this level which is a three step navigation process comprising of Plan, Prepare and Implement to transform as shown in the fig 3 below



Fig: 3 :The Transformation Process

Enterprise transformation needs to be viewed, recognized and accepted by the employees as an integral part of the enterprise. And the management needs to accept that the transformation contributes to the overall success and increased bottom line of the enterprise.

Plan:

A very important step in the transformation process is to develop a plan for getting from the present to the future. The first question that popped up was “are we ready for this”? The reason is that for a majority of the industries, moving from its current state to the desired state requires a fundamental change and is dependent on how the enterprise is managed. Planning for enterprise transformation requires actions to be taken towards reaching the desired state. Planning can take place only through the involvement of the top management hence the owner and the managers of the enterprise took to planning for the transformation along with the researchers. A strategic plan was developed to follow a set of steps to achieve the goal. Although these steps are not always followed in the exact order specified, they do resemble the way most organizations go about planning strategically (Goodstein, 2001)

Create an objective: It began with a stated objective involving enterprise outcomes of increased production and improved quality and improvement or change of culture.

Organizational analysis: Organizations are influenced largely by their internal and external environment and its growth depends mostly on the external environment. The extent to which the environment either aids or hinders a company’s growth (or even its continued existence) depends on several key factors. Specifically, a company has a competitive edge over others when (a) there is a continued supply of resources to sustain production, (b) resources cannot be easily duplicated by others, and (c) competitors do not have resources that are any better (Fred C.Lunenburg 2010)

Prepare:

Transforming is a complex affair and challenging process. Hence there was a need to prepare to transform and this required significant and sustained effort. The idea of transformation was met with resistance initially. But several meetings were conducted with every employee as a group and later individually to brief them on the pros and cons of the transformation endeavour. This phase began with creating a situational awareness. Employees and the management were made aware of the present state of functioning of the organization. They were told what would happen if we did not transform and they were told of the benefits that the enterprise would reap due to transformation and how the employees would be benefited in return. This created an enthusiasm and they became open minded as their fears were dispelled. Instead of telling what needs to be done, open calls were given asking for suggestions as to what they think needs to be done and their ideas were received with open minds and they were debated. This created involvement and the best ideas were rewarded. Hence, now from being “our ideas”, it became “their ideas” creating more involvement and pride. Open calls were given to employees to join the team. Being a small organization, they were divided into two teams as almost everyone was ready for the transformation after convincing. It was made very clear to them that their ability to adapt would have a positive impact on their career and propel them towards success.

A two day informal training program was conducted to brief the employees for planning to proceed with the transformation that “they” had suggested. This eased out the burden of overcoming resistance to transform. Required resources were mobilized and got set to go.

Implement:

With the transformation blueprint in hand the implement phase began. This phase was the execution phase which was in the hands of the employees to make it a success. It is said so because successful implementation of transformation greatly depends on the acceptance or support of employees (Bartunek, Rousseau, Rudolph and DePalma, 2006; Herold, Fedor and Caldwell, 2007. Many researchers stress the importance of employee involvement and commitment for the successful and effective implementation of transformation (Herold et al., 2008; Liu, 2010). Evolutionary transformation was felt to be best suited rather than revolutionary transformation. Hence it was decided to transform over a period of three months. The path through which it had been planned to proceed was followed after preparation and implementation was carried out.

Discussion:

Transformation is the need of the hour for small enterprises too. Competition has forced this upon all industries alike be it small medium or large. The above methodology has helped an ailing small enterprise to overcome bad times and tide over the crisis. The implementation of the Sentramet has helped improve the following parameters as given in table- 2. There has been a significant improvement in many parameters but due to reasons of their own, the organization does not want to disclose a few of them. Hence the parameters where there has been improvement are given in terms of increase or decrease and the rest have been provided as percentage.

A table providing details of improvement of the KPIs of the enterprise is given below:

Table:2 : KPIs reflecting changes

Sl.	KPI	Before Implementation	After Implementation	% increase / decrease
1	Return on investment	Not Disclosed	28.56%	+28.56%
2	Working capital requirement	Not Disclosed	-15%	-15%
3	Cash flow return on investment (CFROI)	Not Disclosed	6.73%	Increased
4	Internal Rate of Return	13.46%	18.41%	+4.95%
5	Economic Value Added (EVA)	Not Available	Not Available	None
6	Total Manufacturing Cost per Unit (Board)	5.50 (Average)	5.05(Average)	-8.18%
7	Manufacturing Cost as a % of Revenue	34%	28%	-6%
8	Net Operating Profit	14%	21%	7%
9	Return on assets	Not Available	Not Available	None
10	EBITDA	Not Disclosed	+12%	+12%
11	Energy cost per unit	Rs.1.30 per Kg	Rs.1.25 Per Kg	+4%
12	Average Unit Contribution Margin	Rs.1.80 per Kg	Rs.2.00 Per kg	+10%
13	Productivity in Revenue per Employee	Not Available	Not Available	None
14	Current ratio	1.25	1.50	+0.25
15	Growth rate in tangible assets	Not Disclosed	8%	+8%
16	Product quality	6/10	9/10	+30%
17	Service quality	5/10	7/10	+20%
18	On-time delivery	45%	63%	+18%
19	Changeover time	Not Applicable	Not Applicable	None
20	Customer fill rate	63%	76%	+13%
21	Brand image and reputation	Not Available	Increased	Increased
22	Suggestions and feedback from customers	Not Available	Increased	Increased
23	Inbound logistics cost	Not Available	Not Available	None
24	Average payment period to suppliers	42 days	35 days	-7days
25	Number of suppliers	04	06	+2 Nos.
26	Supplier incoming quality	Good	Good	No Change
27	Product improvements through Supplier	None	None	None

28	Inventory carried by the supplier	Not Available	Not Available	None
29	Sales per employee	Not Disclosed	+11%	+11.10%
30	Employee cost	13 per kg	12.20 per kg	-6.15
31	Attrition rate	28%	18%	-10%
32	Unit cost of product	Rs. 8.22 per Kg	Rs. 7.73 per Kg	-6%
33	Defect rate	12%	8.75%	-27%
34	Yield	80%(Avg)	75% (avg)	+5%
35	Customer rejects	2.1%	1.7%	-0.4%
36	Throughput	Not Disclosed	+8.5%	+8.5%
37	Overall Equipment Efficiency	67.40%	76.30%	+8.90%
38	Capacity utilization	40%	80%	40%
39	Downtime in Proportion to Operating Time	28% (Average)	22 % (Average)	6%
40	Scrap as a percentage of Raw material	15%	11%	4%
41	Number of employee training hours	None	8 hrs/month	8 hrs
42	Ratio of skilled employees to total employees	1:3	2:4	+17%
43	Market share	Not Available	Not Available	None
44	Growth in Sales	Not Applicable	15% (Approx)	15%
45	Percentage of sales from new products	Not Applicable	Not Applicable	None
46	Percentage of sales from new customers	Not Applicable	23%	+23%
47	Raw material substitutes	Not Applicable	15%	+15%
48	Number of employee suggestions	None	3 per month	3 Fold
49	Vendor development	Not Applicable	Not Applicable	None
50	Cycle time	11 hrs (approx)	10 hrs (Approx)	-9%

Conclusion:

Summarizing, the transformation methodology provides a set of tools and techniques for small enterprises to reach a desired state from its current state. The methodology was developed to help small enterprises to improve their product quality as well as service quality and prevent them from becoming Non Performing Assets. The methodology tries to make changes and improvements in the four major components of small enterprises namely, people process, technology and resources through the use of various tools and techniques in such a manner that it is implemented at a low cost. The methodology was implemented in a small enterprise mentioned above and this helped the enterprise to overcome many hurdles and improve significantly.

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