# Sun Mountain Products

## A Value Chain Case Study

Nirmala David
Matt Rollings
Robert Pufky

# Table of Contents

Table of Contents ..... 0

Executive Summary ..... 2

Key Terms & Definitions ..... 3
- Value Chain Analysis ..... 3
- Value Added Activity ..... 3
- Non-Value-Added Activity ..... 3
- Total Quality Management (TQM) ..... 4
- Cycle Time ..... 4
- Batch Processing System (Push System) ..... 4
- Continuous Process System (Pull System) ..... 4
- Just-In-Time (JIT) ..... 5
- Manufacturing Cycle Efficiency ..... 5

Process Goals ..... 6

Revised Process Explanation ..... 7

Activity Log ..... 10

References ..... 11

Appendix 1: Changing Wood Suppliers ..... 12

Appendix 2: Total Quality Management (JIT) Implementation ..... 12

Appendix 3: Redesigning Floor Plan ..... 13

Appendix 4: Projected Five Year Savings ..... 13

## Executive Summary

Sun Mountain Products (SMP) manufactures their exclusive line of wooden office furniture exemplifying superior craftsmanship using the highest grade wood. SMP is currently focused on improving the throughput quantity and speed of production rather than focusing on the customer's perspective and reducing rework costs. By analyzing this company with a value chain analysis and discovering where the non-value added costs were coming from, the business could maximize profits.

SMP decided that any process which it could eliminate without sacrificing quality would be removed from their business processes. Some non value added steps would remain in their business process due to fundamental inventorying reasons, and to reduce lag times between departments.

Implementing the suggested changes, such as: Just in time (JIT), optimizing the factory floor and changing wood suppliers, it was determined that the company would be able to save $145,060.60 a year, and a total of $725,302.98 in five years. Monthly net income rose by $4,317.76, increasing yearly profits by $51,813.12 and five year profits $259,065.60. By using the value chain analysis, and optimize value added time, production time was reduced, costs were saved, and overall efficiency increased. The overall MCE was improved from 60% to 82.57%.

## Key Terms & Definitions

*Value Chain Analysis*

A value chain analysis is the study and examination of activities and resources needed to create and deliver products or services to the customer. Results of this analysis ordinarily contribute to identifying deficiencies that occur within the value chain and provides opportunities for improving these areas.

*Value Added Activity*

Value added activities are activities of a product or service that are perceived as appealing or desirable from the customer's perspective. Theses activities serve as the primary reasons customers are drawn to certain products or services provided by a company versus its competitors. An activity adds value, if the customer is will to pay for the activity and the activity is performed correctly the first time. A few examples of value added activities may include high quality reliable products, timely and efficient delivery system, or helpful and knowledgeable sales staff.

*Non-Value-Added Activity*

Non-value activities do not improve the overall output for the customer and consumes resources to which customer find it undesirable to pay for the product or service. These activities provide the business process no competitive advantage because fails to perform cheap or better than its competitors. Non-value added activities should be targeted when making business process improvements. Having large amounts of raw materials, work in process, or finished goods inventory.

*Total Quality Management (TQM)*

Total quality management is a philosophy that involves the continual effort of everyone in an organization towards improving quality and achieving high customer satisfaction. The TQM approach involved (1) efforts towards finding out what customers want, (2) designing products or services that adhere to those wants, (3) designing processes that allow the job to be done right the first time, (4) keeping tack of results and using them as a guideline towards improving the system, and (5) finally extending these concepts to a companies suppliers and distributors.

*Cycle Time*

Cycle time is the maximum time permitted at a given workstation or department to complete its set of activities on a single unit. This time establishes the output rate of a line. In essence, cycle time is the total elapsed time to move a single unit of work from the beginning to the end of a physical process.

*Batch Processing System (Push System)*

A batch processing system, or a push system, is when work is pushed to the next station as it is completed. In other words, this system involves the push of products or services onto customer despite the demand for that particular product or demand. Work moves on as it is completed, without regard to the next station's readiness for the work.

*Continuous Process System (Pull System)*

A continuous process system, or a pull system, is when a workstation pulls output from the preceding station as it is needed. In other words, this system produces products and service based on the customer's request or demand for that particular

product or service. Work moves on in response to demand from the next stage in the process.

*Just-In-Time (JIT)*

A highly coordinated system where goods are produced and services are performed, just as they are needed. Materials are moved through the system, and services are delivered with precise timing so that they are delivered as they are demanded. JIT is also commonly associated to lean production, which normally refers to a highly coordinated, repetitive manufacturing or service system designed to produce a high volume of output with fewer resources and also accommodates variability in product output.

*Manufacturing Cycle Efficiency*

Manufacturing cycle efficiency by measuring the time spent in value-added time as a percentage of total cycle time. Manufacturing efficiency is measured in terms of a ratio of value-added time to cycle time. This ratio also provides the percentage of the time spent in non-value-added activities. These time measurements are critical for scheduling production activities in an attempt to prevent bottlenecks and ensure jobs completion JIT.

## Process Goals

Currently SMP manufactures high quality furniture, at a premium price. The future of the business will be determined by how well it can reengineer its business processes. In this case study a value chain analysis will allow SMP to identify the set of activities and resources needed to create and deliver the end product that customers want. SMP is focused on customer quality and will not sacrifice it to achieve lower costs.

SMPs process goals are to remove all unnecessary non-value added steps (as perceived by the customer). These quality driven needs and expectations will allow SMP to cater to a wider range of customers, increasing their customer base, while simultaneously reducing costs involved in waste, production and storage of products by producing only the items that customers want. In short, the customer wants the end product to be inexpensive, high quality, and from a business that does not have added costs in obtaining the quality that they, the customer, desire.

## Revised Process Explanation

To revise the manufacturing process in this company, a very simple and effective methodology was used. The value chain was broken down into specific steps, standard times and costs were calculated and setup in excel (Costs sheet), and formulas setup for automatic calculations of numbers. This provided an ample basis for analyzing each possible change that could occur and the affects that each would have on time and cost savings. Special considerations were taken for implementations that required a yearly or one time fee. These costs were incorporated financial calculations, giving a complete picture of what was actually happening with the company.

The main numbers considered in determining whether a production change choice was good or not were: Total time, cost per unit, Total value added time, and manufacturing efficiency. If the change incurred a yearly or one-time fee, the cost savings were analyzed for 1 and 5 year projections. Changes were selected if the numbers were improved, or a cost savings was apparent at 1 or 5 years. Improvements were considered and implemented in the order they appeared in the case study.

The first improvement considered was changing suppliers to ones that could deliver wood more frequently, in smaller shipments, and of higher quality. The existing process accepted an unusable 8% RM per shipment. This 8% of unusable wood, when spread out across an order for 20 units, would result in $1851.85 of usable wood for one order, or a $148.15 capital loss. When comparing this to the price of ordering the same amount of high quality wood ($1851.85 for comparison), the cost for the *same* amount of usable wood was $1962.96. Comparing the amount spent for the same amount of usable wood, using the higher quality wood not only resulted in a cost savings of

$37.04, but also allowed for the removal of inspecting the receiving wood shipment for quality, an additional $90.00 in savings. The overall wood savings when including the 7% JIT RM savings is $174.45 per 20 units. When this is drawn out for the entire year using average order quantity a year, a savings of $18,840.30 on raw materials and $9720.00 in inspection costs. This step also reduced the amount of raw material inventory needed to be kept on-hand, producing a savings of $32,250. With all of the benefits realized with this step alone, a decision to switch suppliers was made. **Calculations are shown in appendix 1.**

Changing the company from speed and production culture to a total quality management culture was the next improvement to consider. Although this improvement had a steep $20,000.00 a year implementation cost, a 7% decrease in total direct material cost (discussed earlier), along with a 10% increase in labor/time costs; which makes this look unprofitable at first glance, a deeper analysis reveals massive savings. Changing the culture and empowering the employees with the ability to correct problems as they happen, resulted in the elimination of nonessential quality control inspections being eliminated. These changes provide $121,289.10 in calculated total savings, $101,289.10 in savings after accounting for the $20,000.00 required each year. This change was also implemented in the factory. **Calculations are shown in appendix 2.**

Finally, re-arranging the production floor to accommodate a continuous flow environment was considered. This had a one time cost of $30,000, and would last for five years. By rearranging the floor space, movement between the departments in that area would be reduced, and movement to and from the warehouse would be minimized.

When calculated, this change produces a savings of $23,460.00 over five years, these calculations do not factor in savings on direct materials cost, which are calculated in overall materials cost on pages 7 and 8. The savings, although not as strong as previous improvements, is still large enough to dictate implementation. This change was solely implemented in the factory. **Calculations shown in appendix 3.**

Non-value added processes still remain within the process however, even after all of the improvements. These processes still need to be in place for small buffers to exist to compensate for the different production times at each area. This precipitates a continuous flow environment, and reduces the chance of work going through the factory in bubbles.

Considering all of the aforementioned factors and changes, a yearly savings is estimated to be $93,817.90, not including the $32,250 in inventory savings from JIT implementation. This savings in inventory increases working capital, and also improves financial numbers. Projecting five years, a total savings of $469,089.49 is possible, again not including the inventory savings of $161,250.00. A MCE of 82.57% could be achieved also from the dismal 60% before process reengineering. These numbers would indicate that actual implementation of these steps should be done. **Calculations shown in appendix 4.**

## Activity Log

| **Case Study 3** | **Group Member Names** | **Group Member's Responsibilities** |
|---|---|---|
| | | |
| | 1.Nirmala David | All questions |
| | 2.Robert Pufky | All questions |
| | 3. Matt Rollings | All questions |
| | | |
| | | |
| **Meeting Dates, MM/DD/YY** | **Meeting Type and Time Spent on Meeting: P = Physical, O = Online, T = Phone, E = E-mail** | **Group Members Participating in Meeting** |
| 2/12/05 | Physical – 15 minutes | Nirmala, Matt, Robert |
| 2/13/05 | Online – 20 minutes | Nirmala, Matt, Robert |
| 2/15/05 | Physical – 4 hours | Nirmala, Matt, Robert |
| 2/16/05 | Physical – 1 hour | Nirmala, Matt, Robert |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

## References

"Executive Office Furniture, Office desk, Office furniture desk, Reception desk and Executive desk" 247Workspace.com. 15 Feb. 2005 <http://www.247workspace.com/html/desks_tables.html#MahoganyVeneer>

## Appendix 1: Changing Wood Suppliers

| Process* | Cost |
|---|---|
| Existing wood order cost for a batch of 20 | $2,000.00 |
| Unusable (wasted) wood from order (8%)** | -$148.15 |
| Useable wood contained within batch** | $1,851.85 |
| | |
| Cost for equivalent amount of high quality shipment (1851.85) (6% higher) | $1,962.96 |
| 7% savings from JIT manufacturing | $1,825.55 |
| Total savings for a batch of 20 | $174.45 |
| Total savings for 1 year (2160 units a year) | **$18,840.30** |
| | |
| Savings by removing inspection step ($90 per batch of 20) | **$9,720.00** |
| | |
| Savings by reducing holding inventory | |
| Typical Annual Holding Cost | $43,000.00 |
| 75% Savings by reducing holding inventory from 4 weeks to 1 week | **$32,250.00** |
| Total holding costs for raw materials | $10,750.00 |

*All values shown in dollars

**found using the formula: x + .08x = 2000

## Appendix 2: Total Quality Management (JIT) Implementation

| Process* | Quantity | Cost |
|---|---|---|
| Total yearly savings in wood (higher quality wood - 7% decrease in cost from JIT) | | $18,840.30 |
| | | |
| Current production cost per unit | | $226.13 |
| production cost per unit after JIT implementation | | $178.70 |
| Total savings per unit | | $47.43 |
| Total number of products sold per year | 2160 | |
| | | |
| Total savings from JIT per year | | $121,289.10 |
| Overhead costs per year to implement JIT | | $20,000.00 |
| Adjusted total savings from JIT per year | | **$101,289.10** |

*calculated after implementing wood process change, but before any other changes

## Appendix 3: Redesigning Floor Plan

| Process* | Quantity | Cost |
|---|---|---|
| Cost per unit before implementing | | $193.02 |
| Cost per unit after implementing | | $178.70 |
| Total savings for implementation | | $14.32 |
| Total number of products purchased annually (180 per month) | 2160 | |
| Yearly savings for reduced handling costs (excluding Wa-Wo, P-Wa) | | $30,931.20 |
| Five year savings | | $154,656.00 |
| cost of implementation | | $30,000.00 |
| Adjusted five year savings for implementation | | **$124,656.00** |

## Appendix 4: Projected Five Year Savings

| Item | 1 Year Savings | 5 Year Savings |
|---|---|---|
| Changing Wood Suppliers | $18,840.30 | $94,201.49 |
| TQM / JIT Implementation | $101,289.10 | $506,445.49 |
| Redesigning Floor Plan | $24,931.20 | $124,656.00 |
| Total Savings | **$145,060.60** | **$725,302.98** |
| Inventory Reduction | $32,250.00 | $161,250.00 |
| Yearly Net Income | $51,813.12 | $259,065.60 |