QUICK RESPONSE MANUFACTURING

"QRM allows manufacturers to gain market share and increase profitability by developing maximum flexibility and response in manufacturing to adjust quickly to changes in customer demand. By eliminating the rigidity and overhead associated with schedule-driven manufacturing, QRM companies benefit from dramatically reduced working capital, improved quality and more flexible employees."

"The tools of Quick Response Manufacturing provide an incredible advantage because companies can control the supply, manufacturing and distribution pipelines, based upon actual demand rather than forecasting guesses. This creates a dynamic opportunity for management to strategically attack competition and increase market share, profitability and cash on-hand."

- *Joseph Turnbull*

Introduction

The Japanese as far back as the 1950's, implementing a successful model into the Toyota Plant in Japan, developed quick Response Manufacturing (QRM). The development of this concept since then has been in response to the changing nature of demand, the increased state of technology, and most importantly, the competitive pressure from the Japanese. Listed below are eight areas of manufacturing that the Japanese have excelled at in the past several decades:

1. Simpler inventory control methods
2. Shorter production lines
3. Equipment with lower set-up costs
4. Less inventory
5. Workers are able to perform multiple tasks
6. Workers' hours are more according to employer's discretion
7. Less floor space
8. Fewer defects

Due to this overseas threat, the Western Powers felt a great deal of pressure to maintain and hopefully increase their domestic manufacturing capabilities.

Quick Response Manufacturing was developed to give companies a competitive advantage by increasing their operating efficiency.

By providing stable growth and stronger profitability, QRM should encourage new domestic manufacturing sites and strengthen the manufacturing position of the West.

What is Quick Response Manufacturing?

QRM is difficult to define due to its "holistic" nature but requires the firm to move from the perspective of a traditional batch manufacturer to a "flow" manufacturer. This "flow" manufacturing entity would produce only when triggered by consumer demand (pull system), not based on complex demand forecasts. By operating in this fashion, the firm is hedged from fluctuations in the economy and ever-changing market demands, which can cause excess inventory or stockouts, both detrimental to the market position of the company. Quick Response Manufacturing actually encompasses several concepts such as Total Quality Management (TQM); Time to Market, Activity Based Costing, and Cellular Manufacturing but its main stratagem is to *increase the overall flexibility and responsiveness of the firm*. For example, by manufacturing in cells, the production teams can be dedicated to specific product lines. These teams can be quickly and efficiently re-allocated if the product mix should change. Therefore, the firm has increased production flexibility and will be better equipped to meet the changing market demands. This is a more efficient arrangement than mass production systems that are designed to take advantage of the economies of scale by producing large batches, which encourages stockpiling.

In the ideal QRM situation, a manufacturing company would begin production as soon as an order is initiated, suppliers would deliver raw materials directly to the production line, the product would be manufactured and the finished goods would flow directly to a waiting truck. Firms have tried to move towards this concept but have encountered high operating costs and the inability to meet consumer demand in a timely fashion. Problems such as increased set-up times; stockouts, lower quality and inefficient production scheduling have prevented manufacturers from attaining this "optimal" way of running a business. QRM is designed to help manufacturers move towards this goal by taking a unique approach. The primary concept of Quick Response Manufacturing is to pull raw materials through the production process strictly according to the market demands. Under the QRM philosophy, every part and order moves at maximum pace throughout the entire supply chain. Therefore, QRM should not be viewed as a manufacturing strategy but as a *complete business enabler.*

QRM Focuses on Working Capital

QRM is designed to make production systems more flexible and responsive to consumer demand utilising concepts such as Just-In-Time and Cellular Manufacturing.

Therefore, both inventory and working capital decreases which frees up valuable resources and capital. Traditional "batch" manufacturers develop complex long-term forecasts and manufacture based on these estimates. This creates large inventories, inefficient use of capital and higher business risk due to obsolescence and shrinkage. By producing in a just-in-time fashion, forecasts are scrapped and companies make to order.

The current challenge for companies is to become flexible and efficient in adapting to the changing consumer demand. In an era where capital investment is necessary to expand and capture global markets, this newly developed discipline represents an appealing, powerful tool.

Benefits of Quick Response Manufacturing

1. Lower working capital - Since raw material and finished goods inventory is minimised, working capital is decreased. This places the firm in a better strategic position to utilise their resources and capital.

2. Better position to increase market share - The increased responsiveness will hopefully attract new clients and allow the firm to capture a larger percentage of the market.

3. Increased inventory turns - Since the production system is triggered by demand, smaller batches are produced, inventory decreases, and the number of inventory turns increases. Many inefficient manufacturers currently have large amounts of capital tied up in inventory; therefore, their inventory turns are low.

4. Reducing the cost of quality by minimising rework - Cellular manufacturing places more responsibility and accountability on specific production teams which inherently increases the quality of the product. It is much easier to pinpoint defects since the problems are directly traceable to certain teams or members. This has a positive impact on the quality of products.

Issues of Quick Response Manufacturing

1. Increased reliance on suppliers - QRM requires a solid relationship with one's raw material suppliers. To react to demand, a manufacturing firm must closely partner with suppliers that will quickly accommodate the firm's production schedule. However, if the supplier cannot provide raw materials due to problems such as quality assurance/control, equipment repair or union labour, the manufacturing firm may not be able to meet customer requirements. This could result in stockouts and backorders.

2. Large variations in demand - If a manufacturing company competes in a market that has large fluctuations in demand, QRM may not be the most appropriate business enabler. For example, if a company competes in a cyclical market and receives a few large surges in demand each year, the company may not be able to react to the high production volume in a timely fashion. Therefore, it may be necessary to carry some inventory. An example of this type of demand occurs in the recreational marine industry.

3. Change Management - It can be very difficult to implement QRM in a manufacturing environment. QRM is a business enabling philosophy that pushes authority down to lower levels and therefore, changes the roles and responsibilities of the employees. "Traditional" roles, from lower levels through upper management, are drastically modified and the corporate infrastructure is typically altered. Employees can be extremely apathetic to these changes, which is a barrier that could significantly hinder the implementation process and the success of QRM.

To implement QRM, companies must have representation from all disciplines including production, planning, purchasing, engineering, manufacturing, quality, finance and human resources to facilitate the implementation. All functional areas need to buy-in to QRM to successfully implement such a major change in the way the firm does business.

Case Study: American Standard

American Standard is a $3.8 billion transnational company that competes in the air conditioning, plumbing and brake industries. In 1988, the company became the target of a take-over bid by Black & Decker, provoking a management led leveraged buyout for $3.2 billion. After the buyout, the executive managers at American Standard felt that their strategic long-term goal was to expand globally and establish new plants to serve their local markets. This decision was based on the rapid expansion of emerging markets, the decrease in transportation costs, the advancements in telecommunications, and the decrease in trade barriers. However, American Standard had astronomical debt, which severely constrained their ability to invest overseas.

The President and CEO, Mr. Emmanuel A. Kampouris, decided that Quick Response Manufacturing was the approach for the firm to increase efficiency; lower operating costs, and decreases working capital. This would allow American Standard to free up cash, pay back debt and invest in the emerging global markets.

Highlights of the American Standard Implementation

1. Rearranged the plant - Kanban, a production flow concept, was instituted to help control the flow of raw material and work in process on an as-needed basis. The manufacturing lines were rearranged in cells and permanent production teams were

formed to increase efficiency and accountability. Workers were trained to perform tasks adjacent to them on both the upstream and downstream sides. Therefore, when a team was short staffed, the team would still have the skills to manufacture product. These modifications immediately showed improvements in cycle time, rework, inventory space and quality.

2. Capital investment - To implement QRM, the initial investments must be devoted to worker training and the rearrangement of the production machinery. Once these gains were realised, new opportunities were found in the production system through complementary equipment and continuous improvement initiatives, which increased productivity, quality or other performance metrics.

3. Organisation and job assignments - Since the roles and responsibilities of the worker have been expanded, the traditional roles of foreman and plant operative began to overlap. The organisational structure and compensation scheme were modified to reflect this new business approach. Managers and employees not willing to embrace the concept were encouraged to leave the firm. Also, many administrative jobs were eliminated due to simplified procedures and automation.

Results of the American Standard Implementation

Since the implementation of QRM, American Standard has strengthened their core businesses and divested the areas that did not fit with their core competencies. Within the first several years, American Standard accomplished the following milestones:

1. Reduced working capital to $525 million and used $200 million to pay down debt and capital investments

2. Sales rose 44% while the workforce decreased 21%

3. Inventory turns rose from 6 to 38 and inventory decreased by 50%

4. Product life cycle time decreased by 90%

5. Rework of defective products declined by 70%

6. Working space has halved and labour productivity increased 20%

7. Working capital as a percentage of sales has declined from 16.5% to 8%

American Standard is a tremendous example of Quick Response Manufacturing because it illustrates how a troubled company managed to become a market leader, primarily through the implementation of this concept.

Companies Promoting Quick Response Manufacturing

Seagate Inc in Singapore and San Francisco.	British Aerospace at Filton (UK)
Marconi Communications (Italy)	Roxspur Plc.
Cummins Diesel Engines (UK)	General Electric
Toyota	Ford

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