

The impact of product life cycle on supply strategy for very short life cycle products

Rajesh Songar¹, Dheeraj Mandliya², Kamal Ojha³, Soham Munjal⁴

¹Vindhya Institute of Technology, Indore (M.P.),

^{2,3}Indore Institute of Science & Technology, Indore (M.P.)

⁴Shri Aurobindo Institute of Technology, Indore(M.P.)

Email id. : dheerajmandliya96@gmail.com

ABSTRACT

The progress of industrialization, development of new techniques and to compete at national & international levels supply chain must be engineered to match product characteristics & customer requirements. As products proceed through their life cycles these requirements dramatically change & it is different for different life cycles products such as for seasonal products it will be different & for non-seasonal product it will be different. Consequently supply chain strategies must be dynamically matched so as to maximize competitiveness. This demonstrates how an cracker manufacturing company reengineered its supply chain to accommodate the impact of product life cycles. The main reason for their success is to classify products & develop appropriate supply chain strategies. The classification system used enables generic modeling of the methodology & it is applicable only for only those products whose life cycle ranges in between 3 & 6 months only.

Introduction

As everybody knows that to compete in a market some strategies are required. For an industry to success the strategies are required at the right time, so that the firm get more & more advantages. Very short life cycle products such as fashion & seasonal products have life cycle ranging between 3 & 6 months & these products exhibit high demand uncertainty before their launch. In the past firm that procured & sold such products to the customers or retails usually order the entire quantity will before the selling season due to the demand uncertainty ,the short lifespan & quick obsolescence of the products ,the difficulties in repeated negotiations , & procurement & the long procurement lead time. Depending upon

how the product performed vis a vis the original forecast the firm use to mismatch cost due to either short supply or surplus supply. Since the last decade these firm may be using quick response strategies, to reduce the mismatch cost for such products.

We start by outlining the literature review to present the paper. This includes the difficulties encountered in conducting a research in the present fast changing environment. This is followed by a description given by different research in this field. The present situation is worsened because industry in under intense pressure not only to changes products & processes, but to do so with increasing frequency. Hence there is inevitable tendency for the

companies to embark not just on one improvement programmed at a time, but on a judgmental basis to execute a series of sequential & or overlapping programs. For research investigators this muddies the water still, further, not least because each program take many months to bring a satisfactory conclusion. Yet if industry is to obtain the full benefit of the methodological change, result has to be interpreted in a generic form & related to an appropriate infrastructure.

After then we will continue with a review of the need to engineer supply chain to match customer requirement. Emphasis is given to the supply chain strategies, so as to maximize competitiveness. This is followed by a case study of a season product like Cracker Company, how the supply chain strategies changes during its life cycle. Finally a generic model is given.

Literature Review

Analogous to the life cycle of living organisms the product life cycle is a descriptive framework that classifies the evolution of product market into four stylized stages. Introduction, growth, maturity & decline (Levit 1965, moon 2005, Rink & Swan 1979). During the introduction stages there are few competitors in the market. This provides innovators with an opportunity to use a price skimming strategy as they seek to recoup their product development costs & promote awareness of the new product. In the subsequent growth stage overall market sales increases dramatically attracting many new entrants into the market. Advertising during the second stage is geared towards promoting specific brands rather than

generating product awareness. Sales growth begins to taper off as the market enters to the maturity stage. Eventually market saturation leads to price wars & intense competition among firm for market share. The decline stage of the PLC is entered when overall market sales begin to fall. During this final stage products are withdrawn from the market & firm reduce their market expenditure to cut costs.

There is a long history of contributions linking product type in general, & the product life cycle specifically with operations, supply or demand chain management. A common thread of there work is that appear to suggest that product classification, like the life cycle, are suited to bringing market dimension into management.

Hayes & Wheelright in 1979 emphasized first that from manufacturing, the need to link operation process with products in the life cycle. they suggested that there is an optimum manufacturing process for each stage in the product life cycle, & proposed a two dimensional matrix with products & process life cycles. In 1996 Lampel & Mintzberg propose strategies of customization & standardization throughout the operating process of manufacturing the products, as well as the associated transaction by which come to an agreement with sellers. In 1997 Fisher suggested a match between responsive supply chain & innovative products & efficient supply chain & finished products. His work was also the first to locate the root cause of the problems playing many supplies at the time in a mismatch between the product & type of supply chain. In 1998 Shewchuck

philosophy states that “one sight does not fit all” & the product related classification as a means of differentiating supply chain was further refined & extended. In 1998 Pagh & Cooper suggested different supply chain strategies based on product life cycle, product design characteristics & product range

In 2000 Lamming Johnsen Zheng, & Harland suggested that difference in supply network can be trace down to difference in products degree of innovation, uniqueness & complexity. In 2000 Childerhouse apply the product classification system with five parameter they are duration of life cycle, time window for delivery, volume, variety & variability to the demand chain management approach of their case company in Cracker Company. Interestingly, the product life cycle appears to be best suited to explain the five different strategies identified.

In 2008 Rahul Patil , Balram Avitather, J & Shah, they developed a mathematical model to calculate the procurement, transportation & mark down plans for new short life cycle product taking into consideration the discount associated with large purchase & bulk transport. They have studied supply chain strategies based on recourse model for very short life cycle products.

Till now we read different papers on short product life cycle but still there is some gap. To fulfill this gap we have conducted a research in cracker manufacturing company & we have used different strategies on different stages of short PLC in cracker company.

If we summaries the life cycle of a product seems to be a wide spread dimension used to ensure the customer focus within operation, supply & demand chain management. Furthermore, it is used as a classification variable for different supply & demand chain strategies proposed in the literature.

Case study of a cracker company

Here is a case study of a cracker company. The demand of cracker manufacturing company is zero in rainy season. (ie in the month of June, July, August, September) .The demand will increase from Dashhara & it will go increasing up to Deepawali . The demand of cracker is maximum on the day of Deepawali. After Deepawali the demand goes on decreasing up to Chotti Deepawali but it is not zero. The demand is still remain in the market due to marriages. The demand of cracker increases in the summer & the graph moves slightly upwards & then it goes down & it reaches to zero in the end of May. The graph between demand & time is as shown for a cracker manufacturing company.

Data collection

The data of a cracker manufacturing company is given below. This is the data of the year July 2010 –June 2011. We see that in the month of July there is no income of cracker company. The income for the month of July and August is shown zero. In this duration the storage of manufacturing product is done so that the requirement of the customer is fulfill. In the month of

S. No.	Months	Sales in Rs (lakes)
1	July	0.0
2	August	0.0
3	September	0.22
4	October	2.1
5	November	5.7
6	December	1.2
7	January	1.15
8	February	1.12
9	March	1.1
10	April	1.0
11	May	1.0
12	June	0.0

September there is very little income of twenty two thousands only. After then in the month of October there is an earning of 2.1 lakes because at time of dashhara there is large selling. There after in the month of November there is very large selling of cracker due to the festival Deepawali. In the month of December curve of selling comes down but it is not zero due to marriages & election & the income is only of 1.2 lakes. In the month of January the total selling is of 1.15 lakes. There is still some income in the month of February, March, April & May which are given as 1.12, 1.1, 1.0, & 1.0 lakes which cannot be neglected & this is through marriages & many other activity which are celebrated in the society. It is seen from the table that sales in June July August

the plants stops due to rainy season. In the months of October & November the plants sales is maximum but the plant is in still profit.

To fulfill the demand during the time of Deepawali inventory plays important role. Inventory not only separate processes but also reduces risk of production shortages. For example, manufacturing firms frequently produces goods with hundred or even thousands of components. If any of these components are not available on time, the entire production system can be halted. This would be a heavy loss to the firm. To avoid starting a production run & then discovering the shortage of a vital raw material or other components, firm maintain inventories. The inventory of material (cracker) is kept up to September, so up to the end of September there is introductory stage. Then at the end of September the demand goes on increasing up to the mid of the October till 20 October. This is the growth stage of the cracker manufacturing company. During the week of Deepawali & before 5 to 10 days the demand increases to a maximum value. This is the maturity stage of the cycle. After that the demands goes on down but it does not touch the line of zero. Due the marriages & the other activity of happiness the demand of cracker still remaining the market. Growth & maturity stage are very short. During the introduction stage of the product life cycle inventory plays an important role. The cost of the product is kept low compare to the other cracker company's product. Skim is also given with a product so that the customer may buy the product. So in introduction stage price skimming strategy is used. Once the product entered the market & it satisfies

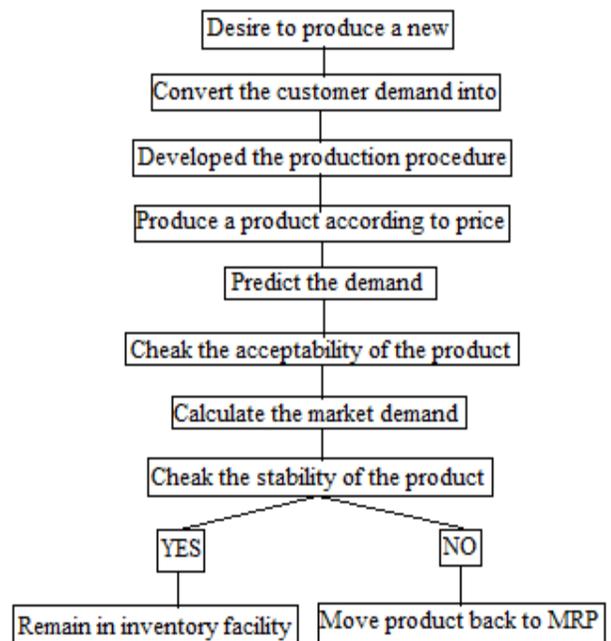
the customer it shows that the product is accepted in the market. Now the product is in position that it can grow in the market it means the demand of the product is increasing. This stage of a product is known as growth stage. At this time the demand of the product is unpredictable so, MRP strategy is used. Once the product has reached its maturity stage the demand of the product is more. To fulfill the requirement of this stage inventory plays an important role so the inventory strategy is used so that there is no scarcity of products. Finally as the demand of the product tails off & enters the decline stage of the product life cycle it is transferred back into the MRP supply chain

Matching of supply chain strategies

Once the customer is satisfied by the product the product is started manufacturing by the price acceptability of a product. This is considered as the birth stage of a product. Then the demand of the product is calculated. Now the stability of the product is checked. If the product is rejected then the life of a product is end. If not it is continued then the product is reached to the second stage of PLC which is known as growth stage. Now the product is reached to the MRP facility. If at this juncture the demand volume for the product is continuously appraised. When the sales increase significantly the product is moved to inventory facility, but if the demand drops off the product is moved back to MRP supply chain. Now the product has reached to stage of the PLC & the product moved to the inventory facility. But if consumer demand remains stable the product remains in

saturation stage if not it moves back to MRP facility. This is the last stage of the product i.e. decline stage. In the decline stage if once the aftermarket demand has reduced the product is not discontinued but instead it is moved back to the birth stage of PLC. Thus the product is still retained as a part of the portfolio if consumers require the product it is then manufactured & dispatched to the customer.

Flow diagram of supply chain strategy & stages of PLC



Explanation of flowchart

Flow diagram of supply chain strategy & stages of short product life cycle is as shown in figure. First of all a company has a desire to produce a new product. Then after the customer demand should be converted into specification. After this production procedure, production process should be developing to produce a prototype. After producing a prototype it should be launch to market. Having

launched to market the product should be checked. Whether the customer is satisfied by the product or not. If the product does not satisfy the customer then it should be go back to the conversion of customer demand into specification. If it satisfies the customer then it should be continued.

During the first stage of the product the price acceptability & price skimming strategies are used so that the product may move to the next stage of short product life cycle. After then try to predict the demand of the product in the market. After this try to check the acceptability of the product in the market. If the product is rejecting then the life cycle of the product is end. If the product is accepted then it moves to the second stage of the product which is known as growth stage of short product life cycle. In this material requirement planning strategy is used. Then after again the demand of the product is calculate. After this if the demand of the product is low MRP should be continue & volume of the product is review continuously. If the demand of the product is high it should be move to inventory facility which is considered as third stage of the product & is known as maturity stage. Now the stability of the product is check. If the product is stable then it should be remain in inventory facility. But if the product is not stable for a long time then it move to the MRP strategy. This is considered as decline stage of short PLC. So that the company should remain in profit.

Conclusion

In general there is no single supply chain strategy that is applicable to all

product types. Rather we have found that supply chain should be engineered to match customer requirements. It has been shown that each stage of a product life cycle has significant effect on strategy, especially in relation to supply chain management. As a product proceeds through its life cycle the demand characteristics change. There has to be a consequential requirement to change the supply strategy to maintain competitiveness. By monitoring a product as it proceeds through its product life it can be switched & matched to the most appropriate supply chain strategy for the next stage of its existence. In contrast most companies often specialize in just one or two of the life cycle stages which are most closely in line with their core competencies. If a company attempts to compete during all stages of product life cycle but does not have the appropriate mix of supply chain strategies the company will suffer for various reasons.

The cracker manufacturing company analyzed herein has provided compelling evidence of the need to match supply chain strategy with stage of product life cycle. Furthermore the case study has provided methodology for achieving this goal. The cracker manufacturing has shown that how the supply chain strategy is useful with the stage of short PLC. Furthermore the case study has provided a methodology for achieving this aim. In the previous year the profit of the company was only 20%. But in the current year the profit of the company is increased up to 35%. It means that the profit of the company is increase 20%. This is only possible through the strategy used during the different stages of the PLC. If we do not use the strategy the profit of the company remains 20% only. Most of the companies

are specializes only one or two stages of short PLC. But this company is specialize in all the stages of short PLC. In the month of June, July, August, & up to mid of the September the company sales is zero but the company is in still profit. Sales of the company is more in the month of October & November only as we have seen in table. If a company does not have appropriate strategies during different stages of PLC then it is very difficult to compete with the similar companies. They may have less profit & there are chances for the companies to outdated from the company.

References

- Fisher, M. 1997. What is the right supply chain for your product? Harvard business review 75, 105-116.
- Christopher, M, Towill D.,R. Developing market specific supply chain strategies. International Journal of logistic management 13 (1), 1-14.
- Childerhouse P., 2000. Engineering the supply chain management to match customer requirements. International Journal of logistics & Information Management 13(6), 337-345.
- Aitken, J, Childerhouse P, Towill D.R., 2001. The impact of product life cycle on supply chain strategy. International conference on production research, Prague 12 (5), 0118.
- Aitken J., Childerhouse,P., Towill, D.R. 2002.Understanding, implementing & exploiting agility & leanness. International journal of logistics: research & applications 5(3), 59-74.
- Kotler,P.,2006. Marketing management 12th edition
- Shewchuck., P 1998. Agile manufacturing: One size does not fit all. Proceeding of International Conference on manufacturing value chains Troon pp. 143-150.
- Pagh, J.D., Cooper, M.L., 1998. Supply chain postponement and speculation strategy: how to choose the right strategy. Journal of business Logistics 19 (2), 13-33.
- Lampel, J., Mintzberg, H.,1996. Customizing customization. Sloan Management Review, Fall, 21-30.
- Hayes, R.H., Wheelwright, S.C., 1979. Link manufacturing process and product life cycle. Harvard Business Review, January /February, 133-140.
- Lamping, R., 1993. Beyond Partnership: Strategies for Innovation and Lean supply chain. Prentice-hall, London.