

POSITIONING OF DECOUPLING POINT IN THE VALUE CHAIN OF INDIAN SME FOUNDRIES

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Abstract— there are different models in which an organization can operate, they can operate as Made to order, Made to stock, assembled to order, engineer to order or in a mass customized manner but how they work determines their profit margin at the end. In this competitive condition a firm cannot operate as complete Made to stock because customer satisfaction is their key priority neither as Made to order because being economical in operation is also very important so till a particular point an organization can operate same for all products and after a particular point customization can be done. So the point where the operation changes according to customer specification is called as decoupling point. The positioning of decoupling point for an organization which operates as both Made to order and Made to stock would be studied in this paper with the help of two firms which are medium scale foundries and from them the consequences of locating the decoupling point at various places of the supply chain would be understood.

Keywords—*made to order(MTO), made to stock(MTS), assembled to order, mass customized,engineered to order.*

I. INTRODUCTION

The competition among SMEs is very high and especially due to globalization it has increased, the firms have also started to focus more on customer satisfaction. Thus the concept of customization has gained more importance. In a cluster of firms which are all SMEs the need to operate efficiently as well as satisfy customers is very high. In order to do that the organizations does not prefer operating as a complete MTO or complete MTS. They are operating as a mass customized firm, made to assemble firm, made to engineer Etc. In this paper we are focusing on the different types of production planning. The production planning differs from each other based on the position of the decoupling point. The industry considered in this paper for the study is foundries. Foundries is an organization which has complex orders to be satisfied sometimes it has to work as made to order, sometimes as made to stock and vice versa so the research will be on analyzing the different decoupling points for foundries. The consequences of

positioning the decoupling point at different point will also discussed along with the advantage and disadvantage of using different production methods.

II. MOTIVATION FOR THE TOPIC

The topic was chosen realizing the difficulties of the SMEs in operating efficiently. In a particular locality when there is a pool of sellers everyone sells at the same price but the difference in the profit margin would be only because of their way of operation. In order to be more competitive a firm cannot be completely MTO or MTS and if they decide to operate in a combined manner then there are restrictions till when they can operate an MTO, till when they can operate as MTS. To understand this complexity this paper was written.

III. LITERATURE REVIEW

The literature review deals with an overview of the papers that talks about decoupling point and the different type of production systems that it leads to because of its positioning and the advantages and disadvantages of those production models. To start we will begin with the discussion about the decoupling point

A. *Decoupling point*

Customer order decoupling point is the point where there is customer interaction in the supply chain. It also helps in increasing the variety of the product that can be produced by the firm. It is gaining more attention because it can actually satisfy customer needs as well as there is the benefits of the standardization.[1]

Decoupling point defines the kind of operation an firm is performing, based on the positioning of this point there is lots of differences in the entire working methods. CODP can be placed upstream or downstream of the operations. When it is placed in the lower end of the downstream then the variety of outputs produced would be reduced. If the CODP is placed in the far end of the upstream then the customers are willing to wait and get the most customized product. The CODP should

be placed in such a way that the products should be delivered to the customers in the acceptable time. [2].

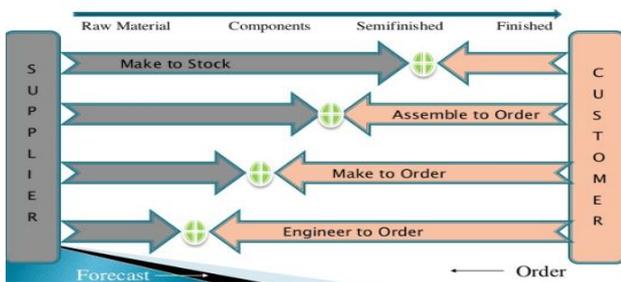
Above CODP

- The processes involved in the upstream of CODP is mostly forecast driven
- It is a form of “Push” where the work is done based on assumptions and forecast in the shop floor.

Below CODP

- Here all the activities are based on customer orders
- It is equivalent to “pull” flow.

POSITIONIN OF CODP



B. Different types of firms

MTO

The output of MTO system is highly customer specific with relatively high cost. Their major performance measure would be delivery time [4] MTO is focused on customization. In order to improve service quality and reduce cost MTO is usually preferred.[3]Though MTO is driven by customer orders, forecasting is done in MTO also where it is done in high level decision making where the capacity is planned and demand is met. The customer expectation from MTO industries would be low cost and minimum lead time. Pull or MTO is increasingly being used to minimize the cost and waste [5]

Before an organization chooses to taken an order as MTO it should address the following four questions[6]

1. Will the organization have the technical support for the order?
2. Does the organization has the production capacity for the given order
3. Will the organization be able to complete it on time?
4. What is the profit that can be obtained in this order?

MTO will lead to long response time and sometimes customer demands are uncertain and so MTO cannot satisfy all the customer demands.[3]Their operation issues would be the capacity planning, order acceptance, rejection decision and meeting the due date[4]

MTS

MTS takes advantage of economies of scale. It has low production cost and shorter lead time.[3]MTS production system offers less variety of products at a relatively cheaper price. Their operational focus would be on forecasting and satisfying the demand. Their operations are mostly focused on demand forecasting, inventory management and lot size determination.[4]MTS is driven by forecasts. Service quality can be improved along with the reduction in production cost for which the steel factories uses make to order method.[5] MTS works on demand forecast and inventory. According to MTS the process and products are predefined, whereas MTO works only on backorders and does not keep any inventory for finished goods. [6]

Combined MTO and MTS

Both MTO and MTS has its own advantage and disadvantage, MTO is better for meeting very particular requirements of customers and MTS is suited for reducing lead time. Combined MTO and MTS is the upcoming trend used to solve the difficulties of MTO and MTS. [3] An MTS works on demand forecast and inventory. According to MTS the process and products are predefined. Whereas MTO works only on backorders and does not keep any inventory for finished goods[5]Since the business world is becoming more of customer centric it is not profitable to focus on production alone. Globalization has led to more competition and the life cycles of the product has shortened with an increase in the market instability. So producing products in large quantities may lead to obsolesce due to continuous change in demand. The major decision in hybrid model would be categorizing which are the products to be stocked and which are the products that has to be produced under made to order. In certain industries the supply chain holds inventory at certain part and then makes according to customer order from a particular point. This push pull strategy or hybrid model is being adopted by many industries. Cost can be cut using combined MTO-MTS model [5]

The managerial operation of hybrid model that is combination of MTO and MTS is different from than that pure MTO or MTS [9]. The organizations which have a variety of products and high competition will go in for hybrid model. In hybrid model there is a point from which the operation of the organization is based on the orders instead of forecasting and it is called as decoupling point [10].

IV. RESEARCH QUESTION

From the above discussion we can understand that it is better for the SMEs to work as an combined model so in order to do that how can the positioning of the decoupling point be done, so in short the research question is - *How can the positioning*

of the decoupling point be for the firms that can operate as both MTS and MTO for the same product?

V. METHODOLOGY

The study is done with lots of readings from various journals which is supported by field visit where foundries were studied compared and analyzed. Two foundries were chosen and both the foundries were medium scale foundries which produce castings for automobiles, pumps textiles etc. In these foundries their production planning was studied. The data collected was qualitative data and reasoning for their mode of operation is studied along with the consequence of changing their mode of operation.

VI. INDUSTRY DESCRIPTION

TABLE 1

Description	Foundry1	Foundry2
Products	Automotive, valve, tractor, motor and pump, textile and general engineering.	Automotive, Aerospace, Textiles, Healthcare, White goods and other Engineering industries.
Units produced	<=2000/month	<=2000/Month
Production Method	MTO (under normal conditions)	MTO(under normal conditions)
Key Priority	Quality and on time delivery	Quality and on time delivery
Variety	Wide variety	Wide variety

The foundry 1 and 2 has wide range of products varying from textiles, pumps, automotive and other engineering industries. Normally they prefer working as made to order industry. The process of production begins only when the order is received. They have a common priority that is both the foundries would like to position themselves in the minds of the customers as a very reliable one with good quality. Their reason for operating as MTO is that each product demanded by the customers is unique and it needs customer description for producing the expected output.

Both the industries are interested in investing in new products and establishing a new product line. They are not into any one particular industry. They have their business shares in variety of industries. Their order processing starts once the order is received. So they generally work as MTO. Both the foundries charge premium pricing for their products because of their quality and variety.

VII. APPLICATION OF DECOUPLING POINT

In foundries customer involvement is very high. From the material of the product to the delivery of the product customer

involvement is everywhere. In the supply chain of the foundries there can be four levels of customer involvement [8]
 Design → Fabrication → Assembly → Distribution

The customer involvement is mandatory is the design stage because when the specification from the customers are right only the manufacturing process can be done effectively. So it is an important point of customer contact and it is also important for the foundries to have resources and facilities to guide customers in developing the design they require based on their need.

In fabrication the foundries use common raw materials for particular industry but when the customer demands for some other material they should be willing to do it according to their requirement, because customer satisfaction comes as priority in the competitive environment , also the relationship between the suppliers is also very strong generally in small scale industries.

Assembly depends on customer needs, it depends on the design the customer gives. The foundries should have facilities to cater to the customer needs and also support them whenever they need help in designing.

The distribution is normally taken by customers but sometimes orders are based on bidding so to win the bid the foundry should satisfy the customer demands and certain customer demands that the firm should support the distribution in that case to win the bid and to be more competitive it is better that companies have a logistic support .

Foundry 1

In foundry 1 there is point of contact in the designing stage, as they receive the graph of the product and then only start processing and assembling is also done according to the design. The fabrication is generally done without customer interference but still they will consider customer choice and it won't be a problem for them because they have strong customer relation. Distribution is also customer choice if need the foundries would provide, by default it is customer responsibility.

Foundry 2

In foundry 2 there are four stages in the product life cycle, Procurement, product life cycle management, distribution and logistics. Here during the procurement process there is no customer involvement, usually the raw materials are purchased and stored unless there is a special case, but in the other stages like designing, assembly and delivery there is customer involvement, similar to the other foundry

VIII. CONSEQUENCE OF APPLYING IT IN THE WRONG POINT

The customer order decoupling point should be there from the beginning till the end of the supply chain for a foundry to have more competitive advantage, but because of this it should not compensate on its value of on time delivery and good quality. The implication of customer order decoupling point have turned from being a competitive advantage to a mandatory quality which is expected to be present. So when a

customer approaches a foundry he knows its capacity and expects accordingly only but the most expected outcome from the foundries by the customers is good quality and on time delivery, because the output from the foundry would be a tier 2 product, so tier 2 product is required to produce the end product, when a tier 2 product is delayed then end product would be delayed and so the entire cycle would be delayed. Whenever they offer to customize at any point for the customers like a change in distribution or material change on the request of the customers they should check about these constrains.

IX. DEMAND PROFILE

TABLE 2

How is demand mix, demand variability and demand volume in both industries	There is a wide range of demand mix	There is a wide range of demand mix
Customer service and demand amplification	YES	YES
Stock availability	YES	YES
Order lead time	YES	YES
Delivery reliability	YES	YES
Product Standardization	NO	NO

There is a wide range of variation in the product demand as each industry they cater to has different set of requirements and those requirements has to be satisfied by them. In both the industry most of the production choices are made by the customer and when it comes to stock though they work as made to order they do stock semi-finished goods or the end products of a particular customer, at some point both the firms stock certain products and they cannot operate by pure JIT mechanism. The firms delivers the products in the feasible time but they make sure that there is no delays and there is also no on the spot delivery possible as the products are manufacture according to the design of the customer. There is high delivery reliability as there is no missing of deliveries which would reduce their trust with their customers and in the operation of SMEs trust is very important so delivery is very reliable and there is no common product or standardized product for the industry.

X. CROSS CASE ANALYSIS

The working of the first foundry is similar to the second foundry but it has long term customers and it is into many more industries than the second foundry.

Both the companies operate normally as a made to order. But the first operates as made to stock for their long term customers. For Example, if the foundry is supplying regularly to a company then they enter into an agreement for a year or for a quarter and so during those months they stock the product for that particular customers. The business is more customers centric and they have a strong bond build on trust with their customers. Both the foundries have their own customized ERP software and they don't rely too much on the software but it helps them a lot in scheduling. Since the small scale industries have a lot of negotiations and adjustments there cannot use very standardized software.

Comparison Of Foundries

TABLE 3

Volume-variety	High variety, Low volume	High variety, High volume
Distinct components	Yes	yes
Planning process	Both MTO and MTS	Both MTO and MTS
Order quantity	>2000	2000
Raw materials	Aluminium alloy	Grey and ductile iron

When it comes to the variety both the foundries has a huge variety of products among their competitors and are willing to invest in new streams also. The production process is neither pure a MTO or pure MTS they perform using combined made to order and made to stock. The first foundry is quite larger than the second foundry and their raw materials are also different.

In the second foundry there are series of steps involved for different types of customers and the customers can be classified as

- 1 .New customer
2. New product
3. Old customer
4. Old product

New customer new product

In phase 1 of new customer and new product an enquiry is first done from the customers then the information about the company details, specifications, product, volume, expected rate and days are analyzed. After this would be the feasibility finding where the core team consisting of technical and commercial team members will analyze the feasibility of production .The following step would be the cost calculation where the general manager, assistant general manager and sales person will discuss on it. Finally the offer and negotiation will take place

The phase 2 of the process would be issuing of purchase order and then contract will be revised after which tooling and methoding would take place. Then there would be sampling followed by departure of the sample and feedback. This phase will conclude with sample pilot test followed by bulk pilot test. In phase 3: Bulk production will be scheduled after the order acceptance and then production and delivery will happen.

For the other cases like old customers and old products there won't be phase 1 there would be only phase 2 and phase 3.

The first foundry also undergoes similar phases because it also deals with finding the feasibility and then continuing with the order acceptance. Both the foundries almost work as made to stock in the procurement and distribution phase.

XI. CONCLUSION

When we look at the operation of foundries they appear to operate only as MTO but on looking deeply they operate as combined MTO and MTS, this combination can be seen in different stages of their operation for example on procurement stage they operate as MTS. Though raw materials differ from industry to industry the customers of a particular industry demand product of the same raw material so in that case they store the raw materials, in distribution also they tend to operate as MTS, apart from this when they have to supply a particular customer for a long term they operate as made to stock so it depends on foundries when and where they operate as made to stock or made to order. To be more competitive the SMEs can operate with semi-finished goods and at the last stage of finishing the product they can customize it according to customer's demand, so they operate as a combination of made to stock and made to order, their decoupling points are in such a way that it satisfies customers' needs as well as it does not reduce their operating efficiency. In foundries that there is more customer intervention because from the design, fabrication and assembly everything is decided by the customers so that they get what is required. In long term relationship between customer and the firm the trust between them plays an important role because a firm can decide to work as made to stock for an industry if they believe their relationship is going to last long and there is going to be frequent orders from them. Thus customer order decoupling point is very important in SMEs especially in foundries and this point can be in various places of the supply chain as discussed above and based on this point the operating efficiency of the foundry is determined. The common location

of decoupling points is discussed but it may vary under special conditions.

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