

Operations Management: An Overview and Concept Development

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Abstract

Quality improvement is now recognized as essential as life for any organization's survival. New techniques are being developed to bring about an improvement in quality. These include: Continuous improvement, defect prevention, zero defects, statistical process control, reliability engineering, quality circles, and quality function deployment. The present paper seeks to unveil the mystery of operations management in simple terms. The focus of the paper is on developing conceptual framework based on review of the process. Operations Management comprises of product design, process selection, design of plants, plant location, facilities placement and quality control mechanism. A case study method is adopted for understanding of the same.

Keywords

Quality, Operations Management, Customer.

I. Introduction

Growing consciousness about quality among customers has driven the producers to adopt effective quality control techniques. The winners of tomorrow are those who pay attention to quality today. Quality assurance in all spheres of activities must start with quality consciousness within the organisation. To achieve customer satisfaction, the company has to respond rapidly to customer needs. This implies short product and service introduction cycles. These can be achieved with customer-driven and process-oriented product development because, of the resulting simplicity and efficiency greatly reduce the time involved. Efficiencies are realized from the elimination of non-value-adding effort such as re-design. The result is a dramatic improvement in the elapsed time from product concept to the shipment.

Production/operations management is the process, which combines and transforms various resources used in the production subsystem of the organization into value added product/services in a controlled manner as per the objectives of the organization. Therefore, it is that part of an organization, which is concerned with the transformation of a range of inputs into the required products/services having the desirable quality level. The set of interrelated management activities, which are involved in manufacturing certain products, is called as production management. If the same concept is extended to services management, then the corresponding set of management activities is called as operations management.

II. Evolution of Operations Management (OM)

For over two centuries, operations and production management has been recognised as an important factor in a country's economic growth. The traditional view of manufacturing management began in eighteenth century when Adam Smith recognised the economic benefits of specialisation of labour. He recommended breaking of jobs down into subtasks and recognises workers to specialised tasks in which they would become highly skilled and efficient. In the early twentieth century, F.W. Taylor implemented Smith's theories and developed scientific management. From then till

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Table 1 provides a bird's eye view of historical view of operations management over a period of time. Fig. 1 presents the constituents of Operations Management (OM) in a graphical manner.



Fig. 1: Operations Management

Operations and supply chains are intrinsically linked and no business organization could exist without both. A supply chain is the sequence of organizations—their facilities, functions, and activities—that are involved in producing and delivering a product or service.

Table 1: Historical Summary of Operations Management

| Date | Contributions | Authors |
|------|--|---------------------------------|
| 1776 | Specialization of labour in manufacturing | Adam Smith |
| 1799 | Interchangeable parts, cost accounting | Eli Whitney and others |
| 1832 | Division of labour by skill; assignment of jobs by skill; basics of time study | Charles Babbage |
| 1900 | Scientific management time study and work study developed | F.W. Taylor |
| 1900 | Motion study of jobs | Frank B. Gilbreth |
| 1915 | Economic lot sizes for inventory control | F.W. Harris |
| 1927 | Human relations; the Hawthorne studies | Elton Mayo |
| 1935 | Statistical sampling applied to quality control: inspection sampling plans | H.F. Dodge & H.G. Roming |
| 1946 | Digital computer | John Mauchly and J.P. Eckert |
| 1947 | Linear Programming | G.B. Dantzig |
| 1960 | Organizational behaviour: continued study of people at work | L. Cummings, L. Porter |
| 1970 | Integrating operations into overall strategy and policy, Computer App's to manufacturing | W. Skinner J. Orlicky G. Wright |
| 1980 | Quality and productivity app's, Robotics | W.E. Deming Juran |

Source: Adapted from, www.newagepublishers.com

The sequence begins with basic suppliers of raw materials and extends all the way to the final customer, facilities might include warehouses, factories, processing centers, offices, distribution centers, and retail outlets. Functions and activities include forecasting, purchasing, inventory management, information management, quality assurance, scheduling, production, distribution, delivery and customer service. An example of a supply chain: A chain that begins with wheat growing on a farm and ends with a customer buying a loaf of bread in a supermarket. Notice that the value of the product increases as it moves through the supply chain.

There are also many similarities between managing the production of products and managing services. In fact, most of the topics in this book pertain to both. When there are important service considerations, these are highlighted in separate sections. Here are some of the primary factors for both:

- Forecasting and capacity planning to match supply and demand.
- Process management.
- Managing variations.
- Monitoring and controlling costs and productivity.
- Supply chain management.
- Location planning, inventory management, quality control, and scheduling.

Note that many service activities are essential in goods-producing companies. These include training, human resource management, customer service, equipment repair, procurement, and administrative services.

III. Scope of Operations Management

The scope of operations management varies across the organizations depending upon the nature, size, demand and resources at disposal. The function consists of product design, process selection, selection of technology, design of plants/work systems, location plan, facilities placement, and quality control mechanism. They depend on forecasting, capacity utilization planning, scheduling, inventory management, quality assurance, training of employees and motivating them.

We can use an airline company to illustrate a service organization's operations system. The system consists of the airplanes, airport facilities, and maintenance facilities, sometimes spread out over a wide territory. The activities include:

A. Forecasting

It indicates estimating demand for the products and services of the firm. For an airline, it includes such things as weather and landing conditions, seat demand for flights and the growth in air travel.

B. Capacity Planning

It is essential for the company to maintain cash flow and make a reasonable profit. In our example of airline, too few or too many airplanes, or even the right number of planes but in the wrong places, will hurt profits. It is dependent upon estimation of demand for various product range of the company. The respective demand for each product and stock of existing goods shall determine the capacity to produce to be used in every production cycle. It is to be estimated fresh every time. It is established at the initial stage but how much capacity shall be used depends on market demand in each cycle. For example, in holiday season demand for some destinations will be more than others in airline business.

C. Scheduling

It involves planning production according to customer orders as per delivery schedules. It comprises of material requirements planning as well. In an airline, handling planes, cargo, and flight and ground crews is an operations function for successful functioning. Scheduling is an important constituent of such a business as it reduces operations cost to a great extent by prompt operations such as cargo loading/unloading, checking-in and boarding of passengers on time. Otherwise huge losses may occur due to delays in flight schedules. Scheduling of planes for flights and for routine maintenance; scheduling of pilots and flight attendants; and scheduling of ground crews, counter staff, and baggage handlers is another area. It is the most important function in a service provider company. This directly influences the customer satisfaction and value addition to the supply chain management.

D. Facilities and Layout

It is important in achieving effective use of workers and equipment. The facilities, plant, offices, stores, warehouses need to be planned in such a manner so as to keep the cost low and flow of work to be smooth. The decision is also dependent upon availability of proper land, power, trained staff; proximity to other facilities like transport, telecommunications and connectivity to urban facilities.

E. Managing Inventories

Management of inventory and spares/parts is significant constituent of Operations Management. For uninterrupted flow of production line, maintaining a regular supply at need basis with minimum inventory level, at economical cost is targeted at in an efficient system. Material movement of, both raw material and finished goods, is assisted by Logistics Management. Inventory management helps in enhancing customer satisfaction, retaining their loyalty and timely delivery of goods. In an airline, managing inventories of such items as foods and beverages, first-aid equipment, in-flight magazines, pillows and blankets and life preservers is important. In a multi-product firm, it is a challenging task when the number of spares/materials could be very high. In Maruti, the number of vendor suppliers is in thousands, which makes it a challenging job to keep a tab on each one of them. The quality of supplied parts is to be ensured as well.

F. Assuring Quality

Quality assurance is important for boosting image of the company in the minds' of consumers. The quality ensures reliability, ease-to-use, and durability of the products. It reduces rework and defective items produced leading to economy and efficiency in production. Various strategies are used by companies for the same, such as statistical quality control, TQM and Six Sigma. In our example, an airline, quality assurance is essential in flying and maintenance operations, where the emphasis is on safety, and important in dealing with customers at ticket counters, check-in, telephone and electronic reservations and cab service, where the emphasis is on efficiency and courtesy.

G. Motivating and Training Employees

OM has a significant focus on training and motivation of employees as its success depends on their involvement. Motivating them in all phases of operations is important. It requires sincere top management commitment to incentive based training programmes for workers. The inter-linkages of departments and branches of a business require company-wide participation in training modules. Following the dead lines with efficient handling of equipments and machines for on-time delivery of products in the supply chain is significant for success of any company. In a service company like airline, courteous behavior of employees is important for customer handling. They need to be inspired and motivated to work for the comfort and value addition of clients.

H. Locating Facilities

Locational planning plays an imperative role in determining the most suitable facility for a company. In airline, according to managers' decisions on which cities to provide service for, where to locate maintenance facilities, and where to locate major and minor hubs, is significant decision making variable. The demand curve and expected passenger traffic shall be the focal decision criteria for location decisions for air traffic.

IV. Effectiveness of Operations Management in Strategy Formulation

The Operations function plays a significant role in formulation of strategies in the organisation. The operational or functional strategy aims at delivering the right quality of products at the right time to the suitable customers. The functions of finance, marketing and stock keeping are planned as a systems approach or process approach in order to maximise efficiency. The approach to production has shifted from mass production to environment-

demand oriented one, where it depends on the market conditions. The performance is expected to be based on quality and speed of delivery at appropriate cost. With the ever evolving market conditions, firms have to continuously change in order to compete successfully. The approach is based on its ability to foresee future changes and identify gap between future market needs and firm's capabilities. The idea is to develop strategic plans in the wake of dynamic market and plan should indicate the general direction where the firm should move, keeping the resources, abilities and its values in mind. Operations strategy should be based on its ability to accomplish competitive advantage in the market in any form. Variations can be disruptive to operations and supply chain processes, interfering with optimal functioning. Variations result in additional cost, delays and shortages, poor quality, and inefficient work systems. Poor quality and product shortages or service delays can lead dissatisfied customers and damage an organization's reputation and image. It is not surprising, then, that the ability to deal with variability is absolutely necessary for managers.

Marketing, design and production must work closely together to successfully implement design changes and to develop and produce new products. Marketing can provide valuable insight on what competitors are doing. Marketing also can supply information on consumer preferences so that design will know the kinds of products and features needed; operations can supply information about capacities and judge the manufacturability of designs. Operations will also have advance warning if new equipment or skills will be needed for new products or services.

Thus, marketing, operations, and finance must interface on product and process design, forecasting, setting realistic schedules, quality and quantity decisions and keeping each other informed on the other's strengths and weaknesses.

V. Role of Operations Manager

There are strong parallels between the skills required for effective operations management and those needed in both logistics and supply chain management. Consummate organizational ability is crucial in successfully enhancing efficiency and driving productivity as an operations manager. Operations Manager must be able to understand the series of processes within a company in order to get them to flow seamlessly, and in this sense the role is directly related to supply chain management. Meanwhile, the coordination involved in setting up these processes in practice represents logistics; the combination of understanding and coordinating the work of a company are therefore central to being a successful operations manager.

The operations manager is able to transcend industries and because of this, exact functions can vary based on the type of company you work for. At the base level, the two main streams an operations manager might belong to can be reduced to companies with a concentration on manufacturing and production, or those that provide services. For example, the role in a pharmaceutical company will be different from an airline service firm. It is quite obvious that a manufacturing firm shall focus on the delivery of a tangible product whereas services involve a greater contact with customers. In a manufacturing setting such as a factory, operations management would include designing efficient processes to produce the product, timely acquisition of raw materials, insuring adequate numbers of properly trained workers, and proper maintenance of equipment.

Operations management in a service setting would focus on insuring that workers are adequately trained, that customer service

locations are equipped as needed and are safe for employees and the public, that services are revised as dictated by customer preferences or competitive forces. However, operations functions and the skills of an effective operations manager are strongly tied to an organization's lasting success. The following case studies indicate the relevance of OM.

A. Case Study 1: eBay 24 hour Challenge

Source: www.Icmrindia.org

This case discusses eBay's business model and its supply chain and goes on to describe its ambitious same-day delivery service. In 2012, eBay started its same-day delivery service, eBay Now, shortly after its rival Amazon announced its same-day delivery service. Initially started in select cities in the US, the eBay Now shopping application could be downloaded to the user's Apple iPhones and iPads. Once the customer ordered the product, it was delivered within an hour by an eBay valet. On October 10, 2012, the service was made available to all the residents of San Francisco and was later extended to various other cities.

Unlike Amazon, which threatened the existence of local retailers, eBay approached local individual retailers/mom-and-pop stores/retail chains and offered them a platform to sell their merchandise with the advantage of same-hour delivery. While there was a location advantage for eBay, it had to employ couriers to make individual deliveries. It also faced competition from well established retailers and many start-ups that imitated its business model. Moreover, operating a same-day delivery service was loaded with various risks and challenges and could snowball into a logistical nightmare for eBay. However, it emerged a winner through proper supply chain and operations management strategy.

B. Case Study 2: TATA Nano

Tata Nano, one of the most ambitious projects of Tata Motor's, was started in 2008. It was envisioned by the Tata Group former chairman Ratan Tata himself. The case focuses on how the initial strategies for launching and positioning Tata Nano as a "People's Car" backfired and how management recognized its shortcomings and mistakes that led to the wrong positioning of Tata Nano as "Worlds Cheapest Car" among the segment it was created for. And finally after four years of its commercial launch, understanding the inevitability of positioning management repositioned Tata Nano as a "Smart City Car" by focussing on the youth to rejuvenate its image.

On March 30, 2009, Tata Nano was launched with an ex-factory price tag of INR 100,000 (about US\$ 2000). The car was the result of a five year research and development project carried out by Tata Nano development team.

Analysts opined that Tata Nano had created a new segment in the passenger car market. However, they were concerned about the company's lack of capacity to fulfill high demand. They also argued that considering the low margins the company would get, it would take a long time for the project to break even. Management at Tata Motor's tried to focus on the price factor and developed "Price Positioning Strategy" for Tata Nano. Tata Nano tried to position itself as the most Affordable Car in the world. However, it became symbol of a cheap car and people preferred buying a used car due to its low-class image in the market.

Tata Nano's distribution system was not also consistent with its positioning strategy. The Nano did not have a large enough dealer network in the rural areas and smaller towns where the positioning by price was more relevant. The paucity of dealer networks meant they could not capitalize on the initial enthusiasm and interest. The management at Tata Motor's tried to correct mistakes like promotion, distribution and financing. It couldn't help Nano to grow and if we see in volumes Tata Nano's journey is appalling. Since its commercial launch in March 2009, the number of Nano cars sold till October 2013 within a span of four-and-a-half-years is over 2.41 lakh (Indian Express, 2013). The top management decided to correct its four P's and recreate a positioning strategy.

VI. Conclusion

Operations Management deals with transformation of inputs into outputs in a scientific efficient manner so that returns can be maximised. It is mainly concerned with planning, organizing and supervising in the context of production, manufacturing or the provision of services. As such, it is delivery-focused, ensuring that an organization successfully turns inputs to outputs in an efficient manner. The inputs themselves could represent anything from materials, equipment and technology in manufacturing of products; to human resources such as employees in services sectors. Today there is fierce competition in the market so firms have to evolve and implement established tools like Operations Management to economize their actions. It can make or break a firm if operations are not managed efficiently and economically.

The present paper outlined the evolution, relevance of O.M. in strategy formulation and role of operations manager. It includes case studies on eBay and Tata Nano car which throw light on role of OM in managing supplier relationships and Logistics Management. Thus in order to excel, firms have to focus on planning a proper materials and logistics management process along with over all operations management.

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