Migration from Manufacturing to Service Manufacturing—A Research Agenda

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Abstract. This paper offers insights into the research of operations management in service–manufacturing—a new “industry” with a close marriage between service and manufacturing. The concept of service–manufacturing has been iterated; the value creation and aggregation model in service–manufacturing has been demonstrated; the theoretical framework and the research agenda of operations management in service–manufacturing have been illustrated.

Introduction

With the Coming of the 21st century, manufacturing companies in China has been suffering from high overhead expenses, long project cycle time of product design & development, smaller margin of profit. Additionally, manufacturing based on low cost, substantial consumption of resources and the neglect of environmental protection has laid hyper–pressure for China to sustain her manufacturing development. Therefore, China’s manufacturing calls for a timely transformation if it intends to survive and sustain (SUN & Valerie, 2008). Actually, the transformation from pure manufacturing to service–manufacturing is not a new thing at all. Many countries in the world have experienced manufacturing transformation in history. The emergence of service–manufacturing has first appeared in quite a lot of countries as the USA, Australia, HK, Japan and the UK. There once appeared heated discussions about service–manufacturing in businesses and academicians. Business patterns based on service–manufacturing have been groped and developed. For more details concerning the differences between conventional supply chain and service manufacturing network can be illustrated as follows (see Table 1).

The operations management in conventional supply chain is to adjust and moderate the inventory level of the tangible goods in order to shift the product demand with high market fluctuation to smoothed production moderation, thus the customer demand has been satisfied. The mechanism of conventional supply chain can be indicated in Figure 1 (see Figure 1). Hence, Traditional OM basically solve “produce which product, produce what quantity, and how to produce?” problems. The original purpose of the conventional operations management
(OM) was to maximize firm’s profit through the regulation and modification on the fluctuation of inventory between demand and supply in the firms.

Table 1. Differences between Conventional Supply Chain and Service Manufacturing Network (He, 2008).

<table>
<thead>
<tr>
<th>Items</th>
<th>Conventional supply chain</th>
<th>Service manufacturing network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus on</td>
<td>product</td>
<td>Service &amp; Product</td>
</tr>
<tr>
<td>Value creation mode</td>
<td>Based on products</td>
<td>Based on services clinging to products</td>
</tr>
<tr>
<td>Transfer objects</td>
<td>Raw materials and intermediaries</td>
<td>Varied service solutions based on raw materials and intermediaries</td>
</tr>
<tr>
<td>Organizational patterns</td>
<td>Static hierarchical patterns among key players</td>
<td>Uncertain, dynamic structures</td>
</tr>
<tr>
<td>Value distribution</td>
<td>Static sharing along the value chain</td>
<td>Firms at the knots exploit values from downstream activities</td>
</tr>
<tr>
<td>Content of Flow</td>
<td>Trinity in information, cash and logistics</td>
<td>Five in one flow of information, cash and logistics, service and value</td>
</tr>
</tbody>
</table>

Figure 1. The Process of How Production Satisfies Demand in Conventional OM.

However, in service manufacturing network, due to the involvement of service, the majority of product and service can not follow the suit of that in conventional supply chain, because of the characteristics of service. To be specific, service is hard to be stored and it is also hard to keep a certain level of inventory. Service also accommodates the feature of simultaneity of production and consumption, as well as its inconsistency on quality and non–evidenced. Such features of service call for the setup of partnerships among upstream suppliers and downstream customers along the network in the service manufacturing processes. Firms have to decide what business activities to be done by themselves and what to be outsourced to others in order to obtain and maintain their competitive advantages. Moreover, firms have to conduct demand management through customized designs, demand inducement and demand regulation based on the clear realization of their own capabilities. The capability management and demand management under the context of service manufacturing are to smooth the customer demands and respond to the market quickly. This can be illustrated in figure 2 (see Fig.2 below)
Prior to the research on operations management in service manufacturing, it is necessary to differentiate from service operations management. Based on the creams of hundreds of top tier journal papers in the area of Service Operations Management, five notably different points between Service Manufacturing and Service Operations Management have been identified as given below:

A. There is no manufacturing process of products in service process, and Service Operations Management separate service process from physical product manufacturing process;
B. Because traditional services are hard to be separated in terms of space–dimension and time–dimension, they are hard traded and then have a short value chain;
C. Research on Service Operations Management is not complete. Since most of these studies focus on service system design and revenue management, research scale of SOM is relatively narrow;
D. Service Operations Management is static because it considers profit maximization based on finite resources constraint. On the contrary, Operations Management in Service Manufacturing can solve the problem that how many resources needed if the customer needs are to be satisfied dynamically

**Research Agenda for Operations Management in Service Manufacturing**

In general, research on Operations Management in Service Manufacturing mainly comprises of two aspects:

On the one hand, exploratory researches have to be conducted on the characteristics and value creation mechanism of Service Manufacturing, for example:

- Connotation and mechanism of value creation of Service Manufacturing;
- Effects of customer participation and customer experience on traditional manufacturing systems and operating rules of service–manufacturing mixed systems;
- Transfer and interactive mechanism of customer participation, customer experience and service in supply chain.
On the other hand, innovative theory–building researches have to be carried out on the production and operations management problems which companies of Service Manufacturing meet. For example,

- On–line planning methods and its dynamic adjustment, sequential decision methods and its behavioral characteristics;
- How to measure and optimize ‘service flow’ in service and manufacturing mixed supply chain;
- Based on customer participation and experience, how to coordinate supply chain by means of implementation of optimal policies.

More specifically, based on numerous literature reviewed, the following research agenda for OM in SM has been proposed from five perspectives as being shown in . Figure 3 to illustrates the research agenda (see fig. 3)

![Figure 3. Research Agenda for OM in SM.](image)

**Conclusion**

A research agenda on the operations management in service manufacturing has been postulated in five themes in conformity with the challenges in operations management in service manufacturing. To validate the operations management in service manufacturing and secure its efficiency and effectiveness, firms in implementing service manufacturing must have the power to transform its operations mode and strategy; to induce, regulate and manage customer demands; to manage its capabilities and synergize its resources and make make–buy decisions; meanwhile, firms also have to manage production, planning and scheduling in a systematic and comprehensive manner. As this is more like an exploratory research, lots of proposed perspectives have to be testified in real business practices. Therefore, future research and follow up studies have to be focused on the implementation of the ideas in industries and implementing outcomes have to be tracked and checked in order to modify and polish the
operations management in service manufacturing. Comparative studies of the similar topics have to be conducted in different countries so that meaningful similarities and differences will have to be made for a better and valid guidance of business practices in different cultures.

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