

A Framework for Delivering Service Differentiation Through Operating Segments: Research Opportunities and Implementation Challenges

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Abstract

This paper presents a framework for developing a differentiated strategy for the delivery of services. It summarizes the methodology introduced in Guajardo and Cohen [2018] and discusses modeling and implementation implications associated with application of the framework for the management of value-added services that are bundled with manufactured products. The framework utilizes the concept of operating segments (introduced by Frei and Morriss [2012]) and considers issues associated with the definition of market segments appropriate for differentiated services as well as for the design of such services. The paper also discusses operational processes and the tradeoffs associated with producing and delivering differentiated service products to market segments. This discussion includes a review of a set of representative analytical models for service delivery that illustrate OM Service research opportunities.

Keywords: *Service differentiation, operating segments, after-sales services, service operations strategy*

1. Introduction

Product design and post-sales services can be used to support a differentiation strategy based on customer perceptions of value created through product use. This approach is more effective when compared to reliance on global standards and outsourced suppliers of manufacturing and initial product fulfillment functions for determining where and how to adopt service differentiation. Since any product can be viewed as a bundle of tangible goods and intangible services, differentiation specific to services must be considered. We note that while the relative contribution of “pure manufacturing vs. pure service” in a bundle, will vary, the emphasis on services has been increasing as firms adopt a customer focus to gain competitive advantage.

Quality thus has two dimensions, i.e. for the tangible product and for the bundled services. Differentiation therefore will be achieved with respect to customers’ perception of the quality they derive from multiple product attributes, associated with both the tangible and service dimensions of a firm’s products. Our focus in this paper will be on the attributes associated with the value-added services that are associated with customer support. The goal of this paper is to review the framework for developing a strategy based on service differentiation that was introduced by Guajardo and Cohen [2018], which also provides a discussion of a case study illustrating implementation of the framework. We will focus on the role of analytical models that can be used to support implementation of a differentiation strategy and use the framework to note research opportunities and challenges for improving the state-of-the-art.

The framework uses the concept of operating segments, (introduced by Frei and Morriss [2012]). This concept is based on the observation that companies with successful service strategies have concluded that “you cannot be good at everything”. An operating segment is defined as a *list of service priorities shared by a meaningful*

group of customers. Customers with similar service priorities are part of the same operating segment. Importantly, not only are the service priorities different across operating segments, but so are the operational capabilities needed to deliver them. Figure 1 illustrates the variation in the relative performance of a firm for its service product when compared to its competition, as a function of the various attributes embodied in the product, from the perspective of a given group of customers. Consider, for example, the case of retailers such as Walmart, Sears and Mom & Pop stores. The operating segments for each can be compared (see Figure 2 from Frei and Morriss [2012]). If the curve is increasing, then we can say that there is consistency between the relative performance and the importance of service attributes, as is the case for Walmart, i.e. they are good at what their customers care most about and less so for those attributes that their customers find to be less important. Sears and Mom & Pop are less consistent.

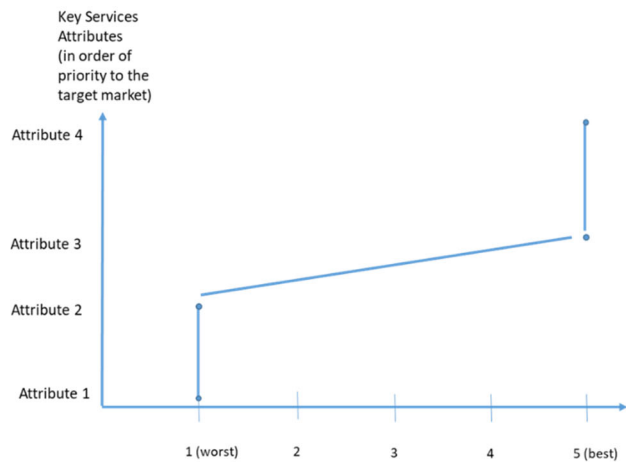


Figure 1: The Attribute Map

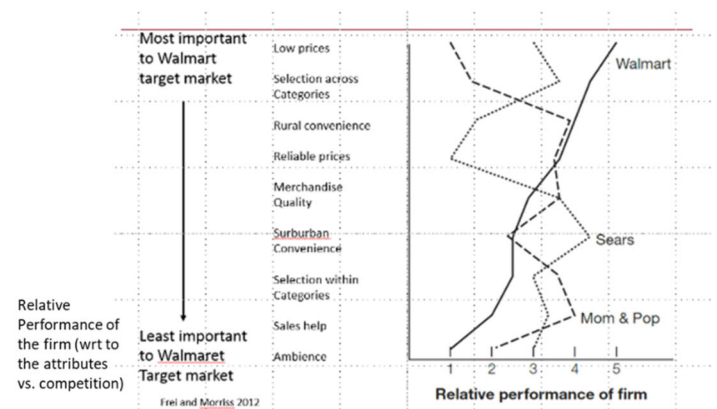


Figure 2: Retailer Attribute Maps

Our framework for service differentiation, (illustrated in Figure 3), uses the mechanism of operating segments to consider the following questions: a) who are members of the segments? b) what service products are offered? c) how are these products produced and delivered to the segments? Answers to these questions describe a firm’s current approach to delivering differentiated services. Firms also must consider what the answers should be in order to maximize competitive performance. The framework moreover raises the strategic question of, to what extent should a firm adopt differentiation. The answer to this question could range from “not at all”, i.e. one size fits all, to “mass customization”, where every customer receives a unique product, designed and delivered to them, and thus each segment consists of a single customer. In general market segments are based on demographic, market and product factors.

Each product-service bundle that a firm offers can be defined by a vector of service attributes and, as noted, preferences for these attributes are shared among the members of the relevant customer segment. In particular, we can define the operating segment in terms of the target values for each service attribute metric as well as membership rules for belonging to the segment (based on customer characteristics). The operations challenge is to develop and implement effective policies for the design and control of the processes required to produce and deliver these products to these customers, leading to resource management decisions (capacity, allocations, and prioritization) and performance evaluation (in terms of strategic indicators).

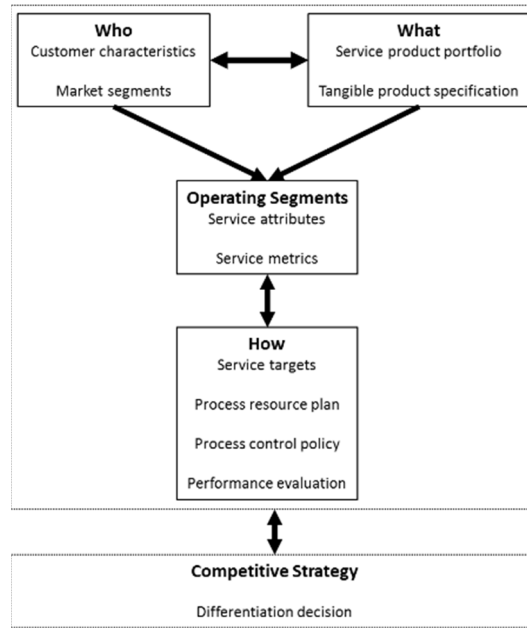


Figure 3: Overview of the Service Differentiation Framework

A key challenge for managing service differentiation is based on answering the questions introduced above in terms of tradeoffs associated with benefits, costs and risks in order to optimize competitive performance. Note that the questions noted above arise at all stages of a product's life cycle, (from design, through sourcing and production, sales, distribution, after-sales and end-of-life).

The next section introduces and describes the key elements of our framework and discusses methodologies for defining both market and operating segments. Section 3 explores issues associated with modeling and optimizing the operational processes to plan, control and evaluate differentiated service delivery. It also considers the strategic question concerning the decision to adopt differentiation. The final section contains discusses research and implementation challenges.

2. Defining Market and Operating Segments

The basic elements of a service differentiation strategy can be defined as follows:

Let $C=(c_1, \dots, c_m)$ be the set of relevant observable customer characteristics; i.e. based on demographic characteristics such as gender, age, and income) and other customer characteristics such as price sensitivity. We note that other factors also can be used to group customers based on product, market and technology factors.

Let $P=(p_1, \dots, p_n)$ be the set of relevant product characteristics, based on service priorities. This will include attributes of the services to be delivered that matter to the customers and that are operationally relevant (e.g., response time, ability to resolve problems, technical knowledge). Note that these attributes entail differences in the operational aspects of service delivery (e.g., "fast service" is an attribute that clearly has operational implications such as larger capacity, better-trained service force). In general, there can be considerable heterogeneity in service preferences across market segments and as a result the operational requirements for (optimally) serving different these segments will vary.

Let $S=(s_1, \dots, s_\theta)$ be the set of service process policies used to produce and deliver a differentiated set of service products. Each policy, s_i , denotes a process defined by a hierarchy of decisions associated with the design and management of the service delivery process, (e.g., setting capacity levels for different classes of resources, and scheduling and control policies that govern the utilization of these resources).

Step 1: Identification of Meaningful Groups of Customers

The first step in defining segments is to identify the set of “meaningful” groups of customers, i.e. that accounts for commonality of attribute preferences across groups.

Let, $CL=(CL_1, \dots, CL_j)$ be a vector group identifiers, where each distinct group denotes a collection of characteristics, and membership in the group is based on that group’s sensitivity to the service attributes in P . Since members of each group share common priorities for different aspects of the service, we can define groups by a membership function that maps C and P into CL and P . Determination of group membership can be accomplished either through application of business rules (e.g. based on demographics or market factors), or through the application of statistical methods, (e.g. cluster analysis).

Step 2: Definition of Operating Segments

We can define the set of rank ordered attributes $P_j=(p_{[1]}, \dots, p_{[j]})$ characterizing group CL_j ’s service preferences. Thus (CL_j, P_j) defines an operating segment and $\{(CL_1, P_1), (CL_2, P_2), \dots, (CL_j, P_j)\}$ defines the set of all potential operating segments. We therefore reduce this set to a subset of “meaningful” segments, if a given operational policy can deliver to more than one segment, i.e., multiple segments are served by a common process or policy. Thus, $\{(CL_k, P_k)\}$ is the final collection of operating segments for $k = 1, 2, \dots, k'$ where $k' \leq j$, which represents the firm’s service product portfolio. The triple, (CL_k, P_k, s_k) defines the k’th group of customers, their rank ordered service performance attributes, and the operational policy required to deliver the service product.

It is necessary to identify which attributes that can be associated with service that will be most relevant to the firm for the management of service differentiation. One approach is to explore the relationship between the performance of the firm, (e.g. likelihood to recommend the brand, customer satisfaction, market share, profit, etc.), customer characteristics and customer perception of service quality. The customer characteristics and quality attributes used to manage differentiation can be based on business rules, or on cluster analysis. Alternatively they can be based on regression analysis (See Guajardo and Cohen [2018]).

3. Producing and Delivering Differentiated Service

We now consider the interactions between various decisions associated with our framework. These decisions form a hierarchy and are highly inter-dependent as illustrated in Figure 4.

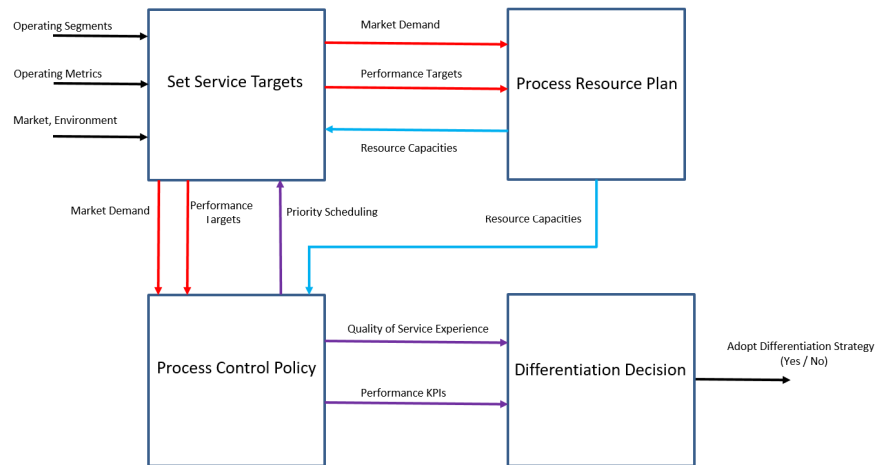


Figure 4: Management Hierarchy for Service Differentiation

The definition of an operating segment requires selection of targets for service performance metrics for its associated market segment. These targets can be based on historical or competitive considerations or could be tied to customer preferences for different attributes of the service experience. This would require solicitation of inputs from customers; i.e. asking them to prioritize the value of various attribute metrics. Guajardo and Cohen [2018] uses stepwise regression of customer survey responses.

The decision to set targets for selected attributes, should consider how different groups of customers will react to different levels of service performance in terms of their demand for the product-service bundle. Selection of target values, will of course, impact requirements for resources, as well as firm profit and competitive position. Thus selection of targets could be based on service standards or can be derived from the solution to an optimization problem, which incorporates a relationship between demand (market share) and the relative level of service.

Step 3: Define Process Resource Plan

Management of the processes required to produce and deliver services requires a plan for deployment of resources which determine the capacity and capability of the service providers and a policy for control, i.e. how these resources are allocated to customers demanding service. The process resource plan typically involves setting service capacity (e.g. number of servers). In general customers can have different requirements for service and servers can have different capabilities for fulfilling customer needs. A resource plan thus seeks to match supply with demand. A solution to this problem must take into consideration the fact that some servers are flexible and can server multiple segments while others can only serve one segment. The process resource plan also requires that service capacity be scheduled to meet service targets for each segment over an appropriate planning horizon.

The process control policy provides mechanisms for matching arriving customers to a queue in front of a server capable of meeting that customer's requirements. Real time routing of customers through the service delivery process ultimately is required and a control policy for such routing could be based on priority rules or rationing conditional on the realized state of the system.

Analytical Models – Representative Examples

There is an extensive literature in operations that has looked at both resource planning and control for service processes. We illustrate how such models could be used to solve these problems by considering a number of examples. The examples illustrate specific requirements to support the delivery of differentiated service, i.e. 1) endogeneity of demand with respect to service quality, 2) competition based on different service quality attributes, 3) allocation of resources to multiple segments with different entitlements for service quality, 4) capacity and capability planning for multiple classes of service providers and 5) real time control and prioritization of service delivery.

Our first two examples model the case where there is competition on the basis of the quality of service. The first model, of Ho and Zheng [2004] introduced a fixed capacity service queueing model where share in a service market is determined by the relative quality of service delivery. The objective is to maximize the demand rate, based on an equilibrium condition derived from total market demand, where market share is endogenously determined by consumer utility, which is derived from multiple dimensions of service performance. The solution is based on an equilibrium condition where “tomorrow’s demand rate” equals today’s demand rate and defines performance targets for each service attribute.

The second formulation by Cohen and Whang [1997], develops a product life-cycle model where customers purchase a product from a manufacturer who provides after-sales service support in competition with an independent service provider. The manufacturer sets product price and both the manufacturer and the service provider set quality and the price of service. Customer utility here is influenced by both service price and service quality, (which is based on availability of the product, which in turn is determined by the resources and policies used to deliver support services). Both of these model formulations illustrate different ways to formulate a model that captures the impact of competition on the basis of the quality of service.

The next model illustrates customer prioritization in the context of service delivery. It deals with the situation where there are multiple classes of customers with different service entitlements, which clearly will occur when differentiation of service is being considered. Deshpande, Cohen and Donohue [2003] analyze a (Q,R) inventory stocking problem where there are multiple classes of customers associated with differentiated service targets, as measured by stock fill rate. Stock is issued to customers on a FIFO basis until on hand stock falls below a threshold and from then on stock is only issued to high priority customers while low priority demand is backlogged.

The final modeling situation we consider is captured in the papers by Gurvich et al. [2008], Gurvich et al. [2010], Gurvich and Whitt [2010] and Mehrotra et al. [2012]. This strand of the literature considers joint optimization of resource decisions (number of each type of server) and control decisions (dispatch rule for assigning customers to servers), where both the demand for service and the capabilities of the supply (service agents) are differentiated in terms of speed and capability, i.e. some servers have the capability to serve multiple customer groups (based on their training, experience, and/or incentives).

Step 4: Service Differentiation Decision

Many firms offer one level of after-sales service to their customers. When firms deviate from this strategy they typically deliver a differentiation strategy in the following ways: 1) Price discrimination (aka revenue management) which is based on the willingness of customers to pay for different levels of service quality, 2) Product based, i.e. customers

who purchased an expensive product receive a higher level of support service, and 3) Deliver differentiated service based on customer and product attributes, e.g. high rollers in a casino who are given perks and discounts to incentivize them to gamble. It is interesting to note the consumer electronics firm we have worked with recently introduced “Concierge” service for those customers who purchased their most expensive high HD TV (\$40K).

Firms must consider the tradeoff between the benefits of differentiating (better match between supply and demand) and the cost of to the increased complexity of the service process. Finally, we note that firms must consider customer perceptions of fairness (when some get a higher level of quality than others).

4. Research Challenges and Opportunities

This paper has described a framework for implementing a strategy based on the delivery of differentiated levels of customer service. Its use raises a number of managerial questions, including assessing the tradeoffs and risks associated with offering differentiated levels of service. Managers also need to determine where/when differentiated service should be offered and how this strategy should be implemented in terms of service product design and delivery.

We note that the framework suggests opportunities for conducting both analytical and empirical research. We observed, in particular, that modeling to support the framework introduced here requires consideration of endogeneity of demand with respect to service quality and competition based on the level delivered service quality based on specific performance attributes. We also noted that decisions for the allocation of resources to the multiple segments introduced by differentiation must consider the different entitlements of each customer segment for service quality. This gives rise to the need to plan the capacity and capability of multiple classes of service providers and to manage real time control and prioritization of service delivery. Needless to say inclusion of all of these factors in a single model is not feasible since the analytical challenges of dealing with the issues noted above will lead to significant modeling and solution algorithm challenges. Thus heuristics and simulation approaches will need to be considered. While much of the data that is needed to implement our methodology is readily available from customer surveys and CRM software systems, there are considerable gaps in the state-of-the-art of models to optimize decisions in the overall hierarchy of decisions associated with differentiated service delivery. Competition based on relative performance for service attributes delivered to different market segments should also be considered. Another factor that should be considered is the implicit decision hierarchy, ranging from long term strategic and structural decisions to shorter term tactical decisions, all the way to real-time control. Most of the models of service delivery focus on one or two stages of the overall process. An additional factor that should be included is the behavioral response to services. Recent examples along these lines refer to consumer response to operational transparency in services (Buell et al. 2017) and more generally to the notion of customer compatibility (Buell et al. 2018). As our case study illustrated, as reported in Guajardo and Cohen [2018], response to service involves complex reactions to a wide range of factors.

There is considerable room to enhance the methodology available for jointly optimizing operations processes design and control throughout the hierarchy. As noted, the framework discussed here can be implemented through readily available data and estimation tools. We also note that the framework suggests a variety of hypotheses concerning the drivers of alternative strategies, which is fertile ground for empirical research. Finally, the underlying

strategic question – to differentiate or not to differentiate, and if yes, to what extent has not been adequately addressed in the literature.

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