Product Characteristics:
The Establishment of Key Attributes for Product Classification

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Abstract

A common characteristic of successful companies is strategic alignment of the supply chain from the purchase of raw materials to the delivery of the finished product. Although frameworks have been proposed to facilitate this alignment there is no consensus on the key characteristics to be used in describing products and the related market demand. This paper analyzes the current research literature to develop common product attributes and suggests key attributes to further research into product characteristics and supply chain alignment. Ultimately, a methodology for classifying products by key characteristics and mapping to the appropriate supply chain is the goal. **Keywords:** Supply Chain, Product Demand, Product Classification

1. Introduction

In his 1997 article in the Harvard Business Review, Marshall Fisher [1] stated that after years of effort very little real improvement had actually taken place in supply chain performance. Fisher suggested that perhaps the problem was that supply chain strategy was not aligned with the characteristics of product demand. Payne and Peters [2] asked a similar question. "Why do companies still struggle to get the maximum service and minimum cost from their supply chains?" Companies often sell many different products with different characteristics in different markets, yet they utilize a single supply chain design that is rarely challenged. This could be part of the problem. "No matter how good the supply chain characteristics are, if the product fundamentally does not fit with the dominant supply chain design, optimum service and cost cannot be achieved." [2]

Fisher [1] suggested that products could be classified as either functional or innovative based upon certain characteristics of the product and its market demand. A functional product satisfies basic needs and typically does not change over time. Demand is stable and predictable, making the demand easier to forecast. The functional product exhibits a long life cycle and typically generates low profit margins due to the ease by which competitors can enter the market and the cost of obsolescence is low. The innovative product is at the opposite end on the spectrum. These products are often trendy, fashionable, or high tech and exhibit highly variable demand. New products tend to fall into this category since the initial demand is largely unknown. Innovative products also tend to have short life cycles and greater product variety. The profit margin for innovative products is higher than that of functional products and thus, lost sales have a much greater effect on company performance.

Fisher proposed the idea that products could be classified as either functional or innovative but did not purport that these were discrete or definitive types and that all products would fall neatly into one of the two classifications. He acknowledged that products were primarily functional or innovative, exhibiting characteristics that would lead to a classification based on the preponderance of those characteristics [1]. In reality, products have attributes that tend to make the product more functional or more innovative. It is possible for a product's characteristics to change as it matures or as customer requirements change [3].

Although there has been some analysis and discussion that a product classification system is needed, a review of the supply chain literature to-date indicates that there is currently no consensus on the critical components of such a product classification system. To achieve alignment there needs to be a universally accepted methodology for the classification of products according to characteristics. The alignment of supply chain and product characteristics benefits the organization beyond the positive effects on cost,

productivity, efficiency and competitiveness. In fact, it has been suggested that companies no longer compete, but that competition is actually between supply networks [4].

For managers to have the information required to make reasonable decisions a framework is needed that can aid in understanding the nature of the market for their products and the supply chain design that will best satisfy that market. The result of non-alignment of products with an appropriate supply chain results in over serving and over charging customers of functional products and under serving and under charging customers for innovative products. Developing an appropriate supply chain for a product/customer combination should be based on achieving the right balance between the required levels of customer service and the total cost of supplying that level of service [2, 5].

2. Existing models and frameworks

During the literature review conducted for this paper, two existing models or frameworks were of particular interest, the DWV^3 model [6] and the Product Supply Characterization (PSC) Model [2]. The DWV^3 model was developed to segregate products according to their supply chain requirements. The DWV^3 is an acronym that represents five key supply chain variables; Duration of life cycle, time Window for delivery, Volume, Variety and Variability. Each variable can be defined with various classification types (e.g. short or long lead times, low or high volume) depending on the product(s). The idea is to align products, based on the characteristics of the five variables, with the main objective to align a vast majority (95%) in a manageable number (4 to 6) of different type of supply chains. Examples of supply chain types are build-

information available, the authors decided to continue our analysis of the characteristics using 15 total

In order to establish a manageable number of attributes for the product classification framework only those attributes with 10% or more references are included in the list of potential model variables. Based on this analysis, *variability* (26.8%), *predictability* (19.6%), *volatility* (14.3%) and *volume* (12.5%) are candidate attributes to be included in the evolving framework for product classification.

Table 3. Attributes of the Characteristic *Demand*

Volume	Variability	Uncertainty	Predictability / Forecast Accuracy	Volatility	Change in Variability / Dynamism	Heterogeneity	Freq of Orders	Number of Customers	Complexity	Expectations	Flexibility

Alignment Theory. To develop objective conclusions from this research a survey of industry supply chain managers should be conducted. The authors are currently working on this survey with intensions of publishing the results in a future article. Performance metrics that result in behaviors that support Supply Chain Alignment Theory must be developed if any gain made by the actual alignment of products and supply chains is to be sustained. To empirically evaluate Supply Chain Alignment Theory, models must be developed to investigate the effect of alignment and misalignment. The authors are currently pursuing these areas of research and will be reporting on the results in future articles.

5. References

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