

Product complexity definition

Business



Product complexity definition What product “ complexity” means to supply chain and the industry? It can be define differently based on the industry and the market. A lot people think complexity is the same meaning with complicacy or simplicity. Unfortunately, both of the definition is wrong because complexity is something that interacts among each other and sub divide it in all its single elements and lead to the solution of the problems. “ Complexity makes a supply chain inflexible and inefficient,” Hoole writes. “ It also hampers on time delivery and creates problems for product quality. From the manufacturing company stand point, it will cause complexity when the variety over the limit of the supply chain. For example, to serve the different types of logistics customer, better technologies to make the merchandise, the different types of the sales channel, handle different types of raw materials and components. Webster define complexity as 1a) the quality or state being composed of two or more separate or analyzable items, parts, constituents, or symbol. 2a) having many varied parts, or elements, and consequently hard to understand. b) marked by involvement of many parts, aspects, and need earnest study or examination to understand it. Based on product design, it defines as proportional to the total number of design decision (Baldwin& Clark 2009). The number of functions designed into products (Griffin 1997a, 1997b), the numbers of components (Gupta&Krishnan 1999). Other than that, it defines as number of physical modules and by the degree of dependency (Kaski&Heikkila 2002). It also has three different definitions for the complex system like it is a system that mixes with the different parts in a complicated way and hard for the industry to understand. Flood &Carson 1988). According to Klir(1985), a system manifesting differentiation and connectively. Complexity is divided into 2 big <https://assignbuster.com/product-complexity-defination/>

categories multiplicity and relatedness into the products. A lot of times, product complexity only call as *ceteris paribus* and it means a product contain more components or more interrelationship among it elements. Product complexity is defined as assessment about the number of components in a product. Industrial purchasing process can affect by a multitude of complexities induced by the nature of purchased products, the organizational structure and the influences of the external environment.

Other than that, product complexity is directly link to the supply chain operation management. Because of this, Jacob literature defines the complexity supply chain by the number of parts and degree of unpredictability, represents by three facts: the number of components, extend of interactions, and degree of product novelty. Besides that, represent by the numbers of modules and markets, it also clear in the different types of the suppliers and their interaction. Because of this, Jacob define the product complexity as a design of multiplicity, relatedness to others, and product architecture elements.

Multiplicity is a unique category and relatedness has three different types like similarity, complementary, and inter-connectedness. Complementary is for economic sense of a product like mp3 player and music player (Jacob). Similarity is merchandise that sharing the same components, provide the same functions, and same benefit role of the products to the market. Other than that, According to Ulrich's (2005), inter-connectedness is a kind of connection of interface such as slot, and sectional typology.

It also includes the logical and mechanical connection between two elements. For example, it modified of old products through the similarity of the components and the function of the products. (Jacob) Literature define Product portfolio complexity management as the combination of decisions, value systems, supporting process, and initiative pertaining to deciding and employing the most effective product portfolio like mix product types, feature sets, and components types. Product complexity has several levels in system theory according to Boulding and Simons (1956, 1962).

In the literature, the levels of the products are product categories, the portfolio of a firm offering, and extend of the product components level. Based on Henderson literature, product complexity had 2 objectives of funding requirements (generating large amounts of cash and estimate long terms sales growth) and the risk mitigation. A lot of firms try to introduce the different types of products into the market to offset economic or political risk, as well as offer broader lines in the hope of increasing the opportunity of a product can become a runaway success. Mark) The other forces that like competitive positioning will cause a firm to offer more products. The impact of product complexity Product complexity will cause problem in supply chain process execution related to product supply, manufacture, innovation, delivery, and support. Product complexity play a main role of affirm operation, the impact of it are complexity management, inventory, and measure. Inventory is a very important force to tie the streams together into the complexity management like the reducing inventory level or cost, and also focus on improving inventory position.

Based on Krishnan and Gupta (2001) literature, relatedness and multiplicity has the implicit relationship and they found out the benefit to increasing the use of the common platforms was the function of components costs.

According to Hoole, we need to use the right metric to measures complexity and the leader need to focus more careful on product and component rationalization. After that, it can use the metric result to manage the number of components of a product more effectively than others.

For instance, the unit costs of the components are standardized and not too high relative to alternative suitable components, the increasing of platform will beneficial. By doing this, the company has the advantageous on the cost effectively when they pursuing to the market segment because it increase the profit and decrease the complexity. A good combination of work cam emerged on the topic of modularity represent the increase of the complexity. It will enable scale economic (Pine, Victor & Boynton 1993), engineering efficiencies (Jacob), and improved coordination (Schilling 2000).

All the benefits are shown analytically related to the cost components being standardized (Fisher et al 1996). Modularity will have the importance impact on elements of competitive advantage according to the empirical research. Complexity wills increase cost and dominate the revenue benefit. (Lancaster, 1979; Moorthy, 1984). Product complexity affects the company economics of the transaction costs and the sourcing and design in operation management. There are 2 theoretical perspectives in the effect of product complexity into operations.

Theory of performance frontiers (TPF) and transaction cost economics (TCE). Strategic on managing supply chain complexity One of the way to reducing the complexity problems is to follow lean production and Just In Times manufacturing (Womack 1990) basically refer to the principle that “ the leaner, the better. ” According to the literature, a lots of the marketing managers, designers, and the engineers need to pay attention on the product innovation, mass customization, variety reduction program, value analysis, and modularization to managing the product complexity (Perona 2004).

According to the Perona literature, it has empirical evidences to show the ways to manage the complexity like the joint venture with the suppliers, product modularization, and information systems for production planning and control. The main issue is the supplier can help the company reduce complexity and improve company performance. Based on the information that collected from the companies show that the company has the stable relationship get the lower complexity score and the company with the short term relationship has the higher complexity and hard to manage.

By investing in joint venture the suppliers can help companies saves times in managing commercial transactions, decrease defects rates in delivery merchandise, improve the transaction reliability, and reduce the effective stock reduction. The product reengineering has the most control on the products to link in between marketing and production; it will helps the them to cause miscommunication on the production process and improved their productions. Based on the transaction cost, company needs to decide either in house production or outsourcing of components.

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Some of the products are easy to outsourcing but it will cost a lot of production cost. Complexity always has the perspective the less complexity is always better because it focus on reduce the procurement cost from reducing unique parts. The numbers of components that required manufacturing products increase, the effort dedicated to ensuring conformance will increase. It will increase the cost to make the products. Another research mentions that production process link to the measures of research and development effectiveness.

To ensure successful supply chain complexity management, the management team needs to set targets for both managing advantageous complexity and reducing disadvantageous complexity for the employee to follow and work on it to set the differentiation level. The other steps to manage supply chain complexity are to identify the different type of key complexity drivers. It can divide in 3 different categories like configuration and structure, products and services, and process and systems. Conclusion

Some of the company likes complexity because it can increase their sales based on the product differentiation. Based on the sales return and cost, complexity can create the potential for the best level in product complexity portfolio. A lot of the company think that product complexity can help the company make different in the customer demand, the way on handle the supply chain and the relationship with supplier. Managing product complexity effectively can be daunting organizational task.

Most if the times, the impact of the inventory of a company will reducing the safety stock to simplify the supply chain level based on the Degree of

Commonality Index(DCI) increased. By doing this, it can help the company save money in the long term and reduce the transportation cost. If the company fails to handle the product and supply chain complexity, it will cause the company to increase the cost and affect the quality of products in the lifecycle management. According to Hoole, it suggests the company to use the right metric to track complexity.