Brandon Thomason
ISM 101
Final Term Paper

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Part A: Product Development Using an Integrated Framework

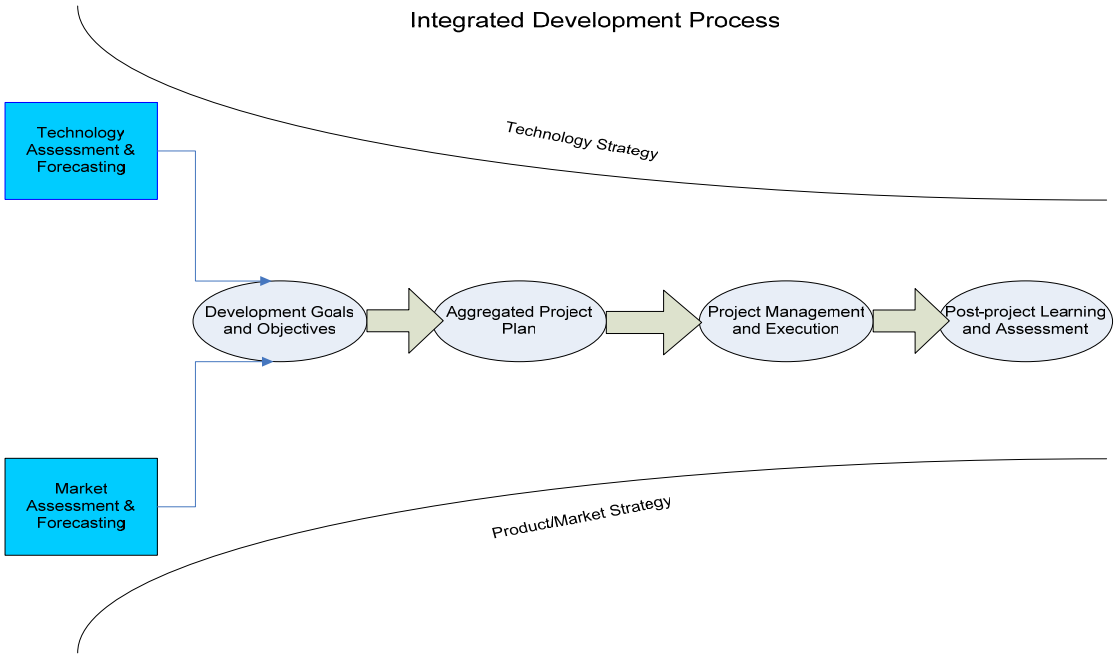
Another View of Product Development

The life's blood for companies is found in the products that they produce and the profits generated by these products. Having innovative and useful products, however, does not ensure that the products will meet the needs of the customer, or that the product will help the firms realize its overall business strategy. In order to maximize the success, or more specifically the profit margin of a product, a integrated approach should be used. The following paper will look at a similar framework as that put forth by Mr. Stolz, but will illustrate in a higher level of detail some of the key steps and integration techniques that are needed in order to ensure a successful product development process. To be more precise, the paper will discuss how companies should develop their product strategy based on an integrated development framework, which includes developing their technology and marketing strategies to meet their development goals and objectives, developing an aggregate project plan, and learning from their mistakes with post-project learning.

The Integrated Development Framework

In an integrated development framework, companies are driven by three different strategies, which must be aligned in order to achieve their development goals and objectives. These strategies, the business strategy, technology strategy, and the product market strategy, are then aligned with the development goals and objectives of a firm, which in turn leads to an aggregate project plan. After developing a project plan, the firm

then turns to project management and execution of the product development process. And finally, there is a phase of post-project learning that allows management to reflect on the product development process and make improvements. The integrated development framework is illustrated in the diagram below.



Technology Strategy

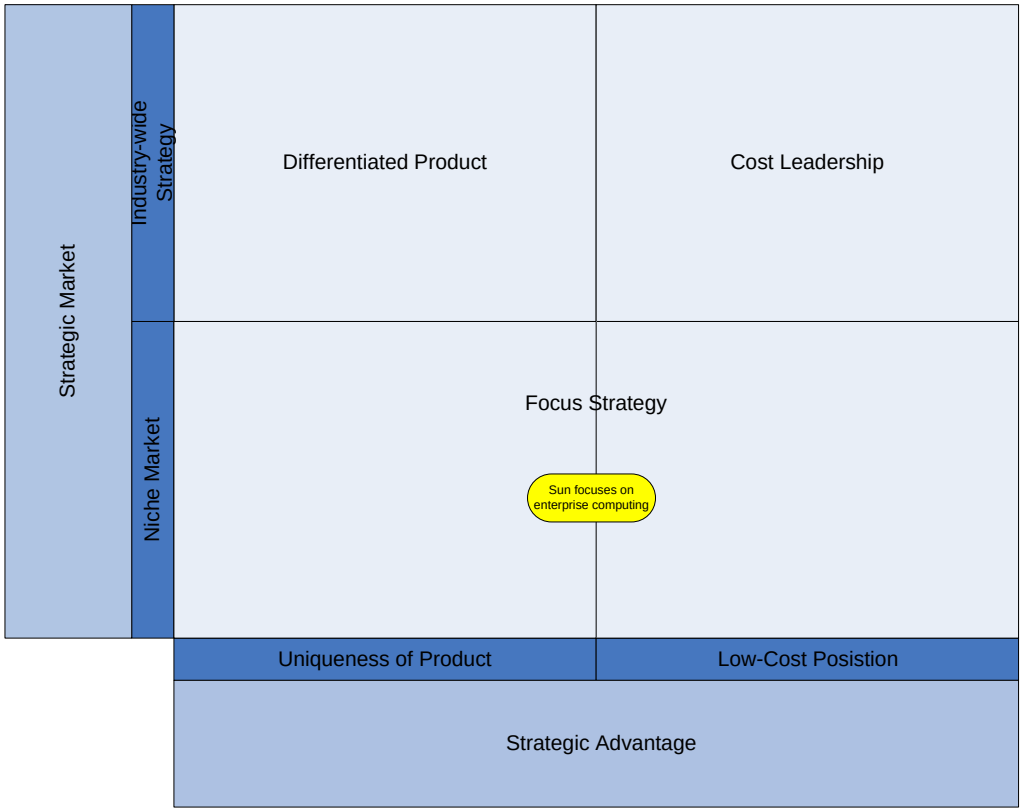
The goal of the technology strategy is to guide the firm in acquiring, developing, and applying technology for competitive advantage. The technology strategy is composed of three primary aspects: focus, source, and timing.

Here, the focus of the technology strategy is primarily concerned with defining capabilities that provide competitive advantage. In the case of Sun, they would need to ask, “What technology do we have that’s innovative and can be used to meet the needs of our customers?”

The source of the technology strategy is concerned with where the technology is coming from—internally or externally. If the source is derived internally, it has most likely been developed within the R&D department of the firm. However, many companies look outside of their firm for technology. An example of using an external source is illustrated by the use of Motorola processors within Sun Microsystems's servers and workstations. In addition to the focus and source, timing is also a critical factor in the technology strategy. Timing refers to the frequency of implementation of a particular technology. This is important because as products evolve, some technologies become obsolete and must be replaced by something more innovative. However, if a firm like Sun introduces a new product prematurely, they run the risk of cannibalizing revenues from other products.

Product Market Strategy

The product market strategy also plays an important role in the product development process. It is with this strategy that the firm answers key questions that are crucial to the success of a product. One of the questions is what makes the firm's product distinctive from its competitors—price, quality, unique features, or design for a niche market? In the case of Sun, they fall into a niche market, focusing on enterprise computing, which is illustrated in the following diagram:



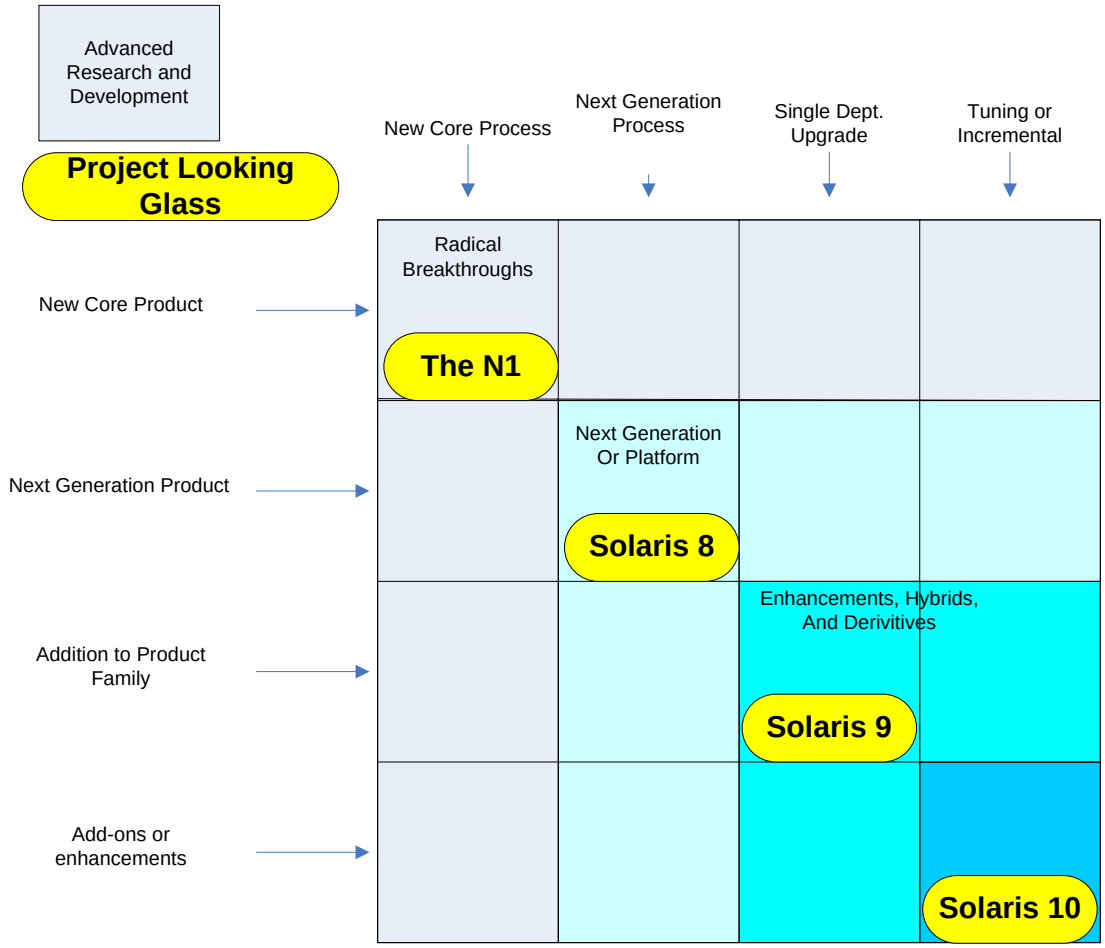
The product market strategy also requires that the firm define its customers in order to know exactly what demographic they are targeting with their product and what those customers demand as far as product characteristics and price. As can be seen above, Sun focuses on creating computers for enterprise applications, rather than trying to compete in the home computing market. In addition, when defining the product market strategy, a firm must decide on product platforms, product lines, and the product family. And, finally, this product market strategy involves defining the distribution channels for a given product.

Development Goals and Objectives

The development goal and objectives align the overall business strategy with the technology and product market strategies. The business strategy is derived from an industry analysis, where the firm analyzes itself and its competitors with respect to suppliers, buyers, substituted and new entrants. This analysis is often done using a framework call the Porter Model. After the firm analyzes their position within an industry they can then choose a business strategy that will help them achieve their business objective such as market share or revenues and profits. These three components, the technology strategy, product market strategy, and business goals are then aligned with respect to intent.

Aggregate Project Plan

After aligning the business goals and objectives with the technology and market strategies, the firm can create an aggregate project that puts the afore mentioned goals and strategies into terms of projects and resources. Below is an aggregate project plan framework that might represent the current state of products at Sun Microsystems.



Project Management and Execution

After defining the aggregate project plan and gaining insight into what products are available and what products are on the horizon, a firm like Sun can then begin to link individual products to the broader strategy and direction of the business.

For example, sun might recognize that the market for the Solaris platform is maturing, so they begin to push for the development of the N1, which is an architecture that treats the entire network as a computer, or Project Looking glass, which is a 3-D user interface that differentiates Sun's interface from its competitors.

Post-project Learning

One of the keys to successful project development is feedback. No product development process is flawless, and, therefore, there is always room for improvement. Because of this, the product development process should be well documented from beginning to end, so that after the project is completed, management can assess the "success" of the product based on events that occurred during development. Project managers can look at the performance of individuals on the development team, conflicts that arise across departmental boundaries, bottlenecks, and manufacturing problems. It is recognizing these problems that allow for improvements in future projects

Conclusion

Although the presentation given by Howard Stolz was thorough, it neglected to give an overall view of the product development process. More specifically, the presentation lacked to show the connection between Sun's overall business strategy and there product development process, and the integration of cross-departmental functions. In this paper, however, it is shown how the different strategies of the firm are aligned to meet the needs of the customer, how aggregate project plans are developed, and the phases of execution and post-project learning. Understanding these components is crucial in understanding overall picture of product development.

It is this overall picture of the development process that many project managers lack. It should be a goal of every firm to instill the overall picture of the integrated development process into its employees. By doing this, they would give a clearer sense of direction to the development of every product, while in turn helping to prepare lover-level workers such as engineers to be project managers some day.

Part B: Aligning Competitive and Supply Chain Strategies

Globalization and the Role of Supply Chains

Globalization refers to the economic integration and interdependence of countries with corresponding trade liberalization, financial liberalization, and expansion of travel paths. This means that firms who would otherwise be confined within the borders of their own country can now expand throughout the globe to take advantage of untapped markets for their products, while at the same time, gaining competitive advantage over their rivals by cutting costs as they relate to inventory, transportation, and facilities. Cutting costs as they pertain to the inventory, transportation, and facilities falls into the realm of supply chain management. Supply chain management consists of all parties involved, directly or indirectly, in fulfilling a customer request. The supply chain not only includes the manufacturer and suppliers, but also transporters, warehouses, retailers, and customers. For global firms, designing an efficient, low-cost supply chain is imperative to their success. This paper will discuss the supply chain strategy and the roles of forecasting demand, inventory, transportation, facilities, and information systems as they apply to the supply chain strategy.

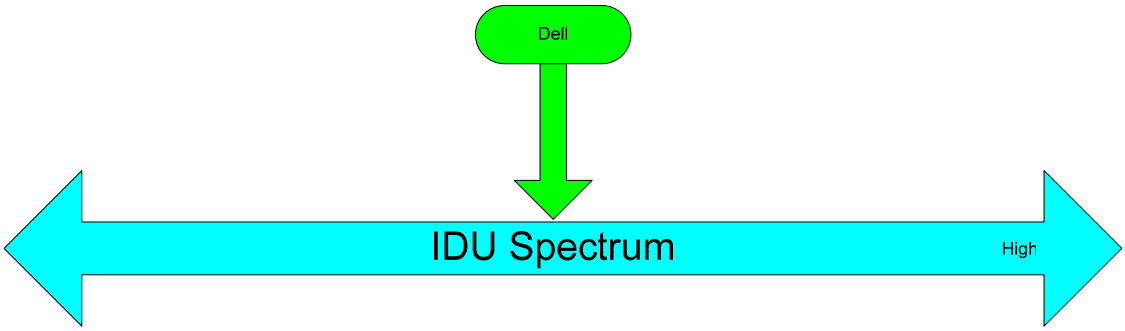
Supply Chain Strategy, Forecasting, and Drivers

Supply Chain Strategy

For any company to be successful, global or domestic, its supply chain strategy and competitive strategy must be aligned with one another. This means that the customer priorities that the competitive strategy hopes to satisfy and the supply chain capabilities that the supply chain strategy aims to build must be consistent with one another. In order

to achieve this strategic fit, firms must understand the implied demand uncertainty, IDU, of their product, as well as the responsiveness of their supply chain.

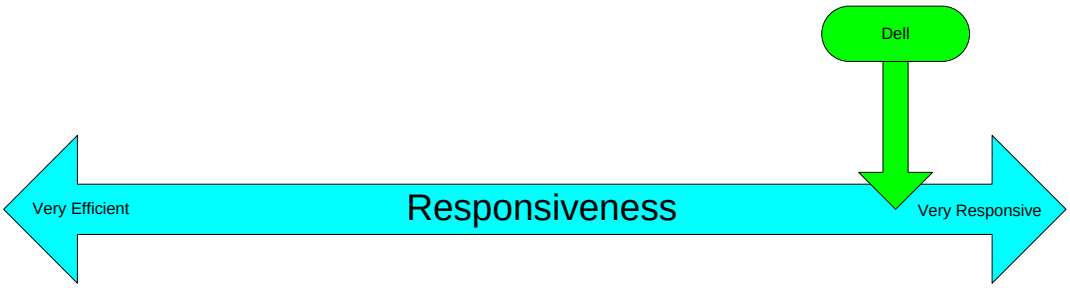
The IDU of refers to the uncertainty of demand by the customer's need for the firm's product. Examples of product that have a low IDU might be milk or gasoline. These products have a low IDU because there is little uncertainty in how much each of these products will be consumed by the public—milk is a staple on the average person's grocery list, and gasoline is used by everyone who owns a car. However, not all products have a low IDU. Products that are new to consumers usually have a high IDU because the firm doesn't know how much customers will desire the particular good. An example of a product with a high IDU would be Intel's Itanium chip because it is untested in the marketplace. However, some products such as the PC would fall somewhere in the middle of the IDU spectrum. Below is an example of where Dell PCs might lie on the IDU spectrum.



Dell's PC would probably fall in the middle of the spectrum because the PC market is maturing, and, as a result, it is easier to estimate the publics demand for PCs.

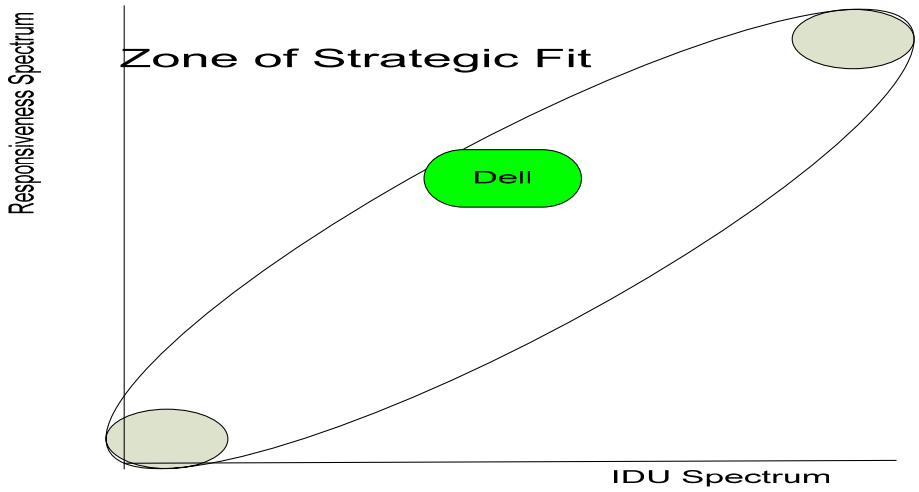
In addition to the IDU, firms must also know how responsive their supply chain needs to be in order to fulfill customer satisfaction. On one end of the responsiveness spectrum is efficiency, while on the other end of the spectrum lies responsiveness. An industry that has a very efficient supply chain might be integrated steel mills. These steel

mills can be very efficient because they have well-defined products with production schedules of several months. On the other hand, a company like DELL is highly responsive, allowing customers to receive a customized PC in as few as five days. The following diagram illustrates Dell's responsiveness spectrum:



However, it is not impossible to be efficient and responsive, but to achieve both of these characteristics, a firm must make use of information systems.

After defining the IDU of their product and the responsiveness of their supply chain, a firm must align these two elements to achieve the zone of strategic fit. Continuing the example of DELL, illustrated above, a diagram that illustrates how the zone of strategic fit is derived from the IDU and responsiveness spectrum can be illustrated.



After defining the supply chain strategy, the firm must begin designing the supply chain. The first step in this process is to estimate the customer demand for a particular product.

Forecasting

Forecasting demand can be difficult at times, especially if the product is new and there is no historical demand data to base future demand on. However, if the firm does have historical demand data, this data can be plotted on a graph to observe trends of level, trend, and seasonality of demand. Then, several forecasting techniques can be applied to the historical demand data to forecast future demand. There are two basic types of demand forecasting techniques—static and adaptive. In static forecasting methods, it is assumed that the estimates of level, trend, and seasonality within the systematic component do not vary as new demand is observed. On the other hand, adaptive methods update level, trend, and seasonality after each demand observation. Examples of the various demand forecasting techniques can be found at the end of this document in Appendix A.

Inventory

Inventory plays a significant role in the supply chain's ability to support a firm's competitive strategy. If a firm's competitive strategy requires a very high level of responsiveness, a company can use inventory to achieve this responsiveness by location large amounts of inventory close to the customer. On the other hand, a company can also use inventory to make itself more efficient by reducing inventory through centralized stocking.

After calculating the demand for a product based on the most appropriate forecast, a firm must determine how inventory will play into the supply chain strategy. In general,

holding higher levels of inventory increases the responsiveness of a supply chain, whereas keeping inventory low increases the supply chain's efficiency. There are various types of inventory which play into this strategy and they are discussed below.

Cycle inventory is the average inventory in the supply chain due to either production or purchases in lot sizes that are larger that those demanded by the customer. Companies produce or purchase in large lots to exploit economies of scale in the production, transportation, or purchasing of inventory product. However, with an increase in lot size comes an increase in holding costs. Therefore, companies must balance the benefit of large lot sizes with the cost of holding all of that inventory.

Firms must also take into consideration safety inventory. Safety inventory is the inventory that is held in case actual demand exceeds the forecasted demand. The trick to calculating how much safety inventory to hold lies between incurring the cost of having too much inventory and losing sales because due to not having enough inventory.

Finally, there is season inventory. Seasonal inventory is inventory that is built up to counter predictable variations in demand. These variations are derived directly from the demand forecasting mentioned earlier. For, example, a manufacturer of snow skis can't produce all of the skis needed to meet winter demand in the month of October. Therefore, they must manufacture skis all year long and stock up the inventory in anticipation of winter demand.

Transportation

Transportation, as it applies to a supply chain, refers to the moving of products between different stages of the supply chain. Like inventory, transportation is an important factor on both responsiveness and efficiency. In general, faster transportation allows a firm to

be more responsive to customers, yet, it come at the expense of efficiency. Therefore, determining the type of transportation plays an important role in the competitive strategy of a firm. If a firm's competitive strategy targets customers who demand a high level of responsiveness, then transportation will likely cost more, but at the same time, it will meet the customer's needs. Conversely, if the customer is concerned primarily with price, a slower, less responsive mode of transportation would be appropriate. Often it is the case that a company leverages a balance between inventory and transportation in order to increase both efficiency and responsiveness.

Facilities

Facilities are the locations to or from which the inventory is transported in the supply chain. Within a facility, inventory is either transformed into something else, or it is stored for some amount of time before being shipped to the next stage in the supply chain.

Facilities and their corresponding capacities to perform their functions are key drivers of supply chain performance in terms of both responsiveness and efficiency. For example, a firm can gain economies of scale if a product is manufactured or stored in a centralized location. This centralization increases the efficiency, but comes at he cost of responsiveness because the product is most likely further away from its customers. In contrast, if a firm manufactures or stores its products at various locations, some costs associated with facilities go up, but the ability to be responsive to customer needs is increased. Therefore, based on the firms supply chain strategy, facilities, their location, and their capacities must be aligned to meet the needs of the customer.

Information Systems

Information systems might be the most important driver in any given supply chain. While the other drivers have a distinct trade off between responsiveness and efficiency, information systems work to reduce this trade off—making supply chains both responsive and efficient.

Information systems server as the connection between all of the supply chain's various stages, which allows them to coordinate by sharing information in an integrated manner. In fact, by creating software modules that encompass all of the other drivers—inventory, transportation, and facilities—and integrating these drivers, systems can be developed that will optimize the profitability of the entire supply chain.

Conclusion

As more and more companies are assimilated into the global economy, it will be imperative that they align their supply chain strategy with their competitive strategy. In order to accomplish this task they will have to determine how each supply chain driver fits into the overall competitive strategy. Of all the drivers, however, information systems may be the most important. Accurate and up-to-date information that is integrated and shared across all stages of the supply chain can make or break a firm, and this becomes even more crucial when consider a supply chain network that encompasses the entire globe. By allowing all phases of the supply chain to share information, firms in a domestic or global environment can get the maximum profits across the entire supply chain.

Part C: The Relationship between the Integrated Product Development Framework and aligning the Supply Chain Strategy and Drivers

Integration

Using the integrated development framework and aligning the supply chain strategy and drivers might, at first, seem to be completely unrelated to one another. But, in fact, the two are very closely correlated and both contribute the success of firms.

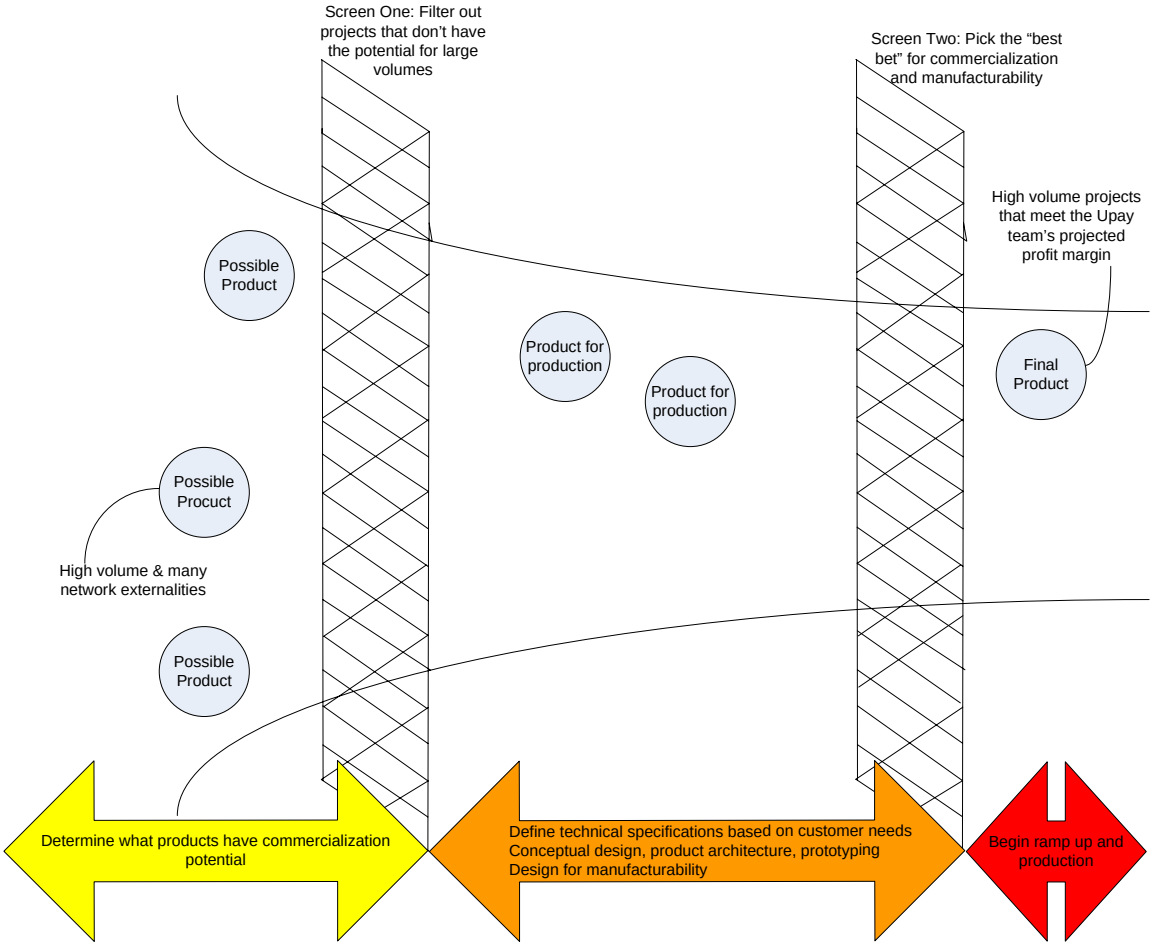
Using the integrated development framework allows firms to produce products which meet the needs of the customer, on schedule and within budget, while aligning the supply chain strategy with the supply chain drivers allows firms to reduce costs across the entire supply chain. By effectively executing these two aspects of a business, firms can maximize their profits, while providing excellent products or services to their customers.

How it Works

Imagine that a firm exists and uses an integrated approach to product development. They have brought together a team that consists of people from the marketing department, engineering, manufacturing, and a high-level executive which oversees the entire project. By allowing people from all departments involved in the development of the product to come together, the firm helps to avoid serious set backs as the product development process moves along. This helps in coordination and reduces the cost associated with budget overruns due to a prolonged product development cycle. During this phase of the development process, the development team collaborates to determine which products should actually be put into production.

The following diagram shows a development funnel and breaks the development process into three main phases. The preceding paragraph illustrated what would take place during the first phase of the development process and is highlighted yellow.

The Development Funnel



In the second phase of the development funnel, the development team must define the technical specifications based on customer needs, conceptual design, product architecture, prototyping, and design the product for manufacturability. It is in this phase that the supply chain begins to play an important role.

As the team begins to ponder the manufacturing process in the second phase (highlighted orange in the diagram), they must also determine what parts are needed to produce the product, who will provide those parts, and where the parts will be assembled. It is at this point that aligning the supply chain strategy with the drivers becomes a crucial part of the firms overall business strategy. Here the firms must take into consideration all of the inbound costs associated with getting the parts they need for their product as well as the holding costs associated with story excess inventory. By optimizing this part of the supply chain, the firm increases the profitability of producing the product, and, by being efficient they work to keep the product development process on schedule.

In the third phase of the product development cycle, the firm begins ramp up and production. If the integrated approach to product development has been executed correctly, the project should be on time and under budget. At the same time, as ramp up and production begin, the supply chain is not only concerned with inbound parts for manufacturing, but also with the outbound shipments of the product to the customer. Again, determining the mode and cost of transport is important to both profits and customer satisfaction.

Conclusion

Using both an integrated approach to product development and aligning the supply chain strategy and drivers are crucial to the success of a firm. Both help the firm to produce products that meet the needs of the customer, while making sure that the development process flows smoothly and costs are kept to a minimum. Not only that, but the two are intertwined in such a way that they are inseparable during the development of products and the success of a firm.

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