Order Winners Criteria: A New Approach in Supplier Selection

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[Abstract] Today, most manufacturing value chains are created outside of companies. Manufacturers seeking long-term value creation have become increasingly dependent on their suppliers to design and manufacture certain parts and subassemblies. To meet customer demand and maintain profitability, companies need flexible supply chains and production capabilities. The purchasing function plays a significant role in fulfilling company goals through supplier selection. This article briefly reviews current studies in supplier selection criteria. It also discusses the concept of "order winners" as a new approach to supplier selection. This article intends to inspire academics and business people to examine the order winner approach in supplier selection.

[Keywords] supply chain, supplier selection, order winners

Introduction

In the past decades, most manufacturers' production strategies were based on a make-to-stock basis that focused on creating a high volume of standard products that were attractive to as many consumers as possible. The continuous advancement in information technology has been reshaping competition among domestic and global producers, resulting in a decline in the market share for standard products. To manage this decline, companies are offering a wider variety of products to create additional incentives to generate added value for customers (Novshek & Thoman, 2006). However, Elmaraghy et al. (2013) find that adding to product variety does not necessarily guarantee more sales or increase market share.

Today, customers have different wants and needs. Therefore, instead of expanding the varieties of suitable products across customers, firms should implement make-to-order (MTO) strategies to offer more customized products that meet customers' specific needs.

Wixcey (2019), in a Deloitte Consumer Review Report, entitled “Make-to-Order: The Rise of Mass Personalization,” the audit, financial and tax preparation company Deloitte notes that as today's consumers are connected to social networks through digital devices, “they are increasingly dictating what they want, and when and where they want it.” Also, their research indicates that more than 50 percent of consumers are interested in purchasing customized products or services in some categories. Moreover, most consumers are willing to wait and pay more for a customized product or service. Companies are continually adjusting to this trend.

In 2011, Tesla launched its "Design Studio," a tool that allows customers to design their cars by choosing a hard or soft top, the paint color, interior design, wheels, and more. Tesla's VP of Sales and Ownership Experience states that “The Design Studio's goal is to personalize the Tesla experience” (Tesla, 2011). When Deere & Co. was experiencing a decline in demand for its products, it began customizing its farm equipment to meet its customers' requirements (Novshek & Thoman, 2006). Siemens also adopted a

strategy of customization. When profit margins on its standard electric motor declined, the company began creating custom motors for individual customers.

Many companies realize that customizing products to meet individual customers' particular needs is critical for their competitiveness (Novshek & Thoman, 2006). Offering customized products adds value for their customers and can help companies better match customer preferences and increase their market share in today's competitive markets. However, it is costly to produce customized products as reduced economies of scale result in increased operating costs, including supply chain costs and lower profits (Ahmad & Elmaraghy, 2017). A study by Duncan et al. (2021) shows that the greater number of product customizations is causing products to fail because of the quality issues that result from using more advanced electronics and software and complex system integrations, and the need to cut corners. As a result, many companies are now against offering product customization. At the same time, the market for standard products has become more competitive as profit margins continue to shrink.

Many companies maximize customer value by offering customized products while also reducing costs and creating a sustainable competitive advantage through their supply chains (Novshek & Thoman, 2006). Most value chains are created outside manufacturing organizations (Kothari, et al., 2011). For example, in the automotive industry, an average of 70% of product value is added by external suppliers.

A critical element of the supply chain is outsourcing direct and indirect purchasing. Outsourcing has become standard practice, and it is estimated that about 85% of US companies outsource products or parts of products to reduce manufacturing costs (Ansari & Modarress, 1999, 2010; Tyndall et al. 1998). However, the most effective way to manage costs is not simply through outsourcing but by transforming the purchasing function into a strategic arm of the value-generating organization (Ghatge et al., 2010).

Companies have become more dependent on suppliers as the purchasing function has gained significant importance in supply chain management. As Weber et al. (1991) note, “In today's competitive operating environment it is impossible to successfully produce low cost, high quality products without a satisfactory supplier.” Hence, supplier selection has become a critical aspect of the purchasing function and, along with it, the supplier selection criteria.

Background

England and Leenders (1975) note that "supplier selection is purchasing's most important responsibility." For most manufacturers, the cost of purchasing raw materials and parts is high and accounts for between 50 and 60% of average total costs (Ellram, 1990). Jahnukainen and Lahti (2009) find that purchased components account for 70 to 80% of the MTO manufacturer's product costs. McKinsey & Company (2021) reports that "With companies facing more pressure than ever to deliver savings, procurement teams can offer short-term relief and long-term rewards." Similarly, in their annual report, the Hacket Group (2021) indicates that the number one priority issue for procurement in 2021 is to reduce purchasing costs. These two reports emphasize that if a manufacturer wishes to meet its objectives, its purchasing function needs to revisit supplier selection. Earlier studies point to the same conclusion (e.g., Dickson, 1966; Braglia & Petroni, 2000; Gonza'lez & Quesada, 2004; Teng, 2005; Percin, 2006; Lin, 2009).

Narasimhan (1983) states that suppliers affect firm performance by affecting such activities as inventory management, production planning and control, cash flow requirements, and quality. Selecting the right suppliers could reduce purchasing costs and improve overall performance and competitiveness (Thomas; Choy et al. 29). A brief search using the term "supplier selection criteria" shows that as of April 2021, there were 31,443 articles published on this topic (www.sciencedirect.com). Studies fall into two distinct quantitative and qualitative approaches (Wang et al., 2005).

Quantitative Approach

Numerous approaches have been developed to select the supplier. However, most studies are quantitatively focused on either a single objective (Kasilingam & Lee, 1996; Moqri et al., 2011) or multiple criteria (Sawik, 2010). Mukherjee et al. (2016) classify and summarize the quantitative approach into two types of models. The first is the single model, whose mathematical one consists of an analytic hierarchy process (AHP), an analytic network process, and total cost ownership. The data are analyzed through methods that

include cluster analysis, multiple regressions, and discriminant analysis. Artificial intelligence is also used through such mechanisms as neural networks and expert systems, and fuzzy sets. The second model is an integrated one that uses an AHP that incorporates linear programming, goal programming, and fuzzy set theory.

These mathematical models have some shortcomings due to their strong assumptions. Further, the models fail to account for the qualitative factors that would affect supplier performance (Sawik, 2010). For example, the AHP method cannot evaluate cluster criteria (Parsia & Tamyez, 2018). Orji and Wei (49) stated that the model's assumptions limit the validity of the results. Ellram (1990) stated that most supplier selection research focuses on quantifiable criteria, such as quality, cost, delivery, and other factors.

Qualitative Approach

Studies conducted in this area present the relative importance of the supplier selection criteria. A study by Dickson (1966) provides findings from survey data on 170 companies that use 23 supplier selection criteria that their purchasing managers rank. These rankings weigh the importance of supplier selection according to a 4-point Likert scale: extremely important, considerably important, of average importance, and slightly important. Dickson's (1966) top five criteria rank the following as extremely important: quality, delivery, performance history, warranty and claims policies, production facilities, and capacity. Price ranks sixth and is noted as "considerably important." Contrary to the study in 1960, the companies in the Dickson (1966) study selected several suppliers for the same part, and generally, the ones that offered the lowest prices were given short-term contracts.

A study by Weber et al. (1991) reviews and analyzes 74 articles published from 1966 to 1990 related to Dickson's (1966) 23 selection criteria. Table 1 presents Dickson's six top criteria, based on the number of articles published. The change in the relative importance of the criteria from 1996 to 1990 shows that whereas the net price ranked sixth in Dickson's (1966) list, it had earlier been ranked first. After 1966, the performance history and warranties and claims policies were not considered extremely important.

Table 1
Top Six Supplier Selection Criteria 1966-1990

Criteria	1966-1990 No. of Papers	%
Net Price	61	80%
Delivery	44	59%
Quality	40	54%
Production facilities and capacity	23	31%
Geographical location	16	21%
Technical capability	15	20%

Source: Weber et al. (1991)

Cheraghi et al. (2004) provides an update based on a review of 113 research papers and analyzes the relative importance of supplier selection criteria between 1990 and 2001. Table 2 presents the top six criteria cited in studies related to Dickson's (1966) top six criteria. The change in the relative importance of these criteria is due to increased competition, globalization, rapid technological development (Cheraghi et al., 2004), just-in-time purchasing (Ansari & Modarress, 2000), and shortened product life cycles (Kellner et al., 2019).

Table 2
Top Six Supplier Selection Criteria --1990-2001

Criteria	1990-2001 No. of papers	%
Quality	31	79%
Delivery	30	77%
Price	26	67%
Technical capability	11	28%
Repair service	11	28%
Production facilities and capacity	10	26%

Source: Cheraghi et al. (2001)

Thanaraksakul and Phruksaphanrat (2009) provide a study of 76 papers on research conducted in various settings for supplier selection; their results provide a list of the criteria that are commonly used in supplier selection, according to Webster et al. (1991). The study shows that the criteria and priorities vary under different settings. For example, in developing countries, the focus is on product reliability and capacity, whereas in advanced countries, the emphasis is on technology, manufacturing flexibility, and capability. Table 3 shows that quality, delivery, and cost are discussed in 97%, 94%, and 94% of the articles, respectively. These criteria are also in the top three positions in Weber et al.'s (1991) study, which provides relatively more significant references. Production facilities and capacity rank fourth in both studies. The other remaining 19 criteria in Weber et al.'s (1992) list are cited in Thanaraksakul and Phruksaphanrat's (2009) study, but with different priorities. Moreover, the latter study provides ten new attributes that are considered in the selection process. For example, environmental and social responsibility, domestic political stability, and cultural congruence are discussed in 8%, 7%, and 6%, respectively, of the articles found in Thanaraksakul and Phruksaphanrat (2009) but not in Weber et al. (1991).

Table 3:
Top Six Supplier Selection Criteria -- 2009

Criteria	2009 No. of papers	%
Quality	74	97%
Delivery	72	94%
Cost	72	94%
Production facilities and capacity	52	68%
Flexibility and reciprocal arrangement	52	68%
Technical capability and support	49	64%

Source: Thanaraksakul and Phruksaphanrat (2009).

Table 4 shows the number of articles in which each of Dickson's (1966) top six criteria are discussed in all three studies: Weber et al. (1991), Cheraghi (2001), and Thanaraksakul (2009). In all three studies, quality, delivery, and cost are the top three criteria. Several other authors also provide a detailed review of the literature on supplier selection (De Boer et al., 2001; De Boer &Van der Wegen, 2003; Aissaoui et al., 2007; Luo et al., 2009; Ho et al., 2010; Wu & Barnes, 2011, 2012). While these studies focus on quality, delivery, and cost as the most important criteria in selecting a supplier, they do not indicate what class of parts suppliers is selected to provide. This study suggests that the order winners should be considered the criteria for selecting suppliers, regardless of the type or class of the purchased part.

Table 4
Comparison of Factors: 1966 - 2009

Dickson's 1966 Top Six Criteria	1966-1990 No. papers	%	1990-2001 No. papers	%	2009 No. papers	%
Quality	40	54%	31	79%	74	97%
Delivery	44	59%	30	77%	72	94%
Performance history	7	9%	4	10%	23	30%
Warranties & claims policies	0	0%	0	0%	15	19%
Production facilities and capacity	23	31%	10	26%	52	68%
Price/net price/cost	61	80%	26	67%	72	94%

Discussions

Hill (2000) defines the order qualifier and order winner as follows: "An order qualifier is a characteristic of a product or service that is required in order for the product/service to even be considered by a customer. An order winner is a characteristic that will win the bid or customer's purchase. Therefore, firms must provide the qualifiers in order to get into or stay in a market."

Most previous studies identify the top three common criteria for selecting a supplier: quality, delivery, and cost. These studies suggest that, first, a generalized approach is applied in the selection process. Here, common criteria are widely associated with the characteristics of the make-to-stock (MTS) strategy. Second, no distinctions are made between suppliers providing "strategic parts" and those providing "standard parts."

MTS manufacturers create a standard bill of materials for each product, making high-volume standard products prior to knowing the actual demand. These products are built using standard parts and many qualified suppliers actively compete for contracts. The order winners (selection criteria) for standard parts differ from one company to the next. For example, for some companies, the order winners provide advantages in delivery and cost, while for other companies, the order winners offer quality, production facilities and capacity. Hence, it is appropriate for a company to select a supplier that meets its criteria.

The high pressure, complex, and unplanned nature of demand for MTO manufacturers provide sufficient rationale for a unique approach to supplier selection. MTO manufacturers offer customized products that are built based on unpredictable customer orders. Each product's bill of materials is different, requiring them to order some key parts that meet customer-specific requirements. Under this strategy, order winners will most likely be those that meet three commonly accepted criteria: the manufacturer's various specific design requirements, the supplier's process capability, flexibility, and proximity to the manufacturer's location.

This study does not suggest that the top three common criteria are not important. However, finding a supplier that can deliver high quality at a very low cost and deliver just-in-time is only possible through collaboration and partnership. A study by McKinsey & Company (Kothari et al., 2021) reports that the leading companies are increasingly involved in collaborating and entering into partnerships with suppliers on such criteria as cost improvement, innovation, quality, and flexibility. The McKinsey report (2021) states that several companies reduce material costs from 10 to 20% and reduce total costs from 35 to 40% through supplier development.

Technological advancements have enabled companies to find new ways to deliver quality. McKinsey & Company's (2021) report shows that many manufacturers use advanced analytics combined with traditional tools through the latest artificial intelligence (AI) and machine learning (ML) techniques to reduce the total cost of quality. For example, a manufacturer using an advanced analytics engine can reduce their warranty cost by 15% (03); an automotive manufacturer's enhanced product development can reduce warranty costs and improve "right-first-time performance" through advanced analytics. Four case examples are briefly presented in the next section.

Case Examples

Case 1. In a survey of 80 companies, Sim et al. (13) identify buyers' preferences in supplier selection based on qualifying criteria, selection criteria, and additional factors in the selection process. The majority of these companies' buyers consider these three common criteria as basic requirements for order qualifiers. The other criteria for order winners include better customer service, after-sales service, being easily assessable, and providing technical support and product warranties.

Case 2. This case is a collaborative study conducted among seven UK companies designing, manufacturing, and constructing capital equipment for power generation, materials handling, and offshore industries. Six out of seven companies were selected to supply highly customized products to meet customer requirements. The study's results indicate that order winners have solid track records of reduced lead times and increased lead-time reliability.

Case 3. Lucent Technology produces customized telephone switches to fulfill customer orders. Orders differentiate, are unpredictable, and contain many specific parts that cannot be held in inventory because the time and cost vary with each order. The order winner is the one that can provide short delivery times (Yue et al., 2010).

Case 4. Boeing Commercial's order winners for supplying the company's 777 aircraft door liners are based on their advanced technology in composites materials, assembly capability, and location. Aircraft door liners are made of composite materials, and about 300 parts and components are used to assemble and install these doors. The Boeing 777 has eight doors: two in the front, two aft, and two next to each wing. The front doors differ from the aft doors in design, parts and components. The wing doors differ from the front and the aft doors in design and assembly.

There are numerous cases similar to the four examples shared in this paper. The proposed approach aims to demonstrate the applicability of the order winners' criteria in supplier selection. This approach allows the purchasing function to consider a supplier that best meets their order winner requirements.

Conclusion

As a result of technological advancements, more customers have become increasingly interested in customized products in recent years. These customers dictate what they want and when and where they want these products delivered. Offering customized products helps companies meet individual customers' particular needs, which is critical for their competitiveness. Moreover, offering customized products adds value for their customers and can help companies better match customer preferences and increase their market share. However, offering customized products is costly as it reduces economies of scale and results in increased operations and supply chain costs and lower profits. The increased number of customizations is causing products to fail more often due to quality issues resulting from advanced electronics, software, and complex system integrations. As a result, now many companies are against offering customized products.

Companies have reduced overall operations costs, shortened product development times, and managed risk through supply chain management. A critical element of the supply chain is outsourcing direct and indirect purchasing. Purchasing has become a strategic, value-generating function and supplier selection has become a critical aspect of this function.

Since 1960, many quantitative and qualitative studies have been conducted on make-to-stock manufacturers and nearly all have identified quality, cost, and delivery as the top three supplier selection criteria. The lack of focus on the type of parts the supplier selects is missing in previous studies. In contrast, there is limited research on supplier selection among make-to-order manufacturers.

This study does not intend to diminish the importance of quality, cost, and delivery when selecting suppliers; however, it proposes a need to move beyond applying a generalized approach based on the three traditional common criteria. It suggests that the purchasing function must clearly define the order winners' criteria for the standard and non-standard parts that meet its strategic objectives. Companies should also review the potential suppliers' business strategies, assess their experience, expertise, capability, and flexibility, and then negotiate contracts with the best possible suppliers.

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