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## Role of demand-side strategy in quality competition

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## ABSTRACT

The research questions studied in this paper concern the role of demand side strategy for a firm engaged in duopolistic competition in quality and price. A demand side strategy research looks towards markets and consumers unlike the traditional *resource side* strategy research that looks upstream — into the firm's resources and its supply side. We examine whether following a demand side strategy would benefit the firm, the consumers or both. In a market where two firms are competing with each other, we first find the equilibrium quality and price levels for the traditional case where the two firms optimize their own profit function. We use this case as a benchmark case for comparison. Next, we let one firm (the lower quality firm) adopt a demand side strategy operationalized by an objective function where the profit is augmented by consumer surplus. The equilibrium results show that a demand side strategy would increase the product quality level in the market, and improve the adopter firm's competitiveness at the same time increasing the market consumer surplus. We also study the case where the higher quality firm adopts demand side strategy and compare the results with the two cases mentioned above. Overall, we find that adopting a demand side strategy would benefit the adopter firm's profitability and the consumers. We, therefore, find evidence of what the strategy literature has been predicting about the role of demand side strategy.

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## 1. Introduction

Currently, research in *demand side* strategy is getting a lot of attention in the strategic management field. Demand side strategy research looks towards markets and consumers, which is opposite to a *resource side* strategy research that looks upstream — into the firm's resources and its supply side. In this context, researchers make a distinction between *value capture* and *value creation*. Value capture is concerned with the structure and resource ownership in the value system (see Bowman and Ambrosini, 2000, 2010; Priem, 2001, 2007). Activities that capture value in a firm include primary activities in a supply chain like purchasing, operations, sales and service (Bowman and Ambrosini, 2007). In general, the resource based view (RBV) strategy focuses on value capture (Makadok and Coff, 2009; Lockett et al., 2009). Value creation, on the other hand, focuses on the consumer side of the operation. Recent strategy literature is focusing on the theory that the economic value is gained mainly by the use of consumers (Kor et al., 2007). Consumer focus, therefore, is a viable strategy for the firms. These researchers argue that value creation is supported by a “demand

side” strategy. According to Priem and Swink (2012), a demand side research is concerned with a firm's value creation rather than value capture. Value creation is determined by consumers' perception of the utility from the firm's end product. It has been argued in the research that focusing on value creation by following a demand side strategy will enhance the utility for the consumers and, therefore, should improve the profitability of the firm.

Recently, a number of industry examples of firms using value creation are found. Google Android has increased its worldwide smart-phone market share from 33% in 2010 to 75% in 2012, while its main competitor Apple IOS holds a market share of only 15% as of 2012. The success of Android can be attributed to its unique strategy that is fully concerned with customers' needs. First, its open source code and liberal licensing allow the software to be freely modified and customized to meet individual consumer needs. Secondly, since Android fully authorizes customers to customize these products to maximize their utility, Android created a large community of developers writing applications (apps) that in turn improves the quality and functionality of the software and eventually enhances its competitive advantage. Another example is that of the retailer Tesco. Tesco's success in the past decades has been attributed to the demand side strategy that focuses on customers. Tesco collects customers' consumption behavior information from its loyalty card, called “Clubcard” and then categorizes them into around 5000 subgroups. These form the market

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segments ranging from “Tesco Value” to “Tesco Finest”. Tesco’s strategy to focus on people enhances its consumers’ utility and in turn gains customer loyalty and thus competitive advantage.

In this paper, we develop a model to analytically test whether it is really beneficial for a firm to follow a demand side strategy. As the design quality level of a product is one of the most important attributes for a consumer to choose a product, it is important for the firm to design and offer a product with the optimum level of quality. Higher quality will increase the utility of the product and attract more customers. On the other hand, offering a product with a higher level of design quality will be costlier, as the cost of the product would increase with the design quality level (Mukhopadhyay and Kouvelis, 1997). Higher cost, in turn, will result in higher prices which would deter some customers from buying the product. This implies that an optimal quality level exists. Our paper is concerned with the interaction between quality and price in a duopoly. We first derive the optimum policies in a benchmark case where both firms follow the traditional policies of maximizing their own profits. Next, we derive a model where one of the firms, in turn, follows a demand side strategy which maximizes the sum of its own profit and the consumers’ utility. We compare the profitability of the firm that follows the demand side strategy with that in the benchmark case where no demand side strategy is followed.

This paper is organized as follows. In Section 2, we briefly review the relevant literature. In Section 3, we develop our duopoly model. In Section 4, we solve the benchmark case to obtain optimum policies. The demand side strategy model is developed in Section 5 which is then compared with the benchmark case. In Section 6, we extend our model to study a Stackelberg price leadership game case. Section 7 concludes the paper highlighting managerial insights and further research directions.

## 2. Literature survey

Operations management literature is very rich in research on quality issues. The effect of product quality in increasing product demand is well established. Garvin (1987) develops a unifying notion of product quality dimensions. Fine (1986) has established that, in case of quality of conformance, high quality and low cost can be achieved at the same time. This, however, contradicts the then prevalent notion mostly advocated by Juran’s economic conformance model which says that a quality-cost tradeoff would result in an optimum quality level that is less than full conformance. Fine also shows that these two notions are not necessarily inconsistent. Kouvelis and Mukhopadhyay (1995) have developed the design quality strategy (as opposed to conformance quality) over the product life cycle. They build a control theoretic model to support the strategic planning process for design quality and price. Optimal design quality in a duopoly is developed in Mukhopadhyay and Kouvelis (1997) where the competition is modeled as a two-player non-zero sum noncooperative game.

Recently quality literature is also looking into reverse logistics operations. Mukhopadhyay and Setaputra (2007) develop a profit-maximization model to jointly obtain optimal policies for the product quality level and the product return policy over time. Mukhopadhyay and Ma (2009) address this issue of a hybrid system where both used and new parts can serve as inputs in the production process to satisfy an uncertain market demand. The quality level of the acquired used parts is uncertain. A model is then developed to obtain the production and procurement decisions in the face of this uncertainty.

As mentioned earlier, strategy literature is reexamining the RBV strategy, which is concerned with “value capture” and focuses on demand side strategy. In this stream, Adner and Levinthal (2001) study the effect of consumer demand on technological innovation.

Empirical evidences show that a consumer-oriented strategy helped US firms to strengthen competences and thus build up long term competitive advantage in many industries, including apparel market and computer graphics chip industry (Danneels, 2003, 2004, 2008). Adner and Levinthal (2001), Adner and Zemsky (2006) and Chatain and Zemsky (2007) demonstrate that consumer heterogeneity offers the viability of the demand-side strategies and value-creation. Value creation strategies focusing on consumers have been further studied in Zander and Zander (2005), Priem (2007), and Adner and Snow (2010). Ye et al. (2012) show how a firm can adopt a strategic move like diversification to create the advantage of consumer value creation. Adner and Snow (2010) show that if managers read consumer heterogeneity effectively, and make consequent differing decisions, it may lead to firm heterogeneity. This stream of research also shows that it is not necessary for a firm to essentially use superior resources for sustainable advantage, as consumer focused demand side strategy can create sustainable competitive advantage (Arora et al., 2009; Jonsson and Regnér, 2009; Madhok et al., 2010).

## 3. The model formulation

We consider a duopoly where two firms are competing on price and quality. The products are distinct in quality and price, but are substitutable. We denote the quality level of the products by  $S_i$  and price by  $p_i$ ,  $i = h, l$ . We assume that one of the firms is a higher quality firm charging higher price. Therefore, we have,  $S_h > S_l$  and  $p_h > p_l$ .

Let  $\theta$  be a parameter that denotes the taste of consumers for quality, which can be interpreted as the marginal rate of substitution between income and quality. Here we follow the concept given in Choi and Shin (1992) which assumes that consumers are distributed uniformly over the interval  $\theta \in [v-1, v]$  where  $v \geq 1$ , being uniformly distributed with unity density. The consumer is indexed by the parameter  $\theta$ , and has the following utility function:

$$u_\theta = \begin{cases} \theta s_i - p_i & \text{if the customer buys from firm } i \\ 0 & \text{otherwise} \end{cases}$$

This utility function is the one as described in Tirole (1988, pp 96–97). A consumer will prefer a higher quality product if prices are the same and a consumer having a higher value of  $\theta$  is willing to pay more for a higher quality product.

### 3.1. Demand functions

As mentioned, all customers are uniformly distributed along the interval  $\theta \in [v-1, v]$ . The consumer whose  $\theta$  is so low that the corresponding utility is  $u \leq \theta S_l - p_l = 0$  will not buy. So, a customer will buy from the lower quality firm (Firm  $l$ ) only if his  $\theta \geq p_l/s_l$ . Similarly, a customer is indifferent between the two products when  $\theta S_l - p_l = \theta S_h - p_h$ . This gives the cut-off  $\theta$  as  $\theta = (p_h - p_l)/(S_h - S_l)$ . Any customer having a  $\theta$  greater than this cut-off value will buy from the higher quality firm (Firm  $h$ ). Given this and the fact that  $\theta$  is uniformly distributed with an upper bound of  $v$ , the demand functions are

$$\begin{aligned} q_h &= 10 \left( v - \frac{p_h - p_l}{S_h - S_l} \right) \\ q_l &= 10 \left( \frac{p_h - p_l}{S_h - S_l} - \frac{p_l}{S_l} \right) \end{aligned} \quad (1)$$

Note that we use a multiplier of 10 to scale it for tractability purposes.

### 3.2. Profit functions

The cost of offering one unit of item is dependent on the quality of the item. Following literature (see Mukhopadhyay and Kouvelis,

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