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**Enablers, Outcomes, and Effects of Product Bundling:
Towards an Analytical Model**

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Abstract

Product bundling consists of “the practice of package selling”. This practice has been analysed by economic and marketing scholars but managerial scholars have devoted very little attention to this topic. The present paper reviews the literature on such type of offer and present an analytical model that can be used to analyse the managerial implication of the product bundling practice. The enablers, the outcomes and the implications on firms’ capabilities of such practice are discussed.

Keywords: Product Bundling, Boundaries of the Firm.

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1. Introduction

Product bundling consists of “the practice of package selling” (Adams and Yellen, 1976: 475). This practice, mostly studied by economists and marketing scholars, has significant implications for monopoly power, level of welfare and marketing strategies. We encounter this practice every time we buy a saver ticket for the bus, a combo-meal in a restaurant, or software with technical support. Through product bundling firms can offer a menu of different bundles aimed at different market segments, making traditional price discrimination more powerful. In recent years, product bundling has gained in importance because, especially in the capital product industries, firms are moving towards the provision of integrated solutions that consist of services and products sold in a bundle and delivered as a unique solution (Davies, 2001). Despite its growing importance, however, very little research has been carried out to analyze the factors that lead firms to adopt this strategy (Davies, 2001; Galbraith, 2002; Oliva and Kallenberg, 2003; Wise and Baumgartner, 1999). The consultancy literature, on the other hand, is full of reports that concentrate on the benefits that this choice entails for firms (Cerasale, 2004; Foote et al., 2001; Johansson, Krishnamurty and Schlissberg, 2003).

The aim of this paper is to develop an analytical model for analyzing the factors that enable firms to adopt product bundling, the outcomes deriving from the adoption of such a strategy, and the effect that a bundled offer has on firm boundaries and capabilities. The research attempts to address in this paper the following questions: What objectives are achieved with product bundling? What are the advantages that a firm seeks by using a bundling strategy? What are the situations in which is it profitable for a firm to offer a bundled product? What are the implications of this strategy on firm boundaries and capabilities? The chief contributions of this paper are: (1) an examination of extant economic and marketing literature on product bundling, (2) the integration of insights gained from this literature into a comprehensive framework and single out implications for scholars and practitioners, (3) drawing some indications for further research.

The paper is organized as follows. The next section reviews the existing literature on this subject. The third section develops a framework within which to analyze product bundling and develops propositions on the managerial implications of product bundling on firm boundaries and capabilities. The fourth section presents the conclusions of the paper and derives implications for empirical research.

2. Literature review

2.1 Defining product bundling

In their seminal work, Adams and Yellen (1976) defined product bundling as “the practice of package selling”. The literature distinguishes different typologies of bundling: pure and mixed bundling (Adams and Yellen, 1976), product and price bundling (Stremersch and Tellis, 2002), mixed-leader bundling and tie-in-sales (Simon, Fassnacht and Wubker, 1995). This section analyzes each of these typologies.

Adams and Yellen (1976) studied the difference between pure and mixed bundling as follows. Pure bundling refers to a strategy in which only a bundle of items or components is available for purchase. In other words, buyers must purchase the bundle, since they do not have the option of purchasing individual components. Therefore, whenever a firm sells products only in a package and not separately, it adopts a pure bundling strategy. In contrast, mixed bundling gives buyers the option of purchasing either the bundle, or any or all of the individual components. Hence, whenever the products are sold in a package as well as separately, a mixed bundling strategy has been adopted. A mixed bundling strategy refers also to an offer of more models or packaging forms of the same product. That is, when a firm sells the same products in different sizes, for instance small and large packages of beer, biscuits or soap, it practices mixed bundling (Adams and Yellen, 1976).

Stremersch and Tellis (2002) pointed to the difference between product and price bundling. Price bundling is “the sale of two or more separate products in a package at a discount, without any integration of the products. Because the products are not integrated, the reservation price for the price bundle is, by definition, equal to the sum of the conditional reservation prices of the separate products” (Stremersch and Tellis, 2002: 30). The motivation for the customer to buy the bundle is the discount offered, because bundling itself does not create value. Examples provided by Stremersch and Tellis (2002) are: a set of luggage items, a six-pack of beer, or a combo meal. On the other hand, product bundling is “the integration and sale of two or more separate products or services at any price” (Stremersch and Tellis, 2002). In this case the bundle offers higher value added to the customer and the reservation price for the bundled product can be higher than the sum of the reservation prices of each product. Value added emerges due to compactness (e.g. integrated stereo systems), seamless interaction (e.g. PC systems), and enhanced performance (e.g. personalized dieting and exercise programs).

Simon, Fassnacht and Wubker (1995) define mixed-leader bundling as follows. A mixed-leader bundling strategy consists of bundling two or more products, where one of these is a leader product, priced high and innovative, and the other is priced low and mature. To sell the first at a profitable price, a firm usually gives a discount for the second product. Drugs are often sold to hospitals in a similar manner in Germany or to the Health Maintenance Organization in the USA (Simon, Fassnacht and Wubker, 1995). Another case studied by the authors is represented by the *tie-in sale*: the buyer of the main product (tying product) agrees to buy one or several complementary products (tied products) – which are necessary to use the tying product – exclusively from the same supplier. Often the tying product is a durable (e.g. a machine, a copier, a computer) while the tied products are non-durables like toner, paper, etc. The main benefit for the supplier is that it can extend its monopoly market from the tying product to the tied product. IBM adopted this strategy during the 1930s: IBM had a semi-monopoly for the tabulating machine and, in order to extend its power to the punched cards, forced customers of the

tabulating machine to buy also the punched cards (Simon, Fassnacht and Wubker, 1995).

2.2 Cost saving

The practice of bundling offers the opportunity to obtain cost savings (Adams and Yellen, 1976; Bakos and Brynjolfsson, 1999; Salinger, 1995; Whinston, 1990). A firm can reduce costs in production, transaction and information exchange (Adams and Yellen, 1976). In the production process of bundled products, it is often possible to obtain scale efficiencies (Bakos and Brynjolfsson, 1999). Because of economies of scale, it is easier to predict customer evaluation for the bundles than for the products sold separately. Thus, it may be simpler to plan the production process, thereby achieving greater economic efficiency.

The economies of joint sales enable a firm to reduce transaction costs. Through product bundling, a firm sells only one bundle rather than more items, so the cost of transacting diminishes. Information costs, as all expenditures that a firm must sustain to inform customers and communicate with them, such as advertising campaigns, can be cut. By selling more products together, the costs of information will decrease, obtaining important scale efficiencies in this area as well.

Bakos and Brynjolfsson (1999) studied the offerings of very large bundles of products, which have historically been considered unprofitable and hence uncommon. These authors showed that,

“Because of the power of the predictive value of the bundling, a multi-product monopolist of information products may achieve higher profits and greater efficiency by using a bundling strategy than by selling the products separately. (...) an information product that is unprofitable if sold separately could become profitable when sold as a part of a larger bundle” (ibid.: 1625).

With the advent of the digitalization of products, whose production is characterized by very low marginal cost, making bundles of thousand of products becomes a profitable strategy. This is the case of the on-line newspaper or cable television. The costs of including an additional news store is positive as is the cost of another TV channel, but because the costs of getting the individual to the site or the cable to the home is a fixed cost, the addition of more content provides a means of increasing demand (subscribers) and thus amortising the additional costs of content over more subscribers. In this way, they can achieve cost efficiencies through economies of scale.

2.3 Extracting customer surplus

Adams and Yellen (1976) argued that product bundling might be a viable strategy that enabled a firm to extract customer surplus. Conventional forms of price discrimination do not always allow firms to achieve this goal. Customer surplus, instead, can be tactically managed through bundling. In the monopolistic market, bundling permits monopolist to oversupply or undersupply specific products, because it decreases the heterogeneity among customers, who buy both products bundled. Implications of pure and mixed bundling strategies are different. By applying a pure bundling strategy, it is easier to decrease the effective dispersion in buyer tastes. The greater is the customer's average willingness to pay, the larger is the reduction in diversity, permitting a more efficient capture of the customer surplus (Schmalensee, 1984). The mixed bundling strategy offers other benefit: by adopting this type of bundling firms can enjoy the benefits of both pure bundling and unbundling sales. Mixed bundling allows firms to sell at prices higher than those buyers are willing to pay for just one product (Schmalensee, 1984).

Losses in welfare

Economists analyzed product bundling by describing it as an alternative technique for price discrimination used by monopolists. Stigler (1968) studied the strategy of film distributors that sold bundlings of assorted movies to

exhibitors. He showed that a bundling strategy could increase the seller's profits when customer valuations for the two products were negatively correlated. Research in economics also focused on the losses in welfare generated by the practice of bundling and demonstrated that bundling can be inefficient by Pareto standards (Adams and Yellen, 1976; Salinger, 1995).

“On the one hand, bundling could lead monopolists to oversupply specific commodities: equilibrium output could fall on either side of the ideal output. On the other hand, bundling could lead monopolists to sell whatever output is produced to the wrong people, in the sense that potential gains from trade among customers would exist in equilibrium” (Adams and Yellen, 1976: 477).

These consequences are more evident under the pure bundling hypothesis. If a monopolist sells two products packaged together, a customer is forced to buy two products in order to get the one she would like. In this case, the monopolist may oversupply certain products. Bundling can also force people to buy quality. Not all customers are interested in quality but firms can bundle quality with other characteristics that customers wish to have. Therefore, customers pay for the quality even if they are not interested in it. Compelling people to buy products in which they are not interested or forcing to pay for quality has an important consequence for public policy, through generating losses in welfare. These losses cause significant implications for public policy analysis for two reasons. First, society may not be aware of the extent of the losses in welfare. Second, even if it is aware, policy makers may fail to pinpoint the losses generated for the application of this strategy (Adams and Yellen, 1976).

2.4 Modification of market structure

Studies of bundling indicate that bundling could potentially alter market structure (Carbajo, Meza and Seidmann, 1990; Whinston, 1990). By pursuing a bundling strategy, in a market characterized by monopolistic competition, a firm may differentiate its products from those of its rivals, as imperfect

competition offers strategic incentives to bundle. In order to react to this strategy, competitors may charge higher prices or decide to cut prices. If they cannot react, sometimes they may be forced to exit from the market.

“The loss for customers arises because, when tied market rivals exit, prices may rise and the level of variety available in the market necessary falls. Indeed (...) tying that leads to the exit of the monopolist’s tied market rival frequently leads to increases in all prices, making customers uniformly worse off” (Whinston, 1990: 839).

If the modifications in the market structure consist of firm exits, the effects are likely to be losses for the customer. The bundling potentiality of altering the market structure can be profitable for the firm but:

“The particular circumstances in which tying is a desirable strategy for the monopolist, however, depend in part on whether he is able to make a precommitment to tie. In many circumstances this is indeed possible” (Whinston, 1990: 839).

2.5 Customer perception

The marketing literature focuses on the effects of product bundling on customer perceptions. Marketing scholars have studied the characteristics of product bundling for affecting the buying decision (Estelami, 1999; Gultinan, 1987; Hanson and Martin, 1990; Herrmann, Huber and Coulter, 1997; Lawless, 1991; Yadav, 1994, 1995; Yadav and Monroe, 1993). Herrmann, Huber and Coulter (1997) demonstrated that customers prefer the pure bundle rather than the mixed one. Based on a study conducted in Germany in 1994 in the automobile sector, they showed that customers perceived the pure bundle as providing more value for money than the mixed bundle, so that the customer’s intention to buy produces greater results for pure bundling than for mixed.

Lawless (1991) pointed out that increasing the number of items in a bundle makes it more difficult for competitors to duplicate the bundle. Therefore, product bundling can be used as a strategy for product differentiation.

Herrmann, Huber and Coulter (1997) found that increasing the number of items, the supplier could raise the intention to purchase. Nonetheless, it is important to consider just how many bundle components customers can process into their decisions. Customers process information about a set of attributes, until the amount of information exceeds their cognitive capacity. This line of reasoning suggests that more components in a bundle are better until the number exceeds processing capacity, so that information overload occurs and purchase intentions decrease.

Another important characteristic that may influence the purchasing decision is the complementarity of the products bundled. Research that has addressed this issue has shown that in very related bundle components, the purchase intentions can be greater than in either moderately related or unrelated components (Gaeth et al., 1990; Herrmann, Huber and Coulter, 1997). Customers evaluate bundles consisting of functionally related products differently from bundles consisting of functionally unrelated products. With the expression “functionally related products” we shall refer to the type of bundles composed by goods that present some degrees of complementarity, e.g. television and DVD-player. Usually the consumers perceive a bundle composed of complementary items as more favourable than a bundle composed of functionally unrelated attributes. Hence, discounts offered can also depend on the heterogeneity of bundled products. The lower is the heterogeneity, the lower will be the discount (Estelami, 1999).

2.6 Pricing the bundle

For a firm with a broad line of complementary products, product bundling can be used as a price strategy alternative to the more traditional follow-the-leader and cost-based strategies (Guiltinan, 1987). Marketing scholars have studied how the customer evaluates price in the bundles (Estelami, 1999; Guiltinan, 1987; Hanson and Martin, 1990; Yadav, 1994, 1995; Yadav and Monroe,

1993). Estelami (1999) pointed out that customers may have problems in evaluating bundles of products. Customer evaluation may be biased. Sub-optimal decisions and inaccurate understandings of the magnitude of savings offered in bundles are likely outcomes.

The perception of prices is sometimes inaccurate because customers may have problems in conducting mental arithmetic. Research has shown that conducting mental arithmetic may cause psychological stress (Estelami, 1999). Therefore, in judging bundles, customers resort to simplified strategies in order to reduce their cognitive effort. Yadav (1994) showed that, in assessing the quality of a product bundle, customers utilize a process called an “anchoring-and-adjustment heuristic” (p.542). Customers initially focus on one component in the bundle, assess its quality (anchoring), and proceed to examine the remaining components and subsequently modify their initial assessment (adjustment). As a result, customer judgments of a bundle may be biased toward the evaluation of the first bundle item presented to them.

Yadav and Monroe (1993) also studied the importance of savings in customer evaluations of bundled products. They argued that buyers who intend to purchase a bundle, first attend to savings offered directly in the bundle, and subsequently notice savings on the individual item. An important key finding of their research was that one large saving is better evaluated than two smaller ones. In order to price product bundling, it is important to consider that firms face different customer segments. Sometimes savings applied on the bundle and not on the single item attract two types of customers: the customers that are interested in the bundle and the ones that are interested only in the item.

3. Model and proposition development

In the previous section a systematic review of the extant literature about product bundling has been offered. In the following section, the concepts previously discussed have been used to state some prepositions that

summarize the more relevant implication of product bundling for managerial scholars and practitioners.

3.1 Enabling product bundling

Complementarity

Changes in the firm's competitive environment can create new complementarities among products. "A functional complementarity exists between two stand-alone products when these products are capable of being used together and, as a result, the demand for each product is greater in the presence of the other product than it would be in the other product's absence" (Spiller and Zelner, 1997: 563-4). Changes can relate to technology or to regulation. Technological change may render a product capable of being used in conjunction with others. For instance, compact disc players, which were initially utilized only as listening devices, started being used also as applications in the computer industry (Spiller and Zelner, 1997). Regulatory changes do not create complementarities per se, but they allow firms to enter new markets that may bear product complementarities. This automatically enlarges firms' strategic options (Spiller and Zelner, 1997).

New product complementarities create marketing new opportunities that in turn may become the basis of new economic rents for firms. Firms can exploit these new complementarities by adopting a product bundling strategy. For a correct implementation, firms must consider the relationships between "product complexity" and the "level of sophistication" of the customer (Spiller and Zelner, 1997). Product complexity "refers to the level of training or experience necessary for a user to comprehend and exploit the full range of functions that a product can provide" (Spiller and Zelner, 1997: 5); in other words, the level of experience that a user needs in order to utilize all the functions of the products. Customer sophistication is "the actual level of such experience that a product user has in relation to the products in question" (Spiller and Zelner, 1997). This refers to the buyers' requirements for product performance and their knowledge of technical specifications. When product

complexity is low or most customers are sophisticated, offering a product bundle is not a viable strategy because the additional demand generated by complementarity manifests itself automatically. Instead, when product complexity is high and customers are unsophisticated, offering a product bundle is feasible since customers are not competent enough to assemble such systems themselves.

Proposition 1: When product complexity is high and customers are unsophisticated product complementarity makes the product bundling strategy economically viable

Heterogeneous capabilities

According to resourced-based theories, the firm is a collection of heterogeneous capabilities (Penrose, 1959). Capabilities represent the knowledge and experience of specific technologies and markets (Penrose, 1959). Capabilities emerge from the coordination of a firm's resources and are utilized to formulate new products in order to meet customer needs (Grant, 1998). They are developed and refined over time and, given their intangible nature, they can be deployed over a broad range of output. New product complementarities constitute an opportunity for firms to deploy their heterogeneous capabilities through product bundling. Thermo Electron Corporation, a firm that offers products and services for research laboratories, constitutes a case in point. Thermo launched a project labelled "The New Lab Initiative" which encompasses three types of offerings: product bundles, comprehensive solutions, and turnkey solutions. The product bundles are designed for specific lab types and specific applications such as microbiology, molecular biology, biochemistry, quality assurance, and quality control. The key feature of this offering is that it takes advantage of Thermo's expertise in product selection, specification, and installation. Customers can have a coordinated purchase of integrated training, service, and support. When a researcher is responsible for setting up a new molecular biology lab, he or she may work with a single Thermo system specialist to choose from a broad array of Thermo product lines. The benefits for the researchers are a single

point of contact, a fully integrated and installed system, and a single service and maintenance arrangement (Studt, 2003). This case indicates that mastering heterogeneous capabilities enable the firm to offer bundled products and therefore to develop a new basis for its competitive advantage.

Proposition 2: Mastering heterogeneous capabilities enables firms to offer bundled products

Modular bundling

Modularity is a general concept that refers to “the degree to which a system’s components can be separated and recombined” (Shilling, 2000: 312). In a modular product, component interfaces are standardized and each component is allocated a specific function to be performed with respect to the given interfaces. Modularity therefore enables units of production to work independently within such pre-defined interfaces (Baldwin and Clark, 2000). Each component can thus be designed and improved independently, so modularity enables a greater division of labour across firms (Arora, Fosfuri and Gambardella, 2002). By exploiting modularity firms may achieve greater flexibility in offering quick answers to the market through the introduction of new products, extension of their product lines, and fast product upgrading.

Modularity enables firms to bundle products more easily. If the standard interfaces among components have been defined, firms can bundle these components in different ways. In this case the concept of ‘bundling’ is extended into the integration domain in ways that are relatively new. An important feature of Baldwin and Clark (2000) is that they base their argument on the computer industry where taking advantage of differential rates of technical advance is a particularly important technological advantage. This is one reason why IBM was able to resist for a long time the ‘plug-compatible’ manufacturers and is one explanation for Dell’s success in the modern PC market – it is better at co-ordinating the component producers than its rivals.

Proposition 3: Product and organizational modularity renders the offer of bundled products easier to achieve

3.2 Outcomes of product bundling

Scale economies

Scale efficiencies are reductions in cost per unit due to an increase in the scale of production. By creating a product bundle and increasing the number of items in the bundle, firms may obtain cost savings through scale efficiencies in transaction and information costs (Bakos and Brynjolfsson, 1999; Coase, 1960; Demsetz, 1968; Williamson, 1975). Negotiation and transfer of information are not costless, and selling two products in a pack can produce savings. Spiller and Zelner (1997) distinguished two types of transactions: core and support transactions. Core transactions are all the transactions necessary “to assemble the bundle upstream of the retail interface” (Spiller and Zelner, 1997: {p?}). Support transactions refer to the provision of compatible services such as billing, marketing, customer support and product maintenance. The practice of product bundling may help reduce associated costs of support transactions as the following example shows. One of the largest providers of elevators in the world, Otis Elevator, adopted this strategy to reduce the cost of customer support and product maintenance. One of the key features of Otis’s strategy was to promote service and maintenance contracts at the time of installation; so elevators and service contracts were sold as a bundle. By ensuring that an increasing number of buyers of elevators purchase the service plan together with the elevator, Otis obtained an increase in the number of service contracts sold. Otis provided highly knowledgeable service teams twenty-four hours a day so that it achieved scale economies that reduced the cost associated with customer support and product maintenance (Eppen, Hanson and Martin, 1991).

In some industries, the costs of providing additional services or products are so low that it is more convenient to sell larger sizes of the products as a bundle than a single product. In the television industry, for example, the

marginal cost of providing an additional channel is very low and it is common for the firm to offer many channels in the basic contract (Spiller and Zelner, 1997). For example, British Sky Broadcasting, the UK's largest operator of digital television platforms, in 1993 launched as a basic pack a bundle of 14 channels. By 2003 the Basic Value Pack gave access to 5 TV channels and 11 audio channels, the Sky World Pack offered 94 TV channels and 11 audio channels, while the price of the Sky World Pack was slightly higher than three times the price of the Basic Value Pack (Sky Fact Book, 2003).

Proposition 4: Product bundling helps firms achieve economies of scale

Scope economies

A firm achieves economies of scope every time joint production is more convenient than separate production. "Economies of scope exist when for all outputs y_1 and y_2 , the cost of joint production is less than the cost of producing each output separately. That is, it is the condition, for all y_1 and y_2 , $c(y_1, y_2) < c(y_1, 0) + c(0, y_2)$ " (Teece, 1980: 226). Product bundling constitutes a way to exploit economies of scope as long as a firm's production process lend itself well to joint production (Eppen, Hanson and Martin, 1991; Hanson and Martin, 1990). Teece (1980) argued that shared know-how represents an input that can be used in a wide variety of applications. Firms involved in life science may well extend the use of their genetically modified technological capabilities in producing technologically related products, such as herbicides (Goldsmith, 2001).

Proposition 5: Product bundling helps firms achieve economies of scope

Customer surplus

By creating a product bundle, firms may exploit customer demand that would otherwise remain latent. Firms may try to utilize latent demand: (i) using the functional complementarity of two or more separate products (Spiller and Zelner, 1997), (ii) bundling different products to fulfil different tastes (Schmalensee, 1984; Yadav and Monroe, 1993), or (iii) using monopoly power from one product to sell another in a bundle (Adams and Yellen, 1976; McAfee, McMillan and Whinston, 1989).

The first case occurs when environmental change creates new opportunities to use products together. This is the case for such products as cable modems, computers, and television. Many customers may find it hard to buy the specific products separately and join them up to work together (Spiller and Zelner, 1997). Because this is a complex task, customers may decide not to buy the products. Firms can exploit this particular demand by selling the products together in a ready-to-use fashion. By adopting this specific strategy, firms capture the additional demand generated by such complementarities. This strategy was adopted by the computer retailer Vobis, now the market leader in Germany, which always offered bundles linked to computers (Simon, Fassnacht and Wubker, 1995). In this case, the complementarity between products is used to create a product bundling finalized to exploit latent demand. Exploiting latent demand means convincing customers to buy a product by increasing the size of the market and the consumption for that product.

This strategy is relevant for new products especially in high-technology environments. In these markets, rapid penetration may entail a rapid diffusion of product and hence a potential for monopoly. Indeed, in high-technology sectors a rapid diffusion of the new product entails imposing the related standards. The application of this strategy aims to facilitate the trial of new products, making the distribution of knowledge easier and increasing the visibility of the product and of the brand. Microsoft constitutes an emblematic example since it sells its software packages as bundles in order to maximize its market penetration. Microsoft's last operating system, Windows XP, has been a bigger bundle than Windows 98, tying together two Internet

applications (Internet Explorer and MSN Explorer), Media Player and an identification verification application, Passport (Rogers, 2001).

Proposition 6a: By exploiting product complementarities, firms through bundling can extract customer surplus

Schmalensee (1984) showed that pure bundling typically reduces the diversity of the population of customers, thereby enabling sellers to extract more customer surplus. In addition, research in marketing confirms that customer evaluation of a bundle of products has a probability distribution with a lower variance per product compared with the evaluation of individual products (Stremersch and Tellis, 2002). The larger the number of products bundled, the greater the typical reduction in the variance (Yadav and Monroe, 1993). A classic example of this strategy is offered by credit card services offered by financial institutions. Typically, a credit card includes a wide variety of services. Not all the subscribers are interested in all of these services. Some customers may evaluate the possibility to have car rental insurance, others a purchase protection plan, but as a result, all buy the same card. In this case the goal for the firm is to fulfil different tastes, offering a bundle of unrelated services that are attractive for a larger number of people. This strategy was introduced for the first time by American Express in 1966, followed by Visa and MasterCard (Eppen, Hanson and Martin, 1991).

Proposition 6b: Firms through bundling can cater for different customer needs and extract customer surplus

The third case occurs when a monopolist sells its products bundled with others. Through product bundling, this strategy is more profitable than simply monopoly pricing because monopolists can oversupply or undersupply specific commodities (Adams and Yellen, 1976). The implication for the customer is that he/she can be forced to buy more or fewer products than would have been bought without a bundled offer. As a consequence, monopolists extract customer surplus (McAfee, McMillan and Whinston, 1989). An example of this strategy is the Microsoft practice of bundles Explorer into

the operating system in order to prevent other companies from offering Internet browser technology as a 'window' onto the Internet. In doing this it extends its market power over operating systems to the market for computer browsers and extracts consumer surplus.

Proposition 6c: Firms can use monopoly power of one product to sell another in a bundle and extract customer surplus

3.3 Effects of product bundling on the boundaries of the firm

The implementation of a product bundling strategy may have implications for the boundaries of the firm. In order to adopt a product bundling strategy, the planning of this strategy must take into account the firm's capabilities. The main issue when a firm decides to offer product bundling belongs to the analysis of the required and owned capabilities. Capabilities are complex combinations of assets, processes and people that firms use to transform inputs to outputs (Nelson and Winter, 1982). In order to offer a bundling, the firm requires a specific set of capabilities that can be already owned or that have to be developed *ex-novo*. As resource-based theories have pointed out, firms are different because the firm's mix of capabilities is heterogeneous (Penrose, 1959). According to this theory, firms are a collection of productive resources developed over time. New capabilities cannot be built up quickly (Grant, 1998): the path pursued by the firm dictates the actual accumulations of capabilities, i.e. history matters (Dierickx and Cool, 1989).

If the production necessitates capabilities already owned or used in the past, it will be easier to start the production in-house. In this situation, it is important to identify the routines useful for the purpose and exploit them. When a firm does not possess the required capabilities, the range of options available is:

- (1) develop capabilities in-house;
- (2) use the market to buy services and products to make up the bundle;
- (3) develop inter-firm collaboration.

The first option may take very long and the results are unpredictable. Developing capabilities is an enduring and painstaking process, entailing uncertainty and trial and error; the probabilities of failing are very high. The capability building process is strongly related to a firm's past accomplishments (Grant, 1998; Miyazaki, 1994). The second option depends largely on the cost of the use of the market. The transaction cost approach argues that firms internalize some phases of the productive process when the cost of the internalised operations is lower than the cost of organising and transacting with the market (Coase, 1960; Williamson, 1975, 1985).

Thus, the decision is influenced by several factors. The economic literature identifies five main factors: (a) interconnections of stocks of capabilities, (b) level of codification and transferability of new knowledge and routines, (c) importance of asset specificity, (d) length of relationship and uncertainty, (e) frequency of transactions (Coase, 1960; Dierickx and Cool, 1989; Teece, 1985; Williamson, 1975, 1985). According to the specific combination of these factors, firms choose the most appropriate option to offer a product bundling. Because of the combination of these factors jointly influences the decision of the firm, the following analysis will be conducted *ceteris paribus*, considering the other variables as constants.

The firm chooses to develop the capabilities in-house when some conditions are satisfied (Nelson and Winter, 1982). In particular, the first factor refers to the interconnections present between the required capabilities and the stock of capabilities already owned by the firms. As Dierickx and Cool (1989) pointed out, the difficulties of imitating and building capabilities largely depend on the level of knowledge stock of a complementary capability.

Proposition 7a: Firms develop capabilities in-house when interconnections between the required capabilities and the stock of capabilities already owned by the firms are present, ceteris paribus

The second factor is represented by the level of codified knowledge present in the product or in the productive process. Generally, technology transfer

requires symmetry in technological capabilities, and since this symmetry it is not always present, to facilitate the transfer the knowledge can be codified. It is possible to codify only explicit component and if the tacit component is relevant, knowledge transfer implies greater difficulties. In this case the transfer requires personal and close contacts between the parties (Teece, 1985). When the knowledge cannot be easily codified, the difficulties of transacting increase and the use of the market becomes more difficult. In this case inter-firm collaboration is more appropriate, as we will see later in this section. On the contrary, when the knowledge underpinning the capabilities is highly codified and easily transferable, to control the transactions does not require a large effort from the firm and the use of the market is the preferred option (Teece, 1985).

Proposition 7b: Firms use the market if knowledge is highly codified and easily transferable, ceteris paribus

The choice whether to internalize some assets or not also depends on the level of asset specificity that the transactions require. The expression “asset specificity” refers to resources used and invested by the parties in a specific transaction (Joskow, 1993; Williamson, 1975, 1985). Dedicated assets can be physical or human, and refer to the investments that suppliers and buyers make with the prospect of selling a significant amount of products. As Williamson pointed out: “transactions that are supported by investments in durable, transaction-specific assets experience ‘lock in’ effects, on which account autonomous trading will commonly be supplanted by unified ownership (vertical integration)” (Williamson, 1985: 53).

Proposition 7c: Firms use the market if the level of asset specificity required by the transactions is low, ceteris paribus

As explained in Williamson (1985), an important characteristic of human behaviour is opportunism. This term refers to a particular type of uncertainty, called behavioural uncertainty, related to “the general propensity of a population to behave opportunistically in advance” (ibid.: 58). Behavioural

uncertainty can be considered as the probability that the firm will have to deal with opportunistic human action. According to this view, the uncertainty has limited consequences in non-specific transactions and short-term relationships but a big impact on long-term relationships. For this reason, the length of the relationship influences the use of the market (Coase, 1960; Williamson, 1975, 1985), as Teece pointed out:

“Markets tend to be more efficient than the firms in handling transactions between a large number of buyers or sellers. Markets will be at a comparative disadvantage when transactions are subject to a high degree of uncertainty and when they consist of long-term exchanges of complex and heterogeneous products between comparatively small number of traders” (Teece, 1985: 23).

Proposition 7d: Firms use the market if they have a short-term relationship with their counterparts, ceteris paribus

The last factor that influences the option to choose concerns the frequency of transactions; more precisely we should focus on the relation between creation of a specialized governance structure and the frequency of the transactions. As the transaction cost economics pointed out, “specialized governance structures are more sensitively attuned to the governance needs of non-standard transactions than are unspecialized structures, *ceteris paribus*” (Williamson, 1985: 60). The cost of a specialized governance structure is greater than the costs of an unspecialized structure, so the volume of the transactions plays a central role in deciding whether to adopt an ad hoc governance structure or not. So, in the case of a one-off transaction, the use of the market is preferred because it is less expensive. This is the rationale underlying the decision to use the market whenever the transactions are not frequent (Coase, 1960; Williamson, 1975, 1985).

Proposition 7e: Firms use the market if the frequency of transactions is low, ceteris paribus

The third option to acquire capabilities for bundling is represented by inter-firm collaboration. According to Spiller and Zelner (1997), the purpose of product bundling may require an organizational structure that is more hierarchical than the structure represented by market governance, even in the absence of asset specificity. This is because the transactions required by product bundling create additional contracting hazards that are more efficiently mitigated by hierarchical structures (Spiller and Zelner, 1997). It is possible to identify three types of contractual hazards: (a) real-time responsiveness, (b) performance measurement, (c) appropriability.

The creation of a bundle of products requires coordination between the providers of different goods and services. The relevance of the coordination changes according to the nature of the bundle sold. If the need for real-time responsiveness is high, a market structure is not appropriate to manage this type of relationship. The lack of real-time responsiveness may be caused by difficulties in exchanging the knowledge flows that have to support the relationship between the two parties. In this case, a more hierarchical structure may be opportune, so the firms decide to start an inter-firm relationship (Spiller and Zelner, 1997).

Proposition 8a: Firms start an inter-firm collaboration if the need for real-time responsiveness in the provision of services and goods is high

An inter-firm relationship also poses problems in measuring the performance and the contributions of the different firms. *Ceteris paribus*, markets are more able to mediate the single contributions of the different transactions if measurable inputs and outputs are included in the transactions. If this is not so and the content of the transactions is more ambiguous, the cost of measurement increases. The difficulties in measuring increase the possibility of more opportunistic behaviour (Alchian and Demsetz, 1972). Adopting a more hierarchical structure, like inter firm collaboration, reduces this risk in three ways: the shift in incentives (from high- to low-powered) reduces opportunistic behaviour because the parties have less to gain in such a situation. Moreover, the more hierarchical structure can provide better

monitoring to prevent such behaviour. Finally, the integration between the parties causes a better distribution of the measurement costs. Therefore, in such a situation, inter-firm collaboration is more adequate (Spiller and Zelner, 1997)

Proposition 8b: Firms start an inter-firm collaboration if the cost of performance measurement is high

The third case of contractual risk is represented by appropriability hazards. According to Anand and Khanna (1997), with the term appropriability we shall refer to all the mechanisms allowing firms exploit advantages generated by their innovation. In this situation the risk is represented by the possibility that the distinctive capabilities are expropriated by the partners. Transactions may create appropriability hazards because, while each firm's capabilities are difficult to codify in symbolic form, using an inter-firm collaboration will be easier to transfer the capabilities (Teece, 1985). This hazard is more frequent in the types of transactions related to the product bundling strategy because a more substantial degree of contact is presupposed. So, if the level of cooperation and information-sharing among members of different organizations is considerable, the risk of appropriability increases. An inter-firm collaboration mitigates this type of hazard. As Spiller and Zelner pointed out:

“Lower-powered incentives directly reduce the likelihood of expropriation, while administrative controls provide for added monitoring joint activities, and reduced reliance on court ordering decreases the requirements for third-party verifiability” (Spiller and Zelner, 1997: 21).

Proposition 8c: Firms start an inter-firm collaboration if the risk of appropriability hazards is high

In creating an inter-firm collaboration, central relevance is represented by the necessity to build an organizational structure “ad hoc”, a network that helps

partners to communicate with one another. The creation of this network requires dedicated assets. Once dedicated assets are developed, the parties are locked in. A consequence of this situation, quite common in business transactions, is that firms have to develop governance structures that help in preventing opportunism and infuse confidence between the partners (Williamson, 1984).

The choice to start an inter-firm collaboration also implies some risks: the time required to develop the network can be long, and firms can have problems in coordinating their resources due to different cultures and different capabilities. On the other hand, in this way, it is possible to make bundles better integrated and offer a more complete product/service. The products can be more customized, the service offered may be improved, and it should be easier for the firm to respond to customers' needs (Eppen, Hanson and Martin, 1991).

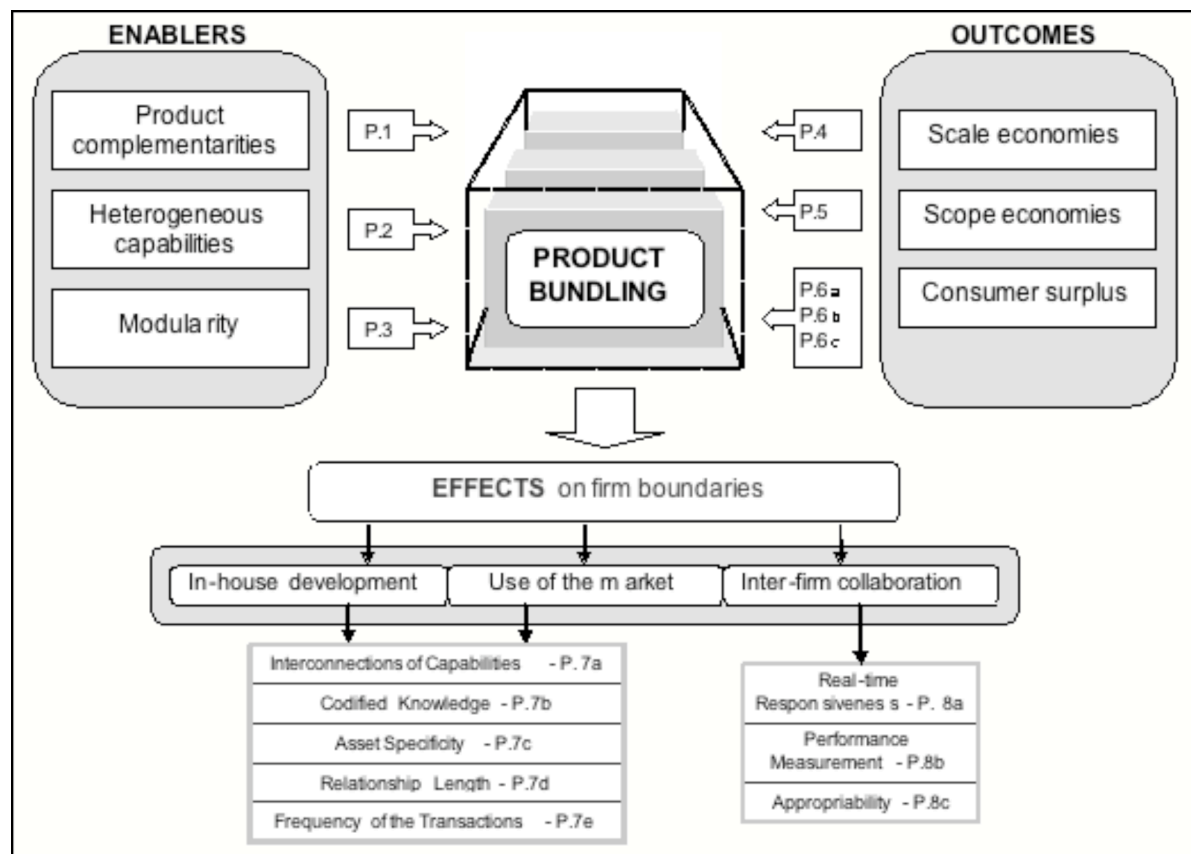


Figure 1

Figure 1 summarizes the characteristics of a product bundling strategy. The graphical representation of the concepts that have been discussed in this paper has to be read as follows: product bundling stands in the centre as the core of the model. On the left three enablers that permit the practice of this strategy are summarized: the existence of product complementarities, the possibility to exploit the firm's heterogeneous capabilities, and the opportunity to use modular architecture of the products. On the right, we have three outcomes of the product bundling strategy: the possibility to reach scope and scale economies and the extraction of customer surplus. At the bottom of the diagram the implications of this strategy for firms' boundaries and three strategic options are summarized: in-house development, use of the market, inter-firm collaboration.

4. Conclusions and directions for further research

The objective of this paper has been to shed further light on the implications for firm strategy of the practice of product bundling. Although this issue has been largely studied by economists for its implications for market structure, monopoly power and the possibility to extract consumer surplus, no management studies have analysed the implications for firms' boundaries and capabilities. This paper intends to build a theoretical framework that can be used to analyse firm behaviour in offering product bundling.

According to the title, this paper has aimed to identify the enablers, the outcomes and the effect of product bundling. This goal is achieved through a systematic review of the literature on product bundling and through the development of an analytical model that aims to summarize the main characteristics of a product bundling strategy and its effects on firm boundaries and capabilities. For each relevant concept there a proposition has been stated that aims to summarize the main key finding. These propositions are presented in the analytical model in Figure 1.

In the paper three categories of enablers that make possible the application of the product bundling strategy have been identified. These are: *product complementarities*, *heterogeneous capabilities* and *modular bundling*. When some of these characteristics are present, product bundling is a viable strategy. The paper also focused on the possible outcomes of the strategy. These are: *scale economies*, *scope economies* and the extraction of *consumer surplus*. These outcomes represent the advantages that firms can reach when applying a product bundling strategy. The aim of this paper has been to offer a model to analyse the characteristics of a product bundling strategy, in which the enablers and the outcomes represent the building blocks of the theoretical contribution.

Changes in the boundaries of the firms are necessary to offer a product bundling. According to resource-based theories, firms have to implement a strategy according to the owned capabilities; if the required capabilities are not possessed, the range of strategic options available is: develop capabilities in-house, use the market to buy services and products to make up the bundle, start an inter-firm collaboration. In order to apply this strategy, boundaries of the firms change (Spiller and Zelner, 1997). In this paper, the issue has been studied through a systematic review of transaction cost economics. Previous works have not paid special attention to this topic, although the relevance of this topic is crucial. The practical implications of this issue are evident: as Galbraith (2002) pointed out, many firms, in order to start offering product bundling, failed because they committed errors in managing these changes. The range of strategic options available is large and the choice between all the possible alternatives can be crucial to assuring the success of the firm.

Product bundling implications can also be studied for strategies to modify the life cycle of the products: in a complementary bundle, according the savings to the product life cycle stage it is possible for the firm to vary the whole product life cycle. In the early stages, sellers can demand high profit margins due to the newness of the product, and the ability to differentiate themselves based on emerging product attributes (Porter, 1985). The increasing competition in the later stages of a product life cycle can force sellers to

reduce prices. Bundling can be used as a competitive strategy to increase demand for all the products present in the firm's lines of business (Monroe, 1990).

Further research should address the importance of product bundling as a new way to offer a new product. A new product bundle may be less risky and less expensive than a completely new product (Eppen, Hanson and Martin, 1991). Thus, this strategy can be used to extend the life cycle of old products and can modify market structures, attracting new customers from competitors (Guiltinan, 1987). This is an interesting issue for innovation studies but such scholars have not devoted their attention to the special features of a bundling strategy as a way to create new products or new product categories.

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