

Exploration and Exploitation on Two Dimensions: Product/Technology and Customer/Market

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Abstract

It is increasingly viewed that in order to have sustained performance and success, firms should engage in two types of innovative activities: exploitation and exploration. However, while focusing on exploration and exploitation concerning a firm's technologies, earlier research has treated exploration and exploitation related to customers and markets rather implicitly. This article pays explicit attention to innovation forms of exploration-exploitation not only on product/technology dimension but also on customer/market dimension. We clarify the potential role of exploration-exploitation on the customer/market dimension and how this combines to exploration-exploitation on the product/technology dimension. Accordingly, we present a two-dimensional matrix implying that in order to have sustained performance and success, a firm should simultaneously engage in different forms of innovation specified in various cells around the matrix – and not to treat the different forms as alternatives with engagement only in one or two.

Keywords:

Exploration-exploitation, innovation, customers, markets

1. Introduction

From the perspective of flexibility and long-term success in an unpredictable world, a central strategic concern for a firm is how much to invest in different types of innovative activities. Two broad types of innovative activities have been suggested: exploration and exploitation. In broad terms, exploitation refers to firm behaviors characterized by efficient use, refinement, and extension of current knowledge and capabilities while exploration refers to firm behaviors characterized by search for, discovery of, and experimentation with new alternatives (Atuahene-Gima, 2005; Cheng & Van de Ven, 1996; March 1991). Although some traditional views imply that exploration and exploitation are competing strategies or activities (see March, 1991; Kyriakopoulos & Moorman, 2004), there is increasing support on the view that a firm's sustained performance and success through organizational adaptation calls for balancing between these two types of innovative activities (Levinthal & March, 1993; Lewin & Volberda, 1999; Kyriakopoulos & Moorman 2004).

In general, there are two aspects to innovations which have been widely recognized since Schumpeter (1934), i.e. (1) the aspect of (new) products/technologies and (2) the aspect of (new) customers/markets. However, the focus in exploration-exploitation literature has been, more or less explicitly, on exploration and exploitation concerning a firm's technologies and technological knowledge and capabilities. Exploration and exploitation related to customers and markets have been treated more implicitly and left with little explicit attention (cf. Smith & Tushman, 2005; Tushman et al., 2002).

In this paper, we aim to fill a research gap by clarifying how firms can practice exploration and exploitation and do this not only on product/technology dimension but also on customer/market dimension. We build on recent exploration-exploitation research implying the significance of the two dimensions (Smith & Tushman, 2005; Tushman & Smith, 2002; Tushman et al., 2002). Concerning the product/technology dimension we build additionally on the notions of product platform and modularity (Jose & Tollenaere, 2005; Meyer & Lehnerd, 1997). Concerning the customer/market dimension, we build additionally on the notions of manifest vs. latent needs and wants of people and organizations (see Kyriakopoulos & Moorman, 2004; Jaworski & Kohli, 2000); inertia of people and organizations (Bozzo, 2002; Hannan & Freeman, 1984); brand awareness and associations (Keller, 1993, 2003), brand loyalty (Jacoby & Kyner, 1973) and brand inertia (Bozzo, 2002; Colgate & Lang, 2001; Zeelenberg & Pieters, 2004); as well as customer relationship management literature.

2. Balancing between exploration and exploitation on two dimensions

Concerning simultaneous exploration and exploitation managed by an organization, Tushman et al. have recently referred to the need to manage portfolios of innovations which are defined along two dimensions, (1) technology and (2) customer/market (Smith & Tushman, 2005; Tushman & Smith, 2002; Tushman et al., 2002).

Along the technology dimension, Tushman et al. (Smith & Tushman, 2005; Tushman et al., 2002) view that an innovation can be incremental, architectural or discontinuous. According to them, incremental innovations involve incremental technical change which refines and extends the existing product through continued exploitation of an existing technological trajectory (see also Dosi, 1982; Rosenkopf & Nerkar, 2001). Architectural innovations add or subtract product subsystems or change the linkages between subsystems (see also Baldwin & Clark, 2000; Henderson & Clark, 1990). Discontinuous innovations involve fundamental technical change in a product's core subsystem (see also Gatignon et al., 2003; Dosi, 1982), triggering cascading effects throughout the product (Tushman & Murmann, 1998).

Along the customer/market dimension, Tushman et al. (Smith & Tushman, 2005; Tushman et al., 2002) view that an innovation may target existing customers, new customers in defined markets (see also Abernathy & Clark, 1985), or emerging markets (see also Leonard-Barton, 1995; Christensen, 1997).

Although Tushman et al. discuss the fact that exploitation and exploration may happen on the two dimensions, i.e. technological and customer/market dimensions, their discussion is still somewhat superficial. They do not clarify what exactly is to be exploited vs. explored on the two dimensions. We clarify this next.

3 Exploration-exploitation on customer/market and product/technology dimensions

3.1 Exploration-exploitation on product/technology dimension

On product/technology dimension, we claim that a firm can engage in exploitation vs. exploration of its (current) products, product platforms, and/or technologies. With product, we refer to an offering with material and service features, produced by the firm. With product platform, we refer to a combination of subsystems and interfaces serving as common components and/or common architecture for multiple products (Jose & Tollenaere, 2005; Meyer & Lehnerd, 1997). With technology, we refer to such knowledge about physical, chemical, technical and/or human factors and their relationships whose application and combination enables the development and production of products and product platforms.

Accordingly, we claim that innovation on the product/technology dimension can take at least the following four archetypal forms, as the level of exploration on the dimension gets higher. First, the organization can exploit its (current) technologies, product platforms, and products, and not explore much anything. Second, the organization can exploit its (current) technologies and product platforms and explore (new) products. Third, the organization can exploit its (current) technologies and explore (new) product platforms and products. Fourth, the organization can explore (new) technologies, product platforms, and products.

With respect to what it is that can be exploited about the different aspects on the product/technology dimension, much of the work on exploration-exploitation is, first of all, based on the basic assumption that an organization can exploit its technologies, or technological knowledge and capabilities to efficiently produce products and develop new (incremental) variations of the products and start their production. Moreover, Tushman and Clark's (Smith & Tushman, 2005; Tushman et al., 2002) notion of architectural innovations implies that technologies can be also exploited to develop and produce subsystems and interfaces, which in turn can be applied to produce products. Indeed, the basic idea in the notion of product platforms, in operations and production management research, is that such subsystems and interfaces can be developed which serve as common components and/or architectures of which different product variations can be efficiently produced, as well as new product variations derived (Jose & Tollenaere, 2005; Meyer & Lehnerd, 1997). With respect to products, product platforms, and technologies, a firm can often exploit also the fact that it has intellectual property rights (IPR) related to them.

3.2 Exploration-exploitation on customer/market dimension

On customer/market dimension, we claim that a firm can engage in exploitation vs. exploration of the identity/contact information of its (current) buyers/customers; its (current) buyers/customers; its (current) customer segments; and/or people/organizations with certain (current) manifest wants/needs. With identity/contact information of (current) buyers/customers, we refer to a firm's knowledge, at proper name level, of the identity of a person or organization that has bought or considered buying the firm's products and of how this person or organization can be reached. With (current) buyers/customers, we refer to a

person or organization who considers or has considered buying a product of the firm or has bought such. With (current) customer segment, we refer to such a group of people or organizations who have similar wants/needs as those that the firm serves and satisfies with its current products. With people/organizations with certain manifest needs/wants, we refer to a situation in which there exist some people/organizations who have certain wants/needs which they can themselves express fairly well and which are widely understood by market players (see Kyriakopoulos & Moorman, 2004; Jaworski & Kohli, 2000).

Accordingly, we claim that innovation on the customer/market dimension can take at least the following five archetypal forms, as the level of exploration gets higher. First, the firm can exploit people/organizations with certain (current) manifest wants/needs, its (current) customer segments, its (current) buyers/customers, and identity/contact information of its (current) buyers/customers and not explore much anything. Second, the firm can exploit people/organizations with certain (current) manifest wants/needs, its (current) customer segments, and its (current) buyers/customers, and explore (new) identity/contact information of its buyers/customers. Third, the firm can exploit people/organizations with certain (current) manifest wants/needs and its (current) customer segments and explore (new) buyers/customers (possibly their identity/contact information). Fourth, the firm can exploit people/organizations with certain (current) manifest wants/needs and explore (new) customer segments and (new) buyers/customers (possibly their identity/contact information). Fifth, the firm can explore (new) wants/needs for people/organizations and (new) customer segments (and possibly new buyers/customers and their identity/contact information).

With respect to what it is that can be exploited about the different aspects on the customer/market dimension, first, concerning people/organizations who have certain manifest wants/needs, a firm can usually exploit the fact that it is easier to sell products to satisfy existing and somewhat expressed wants/needs which some people/organizations have. The organization can avoid having to *create* the wants/needs or elicit latent wants/needs to surface (see e.g. Jaworski & Kohli, 2000). If there does not (yet) exist people/organizations which have the wants/needs somewhat expressed, the situation is more challenging. For instance, in the 1980s, there were hardly people who would have expressively needed mobile phones.

Second, concerning current customer segments (with similar wants/needs), a firm can further exploit the relative ease of selling to different people/organizations same products to serve their similar wants/needs. Even if the firm had not ever sold to a certain person or organization of a segment, the firm is likely to be able to relatively easily sell him/her/it same products to serve his/her/its similar wants/needs as it has already managed to sell to other persons/organizations (in the same segment). The firm can usually exploit its knowledge and understanding of such people/organizations, their wants and needs and even their buying processes. For instance, even competitors of the same industry who have not sold to the segment in question rarely have knowledge or understanding of the same nature or extent – not to mention firms of other industries. Moreover, the inertia of people/organizations (Bozzo, 2002; Hannan & Freeman, 1984) can be exploited: their wants/needs change slowly and they tend to continue buying similar products to those wants/needs, through similar buying processes as before.

Third, concerning current buyers/customers, a firm can usually exploit its even better and more extensive knowledge and understanding of the individual buyers/customers, their wants and needs, and their buying processes. For instance, even companies in the same industry who do not have the persons/organizations in question as buyers/customers seldom have knowledge or understanding of the same nature or extent. Usually the firm can also exploit the fact that a person or organization that has considered buying a product of the organization or has bought such knows the firm and its products fairly well (brand awareness) and associates to the products certain positioning in terms of e.g. price level, product features and

quality levels, appropriateness to certain use context, and yield of certain functional, experiential and symbolic benefits (brand associations) (Keller 1993, 2003). Moreover, the firm can often exploit the potential positive attitude which a buyer/customer has towards the company, as well as loyalty and psychological commitment (Jacoby & Kyner, 1973). Even actual (brand) inertia may be exploited, by which a buyer/customer may continue to buy the firm's products simply out of habit, due to passiveness and/or to save time and effort (Bozzo, 2002; Colgate & Lang, 2001; Zeelenberg & Pieters, 2004).

Concerning identity/contact information of current buyers/customers, customer relationship management literature implies that a firm can further exploit the fact that it can fairly easily access and reach the people/organizations in question and, hence, communicate with them and target them with customized messages, which are likely to reach them (e.g. Lemon, Barnett White & Winer, 2002; Peppers & Rogers 1993, 1997; Peppers, Rogers & Dorf, 1999; Pine, Peppers & Rogers, 1995; Simonson, 2005; Winer, 2001). This makes persuading these buyers/customers easier relative to situation in which it is not exactly known, at proper name level, who the (end-)customers/buyers actually are or how to reach them. Moreover, generating information, knowledge, and intelligence concerning the buyers/customers becomes easier (e.g. Peppers & Rogers 1997; Shapiro & Varian, 1999).

Figure 1 presents our notion of exploitation and exploration on the customer/market and product/technology dimensions. Based on the research on exploration-exploitation (Levinthal & March, 1993; Smith & Tushman, 2005; Lewin & Volberda, 1999; Kyriakopoulos & Moorman, 2004; Tushman & Smith, 2002; Tushman et al., 2002), we claim that sustained performance and success of a firm requires balancing between exploitation and exploration on both dimensions. In the cells of the matrix, we briefly describe what the combination of exploration and exploitation on the two dimensions could mean in terms of developing the business of a firm.

5. Discussion and implications

Our claims are consistent with the view that in order to have sustained performance and success, firms should engage in two types of innovative activities, i.e. exploitation and exploration (e.g. Levinthal & March, 1993; Smith & Tushman, 2005; Lewin & Volberda 1999). However, while focusing on exploration and exploitation concerning a firm's technologies, earlier research has treated exploration and exploitation related to customers and markets rather implicitly. The contribution of our research is to pay explicit attention to innovation forms of exploration-exploitation not only on product/technology dimension but also on customer/market dimension. To recent exploration-exploitation literature implying the significance of the two dimensions (Smith & Tushman, 2005; Tushman & Smith, 2002; Tushman et al., 2002), our contribution is particularly to clarify the potential role of exploration-exploitation on the customer/market dimension and how this combines to exploration-exploitation on the product/technology dimension. Accordingly, we presented a two-dimensional matrix implying that in order to have sustained performance and success, a firm should simultaneously engage in different forms of innovation specified in various cells around the matrix – and not to treat the different forms as alternatives with engagement only in one or two.

Much further research is needed to examine how balancing between exploration-exploitation on the two dimensions actually contributes to the sustained performance and success of firms. Specifically, the effectiveness of different combinations of the innovation forms on the two dimensions need to be studied, with respect to different kinds of firms and industries, and firms operating in different kinds of environments, e.g. stable vs. turbulent.

Product/technology dimension

Customer/market dimension

			Product	Product platform	Technology	Product	Product platform	Technology	Product	Product platform	Technology	Product	Product platform	Technology
		Exploitation ▶	Yes	Yes	Yes		Yes	Yes			Yes			
		Exploration ▶				Yes			Yes	Yes		Yes	Yes	Yes
	Exploitation ▼	Exploration ▼												
<i>identity/cont. info of buyers/customers</i>	Yes		Sell more of your current product to old buyers by reaching them and persuading them with direct marketing and (personal) selling work			Develop such a product variation of your current product/product platform which your old buyers are likely to want, and reach and persuade them with direct marketing, advertising, events, and guerrilla/buzz marketing			Develop such a new product (platform) of your current technology of which you can (easily) make different variations which your old buyers are likely to want, and reach and persuade them with direct marketing, advertising, events, and guerrilla/buzz marketing			Develop a new technology and, based on that, a new product (platform) of which you can (easily) make different variations which your old buyers are likely to want, and reach and persuade them with direct marketing, advertising, events, and guerrilla/buzz marketing		
<i>buyers/customers</i>	Yes													
<i>customer segment (same needs/wants)</i>	Yes													
<i>people/ organizations with certain needs/wants</i>	Yes													
<i>identity/cont. info of buyers/customers</i>		Yes	Sell more of your current product to old buyers by identifying them and reaching and persuading them (see above) or by using a communications channel through which you are likely to reach them with your persuasive messages (e.g. media choice).			Develop such a product variation of your current product/product platform which your old buyers are likely to want, and identify, reach, and persuade them (see above) or use a communications channel through which you are likely to reach them with your persuasive messages (e.g. media choice, events, guerrilla/buzz marketing)			Develop such a new product (platform) of your current technology of which you can (easily) make different variations which your old buyers are likely to want, and identify, reach, and persuade them (see above) or use a communications channel through which you are likely to reach them with your persuasive messages (e.g. media choice, events, guerrilla/buzz marketing)			Develop a new technology and, based on that, a new product (platform) of which you can (easily) make different variations which your old buyers are likely to want, and identify, reach, and persuade them (see above) or use a communications channel through which you are likely to reach them with your persuasive messages (e.g. media choice, events, guerrilla/buzz marketing)		
<i>buyers/customers</i>	Yes													
<i>customer segment (same needs/wants)</i>	Yes													
<i>people/ organizations with certain needs/wants</i>	Yes													
<i>identity/cont. info of buyers/customers</i>		Yes	Sell more of your current product to new buyers by searching for, reaching, and persuading people and organizations (see above) who are likely to have similar needs/wants as your current buyers			Develop such a product variation of your current product/product platform which people and organizations who have somewhat similar needs/wants as your current buyers are likely to want, and identify, reach, and persuade them (see above), catching their attention with the new product			Develop such a new product (platform) of your current technology of which you can (easily) make different variations which people and organizations who have somewhat similar needs/wants as your current buyers are likely to want, and identify, reach, and persuade them (see above), catching their attention with the new products			Develop a new technology and, based on that, a new product (platform) of which you can (easily) make different variations which people and organizations who have somewhat similar needs/wants as your current buyers are likely to want, and identify, reach, and persuade them (see above), catching their attention with the new products		
<i>buyers/customers</i>		Yes												
<i>customer segment (same needs/wants)</i>	Yes													
<i>people/ organizations with certain needs/wants</i>	Yes													
<i>identity/cont. info of buyers/customers</i>		(Yes)	Sell more of your current product to new buyers by coming up with new uses and usage contexts for your product and with ways in which your product can serve the needs/wants of certain people/organizations in their use			Develop such a product variation of your current product/product platform which serves particularly the special needs/wants of certain people/organizations (new customer segment)			Develop such a new product (platform) of your current technology of which you can (easily) make different variations which serve particularly the special needs/wants of certain people/organizations (new customer segments)			Develop a new technology and, based on that, a new product (platform) of which you can (easily) make different variations which serve particularly the special needs/wants of certain people/organizations (new customer segments)		
<i>buyers/customers</i>		Yes												
<i>customer segment (same needs/wants)</i>		Yes												
<i>people/ organizations with certain needs/wants</i>	Yes													
<i>identity/cont. info of buyers/customers</i>		(Yes)	Sell more of your current product to new buyers by creating such needs/wants to people/organizations which your product can satisfy			Develop such a product variation of your current product/product platform, and create needs/wants to certain people/organizations which the product variation can satisfy			Develop such a new product (platform) of your current technology of which you can (easily) make different variations, and create needs/wants to certain people/organizations which the product variations can satisfy			Develop a new technology and, based on that, a new product (platform) of which you can (easily) make different variations, and create needs/wants to certain people/organizations which the product variations can satisfy		
<i>buyers/customers</i>		(Yes)												
<i>customer segment (same needs/wants)</i>		Yes												
<i>people/ organizations with certain needs/wants</i>		Yes												

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