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Velu, C.
Barrett, M.
Kohli, R.
Salge, T.

CAMBRIDGE
Judge Business School

CJBS author contact details are as follows:

Chander Velu
Cambridge Judge Business School
University of Cambridge
c.velu@jbs.cam.ac.uk
Michael Barrett
Cambridge Judge Business School
University of Cambridge
m.barrett@jbs.cam.ac.uk

Please address enquiries about the series to:

Research Manager
Cambridge Judge Business School
Trumpington Street
Cambridge CB2 1AG, UK
Tel: 01223 760546 Fax: 01223 339701
Email: research-support@jbs.cam.ac.uk

Thriving in Open Innovation Ecosystems: Toward a Collaborative Market Orientation

Chander Velu
Cambridge Judge Business School, UK
Michael Barrett
Cambridge Judge Business School, UK
Rajiv Kohli
Mason School of Business, College of William and Mary, USA
Torsten Oliver Salge
Ruhr-University Bochum, Germany

ABSTRACT

Market orientation relates to how well an organization is aligned towards identifying, disseminating and responding to market intelligence. Prior research has typically conceptualized and examined market orientation as a property of an individual firm or business unit. Such research has shown that market orientation can enhance firm-level innovation and performance. More recently however, the locus of competition and innovation has started to shift from the individual firm to the organizational network or ecosystem. To account for these changing realities, we extend the notion of market orientation to a collaborative environment. For this purpose, we introduce the concept of collaborative market orientation (CMO), which we define as a set of capabilities that are jointly built, maintained and exercised by members within an ecosystem. In this paper, we highlight three such CMO capabilities -- (1) collaborative intelligence generation, (2) collaborative intelligence dissemination and (3) collaborative responsiveness. By drawing upon the extant literature to identify its constitutive routines we provide actionable steps for organizations to build CMO capabilities.

Keywords: Market Orientation, Open Innovation, Ecosystems.

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INTRODUCTION

Facebook overtook the market leader MySpace to crown itself to be the dominant firm in social networking in May 2008. Facebook experienced an unprecedented increase in new programs available to users since the opening up of its platform to outside developers a year earlier. It leveraged the collective wisdom of its ecosystem of developers to stimulate the rate of innovation. As a result, Facebook experienced an increase of over 160 percent in unique visitors compared to 5 percent for MySpace in the same period (Allison 2008). Threadless, a T-shirt design and manufacturing company, has been successful in spanning social networking and collaborative creation. Threadless runs competitions that allow users to vote on the T-shirt designs. The design that is the most popularly voted for by users is selected for manufacturing. The selected T-shirts are a great success as the customers' preferences are incorporated in the designs. The phenomenon of opening and collaborating by enabling customers and developers to be drawn into the heart of the innovation process is not unique to the social networking among firms but is seen in many other industries such as fast moving consumer goods, pharmaceuticals and telecommunications among others. However, if not managed properly, such social and partner engagement can incur high coordination costs and consume valuable resources. Therefore, firms that embrace openness and collaboration also face the challenge of building new capabilities to stimulate, capture and exploit innovations.

Traditionally, innovation has generally been conducted internally and firms rarely resort to sharing of innovative outcomes with partners as a means to generate competitive

advantage (Chesbrough, Crowther, and Field 2006). More recently, firms have moved to a more open innovation model. In an open innovation model firms leverage the discovery of others and are also willing to commercialize their innovations by using third party firms whose business models might be better suited to bring the innovation to market (Chesbrough 2003). As a result, firms are able to accelerate the rate of innovation and create a more compelling competitive position. The forces that are shaping the move to a more open innovation model are globalization, the intensity of technological change and shift in industry borders (Gassmann 2006). First, the force of globalization contributes to higher mobility of capital, labor and knowledge. This in turn has lowered entry barriers and increased opportunities for firms that can innovate fast. Second, the intensity of technological change has contributed to a shorter product life cycle which coupled with increasing complexity of the R&D process implies that often no one firm can innovate fast enough by themselves. Third, the rapid shift in industry boundaries, for example in telecommunication, telephony and financial services, creates new opportunities that need to be served by novel cross-product, cross-firm and cross-industry business models. Failure to recognize and address these forces can delay time-to-market for products and services, increase development costs and consequently affect competitiveness.

Evidence of the influence of these forces can be found across many industries. For example, Thomson Reuters, a major global information services firm, is facing challenges in responding to innovation opportunities in a rapidly changing market place. One of Thomson Reuters' key businesses is that of an infrastructure provider and information artery to the financial services industry. The financial services industry is

facing the pressures of globalization with major cross border movement of capital and Thomson Reuters is a key provider of information for the efficient operation of the global capital markets. This coupled with rapid changes in technology has resulted in the product life cycle of its major customers in the financial services industry becoming progressively shorter. Moreover, similar to the trend in the media industry, the financial information industry is moving away from merely broadcasting and distributing information to the provision of relevant and customized information to its customers. In order to remain competitive in this fast changing environment, Thomson Reuters must identify opportunities for innovation and respond quickly to them. Therefore to enhance its innovative competency Thomson Reuters is looking to leverage ideas from outside the firm and also to commercialize ideas generated internally via third party firms.

The traditional form of organization in the twentieth century has been the hierarchical firm to help organize the factors of production (Prandelli and Sawhney 2000). The hierarchical model enables co-ordination by minimizing transaction costs and increasing the efficiency of production (Teece 1986a; Williamson 1975). This method of organization worked well as long as markets were growing and the technological shifts were more or less predictable (Achrol and Kotler 1999). However, the hierarchical organization has not been as adept when globalization and other technological forces are causing rapid shifts in market structure. Therefore, a new organizational form is required to sense these market shifts, create new knowledge and respond to the changes (Prahalad and Krishnan 2008). Scholars have argued that network based organizations are better able to adapt in fast changing environment which are knowledge rich because such

organizations possess superior information processing capabilities (Drucker 1993; Weick 1976) Many firms across several industries are already embracing the network based organizational structure by collaborating with a community of customers and suppliers. For example, RosettaNet is a community of over 500 firms that share information using standardized processes to overcome inertia in increasingly complex supply chains transactions. This in turn helps firms to quickly partner to build new products and services and to stimulate innovation among participating firms. In order to build competencies to innovate firms within such a network need to enhance their capabilities to continuously identify market requirements, bring together partners and build solutions to respond to these opportunities.

Marketing scholars have referred to the concept of market orientation to describe the behavior that helps firms identify changes in their environment and respond to them by providing customers with superior value (Gatignon and Xuereb 1997; Jaworski and Kohli 1993; Kohli and Jaworski 1990; Narver and Slater 1990). Market orientation has been proposed to be either a set of behaviors or the culture that contributes to such behavior (Slater and Narver 1995). Both these conceptual definitions emphasize the principle that market orientated firms display the ability to identify intelligence, disseminate them across the firm and respond accordingly. It has been shown that firms that are more market orientated are more innovative than firms that are less market orientated (Atuahene-Gima 1995; Atuahene-Gima and Ko 2001; Deshpandé, Farley, and Webster Jr 1993; Narver, Slater, and MacLachlan 2004). The concept of market orientation was developed with a lens based on the firm being the focal point of innovation. However,

when the locus of innovation shifts from the firm to the community, additional capabilities are required to manage the innovation process.

The linked nature of the community within the open innovation model calls for a more integrated approach to information gathering, dissemination and response. The integrated approach implies greater coordination via shared processes, frequent data sharing and linked business models (Chesbrough 2003). There are three areas of further capability development. First, within a community of firms there would be significant need to co-learn the appropriate information to identify and transmit between partners within the network. Each partner is responsible to regularly discuss and also inform other partners of its business requirements in order to enhance the overall innovation capability of the community. In turn, each firm must learn and share learning with other firms within the community. Second, firms need to build capability to enhance inter-network information dissemination, as there is an increasing need to transmit appropriate information across the network efficiently. Therefore, firms would need to act as a conduit in connecting firms within the network and also act as a filter in the information dissemination process. Third, given the market orientation concept has primarily focused on the focal firm and how it responds to market opportunities, this firm focused view needs to be extended to incorporate the network of firms in a community and how they innovatively respond to the market opportunities. This behavior encompasses two possibilities. The first is where another firm within the network is better positioned to commercialize the idea generated by the focal firm and therefore respond to the opportunities accordingly. The second is where the focal firm is better positioned to respond to ideas generated by another firm

within the network. In both cases the response is a joint effort by the network of firms rather than a single firm within the community.

Therefore, given the changes, challenges and the opportunities we propose that the market orientation concept needs to be extended to encompass the additional behaviors called on by the network-based open innovation model. The next section provides an overview of the relevant literature.

CONCEPTUAL FOUNDATIONS

Open Innovation

The traditional form of organizing economic activity in the 19th and 20th centuries has been the hierarchical firm (Achrol and Kotler 1999; Prandelli and Sawhney 2000). This is due to the need to organize factors of production such as material, labor and capital in order to increase the efficiency of production. It is argued that hierarchical structure allows for better coordination especially by reducing transactions costs (Teece 1986a; Williamson 1975). The principal reasoning here is that the market is unable to enforce coordination due to the threat of economic agents acting in self interest resulting in opportunistic behavior and 'holding up' other agents whose assets are needed to complete the production (Grossman and Hart 1986; Hart and Moore 1990). The hierarchical model is a closed model whereby the firm retains control of the research and development process with the intellectual property remaining the sole ownership of the firm (Prandelli and Sawhney 2000). However, more recently the knowledge required to compete is becoming increasingly diverse as the forces of globalization, the pace of technological change and the blurring of industry borders accelerates. There are two competing forces

at play for firms as a result. First, firms need to specialize and focus which implies deepening the knowledge base. Second, firms need to keep pace with the speed of change in order to remain relevant and competitive, which implies that firms must also have a wider knowledge base.

Knowledge is the principal form of economic resource in the twenty-first century to complement materials, labor and capital (Powell, Koput, and Smith-Doerr 1996; Snow, Miles, and Coleman Jr 2000). In a turbulent environment the sources of knowledge are more unpredictable and dispersed. Therefore, firms are not able to keep pace with the rate at which knowledge needs to be produced and managed on their own. In such turbulent environments there is much to be gained from innovation and a lot to lose from obsolescence (Powell 1998). Hayek (1945) had argued that decentralized markets were better than centrally planned hierarchies such as the state or nation for the exploitation of dispersed knowledge. A similar reasoning can be applied to the way firms need to organize themselves in a knowledge driven business environment. Thus, a collaborative approach to innovation is needed for firms to effectively leverage distributed knowledge. Firms need to cooperate with customers and other firms along both the demand and supply chain to create and manage knowledge (Dyer and Singh 1998; Klein, Rai, and Straub 2007; Wang and Wei 2007). In a knowledge rich and turbulent environment, Achrol (1991; 1997) emphasized that the new form of organization across firms is likely to be transorganizational systems where the critical managerial activities are boundary spanning across firms. However, this form of cooperative model calls for a different form of governance mechanism to the traditional hierarchical firm in order to create superior customer value.

In a distributed knowledge environment the governance mechanism needs to allow firms to benefit from the creativity of customers and other firms. When there are tremendous changes in the external environment firms need to interact more with stakeholders outside the firm to access knowledge and resources (Powell, Koput, and Smith-Doerr 1996; Snow, Miles, and Coleman Jr 2000). Therefore the focus of analysis shifts from the individual firm to the network of firms. The transactions costs perspective emphasizes the efficiency benefits from reducing the governance cost of a transaction. On the other hand, the network approach allows the optimization of the entire network of relationships (Gulati, Nohria, and Zaheer 2000). There are two principal benefits from a collaborative network based model. The first stems from a sociological and organization theory perspective where the benefit arises from frequent communication and learning (Granovetter 1985; Uzzi 1996). The loose coupling inherent in network-based organizations enables the firm to be more flexible in transmitting information which in turn is conducive to continuously learn and adapt (Drucker 1993; Weick 1976). The second benefit is greater exchange-related benefit that focuses on the complimentary nature of the assets in creating value. This could be common assets being pooled to create scale or different assets being traded in order to compliment one another. For example, firms that generate value from innovative ideas might need the complimentary assets of other firms in order to extract value (Teece 1986b). In addition, the complementarity could be the result of the business model of other firms that more suitable to commercialize the innovation. The challenge for firms that operate within such a network eco-system is to continue understanding customer needs and to convene the competencies of the ecosystems in order to effectively serve customers. The dispersion of knowledge

due to changes induced by globalization, technological progress and convergence of industries calls for a networked organizational structure. A networked organizational structure allows for efficient transmission of ideas. In addition a network organization enables better opportunities to collaborate and share resources to commercialize ideas.

Market Orientation

A number of theoretical and empirical studies have used the term market orientation to describe the superior skills in understanding and serving customers (Day 1994; Kohli and Jaworski 1990; Narver and Slater 1990). Seminal works in developing the concept of market orientation have described it as either a set of *behaviors* (Gatignon and Xuereb 1997; Jaworski and Kohli 1993; Kohli and Jaworski 1990) or the embodiment of an organizational *culture* (Narver and Slater 1990; Slater and Narver 1995). According to the behavioral definition, market orientation embodies activities that relate to implementing the marketing concept and consists of generating marketing intelligence, disseminating that intelligence throughout the organization, and appropriately responding to the opportunities (Kohli and Jaworski 1990). Market intelligence generation includes the activities that relate to collection and assessment of customer needs and the forces that influence those needs. Intelligence dissemination relates to the horizontal and vertical dissemination of market intelligence across the firm. Finally, responsiveness relates to the action taken as a result of the generation and dissemination of intelligence. An alternative perspective holds that market orientation is a part of the pervasive culture of the firm (Narver and Slater 1990). Under this definition, market orientation refers to the values or set of shared beliefs that puts the customer at the heart of the value proposition. Slater

and Narver (1990) argue that the behavior is the manifestation of such a culture and belief system. Therefore, many studies that conceptualize market orientation as a value system continue to operationalize it as a behavioral measure. The operational constructs used within this definition consist of customer orientation, competitor orientation and inter-functional coordination. Customer orientation represents the firm's understanding of the target market and the customer requirements of that market. Competitor orientation implies the firm's understanding of the capabilities of present and prospective competitors. Inter-functional coordination characterizes the firm's commitment to share information and resources efficiently across internal functions and respond with superior customer value. The customer orientation and competitor orientation includes all activities relating to the acquiring and disseminating intelligence about customers and competitors throughout the firm. Whereas the inter-functional coordination relates to the coordinated efforts across the firm in order to respond with an offering with superior value for the customer.

Common to both the behavioral and cultural definitions is the notion of information processing capabilities (Bell, Whitwell, and Lukas 2002). Both approaches compliment each other in articulating the view that market orientation is valuable because it directs the focus of the firm on continuously collecting information about customer needs and competitor capabilities and coordinating the processing of this information in order to create superior customer value (Slater and Narver 1995). However, the primary focus of these approaches to market orientation is that the firm acts as the central tenet of the information identification, dissemination and the strategic response to it. However, such a focus on the individual firm needs to be extended in a world where information sharing

and collaboration becomes the *de facto* standard by which firms innovate and compete. In particular, the role of the firm within the network of firms and customers needs to be the focus of the analysis. The eco-system of firms together with how they utilize internal and external information in order to create superior and sustained customer value needs further examination. Research shows that one firm's level of market orientation can positively influence another partner firm's market orientation further down the supply chain (Siguaw, Simpson, and Baker 1998). This calls for building upon the extant literature on market orientation and to extend to the context of collaborating firms.

TOWARDS A COLLABORATIVE MARKET ORIENTATION

Dynamic Capabilities

In developing the theoretical underpinnings for our conceptual model of collaborative market orientation, we draw upon recent theoretical advances in the strategy discipline and propose a dynamic capability perspective on collaborative market orientation.

The dynamic capability view (Eisenhardt and Martin 2000; Teece, Gary Pisano, and Shuen 1997; Zollo and S. G. Winter 2002) constitutes an important extension of the resource-based view of the firm (Barney 1991; Wernerfelt 1984). The resource-based view (RBV) argues that competitive advantage arises from the resources of the firm that are tied semi-permanently to the firm (Wernerfelt 1984). These resources can be distinguished as either fully appropriable by the firm, such as physical assets or from less tangible assets such as organizational routines and capabilities (Teece 1986b). Our stance of dynamic capabilities is in line with the latter view that organizational routines and

capabilities results less from internal resources than from their effective (re)configuration (Augier and Teece 2009). Dynamic capabilities can hence be defined as:

> "The firm's processes that use resources - specifically the processes to integrate, reconfigure, gain and release resources - to match and even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resource configurations as markets emerge, collide, split, evolve, and die." (Eisenhardt and Martin 2000, 1107)

Dynamic capabilities are thus conceptualized as consisting of bundles of routines - a concept that has a rich history in organization theory (Becker 2004; Cyert and March 1963; Nelson and S. G. Winter 1982; Pentland and Feldman 2005). Defined as "repetitive, recognizable patterns of interdependent actions, carried out by multiple actors" (Feldman and Pentland 2003, 95), routines have long been considered as a source of organizational inertia. The dynamic capability view, in contrast, emphasizes the transformative potential of routines, which is being recognized increasingly in the literature (Feldman 2000; Howard-Grenville 2005).

Dynamic capabilities, however, are distinct from the so-called substantive capabilities (Zahra, Sapienza, and Davidsson 2006). While both consist of bundles of routines, only substantive capabilities and their constitutive operating routines are directly related to the production of goods or the provision of services (Helfat and Peteraf 2003; S. G. Winter 2003). Dynamic capabilities in contrast consist of meta-level routines that allow organizations to adapt, adjust or reconfigure their resource base and operating routines in response to changing market and technology requirements (Eisenhardt and Martin 2000; Helfat and Peteraf 2003; Teece, Gary Pisano, and Shuen 1997). Hence, they

can be thought of as tools to adjust organizational resource configurations (Eisenhardt and Martin 2000). It is therefore through shaping substantive capabilities, operating routines and resources pertaining to the production and delivery of products and services to the customer, that dynamic capabilities are able to affect organizational performance (Zahra, Sapienza, and Davidsson 2006; Zott 2003).

A Dynamic Capability View on Collaborative Market Orientation

As Teece highlights, (2007, 1319 f.) "dynamic capabilities include difficult-to-replicate enterprise capabilities required to adapt to changing customer and technological environments." Dynamic capabilities are thus central to the recognition of, and response to, major developments in the marketplace. Such fundamental changes might pertain to latent customer needs, strategic competitor moves or emerging technological trends, all of which might require a reconfiguration of product and service offerings, operating routines or even business models. This depiction corresponds precisely to the principal function of (collaborative) market orientation and highlights the considerable appeal of a dynamic capability perspective.

In proposing a dynamic capability view on collaborative market orientation, we continue to pursue the integration efforts of market orientation and strategy scholars, as a result of which the examination of market orientation is now "in the domain of strategy scholars as much as it is of marketing scholars" (Slater and Narver 1999, 904). As one of the first proponents of a capability approach to market orientation, Day (1994) was among the first to recognize the potential for theoretical cross-fertilization. Borrowing the capability concept from the strategy field, he sought to shed light on those capabilities

that allow firms to become more market oriented, thereby setting them apart from their competitors. The so-called outside-in capabilities, among which in particular 'market sensing' and 'customer linking' were both considered capabilities and pivotal to the market orientation concept as they "enable the business to compete by anticipating market requirements ahead of competitors and creating durable relationships with customers, channel members, and suppliers" (Day 1994, 41). Since Day's (1994) pioneering efforts, a number of empirical studies in marketing and strategy have examined market orientation through a capability lens (Krasnikov and Jayachandran 2008; Menguc and Auh 2006; K. Z. Zhou et al. 2008), thus highlighting the meaningfulness of this theoretical perspective for empirical research.

A dynamic capability view on collaborative market orientation extends this line of research by incorporating recent theoretical developments in the strategy discipline. Drawing on these insights, we conceptualize collaborative market orientation as a set of dynamic capabilities, each consisting of multiple routines that are jointly built, maintained and exercised by members of the organizational ecosystem. Given the inter-organizational nature of CMO capabilities, we focus on the boundary-spanning routines (Achrol 1991; Aldrich and Herker 1977), which are jointly enacted by members of the ecosystem and frequently involve interactions and exchange with social actors located in the external market environment. Figure 1 graphically depicts this conceptual model of collaborative market orientation.

INSERT FIGURE 1 ABOUT HERE

Building on Kohli and Jaworski's (1990) original conceptualization of market orientation, our theoretical model of collaborative market orientation incorporates the three sequential process stages of intelligence generation, intelligence dissemination and responsiveness.[1] Each of these stages involves different forms of learning and poses its own unique set of challenges. Distinct capabilities are thus required at each stage, if ecosystem members are to be successful at jointly generating, disseminating and responding to novel market insights. Teece (2007) explicates the microfoundations of dynamic capabilities as consisting of routines for (1) sensing and shaping, (2) seizing opportunities and (3) managing threats and reconfiguring. The sensing and shaping capability requires routines that have processes to tap internal R&D, external suppliers and customers as well as tap into developments in science and technology. The seizing capability requires routines such as choosing the boundary of the firm and its business model in order to capture value as well having the appropriate strategic decision making processes to avoid decision errors. Finally, managing threats and reconfiguration requires routines such as suitable governance structures to incorporate elements of decentralization with appropriate matching of asset combinations as well as designing the appropriate knowledge management processes. We argue that market orientation is a form of dynamic capability as it involves organizational routines and capabilities in order to indentify intelligence, disseminate that intelligence and respond to the opportunities.

[1] As suggested by the information processing view (Sinkula 1994), this process is by no means strictly linear and unidirectional. Rather, there are several important feedback loops, through which outcomes at one stage shape subsequent iterations of information processing activities at earlier stages (Day and Schoemaker 2004).

Therefore, the routines described for dynamic capabilities are particularly relevant for market orientation. We explicate the market orientation capabilities that are relevant for a collaborative setting that we call collaborative market orientation (CMO). In particular, we propose three CMO capabilities, labeled *'collaborative intelligence generation'*, *'collaborative intelligence dissemination'* and *'collaborative responsiveness'*.

The first CMO capability, collaborative intelligence generation, describes the collective ability of an ecosystem to generate meaningful market related information. This capability constitutes a form of exploratory learning (March 1991) in that it reaches beyond existing boundaries. More specifically, this capability comprises the two routines of *'environment scanning'* and *'information interpreting'*, by means of which members of the ecosystem jointly search the market environment for new insights and seek to make sense of the resulting information. As such, collaborative intelligence generation is a critical outside-in capability (Day 1994), meant to create awareness and understanding of emerging market opportunities and threats. This closely relates to the sensing and shaping of the dynamic capabilities discussed earlier. In particular, it involves the processes to shape internal R&D by tapping into external suppliers and customers as well as developments in science and technology in general.

Collaborative intelligence dissemination in turn represents the collective ability of an ecosystem to disseminate market insights among its members such that supply and demand are matched and powerful coalitions for actions are formed. The two constitutive routines of *'intelligence routing'* and *'issue selling'* are thus central to this second CMO capability. Collaborative intelligence dissemination will often involve transformative

learning (Lane, Koka, and Pathak 2006), especially when the issue derived from novel market insights fundamentally challenges and eventually alters deep-rooted assumptions and cognitive schemas within the ecosystem. This can be viewed as analogous with the seizing and reconfiguring dynamic capabilities discussed earlier. It also relates to the knowledge management and governance routines discussed in the organizational management literature.

The third and last CMO capability, collaborative responsiveness, describes the collective ability of the ecosystem to develop a timely and concerted response to novel market insights. This capability involves primarily exploitative learning (March 1991), occurring as a result of members' engagement in the two constitutive routines *'opportunity seizing'* and *'ecosystem reconfiguring'*. These are central elements of this CMO capability, as they provide the means by which powerful coalitions for action translate novel market insights into new product developments, product modifications and ecosystem reconfigurations. This is consistent with the seizing and reconfiguring dynamic capabilities discussed earlier. In particular it ties to the strategic decision making and choosing the boundary of the firm and business model to capture value routines.

It is through decomposing the concept of collaborative market orientation into its constitutive capabilities and routines that we seek to enhance the conceptual and practical specificity of the CMO construct. This is required to inform managers who look for meaningful advice on how to build and enhance the collaborative market orientation of their ecosystems (Jaworski and Kohli 1996; Van Raaij and Stoelhorst 2008). Clearly, CMO capabilities are unlikely to be shaped uniformly across extant open innovation and

collaborative ecosystems. That said, we propose that there are likely be important and learning laden characteristics that firms and ecosystems have in common. Eisenhardt and Martin (2000, 1108) concur with this view and argue that "specific dynamic capabilities exhibit common features that are associated with effective processes across firms", despite being idiosyncratic in their details. As for collaborative market orientation, these common features are assumed to take the form of key routines that open innovation ecosystems need to establish and cultivate, if they are to stand out in terms of their CMO. In the following sections, we will therefore explicate each CMO capability by discussing and illustrating its main constitutive routines. In doing so, we draw on and integrate theory-driven concepts from the extant literatures on market orientation, dynamic capabilities and organizational learning.

Collaborative Intelligence Generation

In a marketplace of changing customer preferences, rapid technological advances and increasingly complex competitive landscapes, the capacity to anticipate market opportunities and threats is pivotal (Achrol and Kotler 1999). It is only by staying abreast of emerging market trends and competitor actions that organizations and open innovation ecosystems can proactively adjust their product and service offerings and reconfigure their internal resources and operating routines (Kohli and Jaworski 1990). Collaborative intelligence generation can thus be thought of as the collective capacity of the ecosystem to generate meaningful market intelligence (Day 1994). Collaborative intelligence generation relies on the ability to identify and evaluate external information, which constitutes the first important process dimension of absorptive capacity (Lane, Koka, and

Pathak 2006; U. Lichtenthaler 2009), defined as the "ability to recognize the value of new information, assimilate it, and apply it to commercial ends" (Cohen and Levinthal 1990, 128). As such, collaborative intelligence generation provides the essential input required to fuel subsequent intelligence dissemination and response orchestrating processes within the ecosystem.

When embedded in an ecosystem, firms are in the fortunate position to have the opportunity to learn from each other on a continuous basis. Firms thus need to view each other as co-learning partners. During turbulent environments in particular, individual firms will often not possess the required resources and competences to understand and identify all relevant information. Therefore, partner firms within such an ecosystem would need to act in a cohesive manner to co-learn the relevant information for the benefit of the entire ecosystem. This calls for a more relationship-orientated structure with collaborative mechanisms for the co-generation of intelligence about expressed and latent customer needs (Day 1994; Glazer 1991; Miles and Snow 2003). It is precisely by engaging in such a co-learning relationship that organizations are able to extend both the depth and the breadth of their market coverage.

For market intelligence to be meaningful, market data broadly defined need to be collected and interpreted as part of a collaborative process that involves all members of the ecosystem. We therefore assume the usual sequence of information processing and argue that collaborative '*environment scanning'* and '*information interpreting'* are two key constitutive routines of collaborative intelligence generation (Day and Schoemaker 2004; Huber 1991; Sinkula 1994). We will discuss each in turn.

Environment Scanning

Collaborative intelligence generation requires members of the ecosystem to leave their comfort zones and search their respective environments for clues of emerging market or technology shifts (Day and Schoemaker 2004). As Teece (2007, 1322) points out, "enterprises must constantly scan, search and explore across technologies and markets." We refer to this first constitutive routine of collaborative intelligence generation as *'environment scanning'*, defined as the collective, systematic and wide-ranging search of the external market environment (Frishammar and Ake Horte 2005; Hambrick 1982; Huber 1991).

Routine Description. This search typically pertains to current and future customer preferences, competitor actions and technological developments (Narver and Slater 1990; Slater and Narver 1998). It is often conducted through engaging through formal and informal means with customers, lead users, conducting competitor analyses and technology scouting (Dobni and Luffman 2003; Kohli and Jaworski 1990; Narver and Slater 1990). Such scanning activities may yield information in multiple forms (Aguilar 1967), such as "a chart, a picture, a conversation at a trade show, news of scientific and technological breakthroughs, or the angst expressed by a frustrated customer" (Teece 2007, 1323). Environment scanning can be either passive or active (Daft and Weick 1984). Whenever in passive mode, the focal entity simply waits to pick up outside signals from familiar sources (Mintzberg, Raisinghani, and Theoret 1976). Active scanners in contrast seek answers to specific questions and deploy considerable resources to learn about visible and latent opportunities and threats (Day and Schoemaker 2004; Kohli and Jaworski 1990).

As technological and spatial boundaries are increasingly irrelevant, such search activities need to become ever more proactive, distant and comprehensive (Chesbrough 2003). Ecosystem members are thus required to screen both the core and the periphery of their environments, if the ecosystem is to gain novel market and technology insights ahead of its competitors (Day and Schoemaker 2004; Teece 2007). This idea is consistent with evolutionary arguments, according to which the scope of organizational search increases exposure to variation, which in turn leads to adaptation and ultimately survival advantages (Nelson and S. G. Winter 1982). Empirical research has underlined the value of distant search and its influence upon organizational performance. Dollinger (1984) for instance found that the intensity of boundary-spanning search activities positively affected firm financial performance, especially when coupled with a pronounced information processing capability. Similarly, Rosenkopf and Nerkar (2001) revealed that explorations that span both organizational and technological boundaries resulted in patents with the greatest impact on subsequent inventions.

Firm Perspective. Despite the benefits, distant environment scanning routines pose significant challenges for the firm. First, search costs are likely to increase notably with greater spatial and technological distance. Investments required to enable meaningful scanning across boundaries impose costs pertaining to internal staff time, training and traveling as well as for external market research services. Second, human attention is known to be both selective and situated (March and Shapira 1992; Ocasio 1997). It is selective in that human beings will only be able to attend to a limited number of issues at any one time and the focus of attention depends on the specific context the entity operates

in – an idea central to the field of social cognition (Fiske and Taylor 1991). As Day and Schoemaker (2004, 132) highlight, "most companies cannot afford to focus on all things with great intensity." This fundamental attention allocation problem contributes to a situation where benefits from environment scanning are likely to decrease, as search scope increases (Laursen and Salter 2006). This implies that single entities will have to restrict their search activities to account for financial and attentional limitations (Frishammar and Ake Horte 2005; Koput 1997). Firm-level environment scanning is thus often myopic in that it is overly narrow and local (Levinthal and March 1993; March 1991). Hence, firms operating in isolation often fail to develop adequate environmental scanning routines and suffer from biased perceptions of market and technology changes.

Ecosystem Perspective. Yet, these search biases can potentially be overcome in an open innovation ecosystem that acts as a partnership of skills and resources (Achrol 1991; Rosenkopf and Almeida 2003). In particular, a collaborative approach to environment scanning can take advantage of the fact that the ability to "sense opportunities is clearly not uniformly distributed amongst individuals or enterprises" (Teece 2007, 1323). It might thus be beneficial for the overall innovation ecosystem to establish a separation of tasks such that certain entities focus on exploring the environment, while others focus on exploiting arising opportunities (Gupta, Smith, and Shalley 2006). Ecosystem partners thus have to distribute tasks in such a way that each partner can unfold its strengths, while complementing the contributions of others and keeping an adequate balance between exploration and exploitation within the ecosystem (March 1991).

Moreover, those ecosystem members focusing on environment scanning activities have to negotiate and coordinate the scope of their respective search patterns. Again, a case for specialization can be made (Tushman and Katz 1980). As Day and Schoemaker (2004, 141) point out, a "community of specialists [...] should see and know more, both in their focal area as well as in the periphery." Clearly, the superiority of the specialist community is contingent on the presence of effective knowledge sharing mechanisms. Therefore, search specialization among ecosystem members offers several key advantages over a single firm's pursuit when it comes to scanning increasingly complex knowledge landscapes (Ahuja 2000).

Ecosystem members can specialize, for instance, in scanning certain customer segments, technological fields, geographical regions or strategic groups. They are then in the privileged position to focus their attention and resources on a specific area of the knowledge landscape. This allows them to reap the benefits of knowledge relatedness that arise due to the cumulative nature of organizational learning (Helfat 1994). As a consequence, members engaging in highly focused scanning routines are less likely to face problems of attention allocation and escalating search costs. While environment scanning will be narrow at the level of the individual firm, it does not need to be myopic at the level of the overall ecosystem. As ecosystem members occupy distinct territories on the knowledge landscape, the core of one member will be the periphery of the other (Day and Schoemaker 2004). Local search conducted by one member will thus constitute distant search for another.

Information Interpreting

If executed properly, collaborative environment scanning routines will yield a constant and substantial inflow of complex data likely to contain both noise and vital signals of emerging market or technology trends (Day and Schoemaker 2004). This inflow constitutes a primary source of variation and the main input for developing market-oriented strategies (Luca and Atuahene-Gima 2007). However, if the ecosystem is to act on this information, it requires collective routines to transform these raw data into meaningful market intelligence that can inform decision-makers (Day 1994; Sinkula 1994). This is all the more important, as much of the information gathered has little decision relevance or simply arrives too late. What is required is hence the process component of absorptive capacity that enables ecosystem members to not only identify but also evaluate new market information (Todorova and Durisin 2007). As Kohli and Jaworski (1990, 5) highlight, "the important point is that generation of market intelligence does not stop at obtaining customer opinions, but also involves careful analysis and subsequent interpretations." We refer to this second constitutive routine of collaborative intelligence generation as '*information interpreting*', defined as the collective process whereby ecosystem members try to make sense of the data gathered by collective environment scanning activities.

Routine Description. In their model of organizations as interpretation systems, Daft and Weick (1984, 294) defined interpretation as "the process through which information is given meaning." It is precisely through interpretation that market data are translated into knowledge and understanding about the external environment. Any response to changes in the external environment is necessarily contingent on interpretation as a distinctive

characteristic of human organizations. Consequently, scanning without subsequent interpretation remains meaningless. The primary role of information interpreting is hence "to assemble the myriad pieces of information into a meaningful mosaic" (Day and Schoemaker 2004, 133). Interpretation thus consists in the separation of signal from noise by discovering coherent patterns in apparent chaos and removing redundant and insignificant information (Teece 2007).

Given the ever growing quantity and complexity of market data potentially available to organizations, the development, maintenance and exercise of information interpreting routines move to center-stage. Organisations thus have to excel at sorting, classifying, filtering and simplifying market data, if they are to develop a shared understanding of major patterns with direct decision relevance (Cyert and March 1963; Day 1994). It is therefore little surprising that Weick, Sutcliffe, and Obstfeld (2005, 419) conclude that interpretation and sensemaking are "small actions with large consequences." While still sparse, empirical evidence on the role of collective interpretation in an ecosystem context has started to emerge. Hult, Ketchen Jr. and Slater (2004) for instance examined among others how the extent to which supply chain members possess a shared understanding of the available information affects supply chain performance. Consistent with their theoretical arguments, they found that the presence of such a shared understanding significantly improves supply chain responsiveness by shortening the time from order entry to product or service delivery.

Firm Perspective. That said, the individual firm is likely to face at least two fundamental challenges when attempting to interpret the constant inflow of market data. First, the firm

risks being overwhelmed by the sheer quantity of inflowing market data (Huber 1991; Sinkula 1994). In such a situation of information overload, not all market data can be processed leading to a possible breakdown (Jones, Ravid, and Rafaeli 2004). As Day and Schoemaker (2004) point out, information overload constitutes a substantial and widespread problem. Referring to the case of a medical device manufacturer, they highlight that "there may be as many as 1000 events, market trends, competitive activities, technological developments and macroeconomic uncertainties" (Day and Schoemaker 2004, 133) in the organizational periphery. The individual firm can pursue a number of alternative avenues when being confronted with a situation of information overload. These include increasing the resources available for interpretation, learning more efficient interpretation techniques, reducing the interpretation diligence, storing raw data for later interpretation or entirely ignoring parts of the incoming market data (Jones, Ravid, and Rafaeli 2004). Whatever the path chosen, the individual firm will face a trade-off between interpretation comprehensiveness, accuracy, timeliness and cost. In light of its limited attentional, financial and human resources, the individual firm will necessarily be constrained in its ability to effectively interpret large quantities of market data.

The second challenge individual firms engaged in data interpretation routines are likely to face results less from the sheer quantity than the inherent complexity of the inflowing market data. The ability of a firm to understand and evaluate such complex market information is determined in particular by the nature of its ongoing activity and the extent of its prior related knowledge. The latter can consist among others in basic skills, shared language or awareness of recent market or technological developments in a given field (Cohen and Levinthal 1990). Prior related knowledge is necessarily restricted

to a relatively narrow segment of the overall knowledge landscape owing to resource and cognitive limitations of the firm (Lane, Koka, and Pathak 2006). Incoming market information, however, can be highly heterogeneous and originate from various parts of the knowledge landscape. The individual firm thus risks being unable to adequately understand and evaluate complex incoming market information stemming from knowledge fields outside its respective areas of expertise, unless it employs gatekeepers that are capable of providing linkage to these areas (Tushman and Katz 1980).

Information interpreting routines, however, are affected not only by the quantity and complexity of the incoming market data, but also by cognitive biases of the interpreter (Huber 1991). One such blinder is the tendency to force fit incoming market data into preexisting categories and frames and to discount weak signals that suggest possible alternative models (Day and Schoemaker 2004). Add this to the widespread dislike of ambiguity and it becomes apparent that simple interpretations that are consistent with current worldviews are likely to be favored (Sinkula 1994). In line with such arguments, Deshpandé and Zaltman (1984) for instance found managers to prefer market research results that contained few surprises as they posed little threat to existing cognitive frames and operating routines. Similarly, Christensen and Bower (1996) revealed that managers failed to capture the benefit from new knowledge if it was considered as not being relevant to the current demands of key customers - a consequential bias contributing to the failure of established firms.

Information overload, information complexity and interpretation biases are all likely to increase the probability that information interpreting routines of the individual

firm lead to mistaken conclusions. Following basic statistical theory, two types of interpretation errors can be distinguished. A type I interpretation error (false positive) consists in detecting a specific market trend when there is actually none. Noise is just wrongly interpreted as a valuable signal of an important development in customer needs, competitor behavior or technological progress. Conversely, a type II interpretation error (false negative) consists in failing to observe an important market trend, when in truth there is one. Meaningful market signals are thus overlooked or wrongly interpreted as meaningless. Firms operating in isolation have to trade-off those type I and type II errors, both of which can be extremely costly.

Ecosystem Perspective. Yet, collaborative information interpreting in an ecosystem context potentially allows for a simultaneous reduction of both error types by decreasing the risk of information overload, improving the ability to handle complexity and minimizing interpretation biases.

First, organizations embedded in an open innovation ecosystem are in the fortunate position to pool part of their resources for information interpretation in a collective attempt to master the ever growing volume of incoming market data (Lane, Koka, and Pathak 2006). As ecosystem partners are likely to be exposed to similar market signals, collaborative interpretation routines might yield significant efficiency gains, provided effective coordination mechanisms are in place. Given the superior information processing capabilities of the network organization (Achrol and Kotler 1999), the ecosystem should thus be more robust, though not immune to risks of information overload.

Second, ecosystem membership is likely to increase the ability to understand complex market signals originating from a wide variety of knowledge domains. In particular, ecosystem partners will be able to specialize in those aspects of the field, for which they already possess sufficient prior related knowledge (Powell, Koput, and Smith-Doerr 1996). Each ecosystem member will thus demonstrate strong absorptive capacity in a particular knowledge domain. Provided that each member is familiar with the current knowledge base and language of its ecosystem partners and well connected to the relevant market environment, it can serve as a gatekeeper for this particular element of the knowledge landscape (Cohen and Levinthal 1990). Such gatekeeping role implies that this member has the primary responsibility for interpreting market signals, translating them into a language shared by all ecosystem partners and building the required competence within the ecosystem (Tushman and Katz 1980). Gatekeepers thus act as information filters for their ecosystem partners and empower the latter to make sense of market information from an unfamiliar domain. Provided that individual areas of expertise are complementary, firms embedded in such interpretation and co-learning partnerships will be able to cover adequately a much larger portion of the overall knowledge landscape than their more isolated counterparts (Ahuja 2000; Lane, Koka, and Pathak 2006). Heterogeneity in the portfolio of innovation partners thus increases the collective stock of knowledge firms can benefit from (Powell and Grodal 2005).

Finally, ecosystems provide the opportunity to minimize interpretation biases by means of triangulation. While some ecosystem members might assume specialized gatekeeping roles in certain knowledge fields, the interpretation of a specific piece of market information will routinely involve more than one member. Add this to the fact

that interpretation outcomes are contingent upon existing cognitive categories and frames, which vary across organizations with distinct responsibilities (Huber 1991). It then becomes apparent that collaborative interpreting routines are likely to yield multiple, potentially contrasting evaluations of the same market signal. This provides the basis for triangulation, as part of which members compare and discuss their respective interpretations. This increases the tolerance for ambiguity and the probability that unexpected market signals are not discounted prematurely.

Collaborative Intelligence Dissemination

Meaningful market intelligence is likely to emerge in one part of the innovation ecosystem, while being applied most profitably in another. Similarly, market intelligence will often be created at one point in time, while being needed to inform decision-making at some point in the future (Dyer and Singh 1998; Hansen 2002). Intelligence dissemination thus becomes a central capability of any market-oriented entity (Kohli and Jaworski 1990; Maltz and Kohli 1996). It is only by bridging the spatial and temporal distance between intelligence generation and use, that ecosystems can benefit fully from previous intelligence generation activities. As Hargadon and Sutton (1997, 716) highlight with reference to technology brokering, “ideas from one group might solve the problems of another, but only if connections between existing solutions and problems can be made across the boundaries between them.“ Collaborative intelligence dissemination can thus be thought of as the collective capacity of the ecosystem to match demand and supply of market intelligence. Collaborative intelligence dissemination hence relies on the ability of the ecosystem to assimilate external information, which constitutes the second important

process dimension of absorptive capacity (Lane, Koka, and Pathak 2006; U. Lichtenthaler 2009). As such, collaborative intelligence dissemination is the vital link connecting previous collaborative intelligence generation and subsequent response processes within the ecosystem. If demand and supply of market intelligence are to be matched effectively, routines are needed to manage intelligence flows within the ecosystem and to convince the parties involved of the mutual value of sharing and assimilating a particular piece of market intelligence (Kohli and Jaworski 1990).

We refer to these two key constitutive routines of collaborative intelligence dissemination as *'intelligence routing'* and *'issue selling'*, respectively, and discuss each in turn.

Intelligence Routing

Collaborative intelligence dissemination requires ecosystem members to share and recombine market intelligence (Kohli and Jaworski 1990). Knowledge mobility, that is, "the ease with which knowledge is shared, acquired and deployed within the network" (Dhanaraj and Parkhe 2006, 660), moves to center stage and becomes a vital precondition for innovation and value creation within the ecosystem. The effective management of market intelligence flows within the ecosystem is hence paramount. Adopting the terminology proposed by Huber (1982), we refer to this first constitutive routine of collaborative intelligence dissemination as *'intelligence routing'*. We define the latter as the collective process whereby the ecosystem channels market intelligence such that it is made available to its members at the right place and at the right time whenever possible.

Routine Description. Market intelligence can be routed from sender to recipient through a variety of dissemination channels (Kohli and Jaworski 1990). Those towards the more

formal end of the spectrum include such means as general newsletters, market reports, customer analyses, competitor profiles, technology forecasts, formal transfer groups or electronic intelligence systems. Those towards the more informal end include, among others, informal meetings, staff rotation schemes, study groups, social networking systems or hall talk. Whether formal or informal channels are more appropriate is not least contingent on the degree of familiarity between sender and recipient and the nature of the market intelligence to be disseminated (Nonaka 1994; Simonin 1999). At the risk of oversimplification, formal channels tend to be most appropriate when sender-recipient familiarity and intelligence explictness are high. Conversely, when sender and recipient have yet to develop a common language and mutual understanding of their respective information needs, more informal channels might be more suitable. This holds in particular when market intelligence is tacit and therefore less amenable to codification and formal exchange (Polanyi 1966; Pawlowski and Robey 2004).

Consistent with such arguments, empirical analyses revealed that boundary-crossing dissemination outcomes are optimized when market intelligence is routed through a mix of formal and informal channels (Kohli and Jaworski 1990; Maltz and Kohli 1996). However, this study also uncovered that recipients tend to use market intelligence disseminated through formal means to a greater extent than intelligence disseminated through informal mechanisms. This points not least to possible usability, credibility and verifiability advantages of formal channels. It also lends support to March and Simon's (1958, 167) assertion that "the greater the communication efficiency of the channel, the greater the communication channel usage." Investigating knowledge sharing among foreign subsidiaries and their parent company, Gupta and Gavindarajan (2000)

found that the presence of formal and informal transmission channels positively affects the intensity of bi-directional knowledge sharing. Examining distinct knowledge types rather than dissemination channels, Haas and Hansen (2007) were able to show that it is essential to share both explicit and tacit knowledge given their complementary performance effects. Overall, these findings consistently highlight the benefits of disseminating explicit and tacit intelligence using both formal and informal channels.

Firm Perspective. As long as the entity, within which intelligence is to be disseminated, is small and operates in isolation, simple intelligence routing routines might suffice. As Cyert and March (1963, 128) stated, "in a simple organization it would be possible to allow all information to be shared among all members of the organization and to permit this sharing in the informal manner characteristic of small groups." Intelligence routing would thus simply consist in automatically "forwarding" novel pieces of tacit and explicit market intelligence. This would correspond to a naïve push mechanism that accounts neither for the respective information needs and absorptive capacities of each recipient nor the cost of the routing process itself (Huber 1982).

However, as organizations grow in size and become integrated into wider innovation ecosystems, simple intelligence dissemination routines are increasingly ill-equipped to handle the rising volume and complexity of market intelligence (Huber 1991). In particular, untargeted dissemination fails to account for the individual information needs of each ecosystem partner. These information needs are often highly idiosyncratic given the strong task specialization among ecosystem partners (Luca and

Atuahene-Gima 2007). If information overload and soaring dissemination costs are to be avoided, more elaborate routing mechanisms are clearly required (Huber 1982).

Ecosystem Perspective. In an ecosystem setting, the development of sophisticated routing routines thus moves to center-stage. As Cyert and March (1963, 128-129) highlight, "it is necessary to establish regular procedures for transmitting information, whether it be information from outside the organization or such things as decisions and instructions from within the organization". Routing rules play a key role in this process as they specify the scope, time and mode of intelligence dissemination. As such, they allow for selective, delayed or mediated dissemination.

As for selective dissemination, novel market intelligence is not blindly sent to the entire ecosystem. Rather, it is directed carefully to those members for whom a particular piece of market intelligence is expected to have sufficient decision relevance (Huber 1982). An effective intelligence triage mechanism is thus at the heart of selective dissemination. Each member of an innovation ecosystem would thus act as an intelligence filter deciding which information should be routed to whom.

Delayed dissemination in turn involves the temporary storage of market intelligence until it is required to inform decision-making processes within the ecosystem. Market intelligence therefore becomes part of an organization's memory, commonly defined as "stored information from an organization's past that can be brought to bear on present decisions" (Walsh and Ungson 1991, 61). The placement of tacit market intelligence in retrievable memory, however, is likely to be problematic. Consequently, tacit insights will oftentimes continue to exist only in anecdotal form (Sinkula 1994).

Moreover, organizational memory is subject to attrition due to such factors as staff turnover and knowledge obsolescence. Intelligence maintenance is hence just as vital as intelligence storage and retrieval for delayed dissemination to be effective (Hargadon and Sutton 1997; Sinkula 1994). When embedded in an innovation ecosystem, intelligence storage and maintenance are not the sole responsibility of the focal organization. Rather, the latter is likely to build and benefit from its connective capacity, that is, its ability to retain intelligence not internally, but in interfirm relationships (U. Lichtenthaler and E. Lichtenthaler 2009). In a network setting, members are thus likely to act as repositories that retain market intelligence for use elsewhere in the ecosystem in the future (Paruchuri 2010, forthcoming).

Finally, mediated dissemination implies that a third party acts as a broker that coordinates the intelligence exchange between sender and recipient. Such mediated routing can be particularly effective when intelligence needs to be translated so that it can move across organizational or professional boundaries and be understood by the receiving entity. As such, mediating entities are able to bridge structural holes, that is, gaps in the intra-network flow of information (Ahuja 2000; Burt 2004). Moreover, mediated routing can help to overcome possible intellectual property and appropriability concerns, which frequently threaten the free exchange of intelligence among ecosystem partners (Rothaermel and Deeds 2004). Such concerns are likely to arise as a result of the natural tension that exists between the desire to maximize knowledge sharing with partners and the need to minimize exposure to opportunistic behavior from others (G. P. Pisano 1990). This is especially problematic in loosely coupled ecosystems, where information asymmetries and monitoring costs might be substantial (Huber 1982; Luca

and Atuahene-Gima 2007). Therefore, mediators can be expected to play a key role in reducing appropriability concerns in that they define the formal or informal rules of inter-organizational intelligence exchange and contribute to building an atmosphere of mutual trust and openness (Dhanaraj and Parkhe 2006). When embedded in an innovation ecosystem, each member thus becomes a potential mediator that facilitates the fair dissemination and exploitation of market intelligence within the network.

Issue Selling

Provided that effective intelligence routing mechanisms are in place, market insights gained by means of collaborative environment scanning and information interpreting routines will be available to ecosystem members whenever required. If these market insights are to lead to superior ecosystem performance, they need to shape collective strategies and actions. A concerted, ecosystem-wide response to novel market intelligence is thus required (Kohli and Jaworski 1990). Decision-makers' attention, however, is limited (March and Shapira 1987; Ocasio 1997). As a result, they will be more likely to attend to those market insights that they consider to be strategic issues, that is, "events, developments or trends that are viewed as having implications for organizational performance" (Dutton and Ashford 1993, 397). Members from across the ecosystem hence need to bring key market insights to the attention of decision-makers. Organizations, and even more so ecosystems, can thus be conceptualized as marketplaces, where staff members seek to sell certain issues to top managers as well as to their peers (Dutton et al. 2001). "Trends such as […] changing consumer preferences become strategic issues only if individuals successfully make claims that these conditions are important, and others believe and buy into these claims" (Dutton and Ashford 1993,

403). We refer to this second constitutive routine of collaborative intelligence dissemination as *"issue selling."* In the context of collaborative market orientation, we define the latter as the collective process whereby individual promoters or champions seek to affect others' attention and understanding of issues derived from novel market insights in view of influencing the overall strategic agenda of the ecosystem.

Routine Description. The allocation of managerial attention to a particular issue is a vital precursor for strategic action. It provides the internal legitimacy required to mobilize broad support and to dedicate substantial resources to the search for appropriate solutions. Whenever important market insights are gained at lower hierarchical levels within a single firm, individuals have to engage in upward influence behaviors and issue selling (Dutton et al. 1997; Howard-Grenville 2007). In doing so, issue champions need to persuade top management in order to "defeat the naysayers, transform internal views, and facilitate necessary investment" (Teece 2007, 1327). As such, issue selling is an important enabler of change and is expected to enhance organizational performance (Wooldridge and Floyd 1990).

Occasions for issue selling are manifold and include a wide range of private and public gatherings such as one-on-one meetings, regular staff meetings, board meetings or annual general meetings. Similarly, issues can be sold informally by such means as personal appeals and behind-the-scenes discussions or more formally by writing a report or preparing a scheduled presentation to top management (Dutton and Ashford 1993). Moreover, issue champions might seek to build powerful coalitions to support their campaign rather than pursuing their persuasion efforts alone. This provides access to a

broader pool of resources that can be invested in advocating a common issue vis-à-vis top management (Burgelman and Sayles 1986). The value of these issue selling attributes is likely to be contingent on the respective organisational context. Issue champions thus need to carefully consider organisational norms and goals, if they are to configure issue selling moves that are effective in their respective context (Bansal 2003; Dutton et al. 2001). The effectiveness of an issue selling move is not only determined by the selling process and the organizational context, but also by individual characteristics of the seller (Dutton and Ashford 1993). As Kohli and Jaworski (1990) highlight, organisational responsiveness to novel market insights is likely to be affected by the expertise and trustworthiness of the intelligence source. Consistent with such arguments, Joshi (2010) finds that salesperson trustworthiness increases the effectiveness of their influence strategies aimed at initiating product modifications.

Firm Perspective. In firm-level studies, issue selling has been examined primarily as a form of upward influence behavior, by means of which lower or middle management seeks to gain top management's attention (Dutton and Ashford 1993). Upward issue selling is particularly salient within the individual firm, where top management can play the role of a power promoter, who uses hierarchical authority as the primary mechanism to coordinate and implement strategic actions (Fichter 2009).

The difference in status and power between issue seller and potential issue buyer, however, triggers what could be called a strategic persistence bias in firm-level issue selling routines. In particular, staff members at lower hierarchical levels might hesitate to promote issues derived from novel market insights that challenge the status quo (Kohli

and Jaworski 1990). Schilit (1987) provided early evidence finding that middle managers were more likely to exercise upward influence for issues considered as less risky in terms of economic costs, organizational disruption and future reversability. Similarly, social psychological research suggests that issues conveying “bad news“ such as the forecasted dominance of a competitor will often be suppressed in communications with superiors in fear of negative personal consequences (Huber 1982). Given this conservative tendency, the issues brought to the attention of managers are unlikely to question prevailing worldviews or cognitive schemes. It follows that existing programs and product lines remain frequently unaffected by novel market insights (Teece 2007). Biased issue selling routines are hence likely to contribute to strategic inertia, as a result of which established firms often find themselves unable to adequately respond to new market and technology insights (C. M. Christensen and Bower 1996; Henderson and Clark 1990).

Ecosystem Perspective. In ecosystem settings, hierarchical power and market mechanisms are largely unavailable as instruments to coordinate strategic actions and direct member behavior. Moreover, membership in loosely coupled innovation ecosystems requires relatively little relationship-specific investment. Innovation ecosystems thus differ from conventional strategic alliances in that commitment and governance are less determined by mutual resource dependencies. Instead, relational governance mechanisms driven by democratic decision-making, mutual trust and open sharing move to center stage. Similarly, the balance is likely to shift from coercive to expert and reputational types of power, when moving from the individual firm to the collaborative ecosystem. Peer processes of negotiation and persuasion rather than

hierarchical processes will hence shape the identification of strategic issues and the allocation of resources (Achrol 1991; 1997; Achrol and Kotler 1999).

This has profound implications for the nature of issue selling routines in ecosystem settings. First and perhaps most importantly, selling issues sideways and downwards will become just as critical as upward issue selling. If an issue is to be included in the strategic agenda of the ecosystem, it has to find broad support across ecosystem partners and hierarchical levels. Only when a sufficiently strong coalition has been established, can the ecosystem start allocating resources to a particular strategic issue. Coalition building thus becomes an essential element of issue selling routines (Achrol 1991). Two types of interorganizational promoters, which differ notably from the power promoter introduced earlier, are likely to play a key role in this process. The first type consists of expert promoters, who use their expert knowledge to persuade relevant audiences within the ecosystem of the strategic relevance of a particular issue. Their efforts are frequently complemented by relationship promoters, who seek to establish social bonds and close relationships among network partners (Fichter 2009). This is essential as successful issue selling in ecosystem settings depends in particular on mutual trust, that is, the belief among partners that one "will, without the exercise of influence or control, strive for outcomes that are beneficial for all member firms" (Achrol 1997, 65).

Second and relatedly, ecosystem-level issue selling routines are likely to be less affected by strategic persistence biases that previous research detected at the firm level (Dutton and Ashford 1993). This is expected to be a result of both the specific structure and governance of open innovation ecosystems.

As for its structure, an innovation ecosystem is typically characterized by a high degree of heterogeneity among innovation partners to leverage the complementary skill set of its members. The latter may belong to entirely distinct industries or be located at different stages of the value chain or the organizational life cycle. As a result, ecosystem members are likely to vary with regards to their knowledge bases, market assumptions and strategic priorities. Innovation ecosystems should thus be less affected by industry-wide inertia due to macrocultural homogeneity, that is, shared beliefs about customers, technologies and the nature of competition (Abrahamson and Fombrun 1994). Instead, the structural heterogeneity of innovation ecosystems is expected to increase the likelihood that important new market insights are recognized as strategic issues by at least one of the innovation partners. In a large incumbent firm for instance, middle managers might hesitate to draw top management's attention to a new market insight that signals the need for a fundamental revision of the existing product portfolio. In a small technology startup that is part of the same ecosystem, in contrast, staff members might be quick to identify this market insight as a key strategic issue on their agenda.

With regards to its governance, an innovation ecosystem hardly relies on hierarchical authority as a means of interorganisational governance. As a result, ecosystem partners are expected to have little reason to refrain from selling issues that challenge the status quo. Some ecosystem members might even possess an explicit mandate to identify issues that are expected to transform prevailing views and assumptions about the marketplace and call for a concerted response of all ecosystem members. This role could be assigned to a range of primarily exploratory organisations such as universities, research organizations, think tanks or startups. As their status and

reputation within the ecosystem are likely to be determined by their ability to introduce variation, they have little incentive for conformative behavior. Loose coupling between such exploratory and more exploitative entities, which is typical for many innovation ecosystems, is hence expected to constitute an important means of institutionalizing the recognition of issues that call for significant ecosystem-wide strategic changes.

Collaborative Responsiveness

As discussed above, routines that enable understanding the competitive environment and bringing that intelligence into the ecosystem are at the very heart of collaborative market orientation. However, organizations must translate this market intelligence into effective actions if they are to capture the value contained in superior market insights (Kohli and Jaworski 1990). Traditionally, each firm attempted to craft its own individual response to market insights it had generated. In an increasingly fast changing and information intensive environment, however, such approach is likely to leave the firm flatfooted in not being able to respond fast enough to all arising opportunities (Chesbrough 2003). In particular, the focal firm might lack the complementary assets required to capture value from a specific innovation opportunity. Similarly, another firm might possess a business model that is better suited to develop and commercialize a specific innovation. Conversely, in an ecosystem setting, members have the opportunity to orchestrate their response to novel market intelligence such that the respective strengths of each member are leveraged. Collaborative responsiveness defined as the concerted effort of the innovation ecosystem to implement specific actions based on novel market intelligence in order to create superior customer value thus

becomes a vital CMO capability. Possible responses to new market insights might consist in the launch of a novel product or service, the modification a production or service delivery process or even the reconfiguration of a business model (Teece 2007). Hence, mechanisms need to be in place to allow ecosystem members to coordinate their response and effectively respond to customer needs gathered from novel market insights. We refer to these two constitutive routines of collaborative responsiveness as 'opportunity seizing' and ecosystem reconfiguring'.

Opportunity Seizing

Opportunity seizing is the collective process whereby ecosystem members jointly develop novel products, services or processes in response to novel market insights. As Achrol and Kotler (1999, 147) state, "today's companies work closely with dedicated partners on the supply side […] and the distributor side of their business, expecting them to play proactive roles in designing winning technologies, services and marketing strategies." In an ecosystem context, opportunity seizing is thus an inherently collaborative process to jointly exploit information gained from the marketplace. When coordinated effectively, the collaborative approach to opportunity seizing is likely to offer a number of important advantages over more conventional approaches. First, it allows for specialization in opportunity seizing such that the development and commercialization of a novel product or service is undertaken by those ecosystem members who are best positioned in terms of their existing knowledge base and skill set (Chesbrough 2003). An opportunity might thus be identified by one ecosystem partner, while being exploited by another. This obviously requires good incentive design and appropriate IP protection and revenue sharing mechanisms (Teece 2007). Second, a

collaborative approach to opportunity seizing provides an opportunity for systematic risk pooling. This allows ecosystem members to share the substantial risk potentially associated with large-scale initiatives, where failure is likely to threaten organizational survival if it is undertaken by an individual firm. Similarly, the ecosystem can build a notable portfolio of experiments, a portion of which is expected to fail, without significantly adverse impacts upon to any one firm within the ecosystem. While such failure might be detrimental to the individual form, it is expected to be offset by successes of portfolio experiments generated elsewhere in the ecosystem (Day and Schoemaker 2004). Finally, collaborative opportunity seizing greatly increases the likelihood of a serendipitous recombination of previously unconnected knowledge elements (Luca and Atuahene-Gima 2007). As Prabhu, Chandy and Ellis (2005) argue with reference to the impact of acquisitions on innovation, interaction between concepts from different knowledge domains is likely to trigger what they call "happy accidents". One ecosystem partner might thus possess an important component of technological competence that yields a major product innovation when combined with knowledge elements of another ecosystem partner. Such combinatory innovation is all the more important as innovations become increasingly systemic consisting of multiple interdependent components often resting on a shared platform (Teece 2007).

Routine Description. Pursuant to gathering customer and market intelligence and its dissemination within the ecosystem, the intelligence must be exploited for gain through the opportunity seizing routine. This routine consists of filtering ideas that show promise and connecting them with the capabilities of the ecosystem resulting in new products and services, new ways to deliver products or providing customers with greater control over

existing products (e.g. through compatibility with other products or flexibility of use). Opportunity seizing routine involves mastering the linkage of internal knowledge pertaining to competitive landscape with the collective intelligence of the ecosystem with the aim to shrink time-to-market. This leads to a responsive ecosystem that creates value for all partners.

Firm Perspective. At the firm level, opportunity seizing is accomplished by exploiting the interaction between the partners and often manifested in its ability to create product and process innovations. Firms that develop competencies to quickly insert themselves into the seizing process to join partners in seizing the market opportunity will contribute to the competitiveness of the overall ecosystem, and in doing so, will further enhance their reputation with which other firms would want to collaborate. These competencies require resources to complement partners' efforts to assimilate collaborative intelligence and to use their technological platform to experiment, ascertain and exploit the market's and customers' demands (Malhotra, Gosain, and El Sawy 2005). Along these lines, Barney (1991) argued that new knowledge has an impact only when it is incorporated in an organization's way of doing business and promotes flexibility.

Ecosystem Perspective. In the context of collaborative arrangements, the role of the ecosystem is to be vigilant and exploit innovative opportunities to any partner of the ecosystem. In most cases, the ecosystem is a congregation of firms each with their individual product line and processes to service their customers while also looking out for collaborative opportunities with its partners. It is logical for a firm to first attempt to exploit the opportunity internally. However, when market intelligence is gathered by the

partners, each firm has a responsibility to protect the interests of the entire ecosystem. Therefore, it is important that all firms within the ecosystem are vigilant to opportunities even when they are of tangential value to their line of business. However, firms can blend their individual efforts with the ecosystem prowess to seize opportunities in a win-win scenario. For example, Google relies on market-based efforts for hardware development of its Android phone, while utilizing the collaborative arrangements for the software development (Boudreau and Lakhani 2009).

Ecosystem Reconfiguring

The second routine - ecosystem reconfiguring - shall be defined as the collective process whereby members adapt their ecosystem in response to novel market intelligence. Adaptation might pertain in particular to ecosystem strategy, structure and processes. As for ecosystem strategy, novel market intelligence might signal the need to adjust the current business model. It is precisely this capacity to "create, adjust, hone, and, if necessary, replace business models that is foundational to dynamic capabilities" (Teece 2007, 1230) in general and network-based responsiveness in particular. Similarly, ecosystem reconfiguring might pertain to key processes of inter-organizational knowledge transfer and structural elements within which knowledge transfer takes place across the ecosystem. Novel market insights as external knowledge sources are increasingly tapped into by firms to build innovation capacity (Chesbrough 2003; Laursen and Salter 2006). The interactive dynamics between ecosystem firms as a result of structural mechanisms such as power relations, trust and risk influence how firms interact and knowledge is transferred (Easterby-Smith, Lyles, and Tsang 2008).

Reconfiguring relationships between ecosystem firms also involves new boundary relationships between the platform leader and smaller firms, and the establishment of governance mechanisms and decision rules concerning sharing of costs, risks and revenues (Achrol 1991).

Routine Description. A business model defines the customer value proposition, the means of creating value and the revenue architecture to capture value (Chesbrough 2010; Teece 2010). The business model effectively describes the approach to doing business and hence the route to market for a product or service proposition developed for a target market. Often the challenge for firms is to design and implement a business model in order to capture value and create competitive advantage. It is well known that often firms are able to come up with a new product or service but are unable to change their business model to deliver the proposition to the market (Chesbrough and Rosenbloom 2002).

Firm Perspective. In the case of a single firm, often there will be a dominant business model for a particular proposition. However, in a fast changing environment, firms need to not only identify the new proposition but also align their business models to deliver the proposition to the customer. Business model innovation requires systemic change across many components of the firm (Johnson, Clayton M. Christensen, and Kagermann 2008). For example, in order to effect a change in the customer value proposition requires changes to the marketing mix such as product/service, price, promotion and distribution strategy. This implies changes to the process to create value such as the manufacturing process or service development process. Often firms find it difficult to coordinate such a change as it requires management to simultaneously either disrupt or cannibalize the

existing revenue stream for a potentially uncertain stream in the future. Therefore business model innovation is often a tall order to put in front of management. Experiences from the past have shown firms find it difficult to change their business model as the cognitive frame does not allow management to change an existing business model easily. Xerox and its inventions from Xerox PARC is a case in point. Although Xerox PARC was responsible for many inventions such as the mouse and the word processing software, Xerox did not commercialize these inventions because the business model was not suitable (Chesbrough and Rosenbloom 2002). The Xerox business grew out of a leasing model for the copier. The leasing model provides free copies as part of the lease up to a certain number of copies per month and charges a rate per sheet beyond that. Under the leasing model, the incremental revenue was based on usage and hence its business model was geared towards increasing the speed of photocopiers. Therefore any invention that did not fit this realm was rejected by the senior management team at Xerox (Chesbrough and Rosenbloom 2002). This missed opportunity could have been overcome if Xerox worked collaboratively to commercialize its inventions by engaging other firms that had a more suitable business model. This calls for overcoming the 'Not Invented Here' syndrome that we often hear about in firms when opportunities arise to commercialize inventions of other firms. In particular, firms needs to be comfortable in responding to the needs of the market by helping other firms commercialize an innovation that did not originate within the firm but elsewhere within the network.

Ecosystem Perspective. In an ecosystem setting firms have shared processes, systems and consequently business models (Chesbrough 2010). Often there are multiple business models working concurrently and in tandem within an ecosystem driven by a collection

of firms. This creates the ability of decoupling the development of propositions to the delivery of propositions. In the case of a single firm, the individual firm generates the idea, develops and delivers to the market. In the case of an ecosystem, one member of the ecosystem could identify and develop the idea but another member leverages the business model to deliver the value proposition. This allows an element of flexibility in developing and delivering new value propositions. In such a system, appropriate governance mechanism need to be in place in order to share revenues. In addition, the availability of multiple business models enables the effective development of a contingent strategy whereby business models can be switched from one firm to another depending on developments in the market place such as competitive reaction. This builds flexibility and hence competitive advantage. In short, the ability of the ecosystem to extract value increases as a result of the availability of multiple business models within the ecosystem.

In addition, strategic research has shown that new business models are created from existing sub-systems rather than from completely new systems (Denrell, Fang, and Sidney G. Winter 2003). The existence of multiple business models within an ecosystem enables the ecosystem partners to put together combinations of existing business models in order to create new business models. The ability to learn at close hand the nuances and differences of individual business models within the ecosystem enables members to reconfigure and develop new business models more easily. Moreover, this enables firms to experiment and learn about new business models without necessarily cannibalizing the existing business models (Chesbrough 2010). For example, Boudreau and Lakhani (2009) propose that firms can adopt a nested business model where they take advantage of the

alliance in a competitive market as well as involve ecosystem partners in a collaborative relationship.

The ability to discover and develop complex business models in an ecosystem inherently involves network complexity of a collaborative nature. Value is created and distributed across partnering firms through processes of interorganizational knowledge transfer across the ecosystem involving the integration of knowledge and know-how between firms who are incentivised to share knowledge (Teece 2007). Knowledge transfer takes place in both directions as roles and relationships change through partnerships that allow knowledge transfer to take place. This flow of knowledge between ecosystem firms is dependent on the firms' absorptive capacity (Cohen and Levinthal 1990), which is the ability to recognize the value of new knowledge and to assimilate and use that knowledge.

Innovation ecosystems are collaborative arrangements through which firms combine their individual offerings into a coherent, customer-facing solution. They are exchange networks that are characterised by companies cooperating and competing with each other simultaneously. A significant implication of creating a business model based on an ecosystem is the risk this might entail. Not only may this involve a risk of unintended transfer of knowledge which leads to an erosion of competitive advantage (Easterby-Smith, Lyles, and Tsang 2008; Norman 2002), but there is also the risk of source credibility – knowledge received by a partner firm is not useful or of high enough quality. As noted below this is where the platform leader plays an important role in

mitigating risk of knowledge transfer through an effective organizational and technology infrastructure.

In addition to these issues of risk, power asymmetries always exist between firms in the ecosystem as is particularly evident in the relationship between the platform leader and its smaller players and can be a key mechanism by which the ecosystem is able to be sustained. For example, Apple's success is very much dependent on the adoption of its processes by smaller firms across its business ecosystem in maintaining its dominant market position. They depend on smaller firms in the ecosystem being committed to and following their processes and procedures, and delivering the standards of quality and building a trust competency. Simultaneously, Apple has to show smaller firms that it can be trusted to deliver a consistent operating technology and organizational infrastructure on which they can successfully operate and achieve a competitive advantage. These symbiotic relationships have implications for the boundary relations between platform leaders and complementor firms in the ecosystem . There are also implications for the decision rules and frameworks that are evolving and increasingly complex, recognizing the importance of network effects and installed base trajectories. These need to be factored into decision rules such as whether the platform should be open or proprietary, and whether incentives should be provided to stimulate investment by the complementors. In some cases being mindful and maintaining a sense of fairness across the ecosystem may require flexibility in renegotiating the rights and rewards of the partnership established between firms in the ecosystem. In this sense, then, trust developed and maintained in the relationship is closely related to governance as the allocation of decision rights to parties in the ecosystem.

DISCUSSION AND IMPLICATIONS

Our proposal to build upon marketing orientation and to expand it to collaborative contexts is timely and needed to meet the demands of contemporary customers. In these hypercompetitive environments in which time-to-market foretells success, innovation costs are soaring, and revenues are under pressure, the need to distribute risks and exploit expertise, customer and market intelligence across the spectrum requires a new way of conducting business. Our proposed new way to view firms through the lens of collaborative market orientation articulates routines that position firms and the ecosystem to address demands of contemporary customers. The implications for firms are that they must assemble internal resources to create routines while managing traditional internal innovation (e.g. through research and development). Table 1 summarizes the capabilities and routines for collaborative market orientation.

INSERT TABLE 1 ABOUT HERE

Consistent with the tenets of market orientation, CMO constitutes the capabilities of intelligence gathering, dissemination and responsiveness in collaborative arrangements. Each capability is composed of distinct routines that enable firms to cooperate with others in ecosystem in pursuit of collective competitive advantage. In order to build these capabilities and routines, the firms must address issues of trust among the partners and ecosystem governance. Other implications for the firms in the ecosystem are to reconfigure the firms and the business model to take advantage of emerging business opportunities.

CONCLUSION

Globalization, the intensity of technological change and shift in industry borders are shaping organizational innovation (Teece 2007). As a result, innovation is increasingly pursued by a loosely coupled community of highly specialized organizations centered on a focal firm and united in their desire to serve specific customer needs (Achrol 1991; 1997; Dhanaraj and Parkhe 2006). Firms thus have to excel at building and governing such collaborative ecosystems in an attempt to jointly collect, interpret and respond to novel market intelligence (Almirall and Casadesus-Masanell 2010).

This raises a number of important questions. For instance, how can organizations orchestrate their own intelligence collection activities and those of its countless ecosystem members? How can they avoid information overload within their ecosystem by developing meaningful filtering and interpreting routines? How do they assimilate market intelligence and disseminate it within the system such that it is available at the right place at the right time? How do they coordinate the concerted response of their ecosystem? What mechanisms do they need to put in place to enable these processes? In this paper, we begin to address these critical questions by proposing and explicating the notion of a 'collaborative market orientation' (CMO), which builds on the widely known concept of market orientation. More specifically, we have conceptualized CMO as a set of three dynamic capabilities jointly built, maintained and exercised by all members of the same innovation ecosystem. '*Collaborative intelligence generation*', '*collaborative intelligence dissemination*' and '*collaborative responsiveness'* were the labels we assigned to these three key CMO capabilities. It was in particular through identifying and describing their

main constitutive routines that we sought to shed some light on each of these capabilities. The explicit identification of key CMO routines also provides a framework for managers to enhance the market orientation of their organizations as they migrate to a more collaborative innovation model. In doing so we respond to the call to make the concept of market orientation managerially relevant (Jaworski and Kohli 1996; Van Raaij and Stoelhorst 2008).

This paper contributes to the body of knowledge primarily by revisiting and extending the concept of market orientation. As such, it provides the much needed conceptual foundation for future research to build upon within the collaborative innovation theme. Opportunities are manifold and include further theoretical work that elaborates a series of propositions pertaining to the antecedents, consequences and moderators of CMO. A natural extension is empirical work to test these propositions employing an adequate measurement model for CMO. Similarly, we call for in-depth qualitative studies that seek to uncover the complex micro-processes associated with the development, maintenance and exercise of CMO capabilities. Pursuing any of these avenues appears a worthwhile undertaking given the rise of the organizational ecosystem as an increasingly important locus of innovation and competition.

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FIGURE 1
Conceptual Model of Collaborative Market Orientation (CMO)

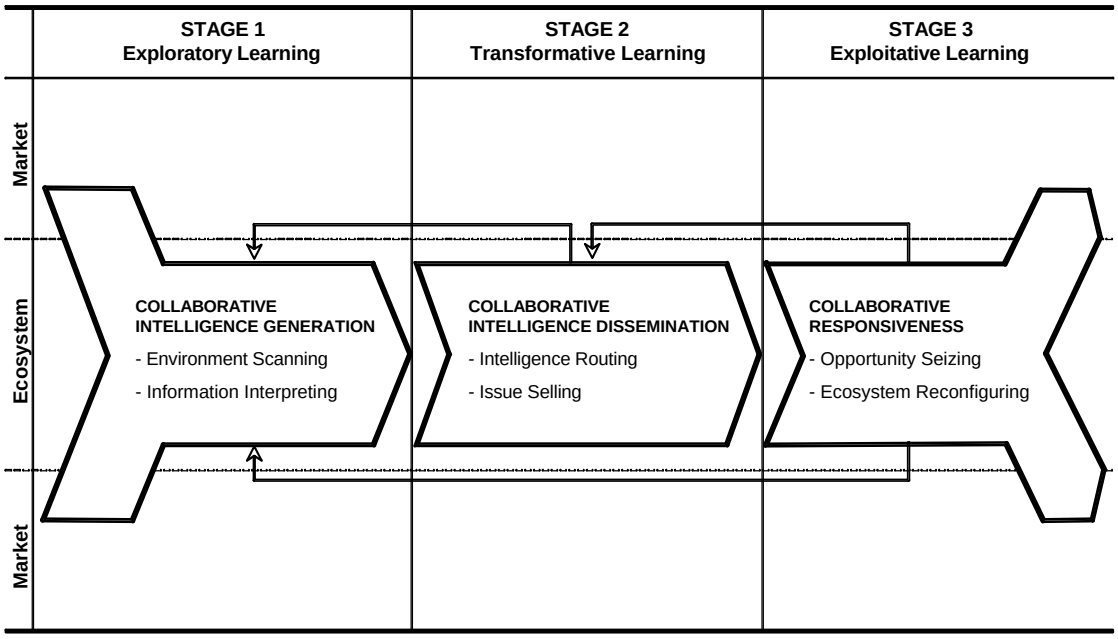

Table 1: Summary of Collaborative Market Orientation: Capabilities and Routines

Capabilities	Routines
1. Collaborative Intelligence generation A. Ecosystem members need to act in a cohesive manner to identify and interpret relevant market insights	A1. **Environmental scanning** - The collective process whereby ecosystem members systematically search the external market environment for new insights on customer preferences, technological trends or competitor moves. A2. **Information interpreting** - The collective process whereby ecosystem members try to make sense of the data gathered by collective environment scanning activities.
2. Collaborative Intelligence dissemination B. Ecosystem members need to share and recombine market intelligence	B1. **Intelligence routing** - The collective process whereby ecosystem members channel market intelligence such that it is made available at the right place and at the right time whenever possible. B2. **Issue selling** - The collective process whereby ecosystem members attempt to build powerful coalitions to support decisions informed by novel market intelligence
3. Collaborative Responsiveness **C.** Ecosystem members need to make a concerted effort to implement specific actions based on novel market intelligence in order to create superior customer value.	C1. **Opportunity seizing** - The collective process whereby ecosystem members jointly develop novel products, services or processes in response to novel market insights. C2. **Ecosystem reconfiguring** - The collective process whereby ecosystem members adapt the business model, structure or processes of their ecosystem in response to novel market intelligence.