

# Managerial Interpretation of Environment Dynamism, Nonlocal Search Trajectories, and Ties with Service Intermediaries\*

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**Abstract** - Firms may no longer rely only on internally generated innovation within today's context of globalization, industry convergence, and rapid technology change. Built on managerial interpretation of external environment and innovation search literature, this paper suggests that managers interpreting external environment as higher levels of dynamism tend to proceed more with nonlocal supply-side and exploratory geographic innovation search, whereas the interpretation as lower levels tends to motivate managers to involve more in nonlocal demand-side and exploitative geographic innovation search. Importantly, ties with service intermediaries provide firms with an alternative to broaden their external search scope, thereby reducing their reliance on those other nonlocal search trajectories.

**Keywords** – Environment dynamism, innovation, managerial interpretation, nonlocal search, service intermediaries

## I. INTRODUCTION

Managerial interpretation of external environment results in different strategic responses. When managers perceive external environment as opportunities, they tend to engage in more proactive and innovative strategic responses. When that perception is associated with threat, they tend to undertake risk-averse and less innovative responses [1][2][3]. In the context of globalization, industry convergence, and rapid technology change, firms find it very difficult to acquire sufficient resources to pursue the opportunities and encounter the challenges [4]. Owing to this emerging trend, external innovation search has become a critical strategic response for firms to gain and maintain their competitive advantage. Through external innovation search, a firm can capture knowledge spillovers from other firms and organizations, thereby becoming more innovative [5].

The extant literature, however, has not clearly explained the direct effects of managerial interpretation on the strategic response with respect to such organizational search for external knowledge [1][2][3][6][7][8]. Knowledge processes importantly determine competitive advantage of an organization [9][10]. Essentially, firms may no longer rely only on internally generated knowledge under the increasingly volatile environment [5][11]. Organizational search is

argued to enhance innovation by augmenting a firm's knowledge base [12]. Searching knowledge from outside through inter-firm cooperation has received a significant attention within the context of innovation [6].

Whereas large established firms may find it not very difficult to access interfirm networks of other firms, universities, and research institutes, new ventures suffer from the liability of newness due to lack of a proven performance record, limited resources, legitimacy, and status [13]. Their internal knowledge space is rather limited due to short history and limited resources. This liability of newness is even more critical for new ventures in technology industries where market and technology changes require the ventures to increase development speed and to establish new markets and technologies quickly [14]. Under this circumstance, innovation search becomes even more important as a problem-solving activity in which firms solve problems through a combination of knowledge elements to create new products [5].

To address this problem, the literature has therefore highlighted the important role of external ties with service intermediaries to facilitate external innovation search of new ventures [4][8][15]. Service intermediaries refer to organizations that provide professional services including accounting and finance, talent search, law, and technology services [8]. Importantly, service intermediaries are potentially available to all firms as they work at the intersection of many firms, organizations, and industries such that they can facilitate the exchange of valuable information [8][4].

This paper extends previous works by uncovering the differential effects of managerial interpretation of external environment on external innovation search through inter-firm alliances. Instead of simply viewing the strong or weak response, this study classifies the organizational search as theoretically meaningful exploratory and exploitative type of innovation search [16]. Drawing on the evolutionary economics [17], exploration and exploitation are defined in terms of nonlocal and local search respectively. In particular, this study proposes three-dimensional supply, demand, and geographic space as search trajectory [6]. Supply-side search involves search for new knowledge relating to technological and organizational aspects. Firms engage in demand-side search to discover new insights regarding market structures and segments, product use and substitutes, as well as customer preferences. A spatial dimension relates

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to the quest for opportunities, localized know-how, and operational experience in different geographical areas. To extend this line of research further, this paper examines the moderating role of ties with service intermediaries in perceived environment dynamism and those different innovation search trajectories [8]. Since establishing ties with service intermediaries may require less conditional provisions whereas these ties may broaden external search scope and reduce search costs, firms perceiving environment dynamisms that possess these ties may not rely on such three-dimensional search as much as when they do not.

## II. MANAGERIAL INTERPRETATION OF EXTERNAL ENVIRONMENT

The organizational environment refers to a variety of external actors attended to by organizational members [18]. The environment involves actors that are outside of and not under control by the organization therefore, it is regarded as a source of the organization's uncertainty [19]. As the dynamics or the change of the environment increases, the uncertainty faced by the organization also increases [20]. In a stable environment, organizations can develop rules or standard operating procedures to deal with their environment, however, in a substantially changing environment particularly like that facing technology ventures, these fixed rules and standard operating procedures will not be able to deal with such environment effectively. How managers perceive and interpret their environment as an entirety hence critically determines the extent to which they engage in external innovation search. In fact, managers are information processors and their interpretations of external environment determine decision process characteristics which constitute their strategic behaviors and the effectiveness of strategies they make in response to environment uncertainty [21]. Such interpretation is unarguably not based on particular aspects of the environment, but a summation of all aspects of environment uncertainty.

Managers comprehend the external environment through a process of selective attention and simplification [2][22]. When facing with ambiguous conditions, managers employ a schema to categorize associated information and reduce the complexity of their surroundings, thereby allowing them to interpret issues before formulating strategic responses [7]. This phenomenon is associated with individual information processing, subsequent behaviors, and organizational structures [23]. Essentially, organizations are seen as an open system that distribute and regulate the attention of their decision-makers [23]. The interpretation of external environment may be as threats or opportunities [2][16]. A threat interpretation is the extent to which managers perceive an external environment as negative, where loss is likely and over which they have relatively little control. In contrast, an opportunity interpretation refers to the

extent to which managers perceive an external environment as positive, where gain is likely and over which they have a fair amount of control. Threat and opportunity perceptions may originate from many sources including environment uncertainty [7].

This paper proposes environment dynamism to represent the source of threat and opportunity interpretation. Environment dynamism is the rate and unpredictability of technical change in the environment [6][24][25]. The environment dynamism is particularly salient in technology industries where market and technology changes require the ventures to increase development speed and to establish new markets and technologies quickly.

## III. EXTERNAL INNOVATION SEARCH AND ORGANIZATIONAL LEARNING

A movement toward open innovation demonstrates a change in the way firms search for new ideas for innovation. A business model of different actors working together to bring about the successful commercial exploitation of a new idea have replaced the early Schumpeterian model of an individual entrepreneur bringing innovations to markets [26]. This new model suggests that innovators rely mainly on interaction with lead users, suppliers, and institutions in the innovation system [27]. Advantages from internal R&D have declined as many successful innovative firms spend less on internal R&D and draw in more knowledge and expertise from external sources [28]. Essentially, open innovators commercialize external ideas by deploying outside (in combination with in-house) pathways to the market [28].

In open innovation business model, exploration and exploitation are important forms of organizational learning and adaptation [29]. Essentially, in the context of technology ventures, when competition intensifies, firms need to renew their technological capability through organizational learning by concurrently exploiting existing competencies and exploring new ones [30]. Firms are required to keep both exploration and exploitation processes in play at all times, albeit they may not completely maximize their benefits from the current domain [29][31]. Exploration involves search, variation, risk taking, experimentation, play, flexibility, discovery, and innovation, whereas exploitation includes refinement, choice, production, efficiency, selection, implementation, and execution [29]. In essence, the distinction between exploration of new possibilities and exploitation of old certainties highlights the fundamental difference in the learning behavior of organizations that significantly influences their subsequent strategic behaviors [29]. This is very true for firms in technology industries. These firms need to be ambidextrous in learning that concurrently develops exploratory innovation for new products and services in emerging markets where experimentation, speed, and flexibility are critical and exploitative

innovation to compete in existing dynamic markets where cost, efficiency and innovation are critical [32].

This paper moves beyond the general conception of exploration and exploitation in extant literature and proposes a more specific supply-side, demand-side, and geographic search to represent their characteristics [6]. Along this line, research in evolutionary economics also highlights the role of search in helping firms find sources of variety which allow them to create new combinations of technologies and knowledge [17] and provide firms with opportunities to choose among alternative technological paths [33]. Such open innovation strategies are indeed influenced by the extent to which technological opportunities are available in the environment and the extent to which other firms are conducting their search activities [17][31][34][35]. These determinants of a firm's levels of open innovation are all reflected in environment dynamism being perceived and interpreted by a firm.

Organizational search from a nonlocal supply side is necessary for a firm to create new products or services to mitigate the adverse effect of local search where firms usually search in the vicinity of their current technological domains [36]. In fact, the search needs not be confined to only the supply side as nonlocal demand-side is often motivated by the potential discovery of innovation opportunities through brand extension, product repositioning, and the targeting of new customer groups [22][37]. Further, diversification literature has also stressed the importance of entries in different geographic regions [38], thus innovation search may be spatial, allowing firms to acquire a variety of useful new knowledge in different geographic regions. With the same logic as the related and unrelated diversification, geographic search may be non-locally or locally oriented toward larger or smaller physically and culturally distant geographic markets respectively [39][40]. Essentially, idiosyncratic problems and opportunities drive exploratory search across geographic regions [41]. Thus, firms undertaking greater geographic search should be able to access to and recombine from a more varied set of knowledge elements not available locally by accessing to multiple regional networks [41][42].

A greater amount of search in nonlocal domains denotes a higher exploration orientation, whereas a lesser amount of nonlocal search is indicative of a higher exploitation orientation [17][29]. Firms differ in level of exploratory and exploitative type of innovation search, thereby influencing in their decisions regarding supply, demand, and spatial boundary spanning search. In fact, managerial interpretation of external environment as more or less dynamism or as constraints or opportunities determines whether innovation search is more or less nonlocal [16][42]. Owing to this, some firms may undertake more whereas others may undertake less explorative or nonlocal supply, demand, and spatial search trajectory [6]. A greater exploration orientation allows firms to adapt to shifts in markets, technologies, and competition through innovation whereas, to expand the knowledge pool that in turn, increases the likelihood

of finding commercially valuable new knowledge combinations [5][17][29][43].

#### IV. PERCEIVED ENVIRONMENT DYNAMISM AS DIRECT EFFECT ON SEARCH TRAJECTORY

##### A. Supply-Side Search

Unexploited opportunities in product and process technologies are likely to be more prevalent in dynamic environments [44]. Managers interpreting external environment as such are anxious to search in external technological, production, and other supply-side domains to attain new knowledge elements that are able to increase valuable product and process innovation, thereby coping with the volatile market opportunity and customer preference [6][17][43][45]. Importantly, in the early stages of a technology paradigm, for example, perceived highly dynamic environment may activate firms to experiment with different unfamiliar technologies in hoping that they can synthesize them into creative successful designs [46][47][48].

In less-dynamic environments, however, nonlocal supply-side search tends to unnecessarily increase the search and integration cost since critical product and process technologies are already in place though may need only an incremental modification [43][49]. Managers interpreting environment more stable will be less anxious about the likelihood of significant technological shift. Creatively new knowledge and technology potentially be discovered via nonlocal supply-side search may have already been realized in the initial search period of highly dynamic evolutionary stages. Therefore, there is not much need for managers interpreting external environment as low dynamism to invest in more costly exploratory nonlocal supply-side search for relatively rare unexploited valuable opportunities. The benefit of nonlocal search tends to attenuate at the latter less-dynamic stages of technological evolution, whereas local search with lower costs would be sufficient to realize experience effects derived from applying knowledge in the proximity areas of established competency by incremental modifications and refinements [47][50].

The foregoing discussion suggests that managerial interpretation of environment as more dynamism arouse firms to proceed with a greater amount of nonlocal supply-side search to attain potential creatively new knowledge though with relatively higher search costs and riskier outcomes.

*Proposition 1: The level of perceived environment dynamism is positively related to the amount of nonlocal supply-side search.*

##### B. Demand-Side Search

Firms in a less-dynamic environment are required to improve ability to refine, adjust, or recombine products

and services that meet their customer needs. Managers perceiving the environment as such are calmer as they increasingly build on existing competence and proceed with demand-side nonlocal search to span market niches, change customer preferences, look for new customer groups, basically to satisfy customer needs [6]. The nonlocal search in this demand-side trajectory involves less search costs and more outcome certainty that enhances knowledge about the needs and preferences of current and potential customers [22][37]. In external environment with high levels of dynamism, however, opportunities and paths of technology are very uncertain, meanwhile, the market and customers are volatile. Managers interpreting external environment as such are more anxious about the uncertain profit potential of their existing products or services and future trend of technology. Essentially, they may not rely on demand-side nonlocal search that hardly provides firms with new knowledge elements sufficiently to cope with the dynamism [50][51]. In fact, the failure of previously successful firms in increasingly high levels of technological evolution is argued to be associated with an excessive customer or demand-side orientation [15]. Accordingly, managerial interpretation of external environment as less dynamism should encourage firms to proceed with a greater amount of nonlocal demand-side search with relatively lower search cost and more certain outcomes.

*Proposition 2: The level of perceived environment dynamism is negatively related to the amount of nonlocal demand-side search.*

### C. Geographic Exploratory and Exploitative Search

Managers interpreting external environment as high or low levels of dynamism are motivated to search for more external knowledge from nonlocal supply side and demand side respectively. However the perceived different levels of dynamism may not prevent firms to span their spatial search to undertake exploratory or exploitative type of organizational learning necessary for them to survive and prosper in high or low levels of environment dynamism. Spatial search in dynamic environment allows firms to exposes to creatively new innovation, technical insights, and problem-solving procedures that may provide a competitive advantage over their rivals searching in a more local domain [6]. This search trajectory provides valuable new insights associated with the production organization, quality improvement, and products distribution [53][54]. Irrespective of perceived levels of environment dynamism, managers are likely to proceed with boundary-spanning geographic search to gain both upstream and downstream exploration and exploitation associated knowledge accordingly.

*Proposition 3a: The level of perceived environment dynamism is positively related to the amount of boundary-spanning geographic exploratory search.*

*Proposition 3b: The level of perceived environment dynamism is negatively related to the amount of boundary-spanning geographic exploitative search.*

## V. TIES WITH SERVICE INTERMEDIARIES AS MODERATING EFFECT ON SEARCH TRAJECTORY

Service intermediaries are positioned at the intersection among many other firms, organizations, and industries, thereby allowing them to establish and maintain extensive networks of ties with different parts of the social system [8]. These intermediaries provide technical, financial, and networking services that individual new ventures may not afford due to high search costs, thereby allow them with more innovation opportunity [55]. Essentially, by establishing ties with service intermediaries, firms are able to plug into these networks that broaden the scope and reduce costs of their external innovation search, hence increasing their competitive advantage [56]. Built upon the literature on innovation search, ties with service intermediaries provide an alternative path for firms to broaden their external search scope and to reduce their search costs, thereby increasing creatively successful product innovations [5][11][34][43][57].

The role of service intermediaries is particularly salient in the context of new ventures as these ventures have a relatively narrow external search scope due to limited external contacts [13]. Further, these new ventures are usually in a difficult situation to afford search costs due to their limited resources in terms of financial and organizational resources as well as managerial time [8]. Given these constraints, establishing ties with service intermediaries provides an alternative path that helps firms justify their needs and costs of external innovation search. Therefore, at different levels of environment dynamism, firms that have established more ties with service intermediaries are more motivated to leverage the potentially more cost effective and more comprehensive valuable knowledge and innovation from these intermediaries in lieu of continuing to rely on their previously supply-side, demand-side, or geographic boundary spanning search trajectory. In essence, irrespective of the different levels of perceived environment dynamism or boundary search trajectories, firms that possess more ties with service intermediaries are likely to rely less on those three-dimensional search trajectories.

*Proposition 4a: Ties with service intermediaries moderate the relationship between the level of perceived environment dynamism and the amount of nonlocal supply-side search such that the relationship is weaker when the venture possesses more ties with service intermediaries.*

*Proposition 4b: Ties with service intermediaries moderate the relationship between the level of perceived environment dynamism and the amount of nonlocal demand-side search such that the relationship is weaker*



when the venture possesses more ties with service intermediaries.

*Proposition 4c: Ties with service intermediaries moderate the relationship between the level of perceived environment dynamism and the amount of boundary-spanning geographic exploratory search such that the relationship is weaker when the venture possesses more ties with service intermediaries.*

*Proposition 4d: Ties with service intermediaries moderate the relationship between the level of perceived environment dynamism and the amount of boundary-spanning geographic exploitative search such that the relationship is weaker when the venture possesses more ties with service intermediaries.*

## VI. CONCLUSION

Globalization, industry convergence, and rapid technology change are among the most critical aspects of today's business environment that provide firms with opportunities and challenges [4]. Firms may no longer rely only on internally generated knowledge under this increasingly volatile environment [5][11]. Essentially, searching knowledge from outside through inter-firm cooperation has become an opportunity as well as a challenge for every firm striving to survive and prosper within the context of today's innovation [6]. This study provides a more specific conceptualization of widely cited exploration and exploitation organizational learning mechanisms [29] within the context of perceived environment dynamism, external knowledge search trajectory, and ties with service intermediaries.

Built on the evolutionary search literature [36] and the classification of search trajectory into supply-side, demand-side, and geographic boundary spanning search [6], this paper suggests that managers interpreting external environment as higher levels of dynamism are likely to proceed with an increase in external search through nonlocal supply and exploratory geographic side, whereas the interpretation as lower levels tends to motivate managers to involve in nonlocal demand-side and exploitative geographic-side search. Importantly, the extent to which firms engage and balance their search in supply, demand, and spatial side determines the levels and benefits of greater or lesser amounts of nonlocal search that varies with the levels of perceived environment dynamism.

Further, external knowledge search through such three-dimension trajectory is not without significant costs. Particularly, new ventures with relatively limited external contacts may not be able to afford such search costs due to their limited resources [13][8]. This paper therefore highlights the role of service intermediaries which uniquely sit at the intersection of many firms, organizations, and industries [4][8]. Service intermediaries maintain extensive networks of ties with different parts of the social system and act as repositories for valuable information, knowledge, and opportunities

[4][55][56]. Ties with service intermediaries therefore allow firms to broaden their external search scope in all dimensions. These ties also reduce external search costs associated with locating valuable information, knowledge, and specialized expertise critical for product innovation [56]. Managers perceiving environment dynamism, irrespective of at which levels, are therefore likely to divert their external innovation search to that less costly and yet effective path, thereby reducing their reliance on those more costly supply, demand, and geographic side of search trajectory.

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