APPLYING A DARWINIAN EVOLUTIONARY LOGIC TO THE DYNAMIC CAPABILITIES VIEW

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ABSTRACT

The Darwinian logic of evolution occurring via the mechanisms of variation, selection and retention provides a possible framework from which to develop the dynamic capabilities view (DCV). Presently criticized for lacking a theoretical foundation and featuring a degree of confusion concerning how it aligns with the resource-based view (RBV), the DCV would benefit from greater clarity concerning its assumptions and theoretical base. Our paper frames how a firm’s resources and capabilities evolve according to the generalized Darwinian logic of variation, selection and retention. We conclude that the DCV can best be positioned as a complementary, albeit independent, theory to the RBV where the focus is on how firms develop over time, rather than as a causal explanation for securing competitive advantage.

Keywords: dynamic capabilities, organizational processes, organizational learning, market transformation, the Darwinian logic, firm evolution.

INTRODUCTION

The resource-based view (RBV) provides a theoretical framework that explains how resources may provide a basis for competitive advantage (Barney, 1991; Peteraf, 1993). Emphasizing imperfections in factor markets as a source of rents, the RBV has been criticized on the basis of its static equilibrium logic (Priem & Butler, 2001). In comparison, the dynamic capabilities view (DCV) has been heralded as possibly overcoming some of the potential weaknesses of the RBV. Positioned as a dynamic model highlighting path-dependent processes, it allows firms to adapt to changing environments by building, integrating and reconfiguring a firm’s resource base (Teece, Pisano & Shuen, 1997), the DCV builds on evolutionary theory as opposed to the neoclassical economic theory adopted by the RBV.

The promise of the DCV has slowly given way to a range of practical issues resulting from a lack of clarity concerning the core concepts and a related problem of a lack of, or at least unclear, theoretical foundations (Ambrosini & Bowman, 2009; Arend & Bromely, 2009). At the heart of these issues is the highly ambiguous relationship between the RBV and the DCV. While the early work of Teece and others (e.g. Teece, Pisano & Shuen, 1997; Teece & Pisano, 1994; Winter, 2003) presented the DCV in evolutionary terms, many authors subsequently have presented the DCV as simply an extension of the RBV or even as part of it: “We … include all organizational capabilities, ‘dynamic’ or otherwise, in a dynamic resource-based view” (Helfat & Peteraf, 2003: 997).
Integrating the two perspectives is difficult as the DCV is a disequilibrium approach that focuses on environmental fit rather than specifically on competitive advantage, and addresses resource building as opposed to picking (Makadok, 2001). Until there is clarity in regard to whether the DCV should be moving towards integration with the RBV (along the lines of Helfat et al., 2007; Helfat & Peteraf, 2003; Makadok, 2001), or whether the DCV should be conceptualized as an independent, but complementary, theory to the RBV, it will be exceedingly difficult to build the necessary theoretical foundations required to advance the DCV.

Arguments in this research project are clearly aligned with the ‘independent’ orientation on the basis that the underlying assumptions and principle arguments of the two views are divergent. But this research also sees the RBV and the DCV as complementary, since the RBV logically presents how resources may sustain a competitive advantage via imperfect markets, whereas the DCV provides a basis for understanding how these resources are constructed and evolve over time.

To explain the need for the DCV’s independence, this research begins by detailing each theory’s theoretical roots; then, based upon evolutionary heritage, it will suggest that Darwinian mechanisms of variation, selection and retention may provide a clear method for understanding the process by which firms develop over time in concert with changing environmental conditions. An evolutionary model builds upon the relatively underutilized tradition of evolutionary approaches in strategy (Barnett & Burgelman, 1996) and aligns well with the inherent nature of strategy with its bounded rationality (at best), issues of learning and iterative feedback loops. A Darwinian interpretation of the DCV also provides a specific theoretical foundation for developing hypotheses concerning the different stages of this evolutionary model.

THEORETICAL UNDERPINNINGS

Neoclassical economic models, whose features include homogeneous markets (and thus products), rational actors, mobile resources, lack of transaction costs and perfect information, allow for an understanding of the theoretical conditions where economic profits are non-existent. In such situations, superior performance can be best explained by considering the conditions under which the different neoclassical assumptions are violated. It is on the basis of such market imperfections that the RBV perspective has been built with resource heterogeneity providing the basis for explaining superior performance (Barney, 1991; Peteraf, 1993; Peteraf & Barney, 2003). Rents may then accrue due to these heterogeneous resources’ value and rarity, and they may be sustained over time if these resources are not imitable or substitutable.

However, exactly how organizations create or acquire these rare and valuable resources is not addressed, other than to highlight how ex-ante limits to competition on the basis of information asymmetries or luck may allow firms to acquire superior rent generating resources (Barney, 1986; Peteraf, 1993). While the RBV has attracted criticism on a number of points (e.g. Porter, 1991; Priem & Butler, 2001; Williamson, 1999), key shortcomings include its inability to account for the creation and development of relevant resources and capabilities internally, and how firms may adapt these resource endowments to meet changing environmental and market conditions (Teece, Pisano & Shuen, 1997; Teece, 2007; Liao & Rice, 2010).
With these shortcomings in mind, the seminal paper by Teece, Pisano and Shuen, (1997) introduced dynamic capabilities as an evolutionary approach to explain the development and reconfiguration of resources within firms. The DCV highlights the potential for path dependent organizational processes that allow for firms to adapt to (rapidly) changing competitive conditions. Their approach to dynamic capabilities is thus complementary, but independent of RBV (Winter, 2003). That is, RBV suggests how firms may create sustainable competitive advantage on the basis of particular resources, whereas the DCV helps to explain the dynamics within the firm that allow resources to develop over time, and how these may be integrated, deployed and reconfigured to meet changing environments.

While this need for a dynamic resource-based theory was obvious for some measures (e.g. Barney, 2001; Helfat & Peteraf, 2003; Winter, 2003), the relationship between the DCV and RBV is ambiguous. A significant portion of the most commonly cited papers in the field position dynamic capabilities as complementary to the RBV (e.g. Teece, Pisano & Shuen, 1997; Winter, 2003; Zollo & Winter, 2002). However, many other scholars have approached the RBV and the DCV as being far more aligned. Some (e.g. Eisenhardt & Martin, 2000; Zott, 2003) have drawn a link between dynamic capabilities and performance, even if it is rarely conceptualized as a direct one, with the relationship being mediated by the firm’s resources. It has also been suggested that the RBV and the DCV would function best as an integrated theory (Helfat, 2000; Madadok, 2001; Zott, 2003). Some are already working towards a level of integration, such as Helfat and Peteraf (2003), who argue that all capabilities (including dynamic capabilities) are captured in a dynamic resource-based perspective. In a review paper, Ambrosini and Bowman (2009: 29) suggest that the DCV “is argued to be an extension of the RBV; [and] it shares similar assumptions” (Barney, 2001). Finally, the highest level of integration is seen in Helfat et al. (2007: 14) who propose that dynamic capabilities need to be valuable, rare, imperfectly imitable and non-substitutable (VRIN) as per Barney (1991), and that the “types of isolating mechanisms that Rumelt (1984) lists apply to dynamic capabilities just as they do to other types of resources or capabilities”. It is therefore not surprising that Barney and Clark (2007: 249) criticize the DCV on the basis that it is not a dynamic model but is instead based upon RBV logic.

Part of this confusion stems from the lack of a clear and consistent theoretical foundation. The field features a mixture of assumptions and inconsistent theory application such as discussing the creation of rents through market imperfections alongside evolutionary paths based upon organizational routines (Arend & Bromiley, 2009). Where researchers have tried to provide a clear theoretical foundation (such as Helfat et al., 2007) they have tended to rely upon aspects of theory developed within the RBV. This reinforces the DCV’s fractured nature and opens itself to the principal criticisms leveled against the RBV (e.g. being tautological).

This research project seeks the possibility that rather than trying to more closely integrate with the RBV, the DCV might highlight its differences from the RBV both in respect of its assumptions and its theoretical logic, thus positioning itself as independent from RBV theory. To do this, the DCV needs to clearly position itself as an evolutionary theory that builds upon the work of both evolutionary economists (e.g. Nelson & Winter, 1982; Penrose, 1959; Schumpeter, 1939/1982; Stoelhorst, 2005) and evolutionary management theorists (e.g. Aldrich & Ruef, 2006; Barnett & Burgelman, 1996; Durand, 2006; Mathews, 2006).
One way to do this would be to clearly introduce the biological concepts of a Darwinian model as a starting point for consistent theory building. This would then alleviate the expectation that the DCV can specifically address the drivers of competitive advantage. Rather, in a Darwinian model, the focus is upon evolutionary processes in which superior performance is not an overt outcome as much as it is likely to be highly correlated with survival and strong growth. Thus the focus remains upon the evolution of the firm and how resources are developed and deployed over time, thereby allowing traditional RBV to provide the theoretical logic in regard to how these resources may provide the basis for competitive advantage.

A POTENTIAL DARWINIAN APPROACH TO THE DYNAMIC CAPABILITIES VIEW

Biological concepts applied to business-related evolutionary theory are not uncommon (e.g. Aldrich & Ruef, 2006; Barnett & Burgelman, 1996; Durand, 2006; Nelson & Winter, 1982). The use of ‘Universal Darwinism’ outside the biological field may not fully be presented as natural evolutionary logic in which the development of businesses in various aspects can be understood in line with the mechanism of ‘evolution in nature’ (Buenstorf, 2006). Hodgson (2002, p.270) nevertheless suggests that “there is a core set of general Darwinian principles that, along with auxiliary explanations specific to each scientific domain, may apply to a wide range of phenomena”. The Darwinist scheme of variation, selection and retention is thus able to be abstracted as a general mechanism for developing hypotheses in generalizing cultural or economic evolution in businesses (Campbell, 1969).

With the generalized Darwinian approach being found appropriate (Aldrich, 1979; Campbell, 1969), it immediately differentiates the DCV from the RBV. For instance, the dependent variable for the DCV is no longer performance, but rather survival and evolution of the firm within a disequilibrium model, as opposed to the economic equilibrium-derived RBV (Stoelhorst, 2008). Thus, a key issue in viewing the DCV via a Darwinian lens is determining how to identify the mechanisms of variation, selection and retention in a way that can be empirically tested. Appropriate empirical testing is important as Pablo et al. (2007: 690) understate a key criticism of the field when they comment that “empirical studies of dynamic capabilities remain relatively rare”. Before moving on to how these mechanisms can be specified, it is necessary to address each mechanism in turn at a theoretical level. It can be seen that the research project intends to extend a generalized Darwinist framework with causal explanations among variation, selection and retention in a cyclical process.

A GENERALIZED DARWINIST FRAMEWORK

Variation

The notion of variation provides for heterogeneity across firms. Dynamic capabilities, whether they emerge through the process of learning (Zollo & Winter, 2002) or via managerial or entrepreneurial capacity (Zahra et al., 2006), allow firms to reconfigure their resources and capabilities to create heterogeneous positions within product markets (Liao & Rice, 2010). Variation will thus be pursued to best achieve market fit. This may be widely recognized as the well-known phrase of “survival of the fittest”. On the other hand, variation may not be purely a response to changing environments...
according to the insights of Pitelis and Teece (2009). They highlight the potential for creating or changing markets in line with Chandler’s (1990) view that managers tend to shape markets (rather than vice versa). Thus dynamic capabilities are critical in driving variation as they underpin a firm being able “meet changing customer needs, and to sustain and amplify evolutionary fitness” (Teece, 2007: 1344).

**Selection**

Selection is most overtly visible via market-based competition, although it should be emphasized that this does not lead or equate to optimization (Sober, 1984). The variation mechanism provides heterogeneity in product markets such that those firms that best fit with the environment will survive and grow, and inappropriate variations will either need to adapt or become extinct over time. Selection is thus able to be understood as a result of adaptive evolution, while it is also a process in which firms considered as comparatively less fit are eventually eliminated based on long term prognosis. This demonstrates a passive manner in which firms are “naturally selected” by the environment. Observing market-based competition over time, apparently only those firms encompassing adaptive advantages, or at least relatively better performance, survive due to their successful variation(s).

On the other hand, selection can also encompass an active aspect in terms of strategic flexibility and intention. Technological or market opportunities are often reshaped due to the disturbance of market equilibrium (D’Aveni, 1994; Roberts & Eisenhardt, 2003). Firms with the intentions to ensure both continued growth and indeed survival may be spurred to sense and calibrate those opportunities, through which new market fit and enhanced performance are thus expectant (Agarwal & Bayus, 2002; Srivastava, Fahey & Christensen, 2001). Hence, selection leads to a process in which organizational resources and capabilities are renewed and reconfigured in the retention process. For instance, traditional measures of performance such as profit are a reflection of the selection process and in themselves provide a stimulus for future retention and variation by creating the cash resources to reinvest in a firm’s routines and dynamic capabilities (and thus providing opportunities for further appropriate heterogeneity in time). In comparison, firms that perform poorly in respect of the selection mechanism will subsequently be challenged in future retention- and variation-related activities due to reduced opportunities to make investments in their resources and capabilities. While selection will be observed via product/market competition, the selection mechanism highlights which resources and capabilities are creating value versus those that are not, hence leading to the notion of retention.

**Retention**

As it has been recognized, retention in framing dynamic capabilities generally involves the firm’s routines, memory, know-how and resource (and capability) bases, as well as the paths where the firm’s learning history is recorded (Walsh & Ungson, 1991; Nelson & Winter, 1982). Thus, retention, on the basis of this feedback from the market, sees firms institutionalize how they interact with the environment through embedding appropriate routines in their activities and building new ones where appropriate, thereby forging evolutionary pathways.

The presence of dynamic capabilities allows for these resources and capabilities to be reconfigured such that the variation process may continue (Zote, 2003; Teece, 2007), thus beginning the cycle again. Hence, from an evolutionary perspective, dynamic capabilities allow for the variations across an
industry. Feedback on the basis of environmental fit is provided by the selection mechanism which then determines that which is retained and what needs to be built anew. Changes in the resource base through the application of dynamic capabilities, as retention has been defined, then begin the process again.

![Figure 1: The Generalized Darwinist Framework](image)

**Propositions**

In line with the generalized Darwinist framework defined a priori, a further step in the research project is defining the propositions in order to illustrate the theoretical characteristics of each aspect of the framework.

To apply a Darwinian approach into either the economic or the industrial field, Buenstorf (2006:515) recently argued that “adoption of the generalized Darwinist position requires a systematic search for structural counterparts to the individual elements of the Darwinist scheme”. This argument implies a challenge insofar as it still lacks a set of comprehensive operational definitions in defining the complexity of each aspect, and the relationships among the aspects, of the generalized Darwinist processes of variation, selection and retention.

**Variation and Selection Mechanisms**

It seems a truism to note that firms exist to meet the demands of their customers, through markets, by supplying products and services (Grant, 1996; Teece, et al., 1997). Yet only those firms capable of adequately perceiving market needs and adapting themselves in time to meet such anticipated demand can expect to survive or even prosper over time (Teece, et al., 1997; Langlois & Foss 1999).

From an evolutionary perspective, the variation mechanism leads to a range of alternative offerings to the market and the selection mechanism then sees some firms prosper, some simply survive and others eventually fail. How much variation is required is determined by the needs of the market; however, according to the observation on SMEs, Liao and Rice (2010) suggest that in the case of small firms in highly competitive markets, almost continual variation in some manner will be required to be competitive. Such firms are unlikely to have very valuable resources that set it apart from other SME competitors, such as an exceptional brand, patents or an incomparable culture. Instead, they are more likely to compete via continual improvements in both their internal operations and their product offerings.
In considering the ways in which selection takes place on the basis of the variation in the market, firms need to continually adapt their market presence in regard to their best suited environmental fitness through a series of resource transformations and reconfiguration processes (Argarwal & Bayus, 2002; Srivastava, Fahey & Christensen, 2001). To be more precise, a part of variation logic may thus be presented as a result of a combination of new product and service releases (as substantive and tangible changes in the market offerings of firms) and changes in advertising, distribution and market locations served (as perceptual and positional market changes) (Liao & Rice, 2010).

Evolutionary theory, nevertheless, views the environment as continually changing, and firms may play a role in this co-evolutionary process to the extent that they may “even create market change” themselves (Eisenhardt & Martin, 2000: 1107). Since firms may transform their market offerings as well as potentially transform the market itself, propositions may be made regarding the variation mechanism with respect to a firm’s market transformation and fitness in response to its evolutionary process (Srivastava, Fahey & Christensen, 2001; Liao & Rice 2010). On the other hand, assessing selection that occurs on the basis of variation is challenging in an empirical sense. Even considering the elements supporting firm survival (Hannan & Freeman, 1984), firms with poor environmental fit may take years to be eliminated from an industry. This may therefore suggest considering the factor of firm performance rather than survival as the overt result of the selection mechanism in a Darwinist perspective.

Taken together, these elements represent a transformation of the competitive basis of the focal firm in its marketplace in a dynamic way (Liao & Rice, 2010). In other words, firms that pursue a certain level of variation through their market transformational activities may achieve a certain level of performance. Such consequences in fact link the firm’s ability to adapt to the competitive environment, finding its niche through positive selection and/or market fitness. In order to illustrate a firm’s evolutionary process and its interplay with the environment, the empirical nexus between variation and selection mechanisms may be able to be assessed by observing the contribution of a firm’s market transformational activities to its resulting performance. Therefore, we posit the following:

**Proposition 1**: The greater a firm's variation through its effective market transformational activities, the greater the level of performance in reflecting the firm's successful selection process.

**Retention and Variation Mechanisms**

Our second proposition considers the role of dynamic capabilities per se in driving variation and subsequent selection. From the review of the literature on dynamic capabilities, most of the studies illustrate that the ‘origins’ of these capabilities lie in fundamental firm processes that are intentionally routinized and/or bundled to form firm capabilities (Eisenhardt & Martin, 2000; Hansen, 1999; Hargadon & Sutton, 1997; Makadok, 2001; Maritan, 2007; Szulanski, 1996; Teece, 2007; Teece, et al., 1997; Zahra & George, 2002; Zollo & Winter, 2002). This bundling also forms the link between knowledge and competencies (e.g. organizational learning and core competence) that contributes to the foundation of the dynamic capabilities view that firms response or adapt to, and lead environmental changes (Argyris & Schon, 1978; Cohen & Levinthal, 1990; Cyert & March, 1963;
Iansiti & Clark, 1994; Kusunoki, Nonaka & Nagata, 1998; Leonard-Barton, 1992; Prahalad & Hamel, 1990; Teece, 2007; Teece et al., 1997). Obviously, such linkage may be built for a causal understanding that connects a firm’s internal dynamics and external changes. Inferably, in a dynamic view, a firm’s retention system (for the purpose of resource and capability development) can be perceived as a driver to secure or enhance its market fitness. In a Darwinist view, such inference is reflective of the causal relationship in which retention contributes to the variety of variation.

While variation is required to achieve environmental fit, any variation is actually possible because of changes that occur within the firm in respect of resources and capabilities; it is these changes which may be driven by the presence of dynamic capabilities (Teece et al., 1997). Zollo and Winter (2002: 340) position learning as a source of dynamic capabilities, defined as “a learned and stable pattern of collective activity through which the organization systemically generates and modifies its operating routines in pursuit of improved effectiveness”. It is the changes and modification of the routine components that are important in forming the causal nexus between retention and variation in reflecting the Darwinian evolutionary logic; retention is perceived as a routine based system within which a firm’s learning activities are actually involved (Eisenhardt & Martin, 2000).

Through such a learning process, dynamic capabilities are reflective of a higher order of firm capabilities, (Winter, 2003; Zahra et al., 2006) where both their development and deployment are underpinned, especially for those capabilities relating to business operations (Kale & Singh, 2007). Cyert and March’s (1963) view of firm processes as ‘learnt mechanisms’ which enable firms to generate and adapt the behavior of their operational routines in response to contextual changes highlights how learning is instrumental in determining a firm’s capacity to create innovative responses to emergent contextual problems. Not only does learning provide an impetus for the variation that we observe as market transformation, but the organizational learning process also relies upon the accumulation of experience and knowledge that it garners from its existing processes (Cohen & Levinthal, 1990; Cohen et al., 1996; Van Den Bosch, Volberda & De Boer, 1999). That is, learning provides a basis for variation and feedback on the success of such variations creating the basis for further learning, thus beginning the cycle anew.

Our focus here is on how learning enables dynamic capabilities to affect the variation mechanism. We note that the retention mechanism, through which a firm develops its dynamic capabilities, leads to a higher level of variation and hence a better fit in the selection process. Therefore, the following proposition is presented:

**Proposition 2**: The greater the development of dynamic capabilities, the greater the level of variation created due to a higher level of market transformational activities involved in the firm’s operations. This will in turn benefit the firm’s selection in response to the changes in competitive environments.

**Feedback from Selection to Retention**

As noted in the framework (Figure 1), the evolutionary process of variation, selection and retention is
recursively cyclical. The selection mechanism that is reflected in the functioning of the market is followed by the retention of routines by embedding them in the firm’s activities. In **proposition 2**, we also posit that a firm’s dynamics can grow intentionally by intensifying its learning routines. Such a learning process provides not only the potential of variation, the increases of which may contribute to successful selection, but also feedback on the success of such variation in re-forming the basis for further learning. As a result, it builds a link of feedback from selection to retention.

Feedback as a controlling process in the retention mechanism is the regulation of managerial activities by which performance is used to conform to the organizational goals, as well as to ensure that desired and necessary corrective actions are required to be put into action (Brand & Scanlan, 1995; Fox, 2003). Such feedback from selection to retention has a determining role in constructing a basis of regularizing the retention system within the firm. It can be seen that firm performance, as a reflection of selection in competition, provides needed information for the regulation of activities in the retention mechanism. It is thus perceived, if hypothesizing empirically, that the contribution of the “learning feedback” to a firm’s retention mechanism holds the potential for direct, rather than indirect, responses from the selection process.

Observations on such feedback and regulation processes reveal the concept of accumulation (of knowledge, capabilities and/or resources) within a firm’s operational activities. We consider the embedding and accumulation of organizational routines over time as dynamic retention; moreover, it is also viewed as a form of dynamic capabilities related to organizational processes (Teece, et al., 1997; Eisenhardt & Martin, 2000). It is built in a form of applications of dynamic capabilities that allows for further variation and eventual selection. Thus, we suggest that the accumulation of routines is a reflection of the retention mechanism, which in turn drives variation and subsequently a better result in terms of selection.

In addition, in reflecting a feedback path from selection to retention, we also note that the accumulation, adaptation and development of routines for resources, knowledge and capabilities are subject to path dependency with the selection mechanism assisting firms in determining where or what changes might be necessary. Path dependency of each firm is indeed perceived as a firm’s distinct and heterogeneous process embedded in its historical path in which a firm’s substantive capabilities and resources are developed, deployed and accumulated (Penrose, 1959; Cohen & Levinthal, 1990; Zahra & George, 2002). Especially, in feedback regulation activities, such a development may be triggered by a set of decisions for marking corrections that is dependent on the firm’s willingness, the awareness of the need and the perceived capacity in response to the environmental changes that are observed in the selection process.

**Proposition 3**: The causal linkage between a firm’s retention and selection mechanisms is bidirectional. In a forward path from retention to selection, the contribution is indirect and mediated by firm variation, while another connection is linked as a feedback path through which the influence directly operates in a backward direction, from selection to retention.
To explore the retention mechanism, we may assess three common routines that are likely to be subject to regular adaptation and change on the basis of learning, and which are simultaneously important for firms seeking to undertake the functioning in variation. These factors are: (i) **processual formalization**, the use of well-defined routines, plans, procedures and instructions embedded in a firm’s procedures (Cyert & March, 1963; De Boer, Van Den Bosch & Volberda, 1999; Grant 1996; Leonard-Barton, 1995; Vega-Jurado, Gutiérrez-Gracia & Fernández de Lucio, 2008), (ii) **the social integration platform**, a process that facilitates knowledge and experience distribution and socialization between individual members, and enhances the introduction of new knowledge and information (Nonaka et al., 2001; Subramaniam & Youndt, 2005; Vega-Jurado et al., 2008; Zahra & George, 2002), and (iii) **information maturity**, the application of information technology (IT) embedded in organizational processes that facilitates organizational learning in terms of the exploration, exploitation, sharing and reposition of knowledge. IT has been shown to concomitantly facilitate communication between members while accelerating the operations of some routine organization processes. IT has also been shown to assist firms with new markets and staying abreast of relevant technology trends (Dixon, 1994; Kane & Alavi, 2007; Robey, Boudreau & Rose, 2000; Yeung, et al., 1999).

With these common routines, the research posits the following two propositions:

**Proposition 3a**: In a forward path between retention and selection, the greater level of accumulation of processual formalization and social integration processes, along with the superior information technology processes involved in a firm’s retention mechanism aimed at a higher level of variation, the greater the level of selection is likely to be possessed by the firm.

**Proposition 3b**: In a backward path from selection to retention, significant improvement in processual formalization, social integration and information technology processes will likely be made for pursuing a higher level of variation when a significant decrease in the selection level is detected in the marketplace.

**DISCUSSION**

The purpose of this paper is to consider dynamic capabilities through an evolutionary lens using the Darwinian mechanisms of variation, selection and retention. By adopting such an approach, this paper has set for considering how firms evolve with respect to the notion of environmental fit rather than the impact of dynamic capabilities upon firm performance. This approach potentially allows the dynamic capabilities view to be conceptualized as independent, but complementary, to the RBV because our framework and incorporating propositions explain how a firm’s resources and capabilities evolve as opposed to determining which resources and capabilities drive superior performance.

Our research framework, shown in Figure 1, indicates that the consequences of the variation process are representative of a determinant to a firm’s market fitness in reflecting its selection mechanism to
respond to environmental changes. The result of such re-fitting activities in selection in turn contributes influences (as feedbacks) to the retention mechanism in which firm resources and capabilities evolve, while further re-initiating the variation cycle. Through this framework, we reshape the theoretical foundation of the DCV and position the DCV as a complementary theory used to reinforce the dynamic basis of the RBV.

In line with this framework, a primary conclusion of the paper is that retention and its accumulation across select and/or deliberate learning routines affect variation via the development and deployment of dynamic capabilities, and that there is subsequent positive influence upon selection which is operationalized as a set of proxy indexes of a firm’s market performance. This study also indicates a systematic structure to reform a firm’s retention mechanism in respect of the effective deployment of IT resources and applications, processual formalization and social integration platforms.

By integrating these observations, the findings of the research shape a complex set of causal relationships among a firm’s dynamics in developing necessary resources and capabilities, learning oriented routines (as retention has been defined), and its market involvement and engagement (as variation has been defined), as well as, in turn, leading to a causal insight between variation and a subsequent superior selection outcome. Such causal understanding does indeed support the view of an indirect impact of dynamic capabilities on organizational performance (Helfat, et al., 2007; Zahra, et al., 2006), while also conferring new insights on the DCV logic, a direct feedback loop from selection in the form of performance to retention of select routines in the subsequent time period.

**Proposition 1** highlights the importance of variation in respect of subsequent selection as measured by firm performance. In a Darwinian model, variation does not have to be high to result in selection and thus survival. Rather it is the appropriateness of the variation that is important. Extreme variants may well fail unless there is a clear environmental reason for their existence. Yet, our model shows that high levels of variation are associated with high levels of performance. This has implications for the application of the DCV as the initial discussion of dynamic capabilities focused on their relevance in rapidly evolving markets where rapid internal changes would be required to cope with future environmental uncertainty and quickly evolving competitors (Teece, et al., 1997).

Manufacturing firms may exemplify a case of how a firm’s variation affects its environment fit in the selection process. According to the observations on SME manufacturing firms, Liao and Rice (2010) recommend an alternative logic for this suggested need to continually adapt to achieve high levels of performance. A premise to success is that a firm’s continual innovation is a precursor to its performance if it can significantly drive its market presence through changes in the range of products/services, distribution of products/services, and market targets (Liao & Rice, 2010). These presences, defined in the Schumpeterian approaches (Brouwer, 1991), have been perceived as a set of proxy measures in defining the fitness of environments by which firms tend to position (and reposition) themselves. In addition, it may be perceived that most small manufacturers are also unlikely to possess significant resources (and capabilities) that are valuable, rare, inimitable and non-substitutable (Barney, 1991). These companies, rather, are likely to compete with incumbent firms (and even those potential entrants) on the basis of how they develop (redevelop) and integrate particular resources across their value chain from procurement to the production and operation process, and eventually to the sales process in the marketplace.
**Proposition 2** illustrates that a firm’s retention mechanism, in which the deployment of dynamic capabilities occurs, does not have a direct effect upon the outcomes of selection; instead, the relationship is mediated by the variation mechanism, the firm’s market transformational activities (Liao & Rice, 2010). This has implications as to the way we commonly define dynamic capabilities. Dynamic capabilities are required to “address rapidly changing environments” (Teece et al, 1997: 516), in order “to match and even create market change” (Eisenhardt & Martin, 2000: 1107); more recently, Teece (2007: 1344) notes the role of dynamic capabilities in “meet[ing] changing customer needs”. Alternate definitions capture the core notion of adapting and reconfiguring the firm’s resources base but fail to explicitly incorporate the notion of market transformation such as, Helfat et al. (2007: 4) who suggest that “a dynamic capability is the capacity of an organization to purposefully create, extend, or modify its resource base”. The research reinforces the need for variation in market activities to link dynamic capabilities and superior selection outcomes.

Our analysis on firm retention may also be supported by value chain analysis, especially in the role of supportive activities in the analysis (Porter, 1991). As noted, supportive activities in a firm’s value chain, such as IT (or MIS) process and the development of employee skills and knowledge via the social integration platform, may drive the changes in a firm’s market interaction. Such continuous improvement within firms is actually understood as being indirectly instrumental in determining their performance as a result (Liao, Rice & Martin, 2011). On the other hand, it is obvious that firms that do not continually adapt their product and service offerings, as well as their operational routines and managerial processes in response to the environmental changes are likely to be left behind in a long-term process.

**Proposition 3** demonstrates the likely cyclical nature of the evolutionary approach. Various learning oriented routines are retained to further develop dynamic capabilities (Zollo & Winter, 2002; Kale & Singh, 2007). The development and deployment of dynamic capabilities allows for variations in the form of market transformation and subsequent selection in the form of firm performance. On the other hand, since firm evolution is actually contextual dependent, in a way, it is naturally selected. How well a firm survives is partially determined by how it can learn from and fit into the environment; that is, when a firm wishes to survive, to achieve a better fit or to find a niche in the environment, it must learn how to adapt to meet the environmental changes. For such adaptation, firms need information for redeveloping needed resources and capabilities (especially for some information relating to the unmet needs in the market), as well as feedback for correcting their organizational routines and/or processes in the retention mechanism; this presents a feedback path from selection to retention as a set of commonly controlling procedures to regulate a firm’s operations. This, in fact, echoes the view of Pfeffer and Salancik (2003:49) that to regulate the use of resources within firms, the source of control “derives from the ability to make rules or otherwise regulate the possession, allocation, and use of resources and to enforce the regulations” in accordance with the dependence that requires firms to engage in exchange with, and fit in, their environments.

Moreover, while a firm’s performance, as it is widely perceived, is significantly associated with its environment, what enables a firm to survive is a set of capabilities related to how it retains needed resources over time (Pfeffer & Salancik, 2003). In the present framework, we applied cumulative insight of routines to reinforce the path dependent nature. Such cumulative insight is a reflection of the
organizational learning taking place (by which firms accumulate knowledge, their own experiences, resources and capabilities) that underpins the development of the dynamic capabilities of the firm.

On the other hand, it may also be argued that a firm’s developmental path is interdependent on other firms (Granovetter, 1985). A firm’s development may rely on its own superior ability to access external resources from other firms. Still, such the dependency does not assure that the firm will be able to create a dependent path for other organizations, due to the fact that a firm’s developmental path dependent on others is far more temporary than one rooted in the focal firm and its history. For most firms, their development must derive mainly from the concentration of internal resources and capabilities, while external resources are often viewed as a complement to their development of dynamic capabilities (Heltat et al, 2007).

We thus explored three relevant exogenous antecedents of how a firm develops capabilities in retaining its retention processes. These antecedents, including processual formalization, the social integration platform and information maturity, were developed based on the perception of a firm’s internal dynamics, and prior contributions to theories of organizational routines, organizational learning, absorptive capacity and knowledge integration, with the aim of developing an appropriate foundation for the retention mechanism.

CONCLUSIONS

In conclusion, the paper highlights that the DCV may be conceptualized as an evolutionary process as per the variation, selection and retention mechanisms. Firms can create, build, integrate and deploy resources and capabilities in a path dependent manner to either meet the needs of a changing environment, or even to take part in the co-evolution of the market. However, the DCV does not directly reveal why some firms achieve competitive advantage (other than to infer competitive advantage from the selection mechanism). But taking this approach potentially provides the basis for a theoretical foundation which was identified as a fundamental weakness of the DCV. The variation, selection and retention cycle allows for theoretical and empirical predictions to be made that are not tautological or reproduced in alternative frameworks. Furthermore, it creates a truly dynamic theory with obvious feedback loops that feed into future iterations. In this sense, the DCV can be positioned as a complementary and dynamic, albeit independent, theory in opposition to the potentially static RBV with a different set of assumptions, a different dependent variable and a different strategic focus: building and reconfiguring resources to create an environmental fit versus appropriating resources to attain rents.

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