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The Mediating role of second order capabilities on Capabilities-Competitive Advantage linkage: A Capability Life Cycle approach

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Abstract -*I examine the role of second order capabilities on capabilities- competitive advantage relationship and its influence on sustainability of competitive advantage. The concept of capabilities life cycle has been used to explicate the proposed relationship. Discussion also involves impact of velocity of environment on capabilities (operational as well as dynamic capabilities) – competitive advantage relationship. Investigation posit a mediation effect of second order capabilities on capabilities- competitive advantage relationship and they also have potential to help in attaining sustainability of completive advantage, while velocity of environment moderates capabilities- competitive advantage relationship.*

Keywords: *Capability life cycle; Resource based view; dynamic capability; operational capability.*

1. INTRODUCTION

Wernerfelt (1984)[20] contend that resources and products are closely related, though appear different. Products follow life cycle, thus capabilities evolve over a period of time and have life cycle (Helfat and Peteraf, 2003). Similar to product life cycle, capabilities life cycle (henceforth will be referred as CLC) also consist three stages- "founding, development and maturity", which forks out in to six branches- "retirement (death), retrenchment, renewal, replication, redeployment, and recombination" (Helfat and Peteraf, 2003, p. 1000)[10]. According to Zollo and Winter (2002, p. 339), second order capabilities, also known as learning mechanism, comprises " (1) experience accumulation, (2) knowledge articulation, and (3) knowledge codification processes". The second order capabilities have ability to acquire, develop, renew, replicate, redeploy, and recombine first order capabilities, thus helping to attain competitive advantage. This study aims to investigate the influence of second order capabilities on relationship between capabilities and competitive advantage and how does second order capabilities help to sustain this competitive advantage. I will be discussing the impact of velocity of environment on capability (both operational as well as dynamic capabilities) - competitive advantage relationship. This study is organized in two sections i. section I includes introduction ii. section II involves the discussion on important constructs i.e. resources and capabilities, capability life cycle and second order capabilities iii. Section III focuses on impact of second order capabilities and environment on capabilities – competitive advantage relationship and proposes a conceptual model and iv finally discussion is concluded in section IV.

2. RESOURCES AND CAPABILITIES

Resource based view was protracted to firm's capabilities, which was initially applicable only for it's assets (Henderson and Cockburn, 1994)[12]. Resources are conceived as a strengths and weaknesses of the firm (Wernerfelt, 1984)[20] while Caves conceptualized resources as a tangible and intangibles assets, "semi permanently" tied to the organization (Caves, 1980)[5]. Amit and Schoemaker define firm resources as "stocks of available factors that are owned or controlled by firm" (Amit and Schoemaker, 1993, p. 35). Further, resources are referred to as "an asset or input to production" that are owned, controlled by organization or accessed to "on semi permanent basis" by it (Helfat and Peteraf, 2003, p. 999). In contrast to conceptualization of resources, capabilities are referred to as a "capacity to deploy" the resources, normally in amalgamation, through processes of organization to attain an intended outcome (Amit and Schoemaker, 1993, p.35). Capability is also viewed as "ability of an organization to perform a coordinated set of tasks, utilizing organizational resources, for the purpose of achieving a particular end result" (Helfat and Peteraf, 2003, p. 999)[10].

3. TYPE OF CAPABILITIES

Capabilities evolve and change over a period (Helfat and Peteraf, 2003; Amit and Schoemaker, 1993) and they are categorized in to operational and dynamic capabilities (Helfat and Peteraf, 2003), henceforth will be referred as DC. An operational capability is conceptualized as "a high-level routine (or collection of routines) that, together with its implementing input flows, confers upon an organization's management a set of decision options for producing significant outputs of a particular type" (Winter, 2000, p. 983**).** Teece et al. (1997, p. 516)[19]define DC as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments". It suggests that DC is required to change operational capabilities. However, Helfat and Peteraf (2003) argue that while DC can handle particularly "adaptation, learning and change" (p. 998) processes but capabilities possess ability to adapt to the change and do not entail intermediation of DC for "learning, adaptation and change". Zollo and Winter (2002) argue for similarity of operational capabilities with DC, as both comprises routines. These both type of capabilities involve two type of routines i. the routines that execute individual task and ii. the routines that coordinate the individual tasks (Helfat and Peteraf, 2003).

4. CAPABILITIES LIFE CYCLE

Wernerfelt (1984) observed that resources and products are similar but appear different. As product follow the recognizable pattern, the product life cycle, thus the capabilities have capabilities life cycle and similar to the product life cycle, capabilities life cycle also consist three stages- "founding, development and maturity" (Helfat and Peteraf, 2003, p. 1004)[10]. Helfat and Peteraf (2003) have conceptualized the CLC analogous to product life cycle comprising various stages viz. "founding, development and maturity". The CLC commences when a group of individuals or team involve in creation of capabilities to attain a central objective and this is referred as founding stage. The team, laced with the accumulation of experience, develops the capability through the search of viable alternatives of capability development during development stage. Maturity stage of capability necessitates the capability maintenance which involves exercising of capability (Helfat and Peteraf, 2003).

5. BRANCHING OUT OF CAPABILITIES

Development of trajectory of the capabilities may be altered by the strong impact of factors external to the capabilities and thus leading to the branching of CLC (Helfat and Peteraf, 2003). They contend that CLC may fork out in to six branches- "retirement (death), retrenchment, renewal, replication, redeployment, and recombination" (Helfat and Peteraf, 2003, p. 1000). Helfat and Peteraf's (2003) conceptualization of CLC is based upon Wernerfelt's (1984, p. 171)[20] observation that "resources and products of the firm are two sides of the same coin". Extending same argument and drawing the analogy with product life cycle, retirement and retrenchment of capabilities may recede the life cycle fast, as external or/and internal selection environment may select against the capability while replication of capabilities may elongate the life cycle by extending plateau. In respect of product, discovery of new product characteristics portray a scalloped pattern, as sales of product traverses through a succession of life cycles. Similarly, renewal, redeployment (may involve some degree of alteration to serve new but related to old product market) and recombination may trigger a new life cycle, as these branches involve modification or improvement of existing capability. This discussion may provide the arguments for explicating the impact of second order capabilities on sustainability of competitive advantage.

6. SECOND ORDER CAPABILITIES

Zollo and Winter (2002) posited a hierarchal framework suggesting linkages between evolution of operating routines, evolution of DC and learning mechanism wherein operating routines are the lowest order and learning mechanism as the highest order processes with DC lying in between. Learning mechanism comprises of "(1) experience accumulation, (2) knowledge articulation, and (3) knowledge codification processes" and these mechanism play a critical function in evolution of DC and operating routines either directly or through the intermediation of DC (Zollo and Winter, 2002). Collis defined the second order capabilities as "learning to learn" type (Collis, 1994, p.143) and learning mechanism could be referred as second order DC (Zollo and Winter, 2002). Danneels (2002)[7]contend that second order competences are entailed to augment first order competences. During the discussion I will be using term 'capabilities' for first order capabilities – operational and DC and "second order capabilities" for learning mechanism and second order capabilities.

7. CAPABILITIES, SECOND ORDER CAPABILITIES AND COMPETITIVE ADVANTAGE

Resources as a general term consist -resources, capabilities, and competencies (Cramely and Tischler, 2004)[4] and the resources that are idiosyncratic to the firm, are viewed as an important factor for sustainability of competitive advantage (Barney, 1991; Teece et al, 1997). Resources and capabilities that are "valuable and

rare" may facilitate the firm to attain superior performance (Barney, 1991). The resources and capabilities should possess characteristics of valuable, rareness, "inimitability and non-substitutability" for achieving sustainable competitive advantage (Barney, 1991). Second order capabilities lies at higher level in hierarchy, hence these are not specific to a particular domain of skill and knowledge (Danneels, 2002) and have ability to accumulate and articulate the knowledge of new domain. Second order capabilities have potential to identify, evaluate and incorporate capabilities pertaining to new domain, whereas capabilities may be developed through accumulation of experience and codification of knowledge (in form of routines and processes). Thus, second order capabilities facilitate the acquisition and development of capabilities, as the acquired capability may enhance the value of bundle of capabilities that firm possess due to the complementarity of the acquired capability with rest of the bundle of capabilities and resources, offering competitive advantage to the firm. Helfat and Peteraf (2003) suggest that factors of internal or/and external selection environment may lead to branching out of CLC. Due to reduction in demand, obsolescence of a technology, non-availability of input materials, change in govt policies, external environment may select against the capability in a particular market which diminishes the value of capability for a particular product market. Second order capabilities which have the skill and knowledge of multiple domains may sense the opportunity in another market and codification of knowledge (one of the higher order capability) may facilitate the effective replication of the same capability in another product market without getting diminished it's value. The capabilities which have reached to their maturity stage may pass through redeployment, renewal or recombination processes. Helfat and Peteraf argue that the transfer of the capabilities to other markets involves cost and these capabilities may not be transferred to other market unless the threat in existing product market or new opportunities in other product market is sensed (Helfat and Peteraf, 2003). Prior experience (accumulation of experience and articulation of knowledge of multiple domains) may help in accurate determination of transfer cost of capability from one market to another market and present value of future streams of benefit. Development of combinative capabilities involves two stages i. exploration of new capability and ii. Combining with the existing capability (Kogut and Zander, 1992)[13], both the processes require the knowledge of the domains where new (unexplored) capability and existing capability lie. Second order capabilities due to its ability of understanding of multiple domains have potential to develop combinative capabilities, which may be unique across the firms and may help to achieve the competitive advantage. Example- Initially telegraph messages were sent through simplex/duplex telegraph machines, a very time consuming and costly mechanism. With the advent of internet, both the capabilities – internet and telegraph were combined to ensure fast, reliable and cost effective delivery of messages to the customer, making it a profitable business for the organization. Subsequently, deep penetration of internet reduced the telegraph traffic drastically, making it very costly for the organization and recently BSNL retired telegraph capability. Since the BSNL possessed the second order capabilities (having the knowledge of telegraph as well as of internet domain), it could combine both the capabilities and this combinative capability extended the competitive advantage to the firm and when cost started to exceed the benefits in combination to other socio political factors like fulfilling the social obligation being a PSU, it decided to retire this capability. Similarly, Canon developed new core knowledge about chemicals and combined this new knowledge with its capability of precision optics and mechanics, which it was already possessing to produce mechanical cameras, to introduce plain paper copier (Helfat and Raubitschek, 2000)[11].

Meyer and Utterback state that it is very difficult for the 'technology based firms' to learn about market than learning technology (Meyer and Utterback, 1995)[15]. It indicates that lack of second order capabilities, may limit the option for the firm to renew its existing capabilities (Danneels, 2002). Danneels further argues that second order capabilities may alleviate the impact of path dependencies (cfDanneels, 2002). Thus the absence of second order capabilities may force retrenchment or retirement of the capability (which have been selected against by internal or external environment), thus loosing competitive advantage ought to be achieved due to renewal or replication of the capability. Research scholars have considered the firm as a bunch of resources and capabilities. Argyres and Zenger (2012, p.1644) argue that "superiority or inferiority of an asset or activity's capability considered in isolation" does not impact firm because asset's value or capability depends upon the complementarity of an asset with other assets of the firm. They further contend that "value or capability of an asset is an entirely firm- or bundle-specific concept" (Argyres and Zenger, 2012, p. 1644). The capability may have complementarity with bundle of other capabilities of a firm, though these capabilities might be belonging to different domains. Thus second order capabilities have the potential to determine the complementarity between the capabilities of different domain and attain the competitive advantage by utilizing it.Summing up all the arguments I posit a proposition that valuable and rare capabilities provide competitive advantage and second order

capabilities mediate on capabilities - competitive advantage linkage.
Proposition 1: Second order capabilities mediate on capabilities- competitive advantage linakge.

8. SUSTAINABLE COMPETITIVE ADVANTAGE

As I discussed, effective branching out of capabilities- "retirement (death), retrenchment, renewal, replication, redeployment, and recombination" involve high order capabilities due to it's possessing of multi domain skill and knowledge. Further, second order capabilities also involve "experience accumulation, knowledge articulation, and knowledge codification" processes. Replication of capabilities elongates CLC, extending competitive advantage for longer period, whereas redeployment, recombination and renewal of capabilities triggers a new life cycle facilitating to attain higher level of competitive advantage and simultaneously also providing competitive advantage for longer period. Thus, second order capabilities may help to sustain competitive advantage, attained due to forking out of CLC. Complexity of combinative capability may seemingly increase, as existing capability is combined with new (explored) capability. Reed and DeFillippi argue that causal ambiguity increases exponentially with complexity of competence (Reed and DeFillippi, 1990)[18]. Since causal ambiguity is one of the characteristics of sustainability of competitive advantage (Dierickx and Cool, 1989b)[8], second order capabilities may help to sustain competitive advantage.

9. RELATIONSHIP BETWEEN CAPABILITIES, ENVIRONMENT AND COMPETITIVE ADVANTAGE

Value of the resources or capability are determined exogenously by the product market (s) associated with a particular resource or capability (Barney, 1991). Helfat and Peteraf (2003) suggest that development trajectory of capability may be impacted by the factors of external selection environment and internal selection environment. External environment's selection against the capability may lead to the branching out of a capability and subsequently result in to transformation in to any of the six branches depending upon the perceived threat or new opportunity. Helfat and Peteraf (2003) further argue that environmental conditions may result in to heterogeneity (a necessary condition for achieving competitive advantage) of capability at the first stage of CLC – founding stage. Teece et al (1997) conceptualized DC as responding to quickly changing environment, whereas Eisenhardt and Martin (2000) contend that DC have critical role to play in varying degree of market dynamism. "In moderately dynamic market", reliance of effective capabilities is on prevailing knowledge while DC rely on rapid changing situation specific knowledge in "high velocity markets" (Eisenhardt and Martin, 2000, p. 1113)[9]. Zahra et al. (2006, p.6)[22]propounded that " a volatile or changing environment is not a necessary component of a dynamic capability" and Zollo and Winter (2000) affirming Zahra et al. (2006)'s contention, suggested that DC are useful even for firms operating in slow changing environments. However, both view points converge and admit that DC may be more important in fast changing environment, thus suggest a moderating role of environment. The arguments posit a moderating effect of velocity of environment on capabilities- competitive advantage linkage. The velocity of environment increases the effectiveness of DC, whereas it may decrease the effectiveness of operational capabilities, as the processes or routines consisted by the operation capabilities are more suited for stable environment.
Proposition 2: Velocity of environment moderate on capabilities- competitive advantage linkage

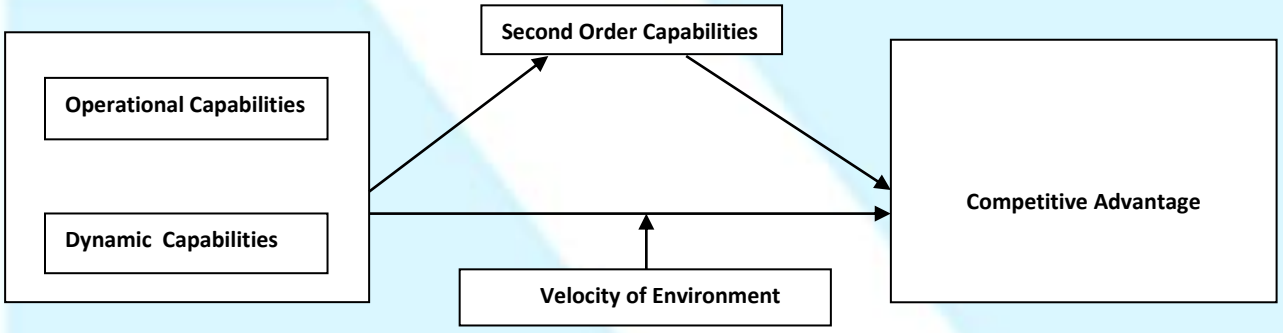

Fig 1- Model depicting the relationship between capabilities, second order capabilities, Environment and competitive advantage

10. CONCLUSION

Drawing analogy with the product life cycle, capabilities evolve over a period of time and follow a life cycle which also comprises three stages- "founding, development and maturity" (Helfat and Peteraf, 2003)[10]. The CLC may fork out in to six branches- "retirement (death), retrenchment, renewal, replication, redeployment, and recombination" (Helfat and Peteraf, 2003, p. 1000). Second order capabilities which comprise of "(1) experience accumulation, (2) knowledge articulation, and (3) knowledge codification processes" (Zollo and Winter, 2002, p. 339) have potential to effectively manage the stages of CLC, including six branches of CLC. Though competitive advantage does not emanate from second order capabilities but they enhance competitive advantage due to their potential to effectively acquire, develop, renew, recombine, replicate and redeploy the capabilities, thus mediating the relationship between capability and competitive advantage.

Prior literature on the subject suggest that DC are used even in slow changing environment but these become more valuable in fast changing environment. Environmental factors may result in to heterogeneity at founding stage of capability and also affects the branching out of CLC (Helfat and Peteraf, 2003). The CLC is relevant for both type of capabilities- operational as well as dynamic, suggesting moderation effect of velocity of environment on capability- competitive advantage relationship.

11. LIMITATIONS AND FUTURE SCOPE OF RESEARCH

This study proposes a conceptual model depicting the mediating effect of second order capabilities and moderating effect of velocity of environment over capabilities- competitive advantage relationship. Empirical study measuring moderation and mediation effect of second order capabilities and velocity of environment respectively will validate the model. The arguments in literature suggest an adverse impact of velocity of environment over the value of operational capabilities. However, need of arguments to further strengthen the model provides the scope for future research.

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