Dynamic capabilities: a morphological analysis framework and agenda for future research

1. INTRODUCTION

The Dynamic Capabilities (DCs) approach to strategic management (Mintzberg, 1987) has attracted increasing attention within management literature in recent years. The early foundations of the DCs approach emerged from Schumpeterian theories of innovation-based competition, price-performance rivalry, increasing returns, and the creative destruction of existing competencies (Teece et al., 1997). Encapsulating the wisdom from other works on creating competitive advantage in firms, including the Competitive Forces (CF) approach (Porter, 1985), Core Competencies (CC) approach (Prahlad and Hamel, 1990) and the Resource-Based (RB) approach (Wernerfelt, 1984; Barney, 2001), the DCs approach has evolved into a distinct body of knowledge for scholarly research since its beginnings (Teece et al., 1994). Firms are facing increasing challenges to sustain competitive advantage in the wake of corporate turbulence, especially in hypercompetitive markets (Wiggins and Ruefli, 2005). Hence, they should be ready to understand, align and imbibe various technologies and deal with environmental changes.

Operational capabilities (otherwise called as ordinary capabilities) have been identified as one of the key drivers of firm-level performance. However, they behave as organizational static routines for day-to-day delivery of products or services. They cannot create a sustained competitive advantage as they seldom interact with the environment (Winter, 2003; Wang and Ahmed, 2007; Zahra et al., 2006). Consciously created higher-order capabilities with unique attributes to build, integrate or reconfigure the operational capabilities, while interacting with the

environment, are termed as 'Dynamic Capabilities' (DCs) which can create sustained competitive advantage in firms (Pisano, 1994; Henderson and Cockburn, 1994, Teece and Pisano, 1994; Grant, 1996). The DCs approach which addresses this important aspect of strategic management is thus crucial to both managers and researchers.

Many contemporary thinkers in the researcher and practitioner communities have widely accepted this approach. According to a recent study, more than 1500 published articles appeared in the ABI/INFORMS database during 1997 to 2007 on the DCs approach (Barreto, 2010). The growth, diversity and applications of research into DCs, have led to significant interest in this field within the mainstream of management and business administration, beyond its original domain of strategic management. Peteraf et al., (2012) observed that there are contradictory understandings about the DCs approach by management thinkers. Wang and Ahmed (2007) highlighted that past research on DCs was conducted in a piece-meal basis, with disconnected research findings. Barreto (2010) pointed out that even the definitions of DCs by various management thinkers varied in terms of the nature, specific role, relevant context, creation and evolution mechanisms, clearly highlighting the lack of coherence in the body of knowledge. These drawbacks perhaps led to consequent arguments by critics that the DCs approach as vague and tautological, and does not have practical value (Williamson, 1999; Kraatz and Zajac, 2001; Davis, 2004; Zahra et al., 2006; Newbert, 2007; Levinthal and Ocasio, 2007; Arend and Bromiley, 2009). Hence, there is a need to synthesize the diverged literature on DCs to gain a more integrated understanding.

We aim to use Morphological Analysis (MA), a 'systems thinking' technique, to represent the conceptual foundations of the subject of DCs in the form of a multi-dimensional conceptual framework. The resulting MA framework – a multi-dimensional tabular structured

representation of all the relevant terminologies, concepts and their extant variations – is based on the key conceptual and empirical articles on the DCs approach published in top-tier management journals from its beginnings in the 1990s till 2016. It supports the development of an integrated theory and helps minimize the reported vagueness. A total of five dimensions and 26 variants were identified from the relevant literature for the construction of the framework. Further, we seek to: (a) clarify various definitions of DCs, (b) identify 81 individual DCs reported by various thinkers, (c) elucidate the assumptions and antecedents behind the concept of the DCs approach and their key characteristics, (d) expound the input variants (organizational resources and processes), impacting factors (endogenous, exogenous and interrelated), desired outcomes (short-term and long-term) and assessment yardsticks of the DCs approach in firms. The paper concludes with directions for future research.

2. THEORETICAL BACKGROUND AND MOTIVATION

2.1 An evolution in management thinking towards creating competitive advantage in firms:

Many management thinkers have suggested various approaches to create competitive strategies. The early attempts of such thinking focused on SWOT (the acronym for Strengths, Weaknesses, Opportunities, and Threats) analysis, the origins of which remain obscure. Though SWOT analysis was perceived helpful, Porter argued that it would be unsuitable and ad-hoc for strategic planning (Porter et al., 2002). Earlier, Porter (1980, 1985) suggested the CF approach as an *inward-out mechanism* relating a company to its environment to tackle its competition and provide above-average returns in the long run. According to him, in order to achieve competitive advantage, firms should focus on developing a strategy considering five forces viz., the threat of substitutes for products or services, the threat from established rivals, the threat

from new entrants, the bargaining power of suppliers and the bargaining power of customers. The CF approach can be used to help firms in an industry to find a position from which they can best defend themselves against competitive forces or influence them in their favor. A few thinkers criticized Porter's generic strategies and CF approach as mere tautology, and not a reflection of generic practices in the real business world (Murray, 1988; Tang and Liou, 2010).

Later, Prahalad and Hamel (1990) proposed the CC approach with a focus on collective learning in employees and development of strategic capabilities to integrate different technologies through cross-functional management and collaborative working. According to the CC approach, core competencies provide competitive advantage to firms by providing potential access to a wide variety of markets, making a significant contribution to the perceived customer benefits of the end product/services. Also, they are difficult to be imitated by competitors. However, the CC approach missed the point that it is not the core competencies themselves that provide competitive advantage, instead of stressing how the core capabilities dynamically influence core competencies that really count (Stalk et al., 1992). Barney (1991) argued that a competitive advantage is sustainable only when the efforts by competitors have ceased to render the competitive advantage redundant, as an *outward-in mechanism*. He emphasized that a firm is said to have a competitive advantage when it is implementing a strategy not simultaneously being implemented by any current or potential players. When the imitative actions come to an end without disrupting the firm's competitive advantage, the firm's strategy can be called sustainable.

According to the RB approach, the competitive advantage of a firm lies primarily in the application of a bundle of valuable tangible or intangible resources at the firm's disposal (Wernerfelt, 1984). It explains that a firm's sustainable competitive advantage is reached by

virtue of its unique resources being rare, valuable, inimitable, non-tradable, and non-substitutable, as well as firm-specific (Barney, 2001; Makadok, 2001). Amit and Schoemaker (1993) argued that competitive strategies could be created and sustained not merely by a firm's capabilities or resources, but as a combination of both. They defined 'resources' as tradable entities non-specific to the firm, while 'capabilities' are firm-specific and used to engage the resources within the firm. Makadok (2001) highlighted the difference between capabilities and resources by defining capabilities as a special type of resource whose purpose is to improve the productivity of the other resources possessed by a firm. Sirmon et al., (2007) added that the strategic bundling of resources builds capabilities in the firm. According to a few contemporary thinkers, the RB approach is considered to be static in its nature and hence inadequate to explain a firm's competitive advantage in changing environments (Teece and Pisano, 1994; Priem and Butler, 2001; Barreto, 2010).

According to Teece et al., (1997), the CF, CC and RB approaches with firm-specific capabilities and resource-based strategies are not sufficient to create sustainable competitive advantage, given the dynamic environments, dependencies and market positions. They argue that a firm's competitive strategy cannot be static in order to sustain its competitive advantage. A few contemporary thinkers supported this view, and affirmed that the static routines of a firm are mere operational capabilities for generating transactional output. In a 'dynamic context', firms continuously learn from their environments enabling managers to acquire, shed, integrate and recombine these operational capabilities to generate desired outcomes. Consciously created firm-level capabilities with unique attributes to build, integrate or reconfigure the operational capabilities are termed as 'Dynamic Capabilities' (DCs), which can be used to create sustained competitive advantage for firms (Grant, 1996; Pisano, 1994; Henderson and Cockburn, 1994).

Strategy researchers have used the term "Red Queen Effect" to describe competitive advantage as a function of competitive actions between a firm and its rivals, and further emphasized the need for DCs to be adapted to and evolved faster than competitors to sustain competitive advantage (Su et al., 2014). This Dynamic Capabilities approach has attracted increasing attention in management literature in recent years.

2.2 The Dynamic Capabilities Approach:

The founding thinkers (Teece et al., 1997) defined the DCs approach as a firm's ability to alter its resource configurations by applying certain capabilities for adapting to changing environments and to achieve new forms of competitive advantage. The term 'Dynamic' refers to the capacity to renew existing competencies so as to achieve flexibility while dealing with a changing environment. The term 'Capabilities' emphasizes the key role of strategic management in appropriately adapting, integrating, and reconfiguring internal and external organizational resources and competencies to match the requirements of changing environments or even influence them in desired ways. Teece and Pisano (1994) suggested that a firm's DCs are determined by: (i) processes – managerial and organizational 'routines', (ii) positions – current endowments of technology, customer bases and suppliers, and (iii) paths – available strategic alternatives. The term 'Capability', in the strategic context of a firm, should serve two fundamental purposes, viz., performance and coordination of activities (Helfat and Peteraf, 2003).

In other words, the capability of an organization means that it has reached some minimum level of functionality that permits repeated and reliable performance of an activity, in contrast to ad-hoc activity that does not reflect practiced or patterned behavior. The magnitude of the

capability could vary from firm to firm for the same functionality. For example, in the e-commerce industry, firms like Amazon, E-bay and Alibaba.com all have effective online-sales service capability at different levels of functionalities. Literature features the fundamental difference between operational capabilities and DCs. Winter (2000) defines operational capabilities as merely high-level routines such as manufacturing a particular product, processing a transaction etc., whereas DCs are unique capabilities that do not involve production of a good or provision of a marketable service, rather they build, integrate or reconfigure the existing operational capabilities of the firm (Helfat and Peteraf, 2003). DCs work differently than operational capabilities, which are generally static and operate independently. Hence, DCs cannot be easily replicated, integrated or imitated by competitors. They cannot be transferred, in a complete sense, between different firms because of the attendant interdependencies in the firms' resources, routines and systems, all of which make it impossible to change one without another. Enterprises with stronger DCs are more flexible and adaptive to changing environments, and hence more successful too (Teece, 2014). Thus, DCs provide a foundation for sustaining competitive difference over time (Teece, 2007). Several alternative conceptualizations of DCs were subsequently offered by various thinkers. A few of these key definitions are featured in Table-1. These definitions vary in terms of the nature, creation, evolution mechanisms and relevant context.

Table-1: Key definitions of DCs

2.3 Examples of DCs:

Teece et al., (1994) highlighted the example of the Lean Production system as a DC in Fujimoto Inc. By deploying *Lean*, they adapted distinctive shop-floor practices and processes cutting across skilled resources, principles and systems of the firm contributing a culture of continuous

improvement (Sunder, 2016). It could be argued that Lean has been adapted by many other firms today, but every firm's Lean practice is unique and based on its interlock with its routines and resources. Another example could be Canon which uses its expertise in optics to serve markets as diverse as cameras, copiers, and semi-conductor equipment. Canon's competitive advantage is thus a result of its *policy management* across markets, which is not easily seen or understood by its rivals (Witcher et al, 2008). Canon does use collaborative forms of cross-functional management, through Hoshin Kanri (Policy Management) which served them as a DC to meet this purpose. Another example, implied through the case of Coca-Cola in India which has enjoyed great success due to their *product branding* DCs, concerns the challenge they faced due to the rapidly reducing groundwater. The government began shutting down Coca-Cola plants in India in 2010. Learning from the demand and the dynamics of the environment, the company devised ways of saving water including rain water harvesting, and started *branding* themselves as a socially responsible organization, which further increased their success in the Indian market (Financial Times, 2014). Similar to these, we have identified 81 such individual DCs (featured in Table-2) reported by various thinkers. Though a few authors have aggregated the relevant DCs, like managerial DCs, marketing DCs, etc., we have presented them as individual items in Table-2 to enable readers' ease of understanding. This representation doesn't argue or test whether these are DCs are not. Here, we agree with the reported scholarly literature that these are individual DCs, despite the debates therein. However, some critics of the DCs approach could disagree.

Table-2: Individual Dynamic Capabilities (in order of appearance in research literature)

2.4 Criticisms of the DCs approach

Despite the substantial body of work that endorsed DCs, the approach has been subject to some strong criticisms. This may be due to differing versions, which are loosely structured together, in the development of DCs literature. For example, when introducing the concept of DCs, Teece and Pisano (1994) referred to the 'processes, positions and paths' as strategic dimensions of a firm. Later, Teece et al., (1997) then stated that DCs lie 'embedded within the firm's processes'. In a more recent paper, Teece has disaggregated DCs into three capacities for practice: sensing, seizing and reconfiguration (2007), in order to exercise inside-out capacities to the edges of a firm's internal and external environment. Kraatz and Zajac (2001) stated that while the concept of DCs is appealing, it is apparently vague and elusive, and has thus far proven largely resistant to observation and measurement. Further, Davis (2004) claimed that most of the research publications on DCs were primarily conceptual rather than empirical, while excluding certain immeasurable capabilities, which could be crucial for a firm. This contradicts the fact of real time applications of DCs. Even recently, Newbert (2007) conducted empirical tests on a limited set of firms by employing the DCs approach, and concluded that there was only a low level of support for the concept. Arend and Bromiley (2009) criticized the DCs approach as unclear, accompanied by a lack of coherent theoretical foundation, that it yielded lower value-addition than existing concepts. They opposed Rindova and Kotha's study (2001) which claimed Yahoo! and Excite possessed DCs. Arend and Bromiley (2009) criticized that, Excite never had positive operating income during their study period, and Yahoo! lost over 99 percent of its market value during the dotcom bust. However, these claims were strongly opposed by Helfat et al. (2007) and Helfat and Peteraf (2009), who argued that "Arend and Bromiley (2009) failed to see 'deficiencies' or the tell-tale signs on early-stage development of an area of inquiry", and that well-established DCs may be developed slowly. Though the seminal characteristics of DCs

continues to be questioned (Peteraf et al., 2012), the opportunities for further research are quite open considering the concept's ongoing developing path.

2.5 Our motivation for this study

We draw motivation from both, the importance of the DCs approach as well as criticisms against it. Firstly, we aim to test, through methodological analysis, the claims made by a few scholars that DCs research is non-empirical and predominantly conceptual. Secondly, since many scholars have judged the DCs approach to be vague, unstructured and tautological, we aim to develop a structure to represent the existing DCs literature by developing a holistic framework using Morphological Analysis (MA) for enabling the development of meaningful theory. Against the background of all the adverse criticisms of DCs, we aim to present a structured theoretical foundation for the DCs approach with an agenda for future research.

3. METHOD

We have studied the published research literature on DCs from relevant top-tier management journals and analysed the data. Systematic review has become a fundamental scientific activity, essential for deriving intellectual value for strengthening a body of knowledge (Tranfield et al., 2003). We have performed an extensive online search in top-tier management journals (see Table-3 for the list of journals) in their individual website databases, using the keyword 'Dynamic Capability/Capabilities' on publications from 1990 to 2016, and identified 171 papers. After eliminating the duplicates and studying the abstracts, 133 papers across 21 recognized, top-tier scholarly journals were identified as relevant to the subject. However, it is possible that a

few papers may exist that were unintentionally not investigated as a part of this study. Table-3 shows an increasing interest in research publications pertaining to the DCs approach.

Table-3: Relevant publications across journals over time (decreasing order of total papers).

Table-4 presents an overview of the methodological analysis. In all, 38 theoretical papers and 95 empirical studies have appeared. This effectively counters the criticism that the DCs approach is non-empirical, as 71% of the total reviewed papers have used empirical methods of research. The theoretical publications included conceptual or desk analysis by various researchers. The empirical papers limited to descriptive and experimental studies were further classified based on the data collection methods used. 55 papers appeared to have used primary data collection methods. The primary data category comprising 40 papers is dominated by case studies and questionnaires. In the remaining 15 papers, this category also includes the use of experiments, interviews, interviews based on questionnaires, pilot surveys and field visits, questionnaires, and questionnaires with field visit data sources. Thus, we can observe that there is a need for more empirical research that considers non case-study and questionnaire survey methods. There were only 32 papers that leveraged secondary data from existing literature and public data sources. The use of multiple primary research methods (mixed methods) was found in 8 of the reviewed papers.

Table-4: Methodological classification of reviewed papers.

A Microsoft Excel database was formed for classifying these 133 articles into different headings for the purpose of analyzing the trends in the body of knowledge. Further, the full papers were read and the existing literature classified into the Morphological Analysis (MA) framework

developed for (a) structuring the various loosely packed concepts in the DCs literature, and (b) eliminating the reported vagueness. This makes for the theoretical contributions to the body of knowledge constituting DCs. The inferences derived from the MA framework have been used to conceptualize a model of the DCs approach for identifying further theoretical and practical implications.

4. THEORETICAL FRAMEWORK USING MORPHOLOGICAL ANALYSIS (MA)

4.1 A brief introduction to MA

MA is a qualitative analytical technique used for investigating and structuring the total set of relationships contained in multi-dimensional, non-quantifiable contexts to eliminate vagueness (Zwicky, 1969; Ritchey, 2011). MA provides a method to identify and investigate elements of a system (or a concept) in its existing form and to present a holistic conceptual system (Majer, 2007). Using this method, the entire set of unstructured concepts is put into a framework, defined by (a) a set of 'dimensions' representing the ontological structural components of the concept being studied, and (b) 'variants' representing the extant as well as possible ontological manifestations corresponding to each of the dimensions. The 'variants' are a logical set of attributes, that could vary in magnitude based on the context of the MA. These 'dimensions' and their respective 'variants' make up a structured conceptual system, which by design minimizes or may even eliminate vagueness in the unstructured concept under study. It is important to note that the development of an MA framework demands judgement, and it is quite likely that different authors may develop different MA frameworks even from the same literature they use to represent the same unstructured concept. However, the aggregated contents of all such MA frameworks will theoretically be the same, although the form of representations could vary. This

indicates the objectivity of the approach towards theory building through a *systems thinking perspective* (Majaro, 1988). Scholars from social sciences, economics and operations management have used this technique for building structured theories for vaguely defined concepts and generating new ideas for research (Sunder et al., 2018). Researchers in the field of Strategic management will benefit from the use of MA, and this work may perhaps be the first of its kind involving the use of MA for representing the presently loosely structured concept of DCs.

4.2 The MA framework representation of DCs: 'Dimensions' and 'Variants'

After reading the 133 scholarly papers selected for this work, we have categorized various themes in the DCs literature into the following five dimensions, viz., (1) building blocks of DCs, (2) input variants for building DCs, (3) influencing factors that impact DCs, (4) desired outcomes of DCs, and (5) assessment yardsticks for DCs. Further, 26 relevant variants were identified in these dimensions, including sub-dimensions wherever applicable. The complete[1] MA framework representation is given in Figure-1[2], and the dimensions and variants are discussed below in detail.

Figure-1: Dimensions and variants constituting the MA framework

5. DIMENSION-1: BUILDING BLOCKS OF DCs

[1] Theoretically speaking, the word "complete" is not an accurate expression since MA framework representations of a chosen concept or technology/product (which is more often the context) are complete only up to a point in time. One of the greatest constructive characteristics of the MA framework is that it enables, by design, evolutionary representations of further continuing or emergent developments that could arise from creative inputs and eventually even grow to become innovations. In this sense, MA frameworks could be considered as bases for systematic or structured creativity. It is quite possible that following the MA framework representation provided in this paper, others may creatively identify further "dimensions" or "variants" pertaining to DCs and enrich the field.

[2] The colour coding presented in Figure-1 is only of nominal interest, viz., to help identify different sub-groups of dimensions, sub-dimensions and variants. There is no other implication.

The DCs concept has been built over a few assumptions or pre-requisites, and has also been characterized. This section provides an overview of these assumptions and characteristics of DCs.

5.1 Variant-1: Assumptions behind the DCs approach: Overcoming the limitation of RBA, which assumes that the organization being a bundle of resources breaks down in high-velocity markets, DCs approach is built on micro foundations of strategic imperatives of change. These assumptions are fundamental justifications for the existence of DCs theory. The assumptions are listed below along with related, brief discussions.

Assumption 1: Ordinary or operational capabilities exist in organizations.

Assumption 2: Markets and Firms operate in a Schumpeterian world.

Assumption 3: Modularity exists in a firm's systems.

Assumption 4: Necessary resources are available for a firm's operations.

Assumption 5: The fundamental units of analysis of a firm are processes, positions and paths.

Firstly, scholars have recognized the existence of ordinary or operational capabilities in organizations, which are routines that enable a firm to perform an activity on an on-going basis maintaining status quo. Examples include manufacturing a product, providing call centre services, etc., (Helfat and Peteraf, 2003; Drnevich and Kriauciunas, 2011; Helfat and Winter, 2011; Stadler et al., 2013; Karna et al., 2015; Essex et al., 2016; Fainshmidt et al., 2016). On the other hand, DCs enable a firm to alter its operational capabilities or resource base or some features of its external environment to facilitate strategic management. Examples of DCs include alliance management, new product development, outsourcing, talent management, etc. Hence, operational capabilities serve as building blocks for DCs. Secondly, the DCs body of knowledge gains reliability based on the assumption that markets and firms operate in a Schumpeterian

world (Teece, 1997; Peteraf et al., 2013). This is because the DCs approach has been built upon the theoretical foundations provided by Schumpeter (1934), which emphasizes the necessity of creative destruction to constantly create environments of change. Another key assumption behind the DCs approach is that modularity exists in a firm's systems. This enables managing complexity and designing flexible organizational and technological systems as per the environmental undercurrents (Pil and Cohen; 2006). The availability of necessary resources is a pre-requisite for the existence of DCs in a firm (Helfat and Peteraf, 2003). The fundamental resources consist of (a) human, (b) financial, (c) infrastructure and technological, (d) information, knowledge and organizational systems, and (e) networks and relationships. Finally, the DCs theory is built on the assumption that the fundamental units of analysis of firms are processes, positions and paths (Teece et al., 1997). These assumptions not only serve as foundation to the DCs theory, but in their absence the concept of DCs would be meaningless.

5.2 Variant-2: Characteristics of DCs: Further to the above assumptions or pre-requisites, there are several characteristics that DCs exhibit (see Table-5). These characteristics also form part of the building blocks of the concept of DCs, as they typically define what a DC could be. In other words, an organizational capability which does not exhibit these characteristics is considered merely static in nature. Though all DCs exhibit these characteristics, the intensity or magnitude of their presence vary from across DCs and across firms based on various endogenous and exogenous factors. Hence, we have defined these characteristics as a 'degree of presence' phenomenon.

Table-5: Characteristics of Dynamic Capabilities

6. DIMENSION-2: INPUT VARIANTS FOR BUILDING DCs

Dynamic capabilities do not exist in firms by mere chance. They are considered as outcomes of deliberate or sometimes emergent organized combinations of serval organizational resources and processes. In this section, we discuss about several types of 'resources' and 'processes' as input variants required for building DCs in firms.

6.1 Organizational Resources:

Organizational resources could be classified into various basic types, viz., (a) human, (b) financial, (c) infrastructure and technological, (d) information, knowledge and organizational systems, and (e) networks and relationships.

6.1.1 Variant-3: Human Resources: Human resources play a vital part in firms, especially in dynamic environment; adapting new ways towards strategy formulation and execution is a humane activity. According to the recent advances in the emerging field of social cognitive neuroscience, cognition and emotional logic in human resources play a significant role in the process of their strategic adaptation underpinning the capabilities that promote organizational learning, adaptation and performance (Hodgkinson and Healey, 2011). The concept of 'managerial cognition' reinforces that human resources not only include physical capabilities, but mental as well, which contributes to the development of cognitive DCs like sensing, seizing, and reconfiguring (Helfat and Peteraf, 2015). However, human cognition as a resource for development of DCs should not be restricted to managers alone. Since DCs relate to resource exploitation, deployment, acquisition, internalization and dissemination of extant knowledge, resource reconfiguration, divestment, integration and renewal, top executive managerial cognition (Carpenter, Sanders, and Gregersen, 2001), their perceptions and beliefs (Ambrosini and Bowman, 2009) also act as input variants for the formation of DCs in firms. This

phenomenon becomes essential when firms build multiple DCs over time, which would likely overlap across their members and the corresponding learning activities involved. Bingham et al., (2015) highlighted the importance of magnitude, timing, and similarity of experience among human resources. These accelerate the process of 'concurrent learning' in firms. In contrast, a study conducted across 254 Norwegian firms, highlighted the importance of diversification of human capital, as an input variant for the development of DCs in firms (Døving and Gooderham, 2008). The study argued that human resources configuration in firms should not be static, but subjected to continuous development for promoting heterogeneity of these resources, which, in turn, lays emphasis on training for creativity among the staff members including managers (Azadegan, Bush, and Dooley, 2008). Though many studies restricted human resources to a firm's staff alone, a few scholars have argued that human resources should include employees, customers, and social and cognitive mobilization mechanisms between them. Hence, 'human resources' is considered as a superset of variants for development of DCs which include sub-set combinations of human capital, structural capital and relational capital (McKelvie and Davidsson, 2009; Bruni and Verona, 2009). While human capital is grounded on the knowledge created and stored by an organization's employees, structural capital is defined as the relationships that a firm has with its customers; and relational capital is defined as mobilization of these resources through a prima facie social and cognitive structure (Hsu and Wang, 2012).

6.1.2 Variant-4: Financial Resources: Financial resources are important as they cut across different parts of the business plan (with financial implications), for example marketing and sales plan, production plan, personnel plan, capital expenditure, etc. Management scholars have studied investment decisions and financial resource allocation for long. According to Coen and Maritan (2011), financial resources of firms serve as inputs to maintain their existing operational

capabilities as well as for development of new DCs. According to Teece (2007; 2014) financial resources include firms' investments towards change learning, creation and retention, strategy formulation and implementation. However, unless DCs are measured empirically for returns on investment, keeping up the momentum on these resources could be challenging in the long-run. Financial resources are also necessary to meet the costs of coordination of other resources and processes for developing DCs. As noted by Helfat and Peteraf (2015), a climate for trust may reduce the costs of coordination because organization members tend to utilize heuristics over a more calculative approach when assessing peers in this context.

6.1.3 Variant-5: Infrastructure and Technological Resources: Infrastructure is the foundation or framework that supports a system or organization. Infrastructural resources include traditional infrastructure, such as built spaces, utilities, transportation systems and telecommunications networks; and non-traditional infrastructure, including basic research related resources. Further infrastructure resources could be commercial, public, social, and mixed infrastructure, based on the focus of DCs, and the distribution of productive activities it facilitates (Frischmann, 2012). The Project Management office as an infrastructural resource has been found to be specifically highlighted in the scholarly literature of DCs. It is important for firms to understand their current levels of existing capabilities, before embarking upon the development of new DCs, and technological resources play a vital role in this journey. Technology can be viewed as an activity that forms or changes culture. In the context of building DCs, technology helps to combine other resources to produce desired products, to solve problems, fulfill needs, or satisfy wants of the stakeholders. Felin and Powell (2016) suggested the use of design technologies like polyarchy, social proofs, and new forms of open organizations that allow firms to build DCs for sustained innovation in dynamic environments. Further, Teece (2007) highlighted the importance of

advanced new technologies and analytical systems to learn and to sense, filter, shape, and calibrate opportunities for developing DCs.

6.1.4 Variant-6: Information, knowledge and organizational systems: Organization systems include a variety of schemes that organize, manage, and retrieve information and knowledge. They range from authority files to classification schemes, ontologies, awareness levels, adaptability practices etc. Firms' awareness, readiness and adaptability to new technologies play a critical role for the development of DCs. A few scholars also suggested that heuristics could be foundational to DCs in highly dynamic environments where executing common action steps becomes challenging (Bingham et al., 2015; Fainshmidt et al., 2016; Eisenhardt and Martin, 2000; Bingham and Eisenhardt, 2011). Other important resources include core and integrative knowledge existing in both internal and external environments of the firms (Anand et al., 2010). Core knowledge is often scientific or technological specific to a particular vintage or technology which forms the foundation of vertical business units in firms. Integrative knowledge is that which integrates different activities, capabilities, and products in one or more vertical units (Helfat and Raubitschek, 2000). Further, Dyer and Nobeoka (2000) highlighted the importance of tacit and explicit knowledge as input variants for DCs building.

6.1.5 Variant-7: Networks and relationships: Various terms have been used in literature to describe strategic partnering with equally varied definitions. These include 'international coalitions' (Porter and Fuller, 1986), 'strategic networks' (Jarillo, 1988) and 'strategic alliances' (Schilke, 2014; Eisenhardt and Martin, 2000; Lee et al, 2010; Oh et al., 2014; Kale and Singh, 2007; Capaldo, 2010). Theoretically, an alliance may be the 'joining of forces, for a specified or indefinite period, to achieve a common objective'. The communities of personal and professional interactions, both formal and informal between and within the firms are a central

element of such knowledge sharing. However, for the purpose of DCs development, inter-organizational relationships are given more importance than intra-organizational knowledge management. These relationships strengthened by win-win approaches between firms lead to strategic alliances. The positive impact of inter-firm networks on the development of DCs has been traced back to the potential of inter-organizational collaboration to facilitate interactive knowledge sharing processes among participating firms (Capaldo, 2010; Dyer and Nobeoka,2000). This, in turn, is claimed to be strongly dependent on the overall network structure measured in terms of inter-organizational tie strength. Dyer and Nobeoka (2005), highlighted that a few firms like Toyota, consciously invest on nested networks to promote inter-organizational learning and provide incentives for knowledge acquisition and application though a formal process. Further to these, the inter-organizational innovation networks (Smart et al., 2007; Lorenzoni and Lipparini, 1999; Gulati, 1999; Wu, 2010) exploit superior resources that reside beyond the boundary of the firm, pose important questions about the nature of resources that exist in the spaces between firms, and the capabilities needed to leverage them for competitive advantage to handle the dynamics of complexity in markets. Kleinbaum and Stuart (2014) argued that the investigation of network responsiveness by firms is an important source of DCs and the network responsiveness rate varies from firm to firm. They also claimed that low network responsiveness may provide coordination advantages via compensatory fit, whereas fast network responsiveness may facilitate more rapid adaptability in firms.

6.2 Organizational Processes:

We classified various organizational processes which act as input variants for the development of DCs into three key categories, viz., work-processes, behavioral-processes, and change-processes.

6.2.1 Variant-8: Work-processes: According to Teece (2007), opportunity discovery for DCs will be grounded in organizational work-processes. Literature shows five important work-processes for this purpose. Firstly, exploration, assimilation and exploitation of knowledge becomes critical (Zollo and Winter, 2002; Benner and Tushman, 2003; Benner and Tushman, 2003; Newey and Zahra, 2009; Capaldo, 2010; Capaldo, 2010; Saenz et al., 2014; Dixon et al., 2014). This provides a fundamental input source of understanding the internal and external landscape of the firm. Secondly, the knowledge codification process is recognized as an important learning mechanism from the micro-foundations of DCs (Zollo and Winter, 2002; Kale and Singh, 2007; Macher and Mowery, 2009; Barrales-Molina et al., 2012; Bingham et al., 2015). In contrast, Secchi and Camuffo (2016) argue that knowledge codification enables easier and more precise replication at the cost of oversimplification and hence should be at optimal levels in the context of building DCs. In parallel, the accumulation process of experiences in firms becomes important in this context, as learning from past mistakes and the pace of experience (referred together as "paths" by Teece (1997) become inputs for building DCs (Eisenhardt and Martin 2000; Zollo and Winter, 2002; Nielsen 2006). Fourthly, integration of assimilated knowledge though exploration, exploitation and further codification buffered with accumulation of past learnings should be integrated to create a robust resource for competitive advantage (Wang and Ahmed, 2007; Martin 2011; Essex et al., 2016). Finally, process management becomes an important ingredient, as process management activities are beneficial for organizations to bring about stability and also serve as fundamental input for incremental innovation and change in unstable environments (Benner and Tushman, 2003).

6.2.2 Variant-9: Behavioral Processes: Behavior is defined as a range of autonomously or externally driven, voluntary or involuntary actions demonstrated by a system (firm) (Minton and

Khale, 2014). Literature shows eight such behavioral processes in the context of inputs for building DCs. They are:

a) strategic decision making (Karna et al., 2015),

b) shredding (Teece, 2007),

c) sensing and shaping (Hodgkinson and Healey, 2011; Martin 2011; Wilhelm et al., 2015; Fainshmidt and Frazier, 2016; Felin and Powell, 2016),

d) seizing (Hodgkinson and Healey, 2011; Martin 2011; Wollersheim and Heimeriks, 2016; Fainshmidt and Frazier, 2016; Felin and Powell, 2016),

e) reconfiguring (Teece et al, 1997; Karim, 2006; Wang and Ahmed, 2007; Bruni and Verona, 2009; Wu, 2010; Hodgkinson and Healey, 2011; Martin 2011; Wilhelm et al., 2015; Essex et al., 2016; Wollersheim and Heimeriks, 2016; Fainshmidt and Frazier, 2016; Felin and Powell, 2016),

f) attacking rivals: (Sirmon et l., 2010),

g) evolutionary learning/co-evolutionary learning, and

h) isolating mechanisms (Zollo and Winter, 2002; Zott, 2003).

6.2.3 Variant-10: Change Processes: According to Schreyögg and Kliesch (2007), work and behavioral processes alone are not sufficient for building DCs. In the approach to dynamizing capabilities, firms have to look beyond the rigidity trap of operational capabilities, and this is possible by means of effective novel-problem solving patterns for improvement called as 'innovation routines'. These innovation routines become a critical input for building DCs, which are defined as a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness' (Zollo and Winter, 2002). Alongside innovation routines, which lead to incremental innovation

in stable environments, transformation for breakthrough innovation also becomes critical, as it leads to new patterns of adapting latest technologies and leveraging them for competitive advantage (Zahra and George, 2002; Lichtenthaler, 2009; Newey and Zahra, 2009; Wang et al., 2015). The importance of bringing new innovation or transformative patterns in firms depends on the quality of change management. The focus of the firms during these change processes is to reduce the intensity of ambiguity that exists between the period of demarcation where a particular thrust ends and another strategic thrust begins. Rindova and Kotha (2001) recommend 'continuous morphing' for this purpose. Despite handling the innovation routines and transformation in firms, resistance to change is a well-known management problem that can come from a variety of quarters, including rigid cognitive frames within the organization (Helfat and Peteraf, 2015). As strategic adaptation proceeds, top managers may need to play a role in overcoming organizational resistance to change. Hence handling resistance to change also becomes another input in building DCs. Another important change process suggested by Karim (2006) deals with improving modularity while exploring changes in organizational structures. He introduced a process called 'unit configuration', which is a systematic addition of units to, deletion of units from, and recombination of units within the firm to effect change management in firms.

7. DIMENSION-3: INFLUENCING FACTORS THAT IMPACT DCs

This dimension deals with various endogenous (internal to firm), exogenous (external to firm) and interrelated factors (cutting across internal and external environments) which impact DCs in organizations.

7.1 Endogenous factors:

These include organizational culture, leadership, firm-specific factors and managerial actions which impact DCs with various intensities in firms.

7.1.1 Variant-11: Organization Culture: Erstwhile management thinkers defined the term 'organizational inertia' as the capacity to produce collective outcomes of a certain quality repeatedly, and they emphasized this as a requirement for guaranteed survival (Hannan and Freeman, 1984). However, contemporary thinkers have argued that organizational inertia doesn't help firms change inhibiting organizational cultures (Schreyögg and Kliesch, 2007). This is because, if firms are bound to their stabilized structures and action patterns, it may lead to the risk of maladaptation. We endorse this claim considering organizational inertia as an influencing factor on DCs. Further, organizational cultural intelligence also plays a key role on DCs (Moon, 2010). Another influencing factor is the firm's age and accumulated experience/evolution paths. There is abundant literature affirming that a firm's age, paths it travelled and the lessons learned through accumulated experiences bring in varying degrees of maturity in it in regards the way it handles DCs (Mosey, 2005; Zahra et al., 2006; Kotha et al., 2011; Eggers, 2012; Chen et al., 2012; Barrales-Molina et al., 2012; Schilke, 2014; Essex et al., 2016; Fainshmidt and Frazier, 2016). Further, Eggers (2012) claimed that DCs were also impacted by the size of the firms. Though 'firm size' is a relative term and depends on the sizes of other firms in the marketplace, apparently, it is an influencing factor on DCs (Døving and Gooderham, 2008; McKelvie and Davidsson, 2009; Wu, 2010; Jiang, 2010; Fawcett et al., 2011; Fainshmidt and Frazier, 2016;). Since DCs rely on collective learning and coordinated effort by organization members, a firm's social climate, which shapes patterns in attitudes, behaviors, and interpersonal relationships among organizational members, may be a driver of DCs (Fainshmidt and Frazier, 2016). Further, an organization's form (monarchy/ polyarchy) impacts its DCs, as

scholars claimed that performance of DCs was observed to be better in polyarchical structures (Teece, 2007; Felin and Powell, 2016). The empowerment level of staff, freedom to question status-quo and risk taking ability which are together defined under the term 'autonomy' in the DCs literature, are important factors which impact the DCs (Martin 2011; Secchi and Camuffo, 2016; Felin and Powell, 2016)

7.1.2 Variant-12: Leadership: Organizational leaders, especially in the top-management positions play a critical role in decision making, strategy planning, formulation and implementation. Leadership being an art, which varies from person to person (and context to context) based on several other factors, serves as an impacting variant on DCs. The reviewed literature shows that several leadership elements such as selection of product architecture and business models (Teece, 2007), entrepreneurial mind-set (Savolainen, 1999; Teece, 2007), DCs configuration and orchestration (Kor and Mesko, 2013; Sirmon and Hitt, 2009), strategy formulation, planning and budgeting, setting direction, environmental scanning (Davenport, 1993; Rosenbloom, 2000; Bititci et al., 2011), handling success traps (Wang et al., 2015) have impacted DCs in organizations.

7.1.3 Variant-13: Firm-specific Factors: Literature shows several firm-specific factors which impact DCs. These include idiosyncratic structures (Eisenhardt and Martin, 2000; Schreyögg and Kliesch, 2007; Vergne and Durand, 2011), product/service diversification (Eggers, 2012), path dependency and prior performance (Arthur, 1989; Cowan and Gunby, 1996; Schreyögg and Kliesch, 2007; Vergne and Durand, 2011; Pentland et al., 2012; Eggers, 2012; Girod, and Whittington, 2016), timing of deployment of dynamic capability (Zott, 2003; Eggers, 2012), cost of deploying dynamic capabilities (Zott, 2003; Eggers, 2012), architectural innovation degree (Galunic and Eisenhardt, 2001), ambidextrity in structures (Benner and Tushman, 2003; Teece,

2014; Kleinbaum and Stuart, 2014; Secchi and Camuffo, 2016), market intelligence (Mosey, 2005; Morgan et al., 2009), and market strategic orientation (Morgan et al., 2009; Zhou and Li, 2010).

7.1.4 Variant-14: Managerial Actions: There are several reasons why managerial actions become an essential factor impacting DCs (Martin, 2011). Firstly, managers are tasked with developing the capabilities necessary to formulate and implement their business-unit-level strategies to accomplish firm-level strategic objectives. Secondly managers have power and control over their business units with a responsibility towards business delivery. Finally, managers have an obligation to effectively work with organizational resources and processes. To endorse these arguments, we have identified several managerial actions which scholars have highlighted as having a significant impact on DCs in firms. They are problem solving and handing complexity (Schreyögg and Kliesch, 2007; Macher and Mowery, 2009; Fainshmidt et al., 2016), market communications (Eggers, 2012), managerial dominant logic (Kor and Mesko, 2013), performance measurement, and reporting, resource allocation, staff management, infrastructure building, stakeholder communications (Davenport, 1993), managing strategy, managing performance, resource planning and allocation, alliancing and networking, managing change, strategic decision making, competence building, organizational learning, knowledge management (Bititci et al., 2011), and managerial cognition (Kor and Mesko, 2013). Alongside these managerial actions, capability monitoring and non-routine dynamization (Schreyögg and Kliesch, 2007) are considered as critical, as these have a direct impact on improving and renewing DCs. Further, scholars also highlighted the importance of 'concurrent learning' (Helfat and Peteraf, 2003; Bingham et al., 2015), which enables managers to learn multiple DCs concurrently

7.2 Exogenous factors:

These include variants like competitors, suppliers and customers, market influence, and social, economic, regulatory and legal factors impacting DCs from the external environment of firms.

7.2.1 Variant-15: Competitors: Rivalry in the marketplace extending to higher levels leads to hyper-competition which undermines the sustainability of a competitive advantage (Lee at al., 2010; Barreto, 2010), and is hence considered to have an impact on DCs (Sirmon et l., 2010). Rindova and Kotha (2001) suggested that 'continuous morphing' on the dynamic capabilities of the firm leads to continuous change in order to regenerate a competitive advantage in hypercompetitive environments. Further, firms' understanding about their rivals' capabilities and the changes in competitive landscape impact the levels of DCs. In fact, it is essential for firms to revise or renew DCs based on these factors (Sirmon et al., 2010; Lee, 2010). Among several strategies rivals impose on firms, imitation potential of rivals retards the progress of DCs (Zott, 2003). This is common among new entrants and hence competitive parity becomes essential (Ambrosini and Bowman, 2009; Dixon et al., 2014). Further, literature also shows evidence of systems based competition (Lee et al., 2010) and randomness in competition (Zott, 2003) that impact DCs in firms.

7.2.2 Variant-16: Suppliers and Customers: An understanding of an enterprise is beyond the boundaries of the organization, which includes both suppliers and customers as well. Karna et al., (2015) categorized supplier and customer relationships with firms as operational capabilities. However, customer management capability, customer management performance, supply chain management performance, integrated closely with raw materials suppliers, customer-side online information capabilities, and supplier-side online information capabilities are fundamental to

supply chain management and customer relationship management. Hence, any changes in these variants would impact the relevant DCs. Further, Zollo and Winter (2002) highlighted that environmental conditions such as the speed of technological development or the time-to-market lags required by customers consequently influence DCs in firms.

7.2.3 Variant-17: Market Influence: The most important parameter in this category is the market type (Marcus and Anderson, 2006; Lee, 2008; Barreto, 2010). This is because DCs operate differently based on market velocity. Teece et al., (1997) highlighted that DCs operate when markets are moderately dynamic, but in high-velocity markets, where the strategic imperatives are speed and adaptability, DCs take on a different character (Peteraf et al., 2013). Literature also shows some criticism in this regard, that sustaining DCs in high velocity markets is difficult unless firms do not consciously safeguard them (Eisenhardt and Martin, 2000). Another factor is 'environmental dynamism', which refers to rate at which the preferences of consumers and the products/services of organizations change over time. This phenomenon, in combination with market dynamism, hostility among the market players and heterogeneity within and between the markets contribute to carrying impacts on DCs (Zahra et al., 2006; Ambrosini et al., 2009; Zhou and Li, 2010; Drnevich and Kriauciunas, 2011; Martin 2011; Barrales-Molina et al., 2012; Stadler et al., 2013; Schilke, 2014; Schilke, 2014; Weber and Tarba, 2014; Wilhelm et al., 2015; Karna et al., 2015; Wang et al., 2015; Li and Holsapple, 2015; Girod, and Whittington, 2016; Fainshmidt et al., 2016; Gelhard et al., 2016). Further, technological dynamism and how quickly firms adapt to the same ahead of the other market players is also a key factor. A rival's capability to cannibalize valuable assets and productive activities, impact a firm's marketing and technological DCs (Fainshmidt et al., 2016). Further, industry effects (Schilke, 2014), task environment (Karna et al., 2015), environmental

munificence (Danneels, 2008; Sirmon et al., 2010), uncertainty and complexity in markets (Aragón-Correa and Sharma, 2003; Schreyögg and Kliesch, 2007; Ambrosini and Bowman, 2009; Wu, 2010; Dixon et al., 2014; Felin and Powell, 2016; Essex et al., 2016), market turbulence and technological turbulence (Slater et al., 2006; Lichtenthaler, 2009; Dixon et al., 2014), and market demand (Martin, 2011) are some other factors which impact various DCs.

7.2.4 Variant-18: Social, Economic, Regulatory and Legal factors: Globalization has paved the way for utilization of technology across nations, where achieving protection against imitation and other forms of replication by rivals becomes challenging. Hence for shaping new 'rules of the game' in the global marketplace, global executives need to be mindful of the impact of globalization on their DCs (Teece, 2000; 2007). Further, increased diversity in partners' industry, organizational, and national background will cause added complexity and coordination costs for firms, but provide broadened resource and learning benefits (Ambrosini and Bowman, 2009; Jiang, 2010). Since ideas flow from all sides in multi-cultural firms, promoting national and industry diversity results in innovation. Alongside national factors, political and regulatory influences in various countries not only impact the local players, but also influence the competitive advantage of global firms (Malik and Kotabe, 2009; Dixon et al., 2014). Hence, Galuni and Eisenhardt (2001) suggested envisaging DCs as areas of responsibility that could be recombined in various ways as per the interplay of economic and social imperatives as a 'dynamic community'. Further, literature shows that social capital (Blyler and Coff, 2003; Bruni and Verona, 2009), and social responsiveness (Sodhi, 2015) impact DCs in firms.

7.3 Interrelated Factors:

These factors could impact the DCs either from external or internal environments based on the context, and hence they are interrelated with regard to the environmental and firm-level boundaries.

7.3.1 Variant-19: Interrelated factors: Various interrelated factors that were found to impact the DCs are presented in the Table-6.

Table-6: Interrelated factors impacting DCs

8. DIMENSION-4: DESIRED OUTCOMES OF DCs:

Required outcomes bundled with appropriate experiences result in the desired outcomes. There are several firms' desired outcomes that result from the DCs, which are identified from the literature and grouped as short-term outcomes and long-term outcomes.

8.1 Short-term Outcomes:

These include variants like creation of competitive advantage, performance and profits, and value creation in firms.

8.1.1 Variant-20: Short-term competitive advantage: Sirmon et al., (2010) after discussing the strengths and weaknesses of operational capabilities, highlighted that DCs could deliver temporary competitive advantage to firms. Evidence suggests that achieving sustained competitive advantage requires managers to understand the bases of competitive advantage as a concatenation of a series of temporary advantages over time (Powell, 2001; Sirmon et al., 2010; Dixon et al., 2014). Further, DCs also help firms in strategic renewal processes, which are central to creation of advanced products and services in the market place consistently as per evolving customer needs (Eggers, 2012). Other short-term outcomes of DCs include promoting innovation in the firms which leads to incremental innovative performance (Benner and

Tushman, 2003; Mosey, 2005; Capaldo, 2010) and subsequent innovative output (Kotha et al., 2011).

8.1.2 Variant-21: Performance and Profits: There are several performance and profit related outcomes which DCs deliver. Literature shows that DCs have benefited firms by improving stock market returns (Bingham et al., 2015), differential firm performance (Zott, 2003), higher operational effectiveness and efficiency (Teece et al., 1997; Tang et al., 2010; Saenz et al., 2014; Vanpoucke et al., 2014; Secchi and Camuffo, 2016;), static and dynamic efficiency (Ghemawat and Ricart-Costa, 1993), functional and adaptive efficiency (Wilhelm et al., 2015), gross revenue and gross profit (Døving and Gooderham, 2008; Essex et al., 2016), return on assets (Adner and Helfat, 2003; Morgan et al., 2009; Hsu and Wang, 2012; Girod, and Whittington, 2016), and returns on investments (Zollo and Winter, 2002).

8.1.3 Variant-22: Value creation: 'Value' has been defined by many scholars in many ways. However, the community of scholars studying DCs has defined value to firms as a contribution through six value creating attributes. Firstly, value is defined by the outcome of DCs to organizational learning and unlearning process (Zahra et al., 2006; Macher and Mowery, 2009; Malik and Kotabe, 2009; Wu, 2010; Hanson et al., 2011; Barrales-Molina et al., 2012; Cepeda-Carrion et al., 2012; Dixon et al., 2014). This is a primary value attribute as the body of knowledge of dynamization is based on the fundamental concept of learning and unlearning in firms as per the changes in the environment to create and sustain competitive advantage. Post unlearning the old patterns and learning the new ways, organizational alignment to the newly adapted technologies becomes essential, and this is challenging considering organizations as complex systems with several resources, processes and impacting factors (Stadler et al., 2013). DCs help organizations in achieving the organizational alignment (Hanson et al., 2011; Essex et

al., 2016). Further DCs also improve agility and flexibility to facilitate this process (Chiang et al., 2012). Even though firms learn and unlearn periodically using DCs and align themselves with agility and flexibility, the existing operational capabilities in the firms operate on a relative basis with the DCs, as they cannot be separated altogether from the capability framework of the firm. Hence, relative capability creation in firms, which is the rate of sustaining the existing operational capabilities in par with building DCs, becomes essential. There is evidence in the literature that DCs could contribute to relational capability creation (Donada et al., 2016) with a focus on other desired outcomes including customer satisfaction (Moon, 2010; Fawcett et al., 2011).

8.2 Long-term Outcomes:

These include variants like creation of long-term competitive advantage, market share, and value sustenance in firms.

8.2.1 Variant-23: Long-term competitive advantage: Sirmon et al., (2009) claimed that creating competitive advantage should be a milestone and not the end of strategic aspirations of firms. The durability of competitive advantage needs to be gauged as it leads to sustenance, and this is generally limited to the relative strength and weakness sets of firms which change significantly over time in rivalrous markets. Tang et al., (2010) highlighted that DCs could certainly help firms in creating sustained competitive advantage, due to their unique characteristics. This could be achieved through several other interlinked outcomes that DCs deliver, like promoting concurrent learning (Bingham et al., 2015), business and social competency development (Marcus and Anderson, 2006), breakthrough innovation or radical change (Mosey, 2005; Hanson et al., 2011; Helfat, and Winter, 2011), innovation performance or innovativeness quotient in firms (Zahra and George, 2002; Cepeda-Carrion et al., 2012) etc.

8.2.2 Variant-24: Market Share: There is evidence in the literature that DCs lead to improved market share. In rivalrous markets, it is the relative (to competitors) capability instead of an absolute quality of capabilities that matters most for competitive advantage (Sirmon et al., 2010). On these lines, Drnevich and Kriauciunas (2011) introduced the term 'relative firm performance' as a relative coordinate of firm level performance with regard to the firm's industry or marketplace. They concluded their research clarifying that DCs contribute positively to a firm's relative performance. Further, scholars have endorsed the fact that DCs could improve the overall competitive position of firms in the markets (Vanpoucke et al., 2014; Essex et al., 2016).

8.2.3 Variant-25: Value Sustenance: Value creation being perhaps regarded as a short-term outcome of DCs, sustaining the created value in firms is the long-term outcome. This is because value creation is not a one-time activity, but should be a part of organizational culture in order to create sustained competitive advantage. DCs facilitate the process of sustaining value outcomes in firms by nourishing the overall efficiency (Bingham et al., 2015), creating patterns of flexibility (Scherrer-Rathje et al., 2014; Bingham et al., 2015), promoting sustainable superior performance (Easterby-Smith and Prieto, 2008; Tang et al., 2010), sustained profitable growth (Teece, 2007; Girod and Whittington, 2016), and finally by creating a culture of information-sharing within the firm (Fawcett et al., 2011).

9. DIMENSION-5: ASSESSMENT YARDSTICKS FOR DCs

Building DCs through input variants, and nourishing or protecting DCs from the negatively impacting factors are mammoth tasks that require formal, well planned and executed, and monitored approaches for realizing the desired outcomes. The entire process will be futile,

unless there is a mechanism to assess the magnitude of success of the DCs in firms. Hence, measures of DCs form an important variant in the MA framework.

9.1 Variant-26: Measures/Key Metrics of DCs: The various measures of performance and success of DCs in firms have been identified from the literature and are presented in Table-7.

Table-7: Assessment Yardsticks for DCs

The MA framework comprising the five dimensions discussed above, along with their respective variants and several attributes defined under each variant is presented in Table-8. The framework provides a structure to represent the overall literature of DCs corresponding to papers published in selected top-tier journals during the period since 1990 to 2016. By showing possible conceptual relationships between and among concepts hitherto considered to be disconnected, it eliminates or at least minimizes the vagueness in the DCs approach reported by a few scholars. Further, it enables development of an integrated understanding of the body of knowledge concerning DCs by virtue of the MA frameworks' roots being in the wider field of Systems Thinking.

Table-8: Conceptual Morphological Analysis framework

10. IMPLICATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Motivated by the growing influence, importance and criticism of Dynamic Capabilities among contemporary management thinkers in the modern business world, our paper has examined the different theoretical and research perspectives in the selected literature. These works have contributed to our understanding of the DCs approach as a strategic management concept used to derive several benefits and advantages to firms including the development of competitive advantage. Through this paper, we have clarified several important propositions of the theory of

DCs. Firstly, we defined characteristics of DCs, and collated 81 DCs identified separately by various scholars. This lays the foundation for researchers in this field to test whether several other similar management constructs exhibit the characteristics of DCs or not, in organizational contexts. Further, future research agenda could include investigating the linkages, or interrelationships among these individual DCs.

Secondly, we have countered the existing myth in the research community that the DCs approach is tautological without practical implications. A comprehensive review of research literature clarifies that 71% of the selected research papers studied here have used empirical methods. The many case studies that have been published have established strongly the practical value of the DCs approach. Though we have proposed assessment yardsticks though this paper, there is significant potential to build in more objectivity on this subject. Future empirical research could strengthen this claim.

Thirdly, we noted that literature on the subject has been vaguely organized and spread across various directions of exploration, with emphasis on isolated concepts of the DCs approach, and on individual DCs. Through this paper, we contribute to the theory of the DCs approach by proposing a much-needed structure to the loosely packed literature. Most previous research has rested on foundations of isolated associated topics with separate theories and conceptual models, including empirical studies based on surveys and experiments.

In this paper, we have examined and integrated multiple theoretical perspectives on DCs; this is not evident in the literature thus far. The MA framework proposed in our paper is the first attempt to develop a holistic conceptual representation of various theories pertaining to DCs. It minimizes or even eliminates the vagueness in those theories reported by a few authors (Kraatz and Zajac, 2001; Davis, 2004; Newbert, 2007; Arend and Bromiley, 2009), and can be used to

resolve the differences in the key assumptions and levels of analysis across them. The MA framework can also be used as a reference to identify and examine possible gaps in the literature and then work on research opportunities. The MA framework has five dimensions having a total of 26 variants. Keeping in mind the selected literature based on which the framework has been proposed here, we acknowledge that some new dimensions and variants (across the building blocks, input variants, impacting factors, desired outcomes and assessment yardsticks) can be identified and integrated into it, and enrich it on a continuing basis.

Practical implications of this study include directions to managers to see DCs as an 'integrated whole' rather than 'fragmented many' in real world situations. Secondly the MA framework devised as part of this paper could help in deducting various relevant dimensions and appropriate variants in the context of DCs. Thirdly, a systems thinking perspective of DCs presented here would be valuable for leadership decision making process. Finally, the yardsticks for measuring DCs featured as part of this study would lead to DCs maturity measurement in firms.

We observe that there is either a significant scarcity, or perhaps even an absence, of papers concerning the DCs ecosystem at large. The concept of a DCs ecosystem represents a new dimension in the MA framework, and will have its corresponding set of variants or options. Briefly, a DCs ecosystem should consist of elements such as input factors for planned development of DCs, the network of DCs within a firm, influencing factors that make the DCs effective, the outcomes of the DCs, measures of performance and success, and feedback structures and mechanisms. Such additions of new dimensions and or variants that could be triggered by the proposed MA framework will only help develop and consolidate the research literature further and make it as comprehensive, clear and cogent as it can be at any point in time

in the future. Finally, we hope that our review provides fruitful directions for future research on DCs and their several related propositions.

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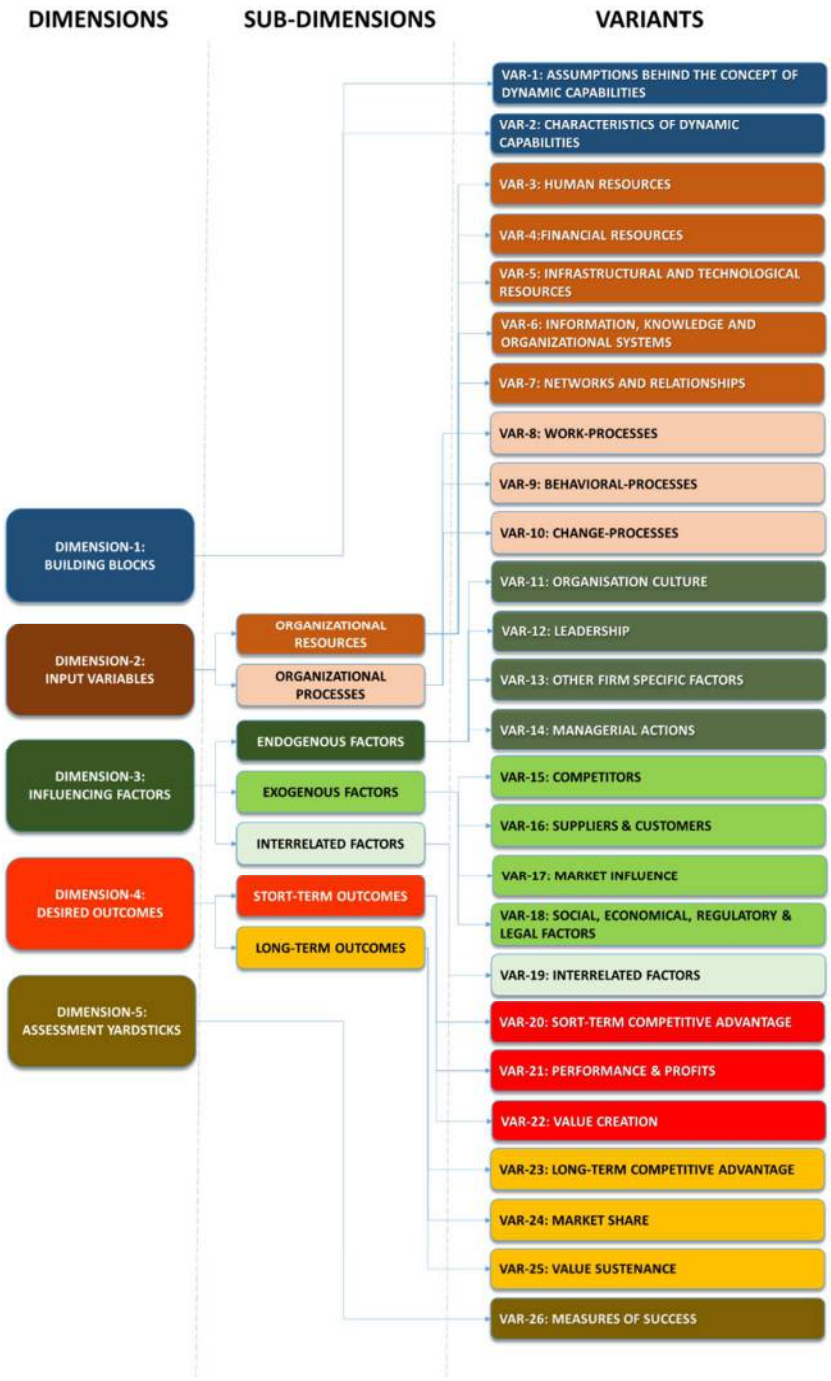

Figure-1: Dimensions and variants constituting the MA framework

Table-1: Key definitions of DCs

Authors	Definition of Dynamic Capability (DCs)
Leonard-Barton, (1992)	…organization's ability to achieve new and innovative forms of competitive advantage given path dependencies and market positions
Teece et al., (1997)	…the firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments.
Eisenhardt and Martin, (2000)	DCs are organizational and strategic routines that firms use to achieve new resource configurations as markets change. They argue that dynamic capabilities are tools, in the form of specific and identifiable processes. These include cross-functional activities such as strategic decision making, product development routines, co-ordination processes for internal collaborations, knowledge creation, alliance and acquisition processes, and market exit routines.
Zollo and Winter (2002)	DCs are defined as a learned and stable pattern of collective activity through which an organization systematically generates and modifies its operating routines in pursuit of improved Effectiveness
Zott, (2003)	…dynamic capabilities are more than a simple addition to resource based view since they manipulate the resources and capabilities that directly engender rents.
Collis, 1994; Winter, (2003)	…dynamic capabilities define and govern the rate of ordinary capabilities
Helfat and Peteraf, (2003)	…unlike operational capabilities, dynamic capabilities do not directly affect output for the firm in which they reside, but indirectly contribute to the output of the firm through an impact on operational capabilities
Winter (2003)	DCs are those that operate to extend, modify or create ordinary Capabilities
Zahra, Sapienza, and Davidsson (2006)	The abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriate by its principal decision maker(s)
Helfat et al., (2007)	…the capacity of an organization to purposefully create, extend, or modify its resource base
Teece (2007)	DCs consist of valuable and difficult-to-replicate organizational routines required to address a changing environment though sensing opportunities and threats, and reconfiguring resources to seize opportunities
Wang and Ahmed (2007),	…a firm's behavioral orientation to constantly integrate, reconfigure, renew and recreate its resources and capabilities and, most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage
Schreyögg and Kliesch-Eberl (2007)	DCs are not merely ad hoc problem-solving event or a spontaneous reaction; rather they have patterned elements called routines embedded for adapting the change.
Danneels (2008)	DCs is defined as a type of competence to build new competencies
Barreto (2010)	A DCs is the firm's potential to systematically solve problems, formed by its propensity to sense opportunities and threats, to make timely and market-oriented decisions, and to change its resource base
Helfat and Winter (2011); Stadler et al., (2013)	Capabilities that aim to "promote economically significant change are dynamic, even if the pace of change appears slow or undramatic."
Teece (2014)	Dynamic capabilities involve higher-level activities that can enable an enterprise to direct its ordinary activities toward high-payoff endeavors

Table-2: Individual Dynamic Capabilities (in order of appearance in research literature)

Individual Dynamic Capabilities	Sample Papers
New product development	Helfat (1997); McKelvie and Davidsson (2009); Bruni and Verona (2009); Fawcett et al., (2011)
Relational capability	Lorenzoni and Lipparini (1999); Capaldo (2007)
Alliance formation and alliance learning	Gulati (1999); Kale and Singh (2007); Jiang (2010); Schilke (2014)
Building relational dynamic capabilities	Lorenzoni and Lipparini (1999); Capaldo (2007); Donada et al., (2016)
Change management capability	Savolainen (1999)
Idea generation and continuous process improvement	Savolainen (1999); Pablo et al., (2007); Anand et al., (2009)
Process risk management	Gulati (1999); Heimeriks et al., (2012); Dixon (2014)
Inter-organizational networking and collaboration	Dyer and Nobeoka (2000); Fawcett et al., (2011); Kleinbaum and Stuart (2014)
Top executive's cognitive capability and style	Carpenter et al., (2001); Kor and Mesko (2013)
Shifting bases and markets	Rindova and Kotha (2001)
Talent hiring	Carpenter et al., (2001)
Continuous morphing	Rindova and Kotha (2001)
Re-engineering	Zollo and Winter (2002)
Absorptive capacity	Zahra and George (2002); Lichtenthaler (2009); Saenz et al., (2014)
Exploitative capability	Zahra and George (2002)
Process management	Zollo and Winter (2002); Benner and Tushman (2003)
Post-acquisition integration	Zollo and Winter (2002); Heimeriks et al., (2012)
Capability to create dynamic capabilities	Helfat and Peteraf (2003); Bingham et al., (2015)
Explorative capability	Benner and Tushman (2003); Danneels (2008); Saenz et al., (2014)
Talent management capability	Adner and Helfat (2003); Sirmon and Hitt (2009)
Capability branching	Helfat and Peteraf (2003)
Project and program management	Mosey (2005); Anand et al., (2009)
Strategic planning and strategy formulation	Slater et al., (2006)
Modularity	Pil and Cohen (2006); Karim (2006)
Product heterogeneity	Pil and Cohen (2006)
Alliance management	Kale and Singh (2007); Jiang et al., (2010); Anand et al., (2010); Schilke (2014); Wang and Rajagopalan (2015)
Capability monitoring	Schreyögg and Kliesch Eberl (2007)
Resource divestment	Moliterno. and Wiersema (2007)
Strategy execution capability	Harreld et al., (2007)
Organizational adaptability and continuous learning	Schreyögg and Kliesch-Eberl (2007); Schilke (2014); Li et al., (2015)
Organizational alignment	Schreyögg and Kliesch-Eberl (2007); Hanson et al., (2011); Li et al., (2015)

Product/process innovation	Smart et al., (2007); Capaldo (2007); Galunic and Eisenhardt (2001)
Knowledge management capability	Wang et al., (2007); Smart et al., (2007)
Best practice creation	Peteraf and Reed (2007)
Metacognition, managerial awareness, discretion and perception	Peteraf and Reed (2007); Essex et al., (2016)
Performance management	Wang et al., (2007); Hanson et al., (2011)
Adaptive capability	Wang and Ahmed (2007); Newey and Zahra (2009)
Strategic political management	Oliver and Holzinger (2008)
Institutional influencing capability	Oliver and Holzinger (2008)
Policy management	Witcher et al., (2008)
Environmental scanning and predictive capability	Danneels (2008); Oliver and Holzinger (2008)
Design creativity	Azadegan et al., (2008)
Business excellence	Witcher et al., (2008)
Training and development	Azadegan et al., (2008)
Ability to study new markets and market disruptions	Danneels (2008); McKelvie and Davidsson, (2009)
Lean capability	Shah and Ward (2007); Anand et al., (2009); Secchi and Camuffo (2016)
Six sigma capability	Anand et al., (2009)
Reverse engineering	Malik and Kotabe (2009)
Experimentation capability	Ambrosini et al., (2009); Dixon et al., (2014)
Transformative learning	Lichtenthaler (2009); Newey and Zahra (2009)
Communication and social cognition	Morgan et al., (2009); Helfat and Peteraf (2015)
Resource management	Sirmon and Hitt (2009)
Manufacturing flexibility	Malik and Kotabe (2009) ; Scherrer-Rathje et al., (2014)
Pricing	Morgan et al., (2009)
Distribution capability	Morgan et al., (2009)
Advertising and marketing communications	Morgan et al., (2009)
Information technology management	Anand et al., (2010); Fawcett et al., (2011)
Infrastructure technology management	Anand et al., (2010)
Intra and inter cultural capability	Moon (2010)
Customer orientation	Zhou and Li (2010)
Fixed assets managing capability	Tang and Liou (2010)
Managerial attention	Martin (2011); Helfat and Peteraf (2015)
Resource allocation	Coen and Maritan (2011)
Metrics management	Hanson et al., (2011)
Strategic agility and flexibility	Chiang, et al., (2012); Weber and Tarba (2014)
Supply chain agility	Chiang et al., (2012); Blome, et al., (2013); Li et al., (2015)
Concurrent learning	Eggers (2012); Bingham et al., (2015)

Product portfolio management	Eggers (2012)
Re-organization, restructuring and reconfiguration	Vanpouckeet al., (2014); Girod and Whittington (2016); Fainshmidt and Frazier (2016)
Outsourcing capability	Scherrer-Rathje et al., (2014)
Reconfiguration	Vanpoucke at al., (2014); Fainshmidt and Frazier (2016)
Supplier integration	Vanpoucke at al., (2014)
Managing demand uncertainty	Barrales-Molina, et al., (2014); Li et al., (2015)
Customer relationship management	Barrales-Molina et al., (2014); Vanpoucke et al., (2014)
Brand building	Barrales-Molina et al., (2014)
Business risk management	Dixon et al., (2014)
Sensing	Helfat and Peteraf (2015); Fainshmidt and Frazier (2016)
Seizing	Helfat and Peteraf (2015); Fainshmidt and Frazier (2016)
Problem solving and reasoning	Helfat and Peteraf (2015)
Corporate social responsibility	Sodhi (2015)
Stakeholders management	Sodhi (2015)

Table-3: Relevant publications across journals over time (decreasing order of total papers).

Journals	Total papers	1990-2000	2001-2005	2006-2010	2011-2016
Strategic Management Journal	**47**	9	6	18	14
British J. of Management	**12**			7	5
Int. J. of Operations and Production Mgmt.	**12**	1	2	3	6
Organization Science	**7**		1	2	4
Academy of Management Journal	**6**		3	1	2
Academy of Management Review	**6**		3	3	
Journal of Management Studies	**6**			4	2
Academy of Management Perspectives	**5**		1		4
International J. of Management Reviews	**4**			2	2
Journal of Business Research	**4**			2	2
International J. of Production Research	**3**			1	2
California Management Review	**3**			1	2
Journal of Management	**3**			1	2
Journal of Operations Management	**3**			2	1
Long Range Planning	**3**				3
Strategic Organization	**3**				3
Journal of Supply Chain Management	**2**				2
Group and Organization Management	**1**			1	
Organization Studies	**1**				1
Production and Operations Mgmt.	**1**				1
Production Planning and Control	**1**				1
Total	**133**	**10**	**16**	**48**	**59**

Table-4: Methodological classification of reviewed papers.

				No. of papers	% papers	Sample papers
Research method	Theoretical (Conceptual)			38	29%	Teece et al., (1997); Eisenhardt and Martin (2000); Winter (2003); Helfat and Peteraf (2015)
	Empirical	Primary data	Case study	19	14%	Rindova and Kotha (2001);
			Experiment	5	4%	Zott (2003); Wollersheim and Heimeriks (2016)
			Interviews	1	1%	Capaldo (2007)
			Interviews and questionnaire	5	4%	Wilden et al., (2003); Heimeriks et al., (2012)
			Interviews, pilot survey and field visits	2	2%	Gulati (1999); Marcus and Anderson (2006)
			Questionnaire	21	16%	Døving and Gooderham (2008); Blome et al., (2013); Fainshmidt and Frazier (2016)
			Questionnaire and field visits	2	2%	Macher and Mowery (2009); Schilke (2014)
		Secon-dary data	Literature	11	8%	Peteraf et al., (2013); Wang and Ahmed (2007)
			Others (Public data sources)	21	16%	Lee (2008); Shamsie et al., (2009); Ross and Sharapov (2015)
		Mixed methods	Literature and interviews	4	3%	Smart (2007); Bititci et al., (2011)
			Questionnaire and public data sources	1	1%	Li et al., (2015)
			Interviews and public data sources	2	2%	Newey and Zahra (2009); Stadler et al., (2013)
			Case Study, Interviews, public data sources	1	1%	Martin (2011)

Table-5: Characteristics of Dynamic Capabilities

Characteristic	Brief Explanation	Authors
1. Heterogeneity	Degree of variety prevailing among all internal/external capabilities – DCs as well as others – of a firm. This variety results from the uniqueness of each DC.	Zollo and Winter, 2002; Helfat and Peteraf, 2003; Pil and Cohen, 2006; Døving and Gooderham, 2008; Adner and Helfat, 2003; Bruni and Verona, 2009; Barreto, 2010
2. Idiosyncrasy	Degree of path dependency which is difficult to be copied/replicated or repeated/reproduced.	Teece et al., 1997; Eisenhardt and Martin, 2000; Pablo et al., 2007; Wang et al., 2015
3. Predictability	Degree of predictability in creation, sustenance and outcomes of DCs.	Eisenhardt and Martin, 2000
4. Capability reconfiguration	Degree to which each DC enables transformation into a new capability or evolution to a better capability.	Lavie, 2006
5. Relative weakness and relative strength among the capabilities	Degree of correlation between the DCs leading to relative strengths or weaknesses, as drivers of competitive advantage of a firm over time.	Sirmon, 2010
6. VRIN resolution	Degree to which DCs enable recognition, development and classification of organizational resources and processes as valuable, rare, inimitable and non-substitutable.	Eisenhardt and Martin, 2000; Ambrosini and Bowman, 2009; Tang et al., 2010; Barreto, 2010; Teece, 2014
7. Ability to be evolved and emergence	Degree of evolution of DCs over time, based on several endogenous and exogenous factors exhibiting the lifecycle stages of growth, maturity and decline. During this process, even new DCs could emerge.	Rindova and Kotha, 2001; Helfat and Peteraf, 2003; Zott, 2003; Lee, 2008
8. Hierarchical structure and order/capabilities nesting	Degree of existence of typology and hierarchical linkages between DCs. As the order of the DCs increases, they overcome path-dependencies, as these generally lead to imitability of lower-order capabilities.	Zott, 2003; Witcher et al., 2008; Døving and Gooderham, 2008; Heimeriks, Schijven and Gates, 2012; Danneels, 2008; Wang et al., 2015; Donada et al., 2016; Wollersheim and Heimeriks, 2016; Fainshmidt et al., 2016
9. Dynamism	Strength of DCs impacting the creation of competitive advantage in firms.	Helfat, and Winter, 2011; Schilke, 2014; Wollersheim and Heimeriks, 2016
10. Inimitability and non-reproducibility	Degree to which DCs are not imitable or directly usable by other players in the market.	Teece et al., 1997; Vergne and Durand, 2011; Teece, 2014; Fainshmidt et al., 2016
11. Non-	Degree to which DCs cannot be substituted by	Zott, 2003; Ambrosini et

substitutability	combinations of other capabilities.	al., 2009
12. Co- and inter-temporal sharability and transferability	Degree to which DCs can be shared concurrently across different markets by a firm, and transferred across time especially when a firm exits a market (often a declining one) and redeploys the capabilities in a new market.	Helfat and Peteraf, 2003
13. Recombination and fungibility	Degree to which two or more DCs can be recombined to provide an alternate approach to capability renewal in the current product-market. This idea of capability recombination draws on the concept of knowledge recombination for structured innovation.	Kogut and Zander, 1992; Eggers, 2012; Helfat and Peteraf, 2003; Wang et al., 2015

Table-6: Interrelated factors impacting DCs

Interrelated Factor	**Authors**
Best practices	(Eisenhardt and Martin, 2000; Teece, 2007; Teece, 2014; Wang et al., 2015)
Path-dependency lock-ins	(Schreyögg and Kliesch, 2007; Vergne and Durand, 2011)
Firm's entry mode and timing	(Lee, 2008; McKelvie and Davidsson, 2009; Anand et al., 2010)
Strategic liabilities	(Dyer and, 2000; Sirmon et l., 2010; Tang and Liou, 2010)
Firm's weakness-set and strength-set	(Sirmon et l., 2010)
Precarious advantage	(Sirmon et l., 2010)
Entry strategies (First entry advantage)	(Rosenbloom, 2000; Zott, 2003; McKelvie and Davidsson, 2009; Eggers, 2012)
Resource alteration (leveraging existing resources, creating new resources, assessing external resources, releasing resources)	(Danneels, 2011; Kor and Mesko, 2013)

Table-7: Assessment Yardsticks for DCs

Measures of DCs	Brief Explanation	Authors
1. Capability rarity	Level of effectiveness per capability as opposed to its mere existence	Sirmon et al., 2010
2. Structural change ratio	Ratio of restricting changes above the expected threshold in senior management	Girod, and Whittington, 2016
3. Dynamism measure	Rate of change of firm's sales to annual industry sales	Girod, and Whittington, 2016
4. Degree of causal clarity	Degree of clarity in a DC with regard to the causal relationships between the decisions or actions taken and the performance outcomes obtained	Zollo and Winter, 2002; Blyer and Coff, 2003
5. Degree of independence and degree of simultaneity	Degree to which DCs contribute effectively while being independent or supporting other existing capabilities, tasks and processes simultaneously	Zollo and Winter, 2002
6. Technical fitness	Degree to which a DC performs its intended function, regardless of how well other capabilities enable a firm to make a living	Teece, 2007; Helfat et al., 2007; Bingham et al., 2015; Martin 2011
7. Evolutionary Fitness	Degree to which a DC enables evolutionary changes within the firm, with reference to environmental changes	Teece, 2007; Helfat et al., 2007; Bingham et al., 2015; Kor and Mesko, 2013; Martin 2011; Newey and Zahra, 2009; Teece, 2014
8. Strategic Fitness	Degree of managing the resource bundles that cannot be comprehended or imitated by outsiders	Tang et al., 2010
9. Strategic Flexibility	Degree of a DCs to quickly commit resources to new courses of action in response to environmental changes, and recognize and act promptly when it is time to halt or reverse existing resource or process commitments	Zahra and George, 2002; Shimizu and Hitt, 2004; Barrales-Molina et al., 2012; Helfat et al., 2007
10. Structural Flexibility/Agility	The ability of DCs to facilitate firms to adapt the current organizational structure to newly changed conditions	Barrales-Molina et al., 2012; Weber and Tarba, 2014
11. Operational Flexibility/Agility	The ability of DCs to renew operational capabilities (most day-to-day tasks or routines involved in basic processes)	Zollo and Winter, 2002; Teece, 2007; Barrales-Molina et al., 2012

Table-8: Conceptual Morphological Analysis Framework

Building B

Input Variables

Pre-requisites/ Assumptions	Chara
• Existence of Ordinary/operational capabilities: (Drnevich & Kriauciunas, 2011; Karna et al., 2015; Helfat and Peteraf, 2003; Helfat and Winter, 2011; Essex et al., 2016; Stadler et al., 2013; Fainshmidt et al., 2016) • Markets operate in Schumpeterian world: (Teece, 1997; Peteraf et al., 2013) • Modularity exists in firm's systems: (Pil and Cohen ; 2006) • Resources availability in firms: (Helfat and Peteraf, 2003) • Fundamental units of analysis of firms: Processes, positions, paths (Teece et al., 1997)	• Heterogeneity: (Helfat and Peteraf, 2003; Pil and 2003; Zollo and Winter, 2002; Barreto, 2010; Bru • Idiosyncrasy: (Teece et al., 1997; Eisenhardt and • Predictability: (Eisenhardt and Martin, 2000) • Capability Reconfiguration: (Lavie, 2006) • Relative weakness and Relative strength among th • VRIN: valuable, rare, inimitable and non-substitu Teece, 2014; Ambrosini and Bowman, 2009) • Evolvability & Emergence: (Helfat and Peteraf, 2 • Hierarchies - Order of capabilities/ Capabilities n Sum Chau, and Harding, 2008; Døving and Good Heimeriks, 2016; Wang et al., 2015; Fainshmidt e • Level/Degree of Dynamism: (Schilke, 2014; He • Inimitability and non-reproducibility:(Teece et al. 2014) • Non-Substitutability: (Zott, 2003; Ambrosini et al • Sharability and intertemporal transferability: (He • Recombination and fungibility: (Kogut and Zande

Resources						
Human Resources	Financial Resources	Infrastructure & Technological Resources	Information, knowledge & organizational systems	Networks & relationships	Work Processes	Be
• Managerial cognition and emotion: (Helfat and Peteraf, 2015; Hodgkinson and Healey, 2011) • Magnitude, timing, and similarity of experience: (Bingham et al., 2015) • Diversification of intangible resources: (Døving and Gooderham, 2008) • Intellectual Capital: ○ Human Capital: (McKelvie and Davidsson, 2009; Hsu and Wang, 2012; Bruni and	• Strategic investment: (Teece, 2007; Teece 2014; Coen	• Traditional infrastructure (transportation systems and communications networks) and non-traditional infrastructure (the atmosphere and basic research	• Heuristics: (Bingham et al., 2015; Fainshmidt et al., 2016; Eisenhardt and Martin, 2000; Bingham and Eisenhardt, 2011) • Core knowledge	• Strategic Alliances/Collaboration: (Schilke, 2014; Eisenhardt and Martin, 2000; Lee et al, 2010; Oh, Yang and Kim, 2014; Kale and Singh, 2007; Capaldo, 2010) • Interorganizational innovation networks/inter-firm relationships:(Smart, Bessant and Gupta,	• Knowledge Codification: (Bingham et al., 2015; Secchi and Camuffo,2016; Kale and Singh, 2007; Barrales-Molina et al., 2012; Macher and Mowery,2009) • Experience accumulation (Zollo and Winter, 2002) • Process Management: (Benner and Tushman, 2003)	• Strategic dec 2015) • Shredding: (• Sensing and Healey, 2011 Frazier, 2016 and Powell, 2 • Seizing: (Ho Wollersheim 2011; Fainsh and Powell, 2

Influencing Factors

Endogenous Factors				Exogenous Factors		
Organization Culture	Leadership	Other firm-specific factors	Managerial Actions	Competitors	Suppliers & Customers	Market inf
• Structural inertia: (Schreyögg and Kliesch, 2007) • Firm's age and accumulated experience/evolution paths: (Schilke, 2014; Mosey, 2005; Eggers, 2012; Chen et al., 2012; Essex et al., 2016; Fainshmidt and Frazier, 2016; Barrales-Molina et al., 2012; Zahra et al., 2006; Kotha et al., 2011; Zahra et al., 2006) • Firm's size: (Eggers, 2012; Døving and Gooderham, 2008; Jiang, 2010; Fawcett et al., 2011; Fainshmidt and Frazier, 2016; McKelvie and Davidsson, 2009; Wu, 2010) • Organisational Climate: (Fainshmidt and Frazier, 2016) • Decentralised organisations/polyarchy: (Teece, 2007; Felin and Powell, 2016)	•Selection of product architecture and business models: (Teece, 2007) •Entrepreneurial mind-set: (Teece, 2007; Savolainen, 1999) •DC configuration and orchestration: (Kor and Mesko, 2013; Sirmon and Hitt, 2009) •Strategy formulation, Planning and budgeting, Setting direction, Environmental scanning (Davenport, 1993; Bititci et al., 2011;	• Idiosyncratic structures (Schreyögg and Kliesch, 2007; Eisenhardt and Martin, 2000; Vergne and Durand, 2011) • Product/Service diversification: (Eggers, 2012) • Path dependancy and Prior Performance: (Schreyögg and Kliesch, 2007; Arthur, 1989; Cowan and Gunby, 1996; Eggers, 2012; Girod, and Whittington, 2016; Vergne and Durand, 2011; Pentland et al., 2012) • Timing of deployment of dynamic capability: (Zott, 2003; Eggers, 2012) • Cost of deploying dynamic capabilities: (Zott, 2003; Eggers, 2012) • Architectural innovation: (Galunic and Eisenhardt, 2001) • Ambidextrity in structures (Benner and Tushman, 2003; Secchi	• Problem solving and Handing complexity: (Schreyögg and Kliesch, 2007; Macher and Mowery,2009; Fainshmidt et al., 2016) • Capability Monitoring and Non routine dynamisation: (Schreyögg and Kliesch, 2007) • Concurrent learning: (Bingham et al., 2015; Helfat and Peteraf, 2003) • Communications: (Eggers, 2012) • Managerial Dominant Logic: (Kor and Mesko, 2013) • Performance measurement, and reporting, Resource allocation, Human resource management, Infrastructure building, Stakeholder communication (Davenport, 1993) • Managing strategy, managing performance, Resource planning and allocation, Alliancing and networking, managing change, Strategic decision making	• Hypercompetitio n: (Sirmon et l., 2010; Lee at al., 2010; Rindova, and Kotha, 2001; Barreto, 2010) • Systems based competition: (Lee et al., 2010; Korn and Rock, 2001) • Rivals' capabilities (Sirmon et l., 2010) • Competitive landscape (Sirmon et l., 2010; Lee, 2010) • Parity effect: (Sirmon et l., 2010; Dixon et al., 2014; Ambrosini and Bowman, 2009) • Randomness in competition:	• Shifts in supply and demand: (Karna et al., 2015) • Time-to-market requireme nts by customer(Zollo and Winter, 2002)	• Environmental/mar Hostility and Heter (Drnevich & Kriau Schilke, 2014; Kar Li and Holsapple, 2 2014; Girod, and W 2016; Stadler et al. 2011; Barrales-Mo Ambrosini et al., 2 2015; Fainshmidt e Zahra et al., 2006; Tarba, 2014; Zhou Zaidi and Othman, al. ,2016; Wilhelm • Technological dyna (Fainshmidt et al., • Industry effects: (S • Task environment: 2015) • Market type (High markets): (Peteraf 2008; Barreto, 201 Anderson, 2006) • Environmental mu (Sirmon et l., 2010 2008) • Volatility, Uncerta and Munificence: (and Sharma, 2003; Bowman, 2009; W

Desired Outcomes

Short -term				
Competitive Advantage	Performance and Profits	Value Creation	Competitive Advantage	Mar
• Temporary competitive advantage: (Sirmon et al., 2010; Dixon et al., 2014) • Strategic renewal (Eggers, 2012) • Incremental Innovative performance (Benner and Tushman, 2003; Mosey, 2005; Capaldo, 2010) • Quantity of Innovative Output: (Kotha et al., 2011)	• Stock market returns (Bingham et al., 2015) • Differential Firm performance (Zott, 2003) • Operational Effectiveness and efficiency (Secchi and Camuffo,2016; Tang et al., 2010; Teece et al., 1997; Saenz et al., 2014; Vanpoucke et al., 2014) • Static and dynamic efficiency (Ghemawat and Ricart Costa, 1993) • Functional and Adaptive efficiency (Wilhelm et al., 2015) • Gross revenue and gross profit (Døving and Gooderham, 2008; Essex et al., 2016) • Return on Assets (Morgan et al., 2009; Girod, and Whittington, 2016; Adner and Helfat, 2003; Hsu and Wang, 2012) • Return on Investments (Zollo and Winter, 2002)	• Learning and unlearning in organisations (Hanson, Melnyk, and Calantone, 2011; Dixon et al., 2014; Barrales-Molina et al., 2012; Cepeda-Carrion et al., 2012; Macher and Mowery,2009; Zahra et al., 2006; Malik and Kotabe,2009; Wu, 2010) • Organisational Alignment (Hanson, Melnyk, and Calantone, 2011; Essex et al., 2016) • Agility and Flexibility (Chiang, Kocabasoglu-Hillmer, and Suresh, 2012) • Relational capability creation (Donada et al., 2016) • Customer satisfaction (Fawcett et al., 2011; Moon, 2010) • Resource development (Stadler et al., 2013)	• Durability of Competitive advantage (Sirmon et l., 2010) • Innovation Performance/Innovativeness (Zahra and George, 2002; Cepeda-Carrion et al., 2012) • Breakthrough Innovation or Radical Change (Hanson, Melnyk, and Calantone, 2011; Mosey, 2005; Helfat, and Winter, 2011) • Concurrent learning (Bingham et al., 2015) • Sustainable competitive advantage (Tang et al., 2010) • Business and Social Competency development (Marcus and Anderson,2006)	• Rela perf (Dri Kria 201 et l. • Ove com posi (Ess 201 Van al.,

Assessment Yardsticks

Measures/Key Metrics

- Capability Rarity: (Sirmon et l., 2010)
- Structural change ratio: (Girod, and Whittington, 2016)
- Dynamism measure/degree of causal ambiguity :(Girod, and Whittington, 2016)
- Degree of independence and degree of simultainity:(Zollo and Winter, 2002)
- Technical Fitness: (Teece, 2007; Helfat et al., 2007; Bingham et al., 2015; Martin 2011)
- Evolutionary Fitness: (Teece, 2007; Helfat et al., 2007; Bingham et al., 2015; Kor and Mesko, 2013; Martin 2011; Newey and Zahra, 2009; Teece, 2014)
- Strategic Fitness: (Tang et al., 2010)Strategic Flexibility:(Zahra and George, 2002; Barrales-Molina et al., 2012; Helfat et al., 2007; Shimizu and Hitt, 2004)
- Strategic, Structural and Operational Felxibility/Agility: (Barrales-Molina et al., 2012; Weber and Tarba, 2014)