Understanding Dynamic Capabilities: a Study on the Role of Agency

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Evidence suggests that many firms operate in increasingly dynamic environments where disruptive forces such as technological innovation, global competition, and entrepreneurship are more typical to emerge (Schreyögg and Sydow, 2010). In such environments firms need to be able to reinvent and transform their constituent resource base, routines, and capabilities to be able to remain aligned with or even ahead of their external environment. For this purpose firms develop dynamic capabilities which come into existence through structural arrangements or co-evolutionary processes (Nelson and Winter, 1982; Kogut and Zander, 1992; Teece et al., 1997) of cumulative and repetitive learning; i.e. dynamic capabilities are collective entities which drive organisational heterogeneity and performance over time (Felin and Foss, 2005; Salvato and Rerup, 2011). While a variety of definitions of dynamic capabilities have been suggested, in this paper I will use the definition proposed by Helfat et al. (2007: 3) who conceptualize a dynamic capability as “the capacity of an organization to purposefully create, extend or modify its resource base”. This definition is chosen because it considers the role of managers in the origin and development of dynamic capabilities; a central theme in this study.

Despite their valuable contributions to our understanding of competitive advantage in turbulent environments studies of dynamic capabilities remain subject to conceptual ambiguity. In essence, it is unlikely that concepts which imply repetition, continuity, locality, stability, and efficiency could adequately account for the existence of dynamic capabilities since volatile or turbulent contexts are (in contrast) strongly related to uncertainty, emergence, disruption, change, and flexibility. Sic, there is a need to include theories and explanations which elucidate how novel knowledge vis-a-vis knowledge from experience is generated as a requirement for the effective operation of dynamic capabilities (Pandza and Thorpe, 2009). More recently several studies have articulated a need for the introduction of managerial agency in the concept of dynamic capabilities (Adner and Helfat, 2003; Peteraf and Reed, 2007; Teece, 2007; Salvato, 2009; Eisenhardt et al., 2010) because this provides a promising route for building a better informed view on dynamic capabilities. Despite these attempts, individual action has remained a secondary role which is captured by the following quote from a study by Salvato (2009: p. 384) on the micro-foundations of dynamic capabilities: “Individual agents and their ordinary activities are placed in the background, and their role in effecting organizational advantage is largely disregarded.”

The preceding discussion suggests that in order to better explain dynamic capabilities, their co-evolution, and, intra- and inter-firm heterogeneity research needs to focus on individuals in organizations as the unit of analysis. More specifically, in this study it is argued that there is a relationship between patterns through which capabilities develop and the role of managerial agency. Essentially this is a strategy process study and hence the focus is not aimed at micro-foundations in the sense of constitutional relationships between capabilities and managers (e.g. capabilities are embedded in managers or their neural networks according to cognitive reductionist views) as there have hitherto been numerous studies which have adopted similar approaches (Tripsas and Gavetti, 2000; Gavetti, 2005; Salvato, 2009). Instead I aim to explore interdependencies between managerial action and the development of dynamic capabilities by looking at how managers or other organizational actors influence dynamic capabilities through mindful, intentional behavior in which their
agency intervenes between discoverable causes and empirically evident consequences (Spender, 2011).

In order to better understand the complex process through which dynamic capabilities develop and renew, a longitudinal, inductive, multiple case study of four technology companies is conducted. Data collection and analysis is guided by an overarching research question (Eisenhardt, 1989), namely: how does agency contribute to the operation and development of dynamic capabilities? This question is addressed by means of an analysis of interview data gathered through semi-structured interviews with informants from different hierarchical levels in these organizations involved in the technological innovation process as a specific dynamic capability (Helfat, 1997).

The remainder of this document is organized as follows: the next chapter elaborates on the theoretical framework of this study through a review of the literature on dynamic capabilities, and the role of agency in organizational analysis. Subsequently, in the third chapter the methodology is described. Furthermore, the findings of work in progress are presented and finally, the implications for the ManETEI project are articulated.

THEORETICAL FRAMEWORK

2.1 DYNAMIC CAPABILITIES
A useful starting point in this paragraph is the recognition that for the purpose of an effective analysis of dynamic capabilities, one needs investigate a) their nature (and constituents) and b) patterns through which they develop (Easterby-Smith et al., 2009). This section introduces these elements with subtle introductions of the role of agency in dynamic capabilities as a prelude for the next paragraph.

1) Nature of dynamic capabilities
Teece et al.’s (1997) landmark study paved the way to numerous attempts by researchers from different backgrounds using different theoretical perspectives to understand the nature of dynamic capabilities. Overarching similarities are that they are higher level capabilities that provide opportunities for knowledge collection and dissemination; ongoing updating of operational processes; interaction with the environment; and reflexivity of decision-making (Easterby-Smith et al., 2009).

The role of agency however seems undervalued in studies on the nature of dynamic capabilities (Felin and Foss, 2005). Admittedly, there have been recent studies focussing on individuals in the nature of dynamic capabilities, e.g. ordinary activities and experimentation and how these are purposefully recombined (Salvato, 2009) to adapt and renew dynamic capabilities; managerial dynamic capabilities to enable sensing and seizing the environment for the purpose of transforming dynamic capabilities (Teece, 2007; Augier and Teece 2009); and managers intentionally unbalancing the structure of their firms in favour of flexibility to remain dynamic in turbulent environment by higher-order thinking and expertise (Eisenhardt et al., 2010). However, these studies do not adequately explain or increase understanding of individual action because they do not focus on the agentic & social dimensions of managerial action in the processes that drive dynamic capabilities. In dealing with environmental change, managers have to cope with inconsistent behavioural expectations between different (groups of) individuals as regards how to dedicate available resources to respectively efficiency and
flexibility (Floyd and Lane, 2000; Eisenhardt et al., 2010) and hence social dynamics of action are important to include in an analysis of agency and dynamic capabilities.

2) Patterns
Traditionally, dynamic capabilities have been theorized as developing through patterns of organisational learning which is based on thoughts from evolutionary economics (Nelson and Winter, 1982; Winter, 2003). However, a salient feature in ex post research that has extended these foundational works is that there has been an increasing focus on the environment and decreasingly on organizations (Gavetti et al., 2007). In the late 1980s and 1990s, organizational learning, change, and adaptation became more central topics. Although these works share a common interest in the firm level of analysis, up until the early 2000s little attention had been given to the role of individuals in patterns through which (dynamic) capabilities develop.

The literature suggests that different forms of social action and interaction emerging from autonomous action or managerial agency influence patterns through which dynamic capabilities develop (Burgelman, 1996; Floyd and Lane, 2000). However, many characteristics of such deliberate engagement with capabilities are not fully addressed (Pandza, 2010). There have been studies that focus on the role of individuals (e.g. Gavetti, 2005; Teece, 2007; Salvato, 2009; Eisenhardt et al., 2010) by adopting a micro-foundations view on (dynamic) capabilities (Felín and Foss, 2005) but it is less clear how and why individuals influence capability development which relates to the social and behavioral strategies driving managerial social (inter)action that emerge from intra-firm diversity. Agency can emerge from both individual managers who are differentially positioned in a firm’s hierarchy or from groups of individuals such as departments and teams.

2.2 AGENCY
In this section different perspectives on the role of agency in strategic management (Garud et al., 2010) are summarized, namely:

a) The ‘path-dependence’ perspective: here, agents are ‘trapped’ by self-enforcing mechanisms driving a stochastic organisational evolution (Vergne and Durand, 2010). This perspective explains phenomena as ‘complex’ due to mutually communicating variables generating feedback loops and non-linear dynamics. These notions strongly corroborate concepts in dynamic capabilities theory such as uncertainty; Schumpeterian shocks; path dependency; and irreversibility. This view would be rather remote from studies stressing the role of managers in shaping phenomena.

b) The ‘embedded’ perspective: in this train of thought the central and only focus is individuals. Entrepreneurship and embedded agency are important concepts and this view accommodates a heroic conceptualisation of the role of managers in phenomena (McGrath and MacMillan, 2000). The drawback of this view is that it posits agents as motivated by ‘a logic of control’ to carry through complex processes (Garud, 2010). Dosi and Lovallo (1997) refer to agents in this perspective as ‘optimistic martyrs’ with an illusion of control.

c) The ‘distributed and emergent’ perspective: this third perspective conceptualises agency as distributed and emergent through the interactions of agents. An example of this view is found in research from Garud and Karnøe (2001) and Garud et al. (2010) who label this view as ‘path creation’. Furthermore, this perspective argues that in the path dependence
perspective actors are deprived of agency because they are deterministically moved from one state to another in an evolutionary path. Albeit uncertainty is an inevitable factor in the process of agents engaging with phenomena; agency is an emergent attribute found in different levels of hierarchy and functional locations in the firm. Fundamentally, agency is the capacity to do certain things and not others based on specific rationales, motivations, intentions, or purposes.

For the purpose of this study the third perspective is adopted because it allows an important role for managerial agency in organizational phenomena and in addition, it provides a theoretical conceptualization – and the possibility of consequent empirical investigation - of managerial agency and dynamic capabilities as two separate entities that interact with each other; hence managers engage with resources or capabilities (Penrose, 1959).

2.3 CONCEPTUAL FRAMEWORK
The preceding literature review offers an overview of patterns through which dynamic capabilities develop and the role of agency within this context. Moreover, it has been argued that patterns of autonomous and individual action; and social interaction are driven by social and behavioral strategies of individuals and groups which impact the development and operation of dynamic capabilities. These facets are depicted in the below framework.

![Figure 1: conceptual framework](image)

METHODOLOGY

In order to examine how organizational actors influence dynamic capabilities a multiple case study design (Eisenhardt, 1989) is adopted with inductive theory-building (Eisenhardt, 1989; Eisenhardt and Greabner, 2007) as the mode of inference.

The research question driving data collection is: how does agency contribute to the operation and development of dynamic capabilities? The research question is significant because existing research does not adequately address it (see previous section for arguments) and because there is no empirical account of this question. The inductive case study approach
is justified based on the potential of qualitative data to offer insight into complex social processes that quantitative data cannot easily elucidate (Greenwood and Suddaby, 2006). This study aims to extend dynamic capabilities theory by utilizing qualitative data to explicate the complex social processes inherent to the role of and interaction between individual and groups in organizations. To impose more empirical focus firms have been selected that accommodate a heterogeneity of processes regarding innovation capability as a specific type of dynamic capability (Helfat, 1997; Teece, 2009).

Field research takes place in four firms with interviews and observation having already started in two firms. These companies operate in hi-tech industries and have demonstrated superior performance over the last 10 years. One firm requested anonymity, so pseudo names are used for all four. Table 1 provides a summary of selected cases and methods of data collection.

#####INSERT TABLE I HERE####

In the process of inference from raw data to theoretical articulation I will first analyze each case individually. Each of the three cases stands on its own as an analytical unit and hence each is expected to generate specific theoretical categories and constructs. These categories will then be used to navigate through the cross-case analysis (Galunic and Eisenhardt, 2001).

**FINDINGS**

Findings presented here are based on data collected so far from two out of four companies, namely: Telco Limited And Life Corporation. So far 20 interviews have been conducted but the data used here is based on 9 interviews because data analysis is still ongoing.

**Telco Ltd.:** Telco Ltd. has got six patents worth of I.P. in Europe at the moment and more in the pipeline in both Europe and the United States. I.P. is a strategic resource and developing new technology from various sources is crucial to preserve Telco Ltd.’s competitive edge and hence this capability is at the core of its strategy and operations. The first steps in the innovation process; i.e. from identification of an idea or technological knowledge to an actual resource commitment into implementation are highly informal and seem to strongly rely on social interaction between individuals, groups within Telco Ltd. The CEO explained that there are technological knowledge gaps:

“We see massive gaps with what we have and what we need to have in knowledge.”

The CEO then mentioned different directions for addressing these gaps: hiring new staff with specific expertise; the acquisition of technology; dedicated business development activities; and the CEO’s network. He further explained that Telco Ltd. Digital is an open company where anyone can approach him with innovative ideas:

“There’s very little formal stuff. It’s who shouts loudest, who can make the case best.”
Regarding the acceptance of new technologies priority gets assigned in both a formal and informal way. A customer driven innovation gets absolute priority which was explicated by several interviewees. This suggests the role of power relationships (i.e. the power of customers) in the innovation process (Todorova and Durisin, 2007) and how these relationships shape the allocation of resources to different emerging technologies. The CTO also stated that in some instances new technologies embed high uncertainty and based on potential value, risks are still taken by accepting such projects:

“In some areas we need to take a leap of faith: like scheduling information systems: very expensive.”

Such uncertainty in new knowledge integration usually indicates social dynamics pertaining to e.g. legitimization and socialization mechanisms (O’Reilly et al., 1989; Pandza, 2010) and these elements emerged slightly when the CTO discussed some radical ideas being promoted for a while now in the organization but still not having enough momentum to be accepted and implemented.

Another interesting notion came from an interview with the Manager System Administration who stated that the identification of new technologies and its consequent communication within the firm seems to be the exclusive right for some individuals higher up in hierarchy, an idea which he strongly opposed. The question is whether this is an individual opinion or whether it is something experienced by an identifiable group, perhaps the team to which the interview belongs? Further investigation should clarify this.

**Nanotech:** Nanotech is a special type of unit within Life Corp. called Emerging Technology Area (ETA). An ETA is a unit that is will move into a Life Corp. Business Group at some point when the technology has matured. The director of Nanotech explained that in most cases emerging technologies are searched for using defined structures and processes, namely:

1) Internal R&D.
2) Technology scouts.
3) Patent scanning.
4) Interacting with academic and professional communities (e.g. attending the MRS Conference).
5) Exploring scientific literature.

He further described dynamics between Nanotech and the other ETA’s in the form of competitive social processes that emerge because of a shared pool of financial resources for all ETA’s. This implies technologies have to be pitched and top management has to be persuaded to prioritize.

“That means we have to compete against them. So when these guys come with “we want to do this” then yeah..., we have to compete against them. We have to fight for the share, and the fight is not always equally fair but that’s what it is.”

The director additionally stated that the approach to technological innovation is not purely based on economic logic. He repeatedly encountered inertia when suggesting different technological innovations which made him resort to deliberate courses of action to overcome
these hurdles. A business group director replied as follows to Nanotech.’s suggestion of moving into the advanced functional coatings market:

“No way, no way am I going to take this into my business group.”

The director explained that although the economic potential of a technology might be clear, it is not sufficient to lead to acceptance and implementation.

“This selecting of Emerging Technoly Areas, in part it’s done on business plans and opportunities but there also must be some belief. There must be personal belief in it.”

The director of Nanotech gave an example of one of his technological innovations in solar cell technology that was opposed by a few top managers because they believed Life Corp should not enter that industry. He responded by utilizing corporate strategy to demonstrate how his idea would increase margins and support Life Corp. to move more to downstream activities in its value chain; two cornerstones of the corporate strategy plan. Hence, the director used one of Life Corp.’s forms of structure – viz. corporate strategy – as an instrument to legitimise his idea; a social strategy that eventually worked because he received approval from the board to start a pilot project.

DISCUSSION AND CONCLUSION

From initial interviews at Telco Ltd. it became clear that autonomous action is crucial to the innovation process of Telco Ltd. for both the integration and development of new technologies close to the core business and for distant technologies which follow a more informal process involving individuals higher up in the hierarchy. New technologies that went through these processes have led to the development of Telco Ltd.’s capabilities transforming it from a WiFi technology provider to a network and systems integrator competing with the likes of Nokia-Siemens and Alcatel-Lucent. Finally, the social complexity associated with adopting new technologies suggests a pivotal role for agency and social interaction in the process of absorbing new technological knowledge. Some of the elements that became apparent within this context during the interviews are: pitching, issue selling, individual and collective cognitive frames, collective action, team dynamics, and autonomous action.

Nanotech. presents an interesting case within the context of this research project because it reveals themes and topics of interest such as: social complexity in Life Corp.’s innovation capability (Floyd and Lane, 2000); the important role of the director and other individuals as agents in the organization (Burgelman, 1994; Pandza and Thorpe, 2009; Eisenhardt et al., 2010; Salvato, 2009); the presence of competing frames and identities between units and individuals (Kaplan, 2008b; Pandza, 2010; Ravasi and Philips, 2011); and the importance of social strategies emphasized by Nanotech’s director (Dutton and Ashford, 1993; Pandza, 2010).
This research is related to research objective 1 of the project: “**Identify strategies and capabilities needed for different members of technology innovation systems to ensure they capture the full value from emergent technologies.**” Several work packages (WP) have been defined which have been assigned to different partners in the network. In this case, this relates to a combination of WP5 “Dynamic capabilities for emergent technology innovation” and WP6 “Entrepreneurial and managerial agency for technology innovation”. More specifically, this study elucidates the micro-sociological processes that play a role in the management of emerging technologies by focussing on intra-firm dynamics arising from heterogeneity between individuals and groups. It has been previously asserted that non-technical factors (i.e. social and behavioral) are a major influence in complex technological innovation characterized by uncertainty and rapid change. This study explores several established corporations in hi-tech industries and is expected to provide pieces of the puzzle of what it takes to be successful in high-velocity industries from a social perspective. The tension between continuing change and inertia in large, structured corporations is an interesting research arena and ultimately the researcher believes his study will help increase understanding of how organizations and their actors influence and are influenced by technological innovation; a pivotal theme in the ManETEI project and more broadly in management research.

**REFERENCES**


