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Knowledge-Intensive Entrepreneurship and Innovation in Low-tech

Industries: a Capabilities Perspective

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Abstract

Knowledge-Intensive Entrepreneurship (KIE) has been recently described as a special type of high potential entrepreneurship strongly connected to innovation (Malerba and McKelvey, 2010). KIE is related to the establishment of new ventures or the expansion of existing ones based on the dynamic creation and application of new knowledge. The debate on KIE has focused primarily on high-tech sectors and academic start-ups, while only lately attention has been drawn on low-tech industries. Existing literature has so far tried to explore several issues regarding the new KIE phenomenon such as concepts and models, main personal, firm and contextual characteristics and features, and issues on performance (e.g. Caloghirou et al., 2012). Regarding the capabilities perspective, there are less than a handful of studies mostly exploring the applicability of dynamic capabilities (DCs) in KIE and mainly high-tech cases.

Therefore, while the origins of high-tech KIE are located in the area of R&D achievements which are then commercialized, there is a major issue regarding the non-R&D related KIE of low-tech industries, not yet addressed by literature; this is how such ventures create initial competitive advantage in order to survive early death and prosper within mature ecosystems. While there is rich literature on entrepreneurial characteristics, skills and competencies, concrete approaches of a more structured capabilities? framework are rare to answer this fundamental question of the genesis of a venture (Zahra, 2011) not only in low-tech industries but in general as well. Furthermore, literature so far lacks adequate explanation of if and how entrepreneurial capabilities and skills are transformed into higher order capabilities.

Attempting to ?decode? the way KI entrepreneurs/teams create novel knowledge-intensive business concepts which create sustainable ventures, we hypothesized that a) KIE in low-tech sectors is related to specific dynamic entrepreneurial capabilities (DECs) which can lead to the creation of initial competitive advantage in order to enter mature business ecosystems and b) DECs can constitute the entrepreneurial side of dynamic capabilities. We contacted thirty information-rich KIE case studies covering different kinds of firms of three low-tech sectors in Greece, which we studied in depth from creation up to 2012.

The research reveals that low-tech KIE processes may be analyzed in terms of specific closely interrelated DECs (called autotelic capabilities) which are found to be operationalized through a set of three dimensions and namely, bricolage, improvisational and transcendental capabilities. Based on the case studies? analysis we provide a concrete conceptual

framework of DEC's and their measures, which endeavors to analyze the sources of low-tech but knowledge-intensive successful venturing and partly explain the genesis of these ventures? dynamic capabilities in sustaining competitive advantage. According to results, new knowledge-intensive low-tech ventures which own and develop DEC's are more likely to innovate, survive and grow. Furthermore, DEC's can constitute the entrepreneurial side of DC's, since certain sub-dimensions are found to be precursors of DC's? micro-foundations.

The DEC's view advances our knowledge on KIE in low-tech industries (shifting focus to this rather neglected research topic); on new venture creation under the scope of entrepreneurial management and an entrepreneurial capabilities view; on the entrepreneurship literature in general, since it applies to both nascent and corporate entrepreneurship, and; on the origins and the entrepreneurial aspect of dynamic capabilities (under the low-tech limitations), their existence at the outset of the ventures, as well as their applicability on more stable environments.

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Knowledge-Intensive Entrepreneurship and Innovation in Low-tech Industries: a Capabilities Perspective

Glykeria Karagouni

Introduction

Knowledge-Intensive Entrepreneurship (KIE) has been recently described as a special type of high potential entrepreneurship strongly connected to innovation (Malerba and McKelvey, 2010). KIE is related to the establishment of new ventures or the expansion of existing ones, based on the dynamic creation and application of new knowledge. The debate on KIE has focused primarily on high-tech sectors and academic start-ups, while only lately attention has been drawn on low-tech (LT) industries. Existing literature has so far tried to explore several issues regarding the KIE phenomenon (Caloghirou et al., 2012). However, new firm formation remained a rather under-researched topic not only within KIE, but the entrepreneurship literature in general (Newbert, 2005). This is especially true regarding low-tech industries, which do not usually enjoy the privilege of radical R&D-based innovation. This study responds to calls for research in this direction by investigating the LT-KI venture creation as well as possible links to its success and future competitiveness. For this purpose, a capabilities' perspective is developed which endeavors to analyze the sources of low-tech but knowledge-intensive successful venturing. It is further linked to the dynamic capabilities view, exploring potential ecologies between the novel KI entrepreneurial capabilities, DCs and long-term survival and growth.

The study's contribution to the literature is threefold. It mainly advances our knowledge on the KIE phenomenon, shifting focus to the rather neglected area of low-tech industries. It adds to the entrepreneurship literature and more precisely in the area of entrepreneurial capabilities and new venture creation applying to both nascent and corporate entrepreneurship. To our knowledge no other framework purports to offer a comprehensive empirical research-based perspective on key entrepreneurial challenges or to operationalize entrepreneurial capabilities. The study further reveals the impact of such capabilities to growth and innovation performances. It also throws some light on the origins of DCs and the debate on their existence at the outset of new

firms, confirming, in parallel, their applicability in low-tech industries or otherwise areas of less environmental dynamism.

The remainder of the paper is organized as follows: The subsequent section presents the theoretical background. The third section details the research question and the main hypotheses. The fourth section describes the research methodology; the fifth section presents and discusses the findings, while the last one discusses theoretical and managerial implications, study limitations and conclusion.

Theoretical background

Knowledge-intensive entrepreneurship in low-tech industries

Knowledge-Intensive Entrepreneurship appeared in literature mainly with the dawn of the new millennium; the term was used interchangeably with that of Knowledge-based entrepreneurship and no further specific definition (Madsen, et al., 2003). KIE regarded mainly technology or science-based entrepreneurship with high R&D intensity in high-tech sectors. A precise definition of KIE was given by Malerba and McKelvey (2010), developed in a very large EU-funded research project¹. In this context KIE is associated with four basic characteristics and namely it concerns

- new firms;
- that are innovative;
- engaging in knowledge-intensive activities,
- not found solely in high-tech industries i.e. they may well be active in industries with medium or low-tech characteristics.

According to this definition, KIE is a mechanism mediating between the creation of knowledge, innovation and its transformation into economic activity (Caloghirou, et. al, 2013), regards only new firms of diverse sectors and aims market success. KIE ventures are responses to innovative opportunities, which can emerge from knowledge in the form of new technology, new markets or new ways of resource exploitation.

Efforts to conceptualize the KIE phenomenon have so far concentrated on linkages between KIE, innovation, growth and societal well-being (Malerba and McKelvey, 2010), key-decision points and processes (McKelvey and Lassen, 2013) and the interdependencies between the level of trans-sectoral knowledge and company-

¹ Advancing Knowledge-Intensive Entrepreneurship and Innovation for Economic Growth and Social Well-being in Europe (AEGIS), 7th Framework Programme.

specific capabilities regarding only low-tech industries (Hirsch-Kreinsen and Schwinge, 2011).

This effort of Hirsch-Kreinsen and Schwinge (2011) was perhaps the first to shift focus on low-tech industries. Actually, investments in knowledge and innovation by traditional industries have only lately attracted the interest of researchers with a clear orientation to process innovation (e.g. Robertson and Smith, 2008). Little attention has been paid so far to sectors that conduct no or very limited formal R&D activities, usually settling for incremental innovation and thus typically characterised as “non-research intensive”, “low-tech”², “mature” and “traditional”.

Low-tech sectors and firms seem unable to easily produce extreme novelties, since their technological knowledge and capabilities are trapped in well-established technological trajectories (Hirsch-Kreinsen and Schwinge, 2011). Low-tech markets are generally assumed to be mature, slow-growing and subject to overcapacity and high levels of price competition forcing firms to focus on technology upgrading and process improvements rather than innovative prospects (Protogerou, et al., 2013).

Nevertheless, besides the severe economic downturn mainly on traditional industries due to the recent global economic recession, LMT sectors continue to be of importance, enjoying a share of 53% of total manufacturing for the EU-27 in 2010. The respective share of high-tech sectors accounted for only about 12% (Jaegers et al., 2013). However, the impact of this global crisis on low-tech industries made quite clear that, besides the established perceptions, mature industries have to compete within a very vulnerable and volatile environment. Furthermore, globalization and trade liberalization, increasing social pressures, and the transformation of the technology base of mature industries intensify even further the environmental instability and turbulence of their business ecosystems (Protogerou, et al., 2013).

Therefore, even if thought of as “exceptional” before, knowledge-intensive activities within the low-tech business have become quite necessary today, both in terms of challenging the markets by promising competitive edges, and as solutions to existing and arising problems. Exploring LT-KIE, Hirsch-Kreinsen and Schwinge (2011)

² Sectors with an R&D intensity >5% are characterized as “high-tech”, 3%-0.9% as “medium-tech” and <0.9% as “low-tech” (OECD, 2002). Food, paper, textiles, clothing, furniture, plastics and metal products are registered as low-tech sectors.

include corporate venturing besides new firm foundation and claim that the ability of transcending the sectoral context is crucial for KIE in traditional industries. Knowledge generation in low-tech companies regards practical and scientific knowledge combinations, linked to knowledge beyond internal sources and thus derived from organizations, institutions and stakeholders of relevant or non-relevant sectors. As levels of R&D are very low in much of the low-tech economy, the use of distributed knowledge is the main source of new ideas and techniques.

Knowledge-intensive venture creation has been explored through concepts and models, personal, firm and contextual characteristics and features, and performance issues (Caloghirou et al., 2012). Hirsch-Kreinsen and Schwinge (2011) related the development of LT-KIE to company-specific capabilities for innovation. Furthermore, LT-KIE has been marginally connected to the DCs notion, while there was very limited empirical evidence on their role in newly-established LT-KI firms (Protogerou and Karagouni, 2012; Protogerou et al., 2013). To our knowledge, so far, there has been no comprehensive capability perspective on LT-KIE and innovation.

Research question and hypotheses

As mentioned above, KIE has been mainly connected with high-tech sectors and the transfer of scientific knowledge from lab to production, treating venturing as an important link between technology-oriented knowledge and economic growth. Yet, the so-called ‘high-potential entrepreneurship’ (Autio, 2003) is also found in traditional low-tech industries, holding the premier role when knowledge is primarily engaged. Therefore, while the origins of high-tech KI venturing are located in the area of R&D achievements which are then commercialized, there is a major issue regarding the non-R&D related KIE development in low-tech industries, not yet addressed by literature:

How can low-tech but knowledge-intensive ventures survive early death and prosper within mature ecosystems?

Therefore, the purpose of the research was to focus on crucial dimensions of knowledge-based innovation benefits and new venture survival (Zahra et al., 2006) within low-tech industries. This practically refers to the capacities of the

entrepreneurs/teams to create novel knowledge-intensive business concepts by identifying, combining and reconfiguring knowledge assets and other resources successfully. According to strategic literature this is a capabilities' matter. Furthermore, limited research on KIE in low-tech industries indicates certain connections of KIE processes to capabilities of a firm or an individual entrepreneur; "A bundle of firm-specific capabilities is a crucial precondition for this (i.e. low-tech KIE)" (Hirsch-Kreinsen and Schwinge, 2011).

Regarding successful creation of resource bases, a broader view of relevant literature indicates two areas: entrepreneurial and dynamic capabilities (Arthurs and Busenitz, 2006; Helfat et al., 2007 respectively). Actually, entrepreneurial capabilities (ECs) have been developed to explain the resources and skills required for effective entrepreneurial opportunity discovery and exploitation, and new firm creation (Steffens and Burgers, 2009) or corporate venturing (Wright and Marlow, 2011). On the other hand, the DCs framework investigates how firms go about to match their resource bases with opportunities in the marketplace (Boccardelli and Magnusson, 2006). Limited but gradually increasing research regarding newly-founded firms indicates that they need DCs in order to survive, grow and innovate (Protogerou and Karagouni, 2012).

In particular, the Dynamic Capabilities approach is a widely acknowledged framework which attracted a great deal of interest (Teece et al., 1997; Teece, 2007; Helfat et al., 2007; Protogerou et al., 2012). DCs have been defined as the "capacity of an organization to purposefully create, extend or modify its resource base" in order to survive and prosper under conditions of change (Helfat et al., 2007). The framework has been mainly focused on large-sized firms operating in high-tech sectors (Teece, 2007) ignoring the huge importance of low-tech industries. That is even more evident in cases of new LT-KI firms with no more of a handful relevant research works. However, a very small stream of empirical research has been slowly emerging, trying to capture the DCs impact in low and medium-tech sectors (Protogerou and Karagouni, 2012).

Furthermore, regardless the technology level, there is a quite new but increasing debate on whether DCs exist, assist or are absent during venture creation, while the relation between dynamic and entrepreneurial capabilities is far from clear; Arthurs and Busenitz (2006) draw a clear distinguishing line between entrepreneurial and

dynamic capabilities. Helfat and Peteraf (2003) argued that an organization in the founding stage cannot have any DCs, to admit some years later that “Creating, adapting to and exploiting change is inherently entrepreneurial” (Helfat et al., 2007). Yet, there are certain indications of potential relationships among the two categories of capabilities. Several scholars try to highlight entrepreneurial capabilities as new categories of DCs (Teece, 2012) or entrepreneurial elements of DCs (Zahra, 2011). Boccardeli et al. (2006) suggest single entrepreneurs/entrepreneurial teams as sources of DCs at the early stages of firm development; early DCs take the form of trial-and-error efforts instead of routines. Teece (2010) called for studying ‘entrepreneurial management’ to understand how sensing and seizing opportunities arise.

Accordingly, building on this specific stream of literature, we expect that the “bundle of firm-specific capabilities” which is “a crucial precondition for low-tech KIE” (Hirsch-Kreinsen and Schwinge, 2011) regards specific dynamic entrepreneurial capabilities (DECs). Treating knowledge as core-resource bases for LT-KIE, DECs may refer to ways of collecting and establishing knowledge assets and asset combinations in order to realize novel business ideas, together with the identification and reconfiguration of multiple other kinds of resources, transcending sectoral, low-tech borders.

A growing stream of empirical studies highlights the impact of entrepreneurial activities on creation, survival, growth and performance (Newbert, 2005; Grande, 2011) while a considerable amount of literature argues on DCs impact on new-venture performance and innovation (Tsekouras et al., 2011). Accordingly, we expect DECs to be related to successful venturing in low-tech but knowledge-intensive cases, where success is described in terms of survival, new venture growth and innovative performance.

Therefore,

Hypothesis 1: KIE in low-tech sectors can be related to specific dynamic entrepreneurial capabilities (DECs)

Hypothesis 2: DECs have a positive impact on new LT-KI ventures

Hypothesis 2.1: New knowledge-intensive low-tech ventures with DECs are more likely to survive and grow

2.1.a: Strong DECs have a positive impact on survival and growth

2.1.b: Weak DEC's have a negative impact on survival and growth

Hypothesis 2.2: New knowledge-intensive low-tech ventures with DEC's are more likely to innovate.

2.2.a: Strong DEC's have a positive impact on innovative performance

2.2.b: Weak DEC's have a negative impact on innovative performance

Hypothesis 3: DEC's can constitute the entrepreneurial side of dynamic capabilities in cases of low-tech KIE

The term “dynamic entrepreneurial capabilities” has been so far used in some papers in a rather indifferent way (e.g. Chirico and Nordqvist, 2010). Lanza and Passarelli (2013) view DEC's as peculiar higher-order capabilities in small business settings, which enable product innovation and technological change. However, they do not describe or operationalize their DEC's. Corner and Wu (2012) try to define DEC's considering venture creation as a number of phases but within a high-tech context. Both efforts - developed in parallel with the present research - are based on limited empirical research (one case study) and reflect very specific cases. Furthermore, in both works, DEC's lack precise definitions and measures. However, they are to our knowledge, the very first efforts to connect entrepreneurial to dynamic capabilities and explain their genesis and impact on venturing.

Methodology

A multiple exploratory case study research design was selected (Yin, 2003) as the most appropriate tool for capturing how knowledge-intensive new ventures are likely to function in low-tech, mature industries, survive and grow by using multiple trans-sectoral knowledge assets and other resources and building novel knowledge and capabilities. As observed by scholars committed to theory development through case studies (Eisenhardt 1989), case studies, when properly designed, are helpful for theory-building purposes since they provide a strong potential for a certain thickness of description.

The final sample consists of 30 case studies (Table 1) of three low-tech sectors, namely food and beverages (F&B), textiles and clothing (T&C), and wood and

furniture (W&F) in the Greek context. All three industries occupy a prominent position in the European and Greek manufacturing sector³. They have undergone significant changes with each sector following a different evolutionary path with important implications to their responses in recent changing environmental conditions.

The firms selected covered the Greek mainland. They were new companies established between 1998-2007, reckoned among the most innovative companies in their market following the definition for knowledge-intensive entrepreneurial ventures provided by Malerba and McKelvey (2010). The age of the ventures averages about 8.5 years (5 to 12 years).

The data gathering took place in face-to-face, in-depth interviews using a semi-structured questionnaire. The individual low-tech company was the unit of analysis. Longitudinal data were obtained and analyzed in depth and extensively. They regarded the exploration of the founding period of the venture, life-span performance, sources of competitive advantage and indicators of innovativeness up-to-the-time of the interview. Additional sources of information were used to complement the interview data such as plant visits, company reports, awards and company websites. The case studies were carried out in Greece during the 2009-2011 period.

It is important to note that capabilities were not the initial target of the present research. Aiming at exploring mechanisms and processes of KIE in low-tech industries, there were almost no questions directly on dynamic, entrepreneurial capabilities or capabilities in general. However, the in-depth interviews and the following reviews of transcripts revealed a wealth of data on patterns which appeared to strongly influence venture creation, while some of them related to certain capabilities attitudes. Furthermore interviewees talking about the firms' life-course revealed a variety of processes and routines which could be assigned as dynamic capabilities. While these data were ancillary to the primary research question they proved central to the focus on capability development in KI-LT ventures. Furthermore, there was no framework provided to the interviewees with which to evaluate and interpret their answers. Therefore, due to these two reasons, the

³ Information was based on interviews with sectoral experts, national and EU reports and other internet sources.

possibility of retrospective bias by informants was evidently minimized. On the other hand, the repetitive nature of certain data revealed similar patterns with different however tendencies regarding individual ventures and groups (e.g. different industries) providing a fruitful area for theory-building. Through multiple iterations between the developing theoretical framework and the data, a large number of themes and apparent patterns were first generated. These were subjects to stringent scrutiny, to challenge the level of support to be found in the data.

Findings

The analysis of the qualitative data indicated that low-tech KIE processes could be analyzed in “terms of capabilities for orchestrating and mobilizing knowledge and other resources” (Hirsch-Kreinsen and Schwinge, 2011). Actually across all thirty case studies, findings pointed to a rich fabric of processes and competencies, many of which matched descriptions of bricolage and improvisation, while others formed the introduced concept of “transcendental capability”. The following sections depict these capabilities in detail, illuminating the ‘how’ of LT-KI new venture creation.

Nature and Dimensions of DECs

Bricolage Capability

In all cases the capability to transform and absorb external knowledge proved to be of utmost importance. This presupposed the ability to discern and appreciate the value on loosely pieces of information, knowledge and technology, novel or not, dispersed in several industrial sectors. This is in line with KIE literature; knowledge-base expansion regarding trans-sectoral knowledge about technological, market and institutional opportunities seems to be a condition sine qua non for low-tech KIE (Hirsch-Kreinsen and Schwinge, 2011) while “distributed knowledge bases” are significant for low-tech innovativeness (Robertson and Smith, 2008). Firms and individual entrepreneurs cannot rest on their specific sectoral knowledge; instead they have to create and nourish linkages with actors out of the sector and out of their nation as well.

In this perspective, resource constraints regarded mainly knowledge issues besides the rather normal shortage of basic resources (e.g. finance) a new venture confronts.

Most times in order to create novel ideas, agents had to “tap distributed competence and knowledge, reemploy, reframe them, and recombine them creatively” (Bender, 2004). This capability to “...create new forms with current resources” has been defined as ‘bricolage’ (Lévi-Strauss, 1967). Bricolage capability has been treated as a form of inter-organisational dynamics (Garud and Karnøe, 2003) enclosing a conscious refusal to limitations defined by knowledge, institutional or cultural settings (Baker and Nelson, 2005).

Knowledge-intensive entrepreneurs of the research developed indeed bricolage capabilities in order to successfully sense and capture both tacit and explicit knowledge and distributed competence. This could be scientific, technological, technical or practical knowledge, design competence, or expertise; it referred to codified or knowledge incorporated in humans and/or technical artifacts. Based on the case-study analysis, we formed two bricolage dimensions with their sub-dimensions:

Concentric Cycle Networking (CCN): Across our case studies, founders engaged in bricolage with regard to knowledge providers, suppliers, customers and consultants in equally formal or informal ways. Actually, the co-operation with both machine and raw material suppliers seems to be more significant in the W&F sector, while the co-operation with customers or potential customers and even competitors in textiles and clothing. On the other hand, F&B seems to be more active in collaborations with research institutes, universities or specialized consultants. In all three industries there are cases where collaborations extended to areas well outside the sector and the market of these companies (e.g. WC10, FC5, TC2).

Across all cases, actors suggested that they started with familiar, pre-existing networks such as friends (e.g. FC10), former business contacts (e.g. WC1) and family (WC8) (initial network pool). However, they soon extended networking within or out of sectoral borders. This development seems to be of a concentric cyclic way; starting of close personal and business networks actors try to be embedded in broader contact networks towards multiple directions. As the young founder of FC9, a rapidly expanding innovative exports F&B company, put it

“you cannot have all necessary knowledge. You need knowledge and technical support by many areas and sectors, mostly in the beginning but that goes for ever... We didn’t have the necessary networks in

the beginning – they were not in our close networking if I may say so... Now we have created extensive networks with co-operations with Universities and relevant research institutes”.

Due to its way of functioning and based on “Network Bricolage” of Baker et al., (2003) this dimension was named Concentric Cycle Networking (CCN).

“Repertoire building”: While CCN denotes the ways actors find and exploit resources this second bricolage dimension concerns the ability to collect tangible and intangible resources. The notion of ‘repertoire’ is at the center of Lévi-Strauss’s (1967) idea of bricolage. However, relevant literature regarded bricolage as a problem-solving situation relating repertoire to defined problems and thus with a more or less expected output and temporal finality. The present research treats bricolage capability more as problem-making than problem-solving, reflecting a relevant stream of literature which regards the “innovative process of bricolage” (Campbell, 1997). Entrepreneurs seem to create problems posing questions on several issues such as standards (WC6), new needs (FC7), novel methods (FC2) and models (TC9), and thus challenging the existing ecosystems.

In order to address the new challenges, actors seemed to develop an ability to identify and deploy sometimes unconventional means “at hand” counting different uses of available resources (in line with Ciborra, 1996; Garud & Karnoe, 2003 among others) such as existing processes (e.g. WC3, FC5), physical resources (e.g. FC2, WC7) technical assets (e.g. WC1) and social and human capital (e.g. FC5). Across all cases there were certain stories told on overcoming key-resource disadvantages such as the case of WC1 where there were significant limitations of both financial capital and available technology or where new applications of existing technology led to novel methods and concepts such as the boxing concept of WC3. This dimension has been defined as Creative Resource Recombination according to relevant references of Baker and Nelson (2005) and Baker et al., (2003).

The cases indicated that all business concepts were around more or less radical knowledge-based innovations which acquired multifaceted knowledge. To collect it, actors pointed to synergies and certain processes of interactive learning, transcending sectoral limits. Learning would come from any piece of the value chain including advice from suppliers, feedback from customers or market information. In cases of corporate venturing, the established learning culture played a significant role in the

creative recombination of new knowledge as well as the avoidance of failure due to persistence to existing routines and strategies (e.g. WC9, FC6).

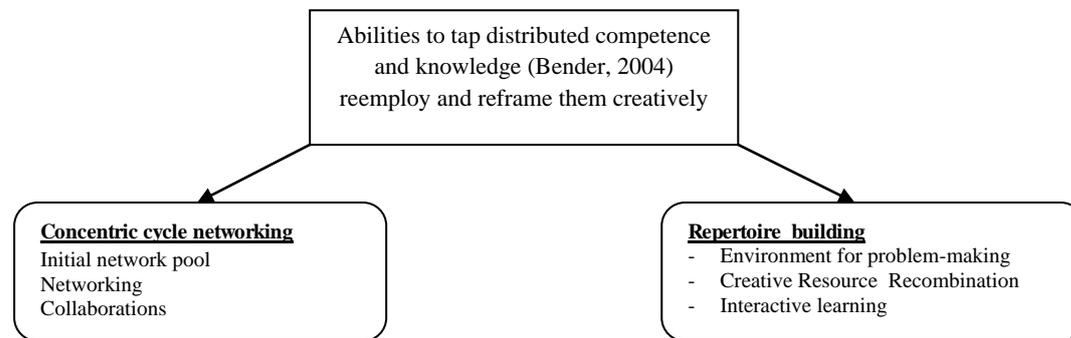


Figure 1: Bricolage capability

Improvisational Capability

Ciborra (2002) suggests that ‘people improvise when they are overwhelmed by the world, and thus, are forced to read the world in a different way’. Low-tech firms are actually forced to read markets and systems in different ways, since today neither cost-leadership nor quality alone can assure safe entrances to newcomers.

Quite astonishingly none of the cases seemed to follow the “design-plan-execute” linear model. On the contrary, it was quite evident that design and execution converged substantively. Yet, this is the actual definition of improvisation (e.g. Baker et al., 2003). “We presented our innovative products in ANUGA⁴ and orders started. Though, we actually did not know how to reach mass production” (FC9). Literally, founders “seem[ed] to plunge into the start-up process, designing the firm as they create[d] it” (Baker et al., 2003). Improvisation has been related to resources and entrepreneurship by many authors (e.g. Miner et al., 2001; Hmieleski and Corbett, 2008). Some authors have considered improvisation as a dynamic capability (Cunha et al., 2007) especially in early-phase entrepreneurship (Boccardelli and Magnusson, 2006) which is usually associated with high uncertainty and high competitive environments.

Real-time Information: According to narrations the initial concept had to be many times reconsidered and reshaped due to several reasons such as arising technical

⁴ International trade show

problems (e.g. WC1), inspiration of the moment (WC2), unexpected laboratory results (FC9), events or reactions (TC2, FC5) and new information (FC8, TC9). Real-time information, formal or informal, internal or external, generalized and vague, or very precise and unique, seems to constitute an important dimension of the improvisational capability. In many cases the use of real-time information was achieved by even engaging customers in testing new products (WC5) and methods (TC3). In all cases its performance depended on the level of the communication fluidness among stakeholders, as well as speed and ways of interacting, responding to changes, indications or new problems (WCI, WC3, FC6) and thus the real-time interaction (Orlikowski, 1997, Miner et al., 2001). However, in order to reap the benefits of real-time information, flexibility proved to play a significant role. This dimension implied the spontaneous response to arising circumstances and obstacles, allowing exceptions to rules.

Provocative organizational competencies: The study of the transcripts revealed a wealth of patterns resembling competencies as described in the literature of improvisation; besides new-to-the world firms the absence of adequate routines and the low procedural memory (Cuhna et al., 1999) was also observed in corporate cases in the form of intensive “isolation” of the new venture from the existing routines (e.g. WC9, TC9). Weak cases were connected to efforts following existing routines and acting according to established memory and path-dependencies (TC4). Such competencies seemed to be strongly related to the existence of minimal structures (Camoche and Cuhna, 2001). These were described as small entrepreneurial teams (never more than four partners) with high levels of trust and specific communication codes among them for new ventures, and deliberate formation of small executive teams to act within decentralized organizational structures for corporate cases.

In the same vein, the cases imply an extemporaneous or spontaneous character of the actions (Vera and Crossan, 2005; Hmieleski and Corbett 2008). Entrepreneurs turned out to be more responsive to situations on the spur of the moment; a phone call of a stranger led to the concept of gluten-free products (FC5). This spontaneity reaction is usually followed by new ideas and approaches, new applications of existing technologies, novel long-term vision and of course the relevant risk taking; this is however the definition of creativity (Amabile, 1996) incorporating a time direction (Vera and Crossan, 2005).

The research revealed also that the improvisational capabilities enabled exploring, *continuous experimenting, tinkering with possibilities without knowing where one's queries will lead or how action will unfold* (Barrett, 1998).

“Once we had decided the core materials, we would try on many possible combinations in laboratory. We were not sure about the final results and even when we presented some of them at the international trade show, we did not know how we would produce them. We were in Hamburg⁵ and still the laboratory was experimenting.” (FC1).

Experimental culture, thus the ability to explore, experiment and learn appears in all efforts. Especially try-and-error is very popular in all thirty cases and in low-tech industries in general. “In-house try-and-error is usually more efficient than trying to reach more advanced second-hand experiences” (CEO, FC6). Entrepreneurs in most cases were constantly reforming the initial business idea in pursuit of more novelty and differentiation without hesitating to change plans according to the inspiration of the moment or the new information accidentally met.

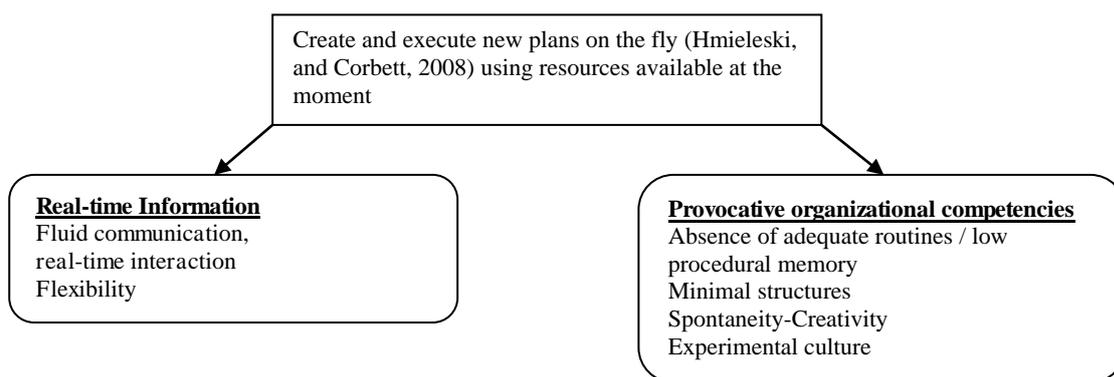


Figure 2: Improvisational capability

Transcendental Capability

“The best way to predict the future is to create it”. The famous quote of Peter Drucker is more popular than ever; in today’s competitive environment new ventures can survive and grow only if they manage to challenge existing business ecosystems or create new ones. This holds especially true for low-tech firms with well-established technologies and highly standardized processes, which share to a greater or lesser extent markets on mature products (Hirsch-Kreinsen and Schwinge, 2011). Therefore, LT-KI actors need to construct novel knowledge-based concepts that permit consumers to amass a great number of concepts allowing them to interpret their needs

⁵ At the international trade-show

in different ways. Actors of all cases challenged the very nature of their low-tech industries and their strong path-dependencies. FC6's CEO, known for his new firm's strong innovative image, specifies this in a very clear way:

“while no-one would argue that rice is really rice, knowledge-intensive innovative concepts can argue about nutritional exception, novel mixtures, waste and by-products genius exploitation, eco-innovation or whatever. Of course, all these presuppose knowledge, scientific involvement and experimentation. Still, ideas are a priori; nothing exists before you imagine and invent them!”

In general, there is a common acceptance that entrepreneurs own the ability to see behind symptomatic solutions (Senge, 1990) and come up with an innovative opportunity, beyond the simplistic combination of pieces of knowledge. In the attempt to “decode” the way KI-LT entrepreneurs/teams created novel knowledge-intensive business concepts and outline “principles that underlie and guide choices of the entrepreneurial acts” (Teece, 2012) we formed the notion of Transcendental Capability inspired by Kant's Critique of Pure Reason⁶. Senge et al. (2005) theorizing on the learning organization relate transcendental to the ability of “building the present on our future”. The term, differently approached, has been used in systems intelligent leadership (Hämäläinen and Saarinen, 2007) and the theory of leadership (e.g. Sanders et al., 2003).

Therefore, we assume transcendental capabilities (TCs) as the key drivers of shaping unorthodox ideas and orchestrating the other two DEC's to realize these ideas. Entrepreneurs form by anticipation genuine concepts based on cognitive capabilities derived from TCs, which determine the origins, the extent, and the objective validity of knowledge, facilitating a path carving within the KI “beginner's” chaos. Such an enactment of mechanisms needed to allow unexplored knowledge paths and produce innovative business ideas constitutes the specific difference between KIE and plain entrepreneurship. The fruits of TCs seem to be able to permit a newcomer be accepted in an already established and seemingly saturated market environment, entice customers, deliver value to them and persuade them to pay for value.

⁶ “I entitle transcendental all knowledge which is occupied not so much with objects as with the mode of our knowledge of objects in so far as this mode of knowledge is to be possible a priori.” (Kant, 1781)

Transcendental conditions: Cross-case analysis revealed the existence of a constant sensation of where the agents were and where they wanted to go; the stronger the cases, the more challenging the novelty entrepreneurs were seeking for. It seemed that actors could envisage conditions of business possibilities. This was named sense of spaciousness⁷ actually describing the conscious excess of the limited ‘known’ because of the existence of the unlimited ‘unknown’ which stimulates forward-looking thinking, creates opportunities and shapes visions. In this way, markets generate opportunities and not limitations.

The width and the quality of resources required, sources to seek, mismatches and combinations to make are defined by spaciousness. Among the major weaknesses of WC5 and FC2 was the limited cognition of space. Both interviewees exposed their impotence to widen ranges and scopes; lack of scientific knowledge, reluctance to get out of national borders or pay for further research were some of the weak points mentioned. On the contrary, the majority of the entrepreneurs would see entrepreneurial space (without existing entrepreneurial activities) (FC1’s CEO).

Still, the ability to realize intra-industry space in saturated markets seems to be strongly dependant on the ability to view global markets in a panoramic way being in the position to estimate value chains, intra- and inter-sectoral industry potential. According to Scharmer (2009) “ecosystem awareness” denotes the ability to perceive a problem from all of the perspectives in a given social-ecological system, internalizing the concerns and issues of the other players.

Entrepreneurs of the cases questioned or purposefully developed such panoramic ecosystem awareness (PEA) before idea-building. Most of them admitted long periods of intentional time-and-money consuming search and questioning, to gain such PEA. “As a client I visited all relevant plants of the planet! I needed to know everything. It took me about a decade to realize my vision” (WC2). In line with literature, PEA seemed to be related to being raised in an entrepreneurial milieu, prior knowledge and vicarious learning, strong networks and previous experiences, and successes (e.g. Aviram, 2010).

⁷ Inspired by Kant (1781) : “...one might very well imagine that there should be space without objects to fill it. Space is therefore regarded as a condition of the possibility of phenomena, not as a determination produced by them”.

Transcendental synthesis: PEA and spaciousness constitute the transcendental conditions necessary to actors to identify areas of interest. However, the cases indicated that at least in low-tech ventures the act of unifying and combining the manifold information into one idea, forming knowledge-intensive innovative business concepts is not that simple. It entails bottom-up and up-down information and knowledge-processing capabilities (called receptivity), depending on the cognitive properties and perceptions of the agents, their knowledge on ways to locate, retrieve and store data, their mechanisms to process them as valuable knowledge sources and match them with relevant resources in order to prepare the manifold. Then it lies on the capacity of turning this manifold in conjunction with opportunities and initial visions into specific business concepts (spontaneity of concepts).

In most cases entrepreneurs claimed that during this idea-forming period they plunged into a plethora of alternative options as potential candidates for development, within conditions of time pressure together with ambiguity and uncertainty. Narrations made evident the existence of judgmental decisions on issues such as scarce resources (WC3), expectations (WC1) and choices (TC4). Usually, applied rules reflect directly the internal structures of the entrepreneur’s environment or the organization. However, in many cases decision errors, as hyper-optimism and strategic disorientation were mentioned as keen to jeopardize the core business concept formation (WC5, WC7). The entrepreneurial judgment concept has long received attention in the entrepreneurship literature (e.g. Knight, 1921; Foss and Klein, 2004).

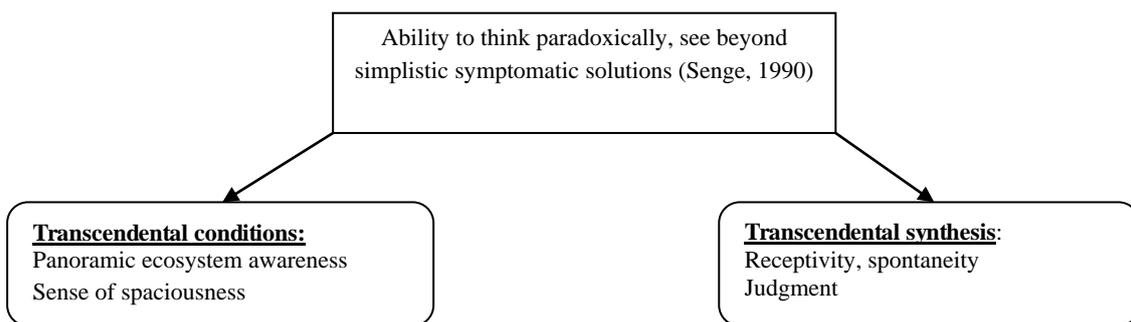


Figure 3: The Transcendental Capability

We called the dimension transcendental synthesis (TS) since its outcome, i.e. the formed idea, entails knowledge which is both synthetic and a priori (i.e. independent of all particular experiences). TS can be productive or reproductive, that is either

exhibiting and producing an original concept prior to experience (*exhibitio originaria*) (FC5, FC9) referring to radical innovations, or producing it on a derivative way by bringing back an empirical intuitive business idea (*exhibitio derivata*) and then we refer to adaptive or relevant types of innovation (TC6, FC7, WC10).

Transcendental capabilities in the examined cases seem to define the depth, the impact and the degree of novelty of knowledge-intensive business concepts; that is the positioning of the new venture within the existing or the newly created business ecosystem and the new venture's dynamism. Although bricolage capability allows for the hunt of knowledge and improvisational capability for the convergence of design and execution, it is TC that rules and curves the directions towards novelty and knowledge seeking, indicating solutions to limitation refusals.

An indicative example is the case of FC5: due to their significant PEA because of former entrepreneurial experience, the actors had developed a high-level sense of spaciousness. Collecting multi-directional information (e.g. product ideas by a celiac-disease patient, bio-functional food niche markets and science through social /academic networks, etc), a wider problem on dietary requests was set regarding science-based wheat-flour products (receptivity). Information and multifaceted knowledge was ere long transformed into the basic novel concept (spontaneity). Engaging bricolage and improvisation, designing the firm as they created it, FC5 became a highly innovative, fast growing company with worldwide patented products, strong co-operations with University Departments and a science-based spin-off, and opened new niche markets addressing special target groups such as cancer patients and athletes⁸.

The impact of DEC's on LT-KI firm performance

Our second hypothesis regarded the impact of DEC's on the survival and growth of KI-LT ventures as well as on the propensity for innovation. To test the hypothesis we considered the five-year survival criterion (Ensley et al., 2006) and the sales trend, derived by the firms' balance sheets (Ireland et al., 2003) after venture creation. Innovativeness is measured by a four-item scale, an elaboration of the scale developed by Dahlqvist and Wiklunda (2012) and identifies four categories of the venture idea

⁸ Sales rates growth 20.8%, 47.5% in 2011 and 2012 respectively (severe crisis in Greece)

newness: new to the world, the market, the firm, or the firm being among the first movers. Novelty can refer to products/services, production methods, promotion methods, business models, technology and opening of new markets. Design, novel uses of innovative materials and improvements of initial innovations are also included as 'incremental' innovations.

In almost all cases knowledge-seeking activities referred to R&D developed both in-house and outside agents' potential (suppliers, other industry, other science, etc.) engaging mainly open innovation. Although there are sectoral differences regarding the dynamism and attitudes of the three sectors, all new ventures form three categories and namely ventures starting with:

- a. strong DEC: all three dimensions are equally and well developed
- b. moderate DEC: the three dimensions are not equally developed
- c. weak DEC: all three dimensions present major weaknesses.

All cases survived the five-year survival criterion. Ventures with strong DEC presented higher sales volumes than the rest in all three sectors. All new F&B and new with strong DEC W&F firms were high-growth firms (OECD, 2012) with average growth rates bigger than 50% for the first five years. Corporate venturing presented average annual turnover growth up to 20%. F&B firms of moderate and strong DEC were not affected by the severe socioeconomic crisis in Greece including the economic year 2012. On the contrary, survival of the crisis is questioned for many of the companies starting with moderate or weak DEC of the other two sectors, while two furniture companies with weak DEC have already bankrupted.

All cases by definition started with knowledge-intensive, innovative activities. Innovations cover all four categories mentioned above ranging from patented products and technologies opening niche markets worldwide to new-to-local markets. DEC seem to affect the initial innovation of LT-KI ventures, while the impact of sectoral context is evident. In W&F and T&C industries, cases with strong DEC challenge and cause significant alterations in their business ecosystems mainly at national level. In F&B sector, changes refer to global relevant business ecosystems and regard various kinds of innovations patented or not. This affects both growth and innovation rates which are comparatively higher than those of the other two industries. The KI-

F&B ventures produce the most patents compared to the other two sectors. These firms intensified in-house innovation upgrading technology, R&D, experimentation and NPD methods in their lifespan. In all W&F cases and most T&C ones innovations during lifespan turn mainly around the initial novel concept, although they are not mere improvements or product family extensions, and refer to process or concept innovations.

Ventures with moderate DEC's created niches in existing markets but they did not manage to change their business ecosystem. Cases of weak DEC's (FC2, WC7, TC4) did not manage to promote the advantages of their novel and unique ideas and reap the first-mover benefits. These firms presented fluctuations in sales volumes and were significantly affected by the crisis.

The research indicated that cases with all DEC's equally strong presented the best performance regarding initial innovation (e.g. with patents at world level) and follow-up, as well as growth and resistance to the crisis. These ventures managed to pose changes to the rules of their competitive environment at sectoral, national or even global level due to innovative products, processes, or novel models.

DCs and DEC's in KI low-tech firms

Although there was no initial intention to explore the DCs concept at the outset of the present research and therefore no relevant questions for the case studies, extant discussions with entrepreneurs indicated that in their majority firms owned specific DCs. Actually, the analysis of the transcripts indicated that DCs are present ever since the very first years of the new LT-KI entities (new-to-the-world or corporate venturing).

According to both the interviewees' narrations and the study of the firms' histories, DCs seemed to be a natural follow up of DEC's to secure viability and growth. Whereas it is rather difficult to specify the transition point from one stage (DEC's) to the next (DCs) with precision (as Helfat and Peteraf (2003) clearly state), DCs appear rather informal and loosely structured in its beginning, bearing the personal touch of the entrepreneur/entrepreneurial team. NPD, market and technical sensing, networking and collaborations seem to be the more advanced DCs⁹ at least during the first years of life.

⁹ A more detailed DCs analysis in Protogerou and Karagouni, 2012; Protogerou et al., 2013

The analysis indicates that although DEC's entail intent and are in their majority human-centric, their dimensions can be embedded quite soon in routines and processes, even if they are not initially fixed and formal. Transcendental capability appears to be embedded in the developing sensing and seizing processes, since these extend and "routinize" PEA and enable receptivity.

"I would try all tastes and peculiar food in every country I would visit. I interviewed famous local chefs, studied all unexpected combinations. I continue to do it but in a more organized way and certainly not alone any more" (FC1's CEO).

NPD seems to stem from a combination of transcendental and improvisational capability; certain dimensions regarding trans-sectoral knowledge, such as sense of spaciousness, receptivity and judgment, experimental culture and learning are then embedded in processes, leading to innovation and adaptation to the market for all cases except the ones starting with weak DEC's. These firms seem to stay caged in problem-solving with mere improvements and product line extensions (WC5, FC2). Food companies usually establish well-organized formal R&D departments (eight firms out of ten) from the very beginning, followed by established large textiles companies (four out of ten) and develop strong linkages with academic and other research institutes. These companies have introduced a significant number of new or upgraded products since establishment; some patent their products and develop advanced marketing and promotion activities (FC5, FC9, TC9). On the other hand most W&F and apparel firms invest on design and build information and knowledge diffusion networks. Their NPD efforts involve suppliers and focus on experimenting with innovative materials elsewhere produced, and alternative production processes, following mainly trial-and-error methods (WC6, TC7).

Networking is deemed important for facilitating access to strands of technology such as R&D on bio-functional food and patented processes of innovative material production (e.g. WPC), stretch to new markets or develop new business models (especially in apparel section). It is a pure continuation of bricolage capability embedding real-time information flow of improvisational capability in relevant mechanisms such as collecting information and managing production and exports. CCN appears in the forms of joint projects and collaboration with academia, research institutes and suppliers, exclusive partnerships and contracts, transcending national or sectoral borders. In the cases of new venturing, initial informal networking based on personal contacts and former relationships becomes more organized and formal.

Cases of weak DEC fail to extend their networks (WC5, WC8). Networking and collaborations do not seem to be very popular among W&F firms in general but neither is the bricolage capability. This can be attributed to their rather limited social capital, their introversion and even the nature of the product in relation to the high potential of the domestic market up to 2007.

Market and technical sensing capability may be considered as stemming from the dimensions of repertoire building and interactive learning which turn to relevant organized processes and routines for observing markets, science and technologies through information collection and filtering mechanisms. FC9's CEO admitted that initial problem-making and the capabilities they had developed to cope with difficulties of technical and marketing nature soon turned to fast-response mechanisms and new knowledge-hunting processes. Repertoire building was further embedded in mechanisms and processes of scanning international trends and demand changes (FC4, WC9). However, it appears that the cases of corporate venturing present better organized market-sensing processes confirming relevant theory (Hirsch-Kreinsen and Schwinge, 2011). On the contrary, our findings indicate that firms with weak DEC are rather unable to translate feedback or respond to challenges and exploit market and technology opportunities.

DCs of the first years appear to depend on a combination of the industry they belong and the type of the venture (new or corporate). Most F&B cases are new-to-the-world firms. They develop and exercise DCs to respond to technological and scientific advances, changing market structures and intense global competition. T&C cases are mostly established companies which try to respond to fierce market competition in a highly ambiguous mature environment due to globalization and trade liberalization. They particularly develop strong strategic competitive response capabilities focusing on learning capability to attain strategic renewal and address the shifting environmental requirements of the last decade after the China's accession to the WTO. Both new and established W&F ventures seem to refer mainly to the national market and develop DCs in order to differentiate against global competitors and the crisis.

All companies with strong DEC developed strong DCs as well, presenting growth within their mature business ecosystems and resistance in the present severe Greek economic crisis.

Conclusion, implications-limitations

This study has endeavored to explore the “black box” of LT-KIE. Findings indicate the existence of a comprehensive set of dynamic entrepreneurial capabilities which suggests a potential ecology between entrepreneurial capabilities, DCs and long-term survival and growth.

To our knowledge, this is the first effort in KIE literature to conceptualize a capabilities framework in order to explain LT-KI venture creation within a “flat landscape” (Friedman, 2007), characterized by hyper-competition and maturity. Therefore, shifting focus to the rather neglected area of low-tech KIE phenomenon seems to be a main contribution of the study.

It is also among the first efforts to try to capture the “how” dimension of the entrepreneurial phenomenon per se (Ihrig et al., 2006) advancing relevant knowledge and providing some explanation for “the ability of some new and established companies to create, define, discover and exploit entrepreneurial opportunities” which is still a very popular issue (Zahra et al., 2006).

Additionally, to the best of our knowledge, this is among the first efforts to link dynamic capabilities to venturing and explain their origins. Thus, the DCs view is expanded by providing some first thoughts on the “principles that underlie and guide choices of the entrepreneurial acts” (Teece, 2012). The analysis indicated that most DECs’ dimensions can be embedded quite soon in routines and processes, suggesting that DECs might constitute the entrepreneurial side of DCs.

Findings further confirm the existence of DCs in LT-KI newly-established firms. In this way, the research seems to shed more light on the open issue of whether DCs have a role to play in an environment characterized as stable with low levels of innovation. It is worth mentioning that cases with strong DCs present better resistance towards crisis, in terms of average sales growth and export activities, indicating the DCs significance to low-tech firms within environmental shocks such as the severe Greek financial crisis.

Perhaps the major contribution of the study regards DECs operationalization as it provides a multidimensional measure of DECs, indicating that they are more than just vague and fuzzy abstractions guided only by human talent and intuition and thus deserve further theoretical and empirical exploration. Bricolage capability enables the

refusal of limitations and the exploitation of resources at hand or the search of new ones. The improvisational capability allows the combination and recombination of knowledge, resources and opportunities in order to refine ideas and question existing business ecosystems. Transcendental Capability is a totally novel concept which explains ‘how’ innovative knowledge-intensive ideas are built. It regards mainly the process of intangible asset needs’ creation, such as novel knowledge and know-how which according to Teece (2011) constitute the new, hard to “build” and difficult to manage “natural resources”.

According to our opinion the DEC’s approach advances further the concepts of bricolage and improvisation to integrated structured capabilities with distinctive dimensions.

Another significant contribution is to provide evidence on the DEC’s impact on new-firm survival, growth and innovative performance. The study pinpoints that at least in LT-KIE cases, DEC’s enable the breaking of the barriers of established developmental paths by selecting new knowledge and technologies that stand out from the resources of the existing sectoral systems, such as scientifically-generated knowledge.

The DEC’s framework advanced endeavors to assist entrepreneurs and managers select priorities and realize the importance of possessing, further cultivating and balancing all three DEC’s when starting new ventures. For example, they should invest on “cycles” of contacts starting from existing core networks and expanding around them to collect knowledge and other assets. Cognition and experimentation processes play a large role for the realization and the refinement of business visions. Transcendental conditions can act as signposts for entrepreneurs/managers to position themselves in global business ecosystems and curve new business ways. Therefore, agents should be keen to connect diverse input, getting out of known limits (national, sectoral or even science-related ones), mobilizing all sources to realize business concepts.

Our findings suggest that newly-established ventures embed most DEC’s dimensions in DCs almost since establishment. However, their degree of development appears to differ in accordance to the firm’s knowledge-intensiveness and the sector of economic activity. They justify relevant theory, such as Boccardelli and Magnusson (2006), who see the entrepreneurial team as a source of DCs.

This study is inductive and exploratory, building on thirty cases of knowledge-intensive ventures of three core traditional industries within the Greek context to generate hypotheses regarding dynamic entrepreneurial capabilities and the founding process more generally. As with all such studies, the generalisability must be viewed with care; systematic quantitative research could further test our hypotheses strengthening the contribution of the work.

The study bears certain other limitations, such as problems associated with the method design used, the level of the interviewees' objectivity regarding self-reported data and its national context. These limitations could be also seen as fruitful avenues for further theoretical and empirical research in order to confirm and enrich findings on several issues such as deepening in nature and dimensions of DEC's, their applicability, and the relations and interactions with DC's.

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Tables

Table 1: Description of case data

Firm	Foundat ion year	Product Family	Employees (2010)	% of sales national/internat. markets	patents
Wood and Furniture Sector					
WC1	2007	Veneers, veneer stitching	8	90/10	yes
WC2	2004	Lacquered/printed MDF laminated flooring	126	75/25	no
WC3	2007	Kitchen, wardrobe	14	100/0	no
WC4	2003	Panels, flooring, glue-laminated products	11	100/0	yes
WC5	2001	Light-weight honeycomb furniture	19	100/0	no
WC6	2005	Plywood flooring decorative panels	185	50/50	no
WC7	2003	Wood pellets	16	100/0	no
WC8	1998	Kitchen, wardrobe	30	100/0	no
WC9	2006	Decking fedges	10	40/60	no
WC10	2005	Mattresses	11	100/0	no
Food and Beverage Sector					
FC1	2003	Antipasti olive spreads	58	0/100	no
FC2	2002	Cucumbers	9	100/0	no
FC3	1998	Whole egg yolk, albumin	7	97/3	no
FC4	2003	Organic, quasi-pharmaceutical chocolate	9	93/7	no
FC5	2002	Biological gluten-free wheat flour, and bio-functional foods	30	80/20	yes
FC6	2000	Parboiled rice, specialties	180	80/20	yes
FC7	2000	Gourmet dairy products	35	80/20	yes
FC8	2000	Milk juices yogurts cheese	345	80/20	yes
FC9	2006	Crackers, snack cheese-ups	18	0/100	yes
FC10	2001	Oil olives spreads-dips	50	18/82	no
Textiles and Clothing Sector					
TC1	2000	Dyeing-finishing	65	40/60	
TC2	2004	Special use and high perf. fabrics, garments and protective systems, for armed forces, police, fire brigade and industry	158	70/30	yes
TC3	2005	Innovative dyeing treatment	9	70/30	no
TC4	2000	tricot	136	70/30	yes
TC5	2007	Children's brand clothing	45	85/15	no
TC6	2000	Cotton yarn, cellulosic fibres blended yarns	197	30/70	no
TC7	1998	Jeans, T-shirts	218	45/55	no
TC8	2000	Underwear sleepwear and lingerie	250	90/10	no
TC9	2000	Indigo-denim	490	2/98	no
TC10	2002	High-fashion clothes and shoes	22	98/2	yes