

The wood and furniture sector within crisis: a dynamic capabilities perspective

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Abstract

This paper aims to explore the applicability of dynamic capabilities in the low-tech wood and furniture sector and their impact before and during the financial and fiscal crisis. For this purpose we have conducted a multiple-case study and built our analysis on qualitative data. The analysis proved that companies of the so called low-tech sector that base their strategy on knowledge use in a formal or informal way all three micro-foundations of dynamic capabilities (DCs) which are sensing, seizing and reconfiguration). This enables them to gain sustainable competitive advantages surpassing price competition which is rather fierce in the today's globalized ecosystem and a rather weak strategy in crisis times. The study therefore provides an empirical contribution to the emerging work on dynamic capabilities penetrating the barriers and proving the existence, role and nature of dynamic capabilities in the low tech sector on the condition of knowledge intensiveness. It also indicates that DC development can constitute a significant strategic option for low-tech companies against the severe fiscal and economic crisis or other vulnerable and volatile environments and threats.

Keywords: knowledge-intensive entrepreneurship, dynamic capabilities, low-tech, wood and furniture sector, economic crisis, competitive advantage

JEL classifications: L2 - Firm Objectives, Organization, and Behavior, L26 - Entrepreneurship, L73 - Forest Products

Introduction

Current theoretical and empirical research enhances the role that traditional sectors still play in modern and vulnerable economies and directs importance of innovation outside R&D-intensive fields (Robertson et al. 2009; Hirsch-Kreinsen and Schwinge, 2011). A small but increasing stream in literature supports the suggestion that although mature, traditional industries are not dynamic by definition (Sciascia et al. 2009) they are characterized by environmental hostility and are also subject to major changes. Globalization and trade liberalization in combination to the vulnerable and volatile crisis environment have raised

significant challenges. Therefore the framework of dynamic capabilities (Teece, 1997; 2007) can play a role in such mature, traditional industries, providing options to expand to new markets and businesses (Penrose, 1959; Wall et al., 2010), and consequently ways to survive. It's also worth mentioning that a new research stream tries to explore dynamic capabilities (DCs) within crisis environments (Colombo et al., 2010; Simon, 2010) which can have a major impact on both high and low-tech sectors. For example, Colombo et al. (2010) has found out that DCs enable them cope with the crisis, since they have a positive impact on firms' growth performances. Still, there is very limited empirical research on the dynamic capabilities' impact on low-tech industries and especially in crisis periods.

The paper studies the dynamic capabilities of four selected case studies in wood and furniture sector within the last five years and their impact in performance and the way these companies resist the crisis. It has been structured as follows. After a short description of the theoretical framework of dynamic capabilities and the special case of low-technology industries, the Greek wood and furniture sector is described as the object of the survey. The following units present the results and the relevant discussion exploring the DCs and their affect on performance of these firms before and in crisis period providing some evidence on DCs importance within the specific business ecosystem.

Theoretical Background

The Dynamic Capabilities Approach

In the context of this paper we adopt the definition given by Helfat et al. (2007) who define dynamic capabilities (DCs) as "the capacity of an organization to purposefully and systematically create, extend or modify its resource base". The firm's resource base includes tangible, intangible and human assets such as includes labor, capital, technology, knowledge, property rights, and also the structures, routines and processes that are needed to support its productive activities (i.e. organizational structures and capabilities).

The dynamic capabilities perspective has received increasing attention in the field of strategic management research, focusing on the competitive advantage that is provided by a certain resource constellation over time to fit changing business environments (Baretto, 2010). Research based on dynamic capabilities, has been used mainly in strategic management, marketing, human resources management, operations management, international management, information management and entrepreneurship (e.g., Arthurs & Busenitz, 2006).

Teece, Pisano and Shuen in their landmark article of 1997 proposed the dynamic capabilities framework which enables organizations to renew competencies and strategically manage the internal and external organizational skills, routines and resources required to maintain performance in the face of changing business conditions. After a decade, since Teece et al.'s (Teece, Pisano, & Shuen, 1997) landmark article the ambition of the dynamic capabilities framework is "nothing less than to explain the sources of enterprise-level competitive advantage over time" (Teece, 2007) providing "a panoply of processes and routinesas

certain microfoundations for dynamic capabilities". In this review article of 2007, Teece states "For analytical purposes, dynamic capabilities can be disaggregated into the capacity (1) to sense and shape opportunities and threats, (2) to seize opportunities, and (3) to maintain competitiveness through enhancing, combining, protecting, and, when necessary, reconfiguring the business enterprise's intangible and tangible assets". Following Teece's terminology, sensing capabilities denote the firm's activities in scanning and monitoring changes in operating environments and identifying new opportunities. Seizing capabilities are vital in selecting product and business model designs and architectures, enterprise boundaries and decision protocols. Reconfiguring capabilities are useful in asset 'orchestration', i.e. activities such as the management of complementary assets and knowledge management for future positioning.

The Dynamic Capabilities framework has been found suitable for multinational companies in international environments (Teece, 2007), large, diversified and multidivisional firms (Zollo and Winter, 2002) while there are quite a few studies referring to the size of companies (Salvato, 2003; Kale & Singh, 2007; Doeving & Gooderham, 2008). Sapienza et al. (2006) assume that SMEs and new ventures need unique dynamic capabilities in order to survive grow and reap the benefit of their innovation at international level. Furthermore, according to Protogerou et al. (2008), the firm's ability to combine and effectively use different types of knowledge is crucial to its success in innovation activities and performance.

Boccardelli and Magnusson (2006) in order to use the dynamic capabilities framework of strategy trying to investigate how firms go about to match their resource bases with opportunities in the marketplace, chose the Swedish mobile Internet industry. Zahra et al (2006) reviewed 19 studies focused on established firms in high technology industries that touched upon capability creation from 1992 to 2002 in the management, strategy and entrepreneurship journals. Among the first relevant research in low-tech industries, Karagouni and Kalesi (2011) building on qualitative data from knowledge-intensive firms active in the food industry, showed that low-tech companies basing their strategy on knowledge intensiveness and innovation develop relatively strong dynamic capabilities in order to gain competitive advantage.

Within AEGIS, an FP7 project, the dynamic capabilities framework has been ascribed to high and low-tech sectors and services. The research confirmed the development of specific dynamic capabilities by all kinds of entrepreneurial ventures and their impact on performance. Especially firms of low and medium-tech industries participate less in technology collaborative agreements compared to high-tech manufacturing firms and KIBS. What seems quite interesting is the fact that the degree of DCs development is dependent on the firm knowledge base and is sector specific (Protogerou and Karagouni, 2012).

In spite the relevant suggestions of theorists and researchers about the use of the DC framework in more moderately dynamic environments (Eisenhardt & Martin, 2000) or even stable ones (e.g., Zahra et al., 2006; Zollo & Winter, 2002) empirical research is still extremely limited especially when the newly developed concept of knowledge-intensiveness is engaged.

Therefore, focus on knowledge-intensiveness seems to constitute a main strategy and a suitable "vehicle" to understand the creation of enterprise-level competitive advantage at the undertaking creation stage and later during the company's lifespan. In order to define knowledge-intensiveness we adopt the definition of Malerba and McKelvey (2010), according to which Knowledge-Intensiveness refers to innovative firms which have significant knowledge intensity and exploit innovative opportunities in diverse sectors. Papers drawn from Economics of industrial dynamics (e.g. Gans et al., 2002; Kirzner, 1973 etc) have outlined the importance of innovation. Innovativeness is closely related to KIE as well as the important seed and start up phases of traditional firms.

Low Tech Sectors

In innovation research, the term "low-technology" refers to those industrial sectors that have no or low R&D expenditures. The basis of this categorization is the R&D intensity indicator which measures the ratio of the R&D expenditure to the turnover of a company or to the output value of a sector. Sectors with an R&D intensity of more than 5% are characterized as "high-tech", between 3 and 0.9% as "medium-tech" and those below 0.9% as "low-tech" (OECD, 2002).

Low-tech enterprises are often regarded as somewhat old-fashioned. Although their products and production processes may be highly complex and capital intensive, in comparison to high-tech industries, their markets are generally mature, slow-growing and subject to over-capacity and high levels of price competition. Traditional industries have been seen as more prone to competition from low-wage countries and less aggressive in terms of competition and innovation.

Nevertheless, traditional sectors are central to economic well-being. They have been considered by researchers as significant for the technological and socio-economic development (e.g. Mendonca and Tunzelmann, 2004; Hirsch-Kreinsen et al., 2005; Smith, 2008), dominating the economies of nations all around the world. Yet, due to globalization and global and national-level crisis, low-tech firms tend to develop different kinds of competitive advantages in order to address competition within their vulnerable and mature markets. Besides the well-known and mostly-used cost-leadership, they turn to differentiation and innovation. They engage mainly in new product development and frequent changes or improvements of process technologies (Hirsch-Kreinsen 2008a, Robertson and Smith 2008, Robertson et al. 2009).

Food, paper, textiles and clothing, wood and furniture, plastics and metal products are registered as low tech sectors, in contrast to biotechnology, pharmaceuticals and nanotechnology which belong to high tech sectors.

Greek Wood and Furniture Sector

Woodworking and furniture industries play a significant role in Greek economy, with a turnover in 2008 of around €2 billion, an added value of around €1 billion and an employment rate of 35.000 people in more than 15.000 companies (Eurostat, 2009). The vast majority is micro-companies, with the wood-based panel sub-sector and sawmills to be the exception.

The sector is mature, highly fragmented and labour-intensive with many firms operating in a 'craft' production mode. 66% of the firms are less

than 30 years old and cover mainly the domestic market, as exports are rather insignificant.

The industry faces growing competition from low-cost, emerging economies and a growing number of technical trade barriers. Decreasing production in absolute numbers was combined with the increasing number of trendy products from Italy and Spain, cheaper products from Turkey, China and India and different approaches such as of IKEA. Furthermore, it faces difficulties in accessing wood as a raw material and a dramatic rise in the price of materials such as leather, plastics natural fibres and petroleum derivatives (Tringkas et al., 2012). The general financial and economic crisis has had a major impact on the entire sector: In 2008 most companies had losses of profits (56.8%) or even damage (27.3%). Regarding the furniture sector, the production volume decreased by 47% among 2009-2011, and further by around 30% in 2012 (EL.STAT).

Greek wood and furniture companies are not considered as innovative even with the Schumpeterian concept of innovation (Karagouni et al., 2010). Advancement of existing and development of new equipment (AMT), the import of design systems (CAD), the application of CIM and MRP, as well as the pilot use of new or improved raw material or semi-finished products are further innovations pursued by Greek wood and furniture manufacturers. Furniture companies invest on differentiation through the development of aesthetic value and fashion. Yet, design is still underdeveloped referring mostly to creative imitations or improvements. Process innovation refers more often to restructuring and modernization.

Major weaknesses of both sectors regard the lack of specialized technical personnel, lack of precise strategies, overall organization and quality control, introversion, while entrepreneurs' educational level is rather low (Likar et al., 2008). The last five years the sectoral context starts changing by becoming more knowledge-intensive. New entrepreneurs or successors have a high educational level and turn to research, innovation and knowledge management.

Research Design and Method

We used the method of multiple exploratory case study analysis (Yin, 2003) with the individual low-tech company as the unit of analysis. For the purposes of this paper we followed a literal replication strategy (Yin, 2003) by choosing four information-rich cases (Patton, 2002) based on certain criteria: innovation could refer to "open innovation" but it should entail a certain amount of knowledge intensity. We controlled for the industry context by taking the case companies from the same industry (Rouse and Daellenbach, 1999). Wood and furniture sector was chosen as one of the representative low-tech ones in Greece, where there is a rather significant dispersion regarding company types and sizes, market range and orientation. It has also a significant share of employment and value added for the European manufacturing industry and for the European economy as a whole. Questioning the existence of dynamic capabilities was really quite provocative. Table 1 describes the selected companies.

The firms were chosen from a sectoral database and after sectoral experts' interviews who gave information on the sector at Greek, European

and global level as well as about new, knowledge-intensive ventures. We contacted interviews twice in 3 years time while the companies' course was closely observed. Our respondents provided also detailed timelines and histories for their firms. The typical interview lasted 2.5-3 hours. All interviews were taped and transcribed. The founders were all involved in all key aspects of the business and consequently have firsthand knowledge of the firm's founding activities. Supplementary telephone conversations and reviews of company and public documents, such as administrative documents, reports, news (internet and press) and information from company web sites followed. Multiple data sources were used such as secondary sources (studies and literature, awards), information by different interviewees (entrepreneurs, core team members, experts, suppliers and customers), visits to the plant and a standardized questionnaire on hard facts and data of the cases which helped to receive a chain of evidence and inter-subjective validity for the analysis.

Table 1: Descriptive Summary of Sample

a / a	Legal form	Location	Year of foundation	number of employees	product family	Sales Nation. /Exports	patents trade-marks	educated staff
1	Ltd	Larissa	2007	15	veneer stitching marquetry inlays, wooden decoration parts	90/10	no/yes	2
2	SA	Grevena	2004 (1981)	126	MDF laminate flooring, MDF lacquered / printed	75/25	Yes/yes	13
3	SA	Chalkida	1924	10	decking - fedges	40/60	Yes/yes	6
4	SA	Xanthi	1989	80	Furniture and mattresses	55/45	Yes/yes	45

The data were analyzed in order to identify and categorize the different types of company-level dynamic capabilities. Teece's (2007) classification was used as the initial first-and second-level coding frame that was iteratively modified and supplemented according to data.

Discussion

All four cases are purely Greek companies which belong to different sub-sectors of wood and furniture sector and are also at different stages of their lifespan. More precisely the sample consists of a new-to-the-world venture, a spin-off, a case of a very old company (1924) which has managed to become famous worldwide for its quality and a relatively new company (1989) which is also globally known for its unique business concept. This heterogeneity ensures the applicability of DCs in quite a significant range of firm conditions.

The four companies had foreseen the sector's weaknesses and overall declination and invested on strong dynamic capabilities in order to differentiate and build unique competitive advantages. Therefore, all four companies occupy knowledge - oriented strategies and all their products or processes within the new millennium are knowledge-intensive. They all fulfill Burger and Helmchen's (2008) conditions, since all four

create new knowledge and new combinations of knowledge and occasionally employ knowledge originally developed in science. In looking for patterns, one can note that results address usually final product and relevant technology leading to innovations that challenge the market rules. A main common characteristic is that contrasting the majority of the industry's firms, they all export. The innovations produced, although novel, are not considered radical or disruptive.

Table 2 gives a brief description of the dynamic capabilities the four companies of the case studies have developed and namely sensing, seizing and reconfiguration with their micro-foundations as described by Teece (2007).

Table 2: Dynamic capabilities of the case firms

CAPABILITIES	A1	A2	A3	A4
Sensing				
Processes to Direct Internal R&D and Select New Technologies	Meetings focused on development issues with designers/participation of TEI. Regular experiments (try and error) with new material and alternative processes Several combinations of equipment potential and new material (NPD)	Routines on selecting knowledge and new technology (long lasting) meetings / trial and error (experimenting). Constantly informed on all developments in wood technology by two wood technologists of the company and TEI experts. NPD -all Departments follow the rule of gathering information (directly or indirectly relevant) both bottom up and up-down. Information is diffused in regular dpt meetings. Business opportunities of either external or internal are ordered and inter - related in time.	Annual budget for R&D - technical Dpt responsible. Try and error processes used. Regular processes for new designs (special NPD team), processes for horizontal integration at strategic and operational level	The R&D Office responsible for evaluating information relative to new tech and stakeholders' innovative ideas. All the above information are recorded and analysed by the statistics office of the company and taken into account in order to plan the company's strategy. Idea brainstorming at all levels, establishment of new terminology. Cooperations with institutions and University. Projects at official or non-official level. New technologies are also a focal point for the company
Processes to Tap Supplier and Complementor Innovation.	Regular visits to machinery and raw material suppliers for information and training	Routines on selecting feedback (long lasting relationships -real time interactions) - meetings / trial and error (experimenting).	Mostly through trade shows. Company has made a series of acquisitions in order to appropriate their know how	a close cooperation with suppliers and complementors all over the world through TQM in terms of EFQM
Processes to Tap Developments in Exogenous Science and Technology.	Constant cooperation with TEI, machinery veneer and glue suppliers Twice a year visits at the two most important international shows (machinery and raw materials) and attendance of foreign veneer and fleece suppliers seminars	Constant cooperation with TEI, worldwide suppliers (leaders) most important international shows (machinery and final products) every year try and error processes joint projects on innovative technologies even with competitors	Regular cooperation with TEI Larissa - research papers on specific industry matters (in the general sense - not only furniture). International trade fairs and conferences Technical department responsible.	Promotion of culture of sustainability, partnerships with individuals, social teams, and professional bodies in Greece and abroad. Collaboration with the University of Thrace, the Athens University of Economics, the University of Munster in Germany, EFQM, Cambridge University, UNESCO, WWF, United

	try and error processes			Nations, CSR Eurochambres in Brussels. All relative Science and Technology on a range of subjects (e.g. medicine, ecology, energy, raw materials etc)
Processes to Identify Target Market Segments, Customer Needs	Regular meetings with designers all over Greece for new trends, customer feedback, internet use	Regular market research by company's team. Special market research abroad. Managers are committed to manipulate all existing resources in order to create new market needs	Market research and customer surveys, trade fairs, fashion, cooperation with famous designers, relevant events	regular market research, questionnaires, complaint management and personal contacts made at the annual in-house conferences and seminars. CSR culture award the contribution of everyone that has been actively involved in the development of the company. A monthly cooperation with stakeholders (e.g. a monthly report of corporate shops all over the world)
Seizing				
Delineating the Customer Solution and the Business Model	Continuous product improvement /development through innovative raw material, selection of technology and new flexible processes and network building in order to capture value, Designing of Revenue architectures (e-market, turn-key solutions, cooperation with conventional factories etc) customer loyalty and target-customers expansion	Continuous technology and product improvements, NPDs and further development through expansions (2004, 2007, 2008, 2009) . Network building in order to establish power at all levels. Designing of Revenue architectures (flexibility, variety of innovative value adding products) Customer loyalty and target -customers' expansion. Expansions are due to synergies provided	Processes on continuous process and product improvement (add value) adding new characteristics and product. Constant quality improvement and use of innovative materials. Advance in product architectures (e.g. modula, KDPF), processes on sales business models Extending to new target -groups. Company's culture and strategy is based on designing methods to capture value.	A strategy of continuous development Unconventional methods of marketing (e.g. bartering). Mechanisms to add value are always added through raw material, social corporate responsibility, customer training, new unexplored natural materials etc Cooperation with social and corporate institutes. Products have won awareness and are accepted by high -income groups all over the world.
Reconfiguration				
Decentralization and Near Decomposability		A decentralized structure at the operational level. Open innovation is embraced creating a multinational and multicultural effect both at planning and implementation phases. But the final decision belongs to the entrepreneur.	Identification of economic activities within the firm; quasi-autonomous standing to each division Awarding incentives; Performing strategic planning (diversification, acquisition, and related activities) - one R&D Dpt for all activities.	Alternative marketing processes. Extroversion and open-mindedness in all aspects. Decentralization regarding administration, creativity and production. Loosely structures adapted to raw material processing (e.g. wool, silk etc) since it comes from producers all over the

			Interdependence through a central strategic decision making, common technical Dpt and administration but full modularity among SBUs	world.
Knowledge Management	Embedded culture of constant learning and experimenting, know-how is achieved by technology transfer and development. Visiting and training in the manufacturing and the non competitor company, the veneer suppliers, TEI, designers. Existing resources (technology - material - methods and processes) in constant experimentation for covering emerging needs	Constant Training at all levels. Teams visit international trade shows and attend seminars on technology and sector innovations. Knowledge and information diffusion meetings especially on innovation and new technology matters (they want to be the first to introduce all novelty in Greece and Balkans). Both executive and employee meetings. Aggressive technology transfer. Processes of connecting customer feedback with the production of new ideas. Introductory training. Experimenting and learning is very important. Application of patents formally or informally acquired	Company invests heavily on training (e-learning 2009-2012) Building new knowledge on both technical and cultural matters. Direct information diffusion encouraged. Participation is rewarded. Business seminars. Regular courses and information by the technical Dpt. which is the main responsible for bringing new knowledge into the group Training on quality matters through the ISO certification.	Employees are the biggest investment for A4 and receive a number of benefits such as continuous training, recognition and reward of personal achievements (in the form of salary bonuses, promotions and gifts). Moreover, employees from Holland, Cyprus, Spain, Belgium and China are visiting Greece in order to be trained and to participate in all processes and improvement actions. They attend EFQM conferences! The head of the Human Resources Office keeps a file containing personnel training charts for each department and a Personnel Training Record. The head of the Human Resources Office makes different educational plans for each department according to its needs. Innovative training programs. Technology acquisition and diffusion by developing partnerships referring to new technologies, training in new methods of production, storage etc

The four companies owned DCs even before the crisis. In the case of A3 and A4, Dynamic Capabilities became stronger with a wider range of application. The companies renewed and expanded the content of almost all micro-foundations avoiding the danger mentioned by Winter (2003) and Eisenhardt and Martin (2000) of DCs to "become increasingly routinized and codified, losing dynamism and leading to the decay of the competitive advantages". Instead they managed to broaden scope and expand exports strengthening their global presentation in the crisis period. The new-to-the-world venture as well as the new spin-off entered the business ecosystem just before the crisis (2008 at European level and since 2009 at national level).

The new-to-the-world company (A1) presents strong DCs at the time of the research, which are deliberately and consciously developed. Sensing is

the strongest one followed by seizing. Processes focus mainly on novel and creative design by blending with innovative elements and materials, as well as novel technology details to add value. The size and partly the age of the case (since its foundation) may explain why reconfiguration is not so strong. Yet, although formal, they are not written procedures or routines due to size and age of company.

(A2)'s case is quite different. Mother company had already a series of well-formed dynamic capabilities which were transmitted to the new company mainly by human capital, culture diffusion and formal procedures despite the fact that the spin-off regarded a different type of entrepreneurial activity.

DCs are recognised as important elements of strategic management by all agents. Knowledge management is rated as very important. Sensing is proven the strongest one focusing on NPD and market sensing. This "is rather sensible for new companies that are striving to earn and keep a piece of the pie by creating or entering markets" (Protogerou and Karagouni, 2012). Development includes products and processes, the creative use of innovative materials (e.g. a mattress of seaweed is not just the use of seaweed but a completely novel concept) and creative design. We have also noted novel services, collaborations and joint projects, such as combinations of technology innovations, product innovations, design and service novelties or services such as e-marketing. All four cases own the capacity to adapt the products and services to the specific needs of different customers. Flexibility was always a major strategic element of Greek wood and furniture companies, since they primarily address the small Greek market. In the cases of knowledge-intensiveness it becomes a matter of strategic option. Besides NPD, market sensing is a significant element of sensing dynamic capability. Actually it is much more important than R&D. This is also quite natural since the specific industry's innovations are mainly market-driven and it is in line with the findings of relevant research (Kreinsen and Schwinge, 2011). The only case which boasts not to sense the market in order to produce innovation is A4. The company's motive is "I pay attention on the product and I train the market".

Seizing is moderate and looser. Still we can also find informal routines and processes of the seizing micro-foundations such as processes to delineate the customer solution and the business model (e.g. A1's designing of revenue architectures (e-market, turn-key solutions, etc) in order to capture value.

The new-to-the-world firm lacks distinct reconfiguration processes since it is small and very young. Such processes can be found in the other three cases. Reconfiguration capabilities of the three older companies are strong in order to address markets which are very volatile due to globalization and trade liberalization. They particularly focus on learning capability in order to attain strategic renewal and identify new production opportunities, satisfy niche markets or even create new markets. The more they export, the more precise their configuration capabilities are.

It is quite interesting to note that all four companies declared "prepared" and "ready" for cases like current economic and fiscal crisis not due to relevant predictions but due to the development of DCs. This is not strange if we consider Teece's definition (2007) of DCs; "(they

explain the sources of enterprise-level competitive advantage over time". Therefore sensing and seizing capabilities indicated new ways for competitive advantage development after the first indications of globalization. Extroversion through open innovation and dynamic networking and knowledge seeking proved to be vital even for small to medium Greek traditional industries. More precisely all four companies presented increasing sales revenues in 2008 and 2009, a small decline (from 0% to 2%) in 2010 and small increases again in 2011. Although the zero revenues may sound bad, they are not if compared to the general situation of the sector; the wood and furniture sector suffered losses of more than 40% during 2009 to 2011.

All cases present a tendency to knowledge management but this can be attributed to the fact that they are fundamentally knowledge-intensive companies and they sustain their existence and competitive advantage on knowledge.

All companies have developed distinct - more or less formal - technical departments and pay a great importance on the design activity. There are certain processes to identify target market segments, changing customer needs or customer innovation. All companies differentiate from the average sectoral enterprise and have created new markets and ecosystems.

A main difference between the new-to-the-world firms and the older ones is that the last ones have developed certain absorptive capacity that ranges from a thorough knowledge on the properties and potential of their raw materials, to the use of novel inter-sectoral technologies. The capacity was developed through training, individual studies and efforts, co-operations with clients and suppliers and the building of a strong research team devoted to the relevant visions. The innovation culture nourished and developed in ways that relate to each company's culture leads to several innovative products, processes, methods and ideas which serve as a basis of constant reconsideration of strengths and weaknesses of competitive advantages.

Another issue to mention is that crisis did not change the main strategies of all four firms. This is a further indication of the successful application of the DC framework which was initially considered as effective in rapidly changing and dynamic environments. Therefore, DCs are applicable in low-tech industries as well and support companies' performance in changing environments and relevant threats such as crisis and globalisation consequences. The development of DCs secures a firm's survival and even growth in vulnerable and volatile environments.

Conclusions

The objective of this paper was to explore the applicability of dynamic capabilities in the low-tech wood and furniture sector and their impact before and during the financial and fiscal crisis. We have conducted a multiple-case study and built our analysis on qualitative data. Our analysis revealed interesting patterns regarding the portfolio of different types of dynamic capabilities and its relation to knowledge intensiveness.

The analysis proved that companies of so called low-tech sector that base their strategy on knowledge, use in a formal or informal way all three micro-foundations of dynamic capabilities as Teece called them (Teece, 2007). It is worth-mentioning that dynamic capabilities apply mainly for the innovative, knowledge-intensive products, while they are rather neglected for the conventional ones, although there are also subject to improvements and upgrades knowledge entailing.

Our case analysis revealed that younger firms have a weaker or rather one-sided portfolio of dynamic capabilities since they are more interested in survival and market exploration. On the other side older companies develop strong reconfiguration capabilities to find or open new markets and exploit their resources of all kinds. There is also an obvious relationship among size and mainly seizing capability, regarding decision protocols and business model delineation. Organizations' internal understanding of the strength of their capabilities plays a significant role in perceiving knowledge based opportunities within mature, saturated markets. Such firms are usually the bigger ones (e.g. A2, A4) with a well-balanced and strong dynamic-capability profile. They are aware of their capabilities and able to make well-informed decisions to adjust their innovations so that customers will perceive the products as innovative, and yet to integrate them into the business model and organization.

This study makes a major contribution providing evidence on the importance of DCs in low-tech sectors which can become a significant strategic model against crisis and other threats. On the other hand it provides managers with alternatives to confront the existing crisis difficulties. Furthermore, the study adds to the current empirical research on dynamic capabilities especially regarding low-tech sectors. It also strengthens the small but increasing stream of literature which regards knowledge-intensive entrepreneurship in low-tech sectors and the very popular discussion on crisis confrontation.

From a managerial point of view, our study carries some important implications. Companies in mature low-tech sectors with strong and versatile dynamic capabilities that build on knowledge have more chances to survive and prosper in a globalized economy and cases of economic crises at national or global level, than those that stick to conventional products or processes and try to survive with low price strategies. Knowledge intensiveness opens up possibilities for a company to gain competitive advantage and create or enter emerging markets and customer needs.

As with any research, there are limitations associated with this study, some of which point to promising directions for future research endeavors. First, analysis is based on the data of only four cases representing the wood and furniture industry, and care should thus be taken in generalizing the findings to other product contexts. Second, the cases may have idiosyncratic characteristics. The suggested relationships need to be validated against other cases and methods to see if these inductive insights survive the empirical test.

Research should also comprise the rest of low-tech industries for more generalized conclusions. The present study can initiate a promising research agenda for many research fields within the unexplored concepts

of both KIE and low tech whether in stable or volatile and dynamic environments.

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