

Entrepreneurial and intrapreneurial growth in Central and Eastern European ventures driven by the fit between micro and macro level opportunity exploitation

Esin Yoruk



Entrepreneurial and intrapreneurial growth in Central and Eastern European ventures driven by the fit between micro and macro level opportunity exploitation

Esin Yoruk

Coventry Business School
and
International Centre for Transformational Entrepreneurship

Coventry University
Gosford Street
Coventry
UK
CV1 5FB

esin.yoruk@coventry.ac.uk

Abstract

Based on theories from entrepreneurship and intrapreneurship literatures, this paper investigates how the fit between micro level entrepreneurial opportunity exploitation and macro level entrepreneurial influence sales and employment growth in the Central and Eastern European (CEE) firms. A multiple case study analysis contrasts young entrepreneurial and established intrapreneurial firms to the established conservative firms. Our findings for entrepreneurial and intrapreneurial ventures are in stark contrast to those of conservative firms. Not only entrepreneurial but also intrapreneurial firms are better at exploiting micro-level opportunities in the technology and market domains empowered by their intra-organisational competences. Moreover, they may purposefully select what macro-level opportunity to exploit, a process which contributes to their higher sales and employment growth. In other words, they are able to create the fit between micro and macro environments to generate high growth in stark contrast to conservative firms.

Acknowledgement. Funding received from the European Union's Seventh Framework Programme (FP7/2007-2013) under grant agreement "Growth-Innovation-Competitiveness: Fostering Cohesion in Central and Eastern Europe" (GRINCOH) is gratefully acknowledged. The author would also like to thank Slavo Radošević and Iciar Domínguez Lacasa for their helpful comments on the questionnaire and earlier versions of this paper.

1. Introduction

For new ventures, growth and survival are strongly linked with each other (Wiklund, 2007). Even though the nature of growth may be predominantly random, the trajectory of growth influences new firm survival, which depends on the accumulated resources of firms (Coad et al., 2013).

Majority of older and established firms, on the other hand, have to comply with slow growth rates or decline as they reach maturity. At this stage, the strong connection between growth and survival gains significance also for the established firms. Some of these established firms, at a convenient point during their lifetime, decide to take an alternative route and extend their operations to produce products beyond the scope of their current activity in seek of higher and more dynamic growth rates. In similar vein to new venture performance, their growth is based on creation of new knowledge and value by the organization whilst exploiting available favourable conditions in the external environment. Value creation and growth generation, in turn creates substantial effect on the sustained employment.

It is widely recognized that firms those are entrepreneurial in nature, perform better than conservatively managed firms (Miller and Friesen, 1982; Miller, 1983; Covin and Slevin, 1989, 1991; Lumpkin and Dess, 1996; Rauch et al., 2009). Covin and Miles (1999: 48) stress on the 'entrepreneurial' philosophy that penetrates into a firm's attitudes, operations and management styles that guide the firm towards achieving higher performance over time. The 'entrepreneurial' philosophy may be realised within several different formations - i.e. in a new young firm or at times in an established old firm. Therefore, it may be observed as:

- (i) Entrepreneurial activity in a newly founded organization, or
- (ii) Intrapreneurial activity within an 'established' organization by means of creating an independent unit or set-up of a new activity for the expansion of current business and diversification through internal development. This activity involves relatively small and independent units designed to create, internally test-market and expand improved and/or innovative staff services, technologies or methods within the organization (Pinchot, 1985; Burgelman, 1983a, 1983b; Nielsen et al, 1985; Kuratko et al, 1990; Zahra, 1993; Shane, 1994; Zahra et al, 1999).

Extant literature on entrepreneurship provides elaborate evidence on the role of opportunity exploitation that leads to firm growth. Entrepreneurial activity in the form of new firm formation has received notable interest within this perspective. It embodies the risky opportunity-seeking behaviour for identification and exploitation of new and/or unexplored existing opportunities (Shane, 2000; Ucbasaran et al, 2008). Importance of intra-organisational factors –i.e. human

resources, innovation capability, firm competences, financial factors, etc. have been widely discussed in terms of their effects on entrepreneurship and opportunity-seeking behaviour (Wiklund and Shepherd, 2003a; Audretsch et al., 2008; Eckhardt and Shane, 2011). These aspects are explored at firm level, i.e. from a micro perspective.

The macro perspective is symbolised by the 'environment' in entrepreneurship literature. Busenitz et al (2003: 296) state that among a sample of 97 manuscripts on entrepreneurship published in top management journals during the period 1985 to 1999, seven manuscripts examined how conducive the entrepreneurial environment is. Here, the 'environments' category captures the manuscripts looking at the rates of start-up at a population level and the cultural, economic or market factors generating an environment that enhances or hinders entrepreneurial activity. Busenitz et al. (2003: 296-297) report that these seven manuscripts do not intersect with other domains in entrepreneurship studies, i.e. with the categories of opportunities, individuals and teams, mode of organizing. This suggests these papers only focus on the environment issue. More recent research examines the policy support to increase rate, magnitude and variety of entrepreneurial exploitation (Zahra and Wright, 2011); the quality of institutional framework, i.e. corruption, property rights, government activity in terms of its effects on entrepreneurial activity (Estrin et al, 2013) and the broader macro aspects of education, training, cultural and social norms, government policies and financial support (Valdez and Richardson, 2013). Institutional factors (and specifically institutional *change*) are important particularly in newly emerging and slow-changing sectors to create opportunities for entrepreneurial activity (Hekkert et al., 2007) and embracing intrapreneurial activity in mature sectors (Sine and David, 2003). Moreover, there is need for the 'environment' to extend beyond cultural, economic and market factors, encompassing the governance of innovation systems that co-evolve with political systems (Kuhlmann, 2001).

In the field of strategy, Porter (1996) stresses the 'fit' between internal characteristics of the firm and the external environment in which it competes. This 'fit' bears importance also in the field of entrepreneurship. It has been addressed in a number of studies, albeit reservedly and investigating the selected aspects of macro environment as moderating the relationship between entrepreneurial behaviour and performance/growth. For instance, hostile versus friendly/dynamic environments (Covin and Slevin, 1989; Lumpkin and Dess, 2001; Moreno and Casillas, 2008),¹ market orientation and hostility (Becherer and Maurer, 1997; Barrett and Weinstein, 1998), uncertainty in the domestic and foreign environment (Dimitratos et al., 2004), market conditions and market turbulence

¹ Contrary to Covin and Slevin (1989) and Lumpkin and Dess (2001), Moreno and Casillas (2008) do not report a statistically significant relationship between entrepreneurial behaviour and firm growth. They also find that neither hostile nor dynamic environment does moderate this relationship.

(Chaston and Sadler-Smith, 2012). Zahra and Covin (1995) and Zahra and Garvis (2000) investigate the effects of hostile environments on corporate entrepreneurship. Conceptualization of environment stems from source of information and stocks of resources. Dynamism then relates to uncertainty surrounding the firm and hostility captures the intensity of competition for scarce resources. Within this setting of macro environment analysis, no distinction is made between the technological and market-related aspects. Indeed, institutional framework holds aspects of technologies and markets, which may be influencing the relationship between entrepreneurial activity and firm growth in different ways, i.e. they may act as substitutes or complements to each other.

This paper addresses this gap by proposing a multi-level framework through which micro-level and macro-level manifestation of technological, market-related and institutional opportunities are analysed for their growth-driving effects differentiating between entrepreneurial and intrapreneurial activity and comparing them to conservative firm behavior. This paper also contributes methodologically by benchmarking conservative firms against entrepreneurial and intrapreneurial firms within a multi-level cross-case analysis.

The paper is organized as follows. In the next section, existing literatures on entrepreneurship and intrapreneurship are discussed in terms of their approach to opportunity exploitation and seizing in micro and macro environments to generate a fit between the two levels of micro (inter-organisational) and macro (institutional). Section 3 describes the research methodology and informs about the multi-level cross-case research setting where cases are drawn from three Central and Eastern European countries (CEEC) Hungary, Poland and Czechia. Results are presented in section 4. Section 5 concludes.

2. Entrepreneurial activity, intrapreneurial activity and opportunity exploitation

Entry of a new venture into the market is a proactive action confronting major risks to test pioneering ideas (Miller, 1983; Covin and Slevin, 1986, 1989, 1991). The same would apply to an established old enterprise if it were to break its routines and try to produce significantly new product/process/service. An old firm would attempt proactive, risk-taking behaviour to gain competitive advantage in the market and such competence would reasonably build on its prior knowledge in the area (Zahra et al., 1999). It is widely agreed that such entrepreneurial orientation has positive influence on firm performance (Dess, Lumpkin and Covin, 1997; Wennekers and Thurik, 1999; Carree and Thurik, 2003; Wiklund and Shepherd, 2003a, 2003b; Wiklund, 2007; Audretsch, 2007; Audretsch et al., 2008).

It is also widely agreed that generation of entrepreneurial activity is a matter of identification, exploration and exploitation of valuable opportunities (Shane, 2000; Ucbasaran et al., 2008). Shane and Venkataraman (2000) state that for the entrepreneurial activity to take place, entrepreneurial opportunities must exist in the first place. But, what are opportunities? Shane and Venkataraman (2000) (citing Casson 1982) define them as “opportunities to bring into existence new goods, services, raw materials, and organizing methods that allow outputs to be sold at more than their cost of production”. In support of this view, Sanders (2007) argues that opportunities are tools to present new knowledge and value creation activities. Opportunities appear to be factors that help generate conditions to make new knowledge creation possible in the organization. For Schumpeter (1934) generation of the ‘new’ or ‘novel’ is in the core of entrepreneurial activity, which leads to entrepreneurial profit. Opportunities help generate conditions to create ‘new’ or ‘novel’ which in turn brings out success. Where are opportunities embedded? According to Eckhardt and Shane (2003) entrepreneurial opportunities manifest themselves in a variety of different forms: (i) by their location (i.e. in the product/process as change, as new raw material or in value chain); (ii) by their source (i.e. asymmetries in existing information or exogenous shocks of new information, demand and supply side opportunities with regard to change and differentiation between productivity-enhancing and rent-seeking behavior; (iii) by their initiator (i.e. the entrepreneurial actor).^{2, 3}

Opportunities operate both at micro-level and macro-level. At micro (intra-organisational) level, they manifest themselves within the technological and market-related factors. These can be observed in firms having the appropriate technological and financial resources, distinctive competences in place when the right moment strikes to generate the ‘new’ and ‘novel’. For instance, Shane (2000) shows, at individual level, that entrepreneurs’ discoveries of opportunities are related to information that they already possess and entrepreneurial opportunities exist because different people possess different information (Kirzner 1997 cited in Shane 2000). In similar vein, different firms possess different resources and competences (Penrose, 1995; Barney, 1991) and the optimal growth of the firm involves a balance between exploitation of existing resources and development of new ones (Wernerfelt, 1984). Knowledge of the entrepreneur about a new

² For a discussion from different perspectives on ‘what is an entrepreneurial opportunity?’ see McMullen et al. (2007) and the special issue of Small Business Economics Volume 28, Issue 4, April 2007. For a comprehensive analysis of existing literature on entrepreneurial opportunities and its definition see Eckhardt and Shane (2003).

³ The question of ‘where do opportunities come from?’ also surrounds the most recent debate. Suddaby et al. (2015) discuss whether entrepreneurs indeed create or discover opportunities. They compare two distinct streams of entrepreneurship research literature, i.e. the creativity approach driven by the resource-based view (Alvarez and Barney, 2007) and the entrepreneurial opportunity identification, exploration and exploitation approach (Shane, 2012). This suggests that the entrepreneurship literature may be moving onto some deep discussions about the ‘origins’ of opportunity concept.

technology helps him/her to embark on the opportunity of establishing a new firm and this would be complemented with the knowledge and exploitation of the opportunity to hire skilled workforce to generate success. Similarly prior technological knowledge can act as catalyst to exploit opportunity to create new ideas as an intrapreneurial activity, the existing workforce, networks of relationships, already accessed markets provide the opportunities for further success.

Opportunities also operate at macro-level. Manifested within institutions, they shape entrepreneurial activity whereby favourable external habitat is provided for new ventures to flourish (Radosevic and Yoruk, 2013; Acs et al., 2014, 2016). If opportunities are provided at macro-level, either by market forces or by policy, firms will identify and grasp them.⁴ Yet, it will be those firms, that have the resources and competences in place, to identify, exploit and alter the entrepreneurial opportunities. Intrapreneurial opportunities, on the other hand, have not been a matter of debate in the literature. However, the 'opportunity' concept provides a useful framework, to be implemented on the intrapreneurial activity.

Major challenge for analysis is to bring together opportunities operating at different levels. This is embedded in a multi-level framework involving intra-organizational factors at the firm level and extra-organizational factors at the industry and national levels. At this point, we turn to the prior contributions in the literature to explain determinants of entrepreneurial opportunities and entrepreneurial/intrapreneurial firm behaviour before providing an analytical framework for a multi-level analysis.

Entrepreneurship literature discusses resources, competences and opportunities in terms of its effects on firm performance and as confined to firm level. These dynamic configurations are observed as technology-related (Shane, 1992, 1996; Wiklund and Shepherd, 2003a, 2003b; Gregoire and Shepherd, 2012) and market-related (Shane, 2000; McKelvie and Wiklund, 2004; Shepherd and DeTienne, 2005; Zahra et al., 2005) as well as institutional (Sine and David, 2003; Wright et al., 2005; Lockett et al., 2012; Valdez and Richardson, 2013). Technological and market-related opportunities operate at both micro and macro-levels. The macro-level opportunities of technology and market dimensions are embedded in institutional aspects. We first start with the micro-level technological and market opportunities and then bring in the macro-level aspects into the discussion.

⁴ Evidence for this argument is the UK venture capital success in creating new firms. Based on its consistently high levels of venture capital availability (0.8 - 1.6 % of GDP during 2008 to 2014) a deliberate choice of policy tool implemented over the years, the UK has been the top country in the EU in terms of number of births of enterprises. About 9-15% of active enterprises are new entrants. The runner-ups Germany and Italy's venture capital investments are as low as 0.1-0.3% of GDP. (Source: EUROSTAT). The UK is now turning to scaling-up these start-ups and a recent report provides insights into how start-up firm growth can be achieved and sustained by policy implementations (see Coutu, 2014).

2.1 Micro-level technological opportunities

Technology generation. A firm's technology generation capability is largely determined by how the firm makes use of available technological opportunities. These are closely associated with the extent of its R&D activities, efforts in accessing new knowledge, learning and its experience, which contributes to its absorptive capacity and in turn capability development in new process, product and service creation (Nelson and Winter, 1982; Leonard-Barton, 1992; Cohen and Levinthal, 1990; Stam and Wennberg, 2010). Knowledge acquisition, integration and generation are for the most part a function of firm-internal resources and factors associated with these resources (Penrose, 1995) and closely related to conduct of R&D, payment for royalties, capability for design, production and innovation. Particularly R&D and patenting are important tools for fast growing firms in high technology sectors (Coad and Rao, 2008).

Technical change occurs in the form of innovation in a firm. According to Drucker (1993) innovation is the action that results in the firm's resources endowed with new capacity to create value, therefore it is the most useful tool of entrepreneurs to exploit change as an opportunity to reconfigure resources to create value in new ways. Reconfiguration of resources in a way is exploiting the technological opportunities. That is why entrepreneurship and innovation concepts are often considered as intertwined in the entrepreneurship literature (Schumpeter 1934; Covin and Slevin, 1986). Changes in rates of entrepreneurship appear to be driven by changes in technology (Shane, 1992; 1996) and technological innovation is an important determinant of entrepreneurial opportunity (Audretsch et al., 2008; Eckhardt and Shane, 2011).

Zahra et al. (1999: 173) stress the potential in intrapreneurial activities with regard to knowledge creation that they "... frequently produce valuable, new, unique, and firm-specific knowledge that can be used to develop new competencies or extend existing ones". The way that intrapreneurial activity leads to technology generation is via learning (Zahra, 1993a), which contributes to formation of firm's dynamic capabilities (Zahra et al., 2006). Innovation activity, in that sense, requires several building blocks: (i) new knowledge has to be generated, (ii) skilled human capital is needed to generate this new knowledge and (iii) knowledge and value chain networks play significant role in creation of this new knowledge.

Human capital relates to competence building based on skills, knowledge and experience that the workforce in the firm embodies. From entrepreneurship perspective, human capital is crucial factor in opportunity identification and exploitation (Shane, 2000; Ucbasaran et al., 2008). Opportunities are identified and seized as manifested in the human capital. Such human capital is associated largely with the founder of the firm at the beginnings of the firm's establishment stage. One can

extend this to intrapreneurial activity in the firm. Being able to spot and recruit the most appropriate workforce for the task is about exploring and exploiting the opportunity. The importance of an individual or individuals (i.e. the role of human resources) championing new product ideas within the intrapreneurial context is emphasized by Pinchot (1985) and Shane (1994). As the repository of intangible resources human capital is most important in new knowledge-intensive firms in emerging industries, since accessing, deploying and empowering this type of capital create opportunities for knowledge generation within intrapreneurial activities (Dess et al., 2003) and important factors for survival of new ventures beyond certain age (Radosevic and Yoruk, 2015).

Networks relate to flow of knowledge among organizations. Firms transact with technology and value chain suppliers in order to access external knowledge resources to produce products/processes and services with the best possible quality at competitive prices so that they can sustain production and innovation activity for growth. These network ties serve to alleviate the extent of risk-taking that is inherent both in entrepreneurial and intrapreneurial activities (Dess et al., 2003). Establishment of such external links during the emergence stage and maintaining them throughout the firm life cycle is crucial. Becoming a member of these networks is about identifying and seizing the opportunity when it arises. Informal links that are established during the emergence stage can deepen based on mutual trust in later stages. These first-degree informal links (i.e. social capital, see Burt, 1997; Nahapiet and Ghoshal, 1998) enable firm to access and become member of valuable networks in supply chain and help access markets. In later stages, the social capital paves the way towards more formal contractual types of links (i.e. strategic alliances, R&D agreements, etc.) in seek of tangible and intangible sophisticated knowledge and pursuing of innovative activity (Hagedoorn, 1993; Hite 2005).

2.2 Micro-level market opportunities

Market demand affecting entrepreneurship is the concrete evidence for profitability (Kirzner, 1979; McMullen, 2011). Where there is profit, there is an opportunity driving the entrepreneurial activity. According to Kirzner (1973) opportunity for profit is embedded in market imbalances, asymmetries, inefficiencies. Awareness, alertness and prompt action of the firm towards these changes in the market are necessary to grasp the opportunities (Kirzner, 1973, 1985). Firm's access to domestic and/or foreign markets, being able to hold a share of these markets and being able to sustain this share over time particularly by increasing its export capability is important for sales and profits in a competitive environment (Kirzner, 1997; Hobday 1994).

Apart from real markets, opportunities are also manifested in efficient finance markets to fund entrepreneurial and intrapreneurial activity. Availability of initial finance, as an opportunity to seize, is crucial for starting new ventures. New ventures' growth is dependent on how well their capital structures are formed at the start of their life and the subsequent support by continuous funding of innovation activity throughout their life cycle (Ahlstrom and Bruton, 2006; Beck and Demirguc-Kunt, 2006; Mazzucato, 2013; Coutu, 2014). Central and Eastern European small and medium sized firms largely rely on their own resources to finance the start-up and scale-up activities (Radošević and Yoruk, 2015).

2.3 Institutional opportunities operating at macro-level

Up to here, we discussed the micro-level opportunities that entrepreneurial, intrapreneurial and conservative firms can make use of in order to advance their performance. Here, we introduce the institutional opportunities at macro-level, but we specifically focus on those institutional opportunities, which have technology and market relatedness, and act as catalyst to enhance the effect of grasped micro-level opportunities.

Quality and effectiveness of institutional framework boost competitiveness and growth (Acemoglu et al. 2002; Rodrik et al. 2002). Institutions are regarded as 'rules of the game in a society' (North, 1990:3). They appear as formal and informal rules that determine corporate behaviour and entrepreneurial activity. Entrepreneurship literature provides well-supported evidence on the effects of institutional factors on an individual entrepreneur's decisions to act assessing economic freedom, intellectual property rights, corruption and government activity (McMullen et al., 2008; Autio and Acs, 2010; Estrin et al., 2013).

There is much debate about whether institutions hinder or promote entrepreneurial activity and firm performance. The issue is a complex one, research findings are ambiguous and much depends on mature versus emerging sectoral activity⁵ and national differences. Evidence from Global Entrepreneurship Monitor (GEM) data suggest it may be determined by what 'rules of the game' prevail within the borders of nations. Countries have different institutional structures thus resulting in heterogeneity in the rates of entrepreneurship (Levie and Autio, 2008). In advanced countries,

⁵ Entrepreneurship literature recently started to discuss the effects of system-level factors, specifically the ones that encourage environmentally sustainable entrepreneurship in emerging sectors at firm and individual levels (Cohen and Winn, 2007; Dean and McMullen, 2007; Patzelt and Shepherd, 2011). These studies find that the prior knowledge of the firm/entrepreneur regarding the natural/communal environment is influential on discovery and exploitation of opportunities related in particular to environmentally sustainable activities.

institutions are well established and relatively stable, whilst in emerging markets and transition countries they are weak and constantly changing causing companies suffer the institutional voids or allowing to exploit them if they can adjust their strategies accordingly (Khanna and Palepu, 1997; Meyer and Peng, 2005; Wright et al., 2005). In that sense, institutions can equally offer incentives and constraints on entrepreneurial activity; it is up to firms whether they can adapt to institutional environment (Jackson and Deeg, 2008; Wan, 2005). It is true that not all firms are entrepreneurial and not all entrepreneurial firms innovate. The external contexts for the innovative entrepreneurial behaviour is determined by the industrial, social, institutional/policy as well as organisational sub-contexts (Autio et al., 2014).

Inspired by opportunity creation theory, which suggests that entrepreneurs create new opportunities (Alvarez and Barney, 1997), institutional entrepreneurship literature responds to traditional institutional theory and argues that "... struggles still occur between different stakeholders in relation to resources and social action, and these have the capacity to recreate, even change, institutionalized practices. [Institutional entrepreneurship] seeks to initiate and enact institutional change." (Lockett et al., 2012: 357). Thus, in terms of available empirical evidence, what exactly 'institutions and institutional factors' are as regards to their effects on entrepreneurship has broad scope and whether firms have control over institutions or not is a matter of debate.

The direct role of institutions is widely investigated on new venture creation and entrepreneurs. Their effects on intrapreneurial activity have not been a major question, since there is a presumption that established firms would have already acquired the necessary information about the norms in force in the institutional environment. Although this argument may have some sound basis, it is still a challenge for the intrapreneurial firm to explore issues related to, for instance, IPR protection, public procurement of products and auditing requirements in relation to newly added product and process lines.

Literature suggests macro-level legislations about IPR protection (Autio and Acs, 2010), government's procurement of advanced products (Edquist and Zabala-Iturriagoitia, 2012), R&D tax incentives (Castellacci and Lie, 2015) are influential policy tools on firms' technology generation activities. Opportunities related to human skills at the macro-level relate to quality of the educational system as the provider of human capital and local availability of specialized research and training services, which contribute to firm's specific needs in technological issues. Heinze and Kuhlmann (2008: 895) observe that the quantity and quality of staff at the research institutions (i.e. resource endowment) and the level of communication among the research bodies (i.e. organizational dimension) are among the factors that influence emergence of conducive institutional environment for research collaboration in high-tech sectors. Macro-level support to elevate the

quantity and quality of suppliers, quality of research institutes and development of clusters has significant impact on firms' success. For instance, the UK government pays special attention to strengthening the supply chains, which serve selected sectors such as advanced materials, aerospace and biotechnology (BIS, 2014). Wennberg and Lindqvist (2010) state that being located in strong clusters have supported Swedish new ventures in high technology fields in terms of creating more jobs, paying higher taxes and paying higher wages to their employees. Firms can exploit these externally created opportunities, which are beyond their control, if they have related firm level competences in place. They may even be wittingly selective about which institutional opportunity to embark on.

Ability to sense buyers' new needs is prerequisite to identify and exploit the available macro-level opportunities in the market. Eckhardt and Shane (2003) note exogenous shocks, as generators of market disequilibrium, which lead to change in consumer tastes and preferences driven by increasingly more sophisticated buyers on the demand side. In markets or sectors with high degree of buyer sophistication, firms will need to adjust themselves to what buyers need, i.e. cheaper products or better performing products. Porter (1990) argues firms with buyer knowledge and buyer sophistication possess better opportunities for easier and quicker recognition of new buyer needs. From a systemic approach stimulation of demand articulation is an important function in management of innovation to generate higher degrees of buyer sophistication (Smits and Kuhlmann, 2004), which may be driven by the role of users (Von Hippel, 1986).

Despite mostly using their own finances and private banks' resources, CEE firms have access to generous funding in the form of public grants, loans and EU funding especially since their accession to the EU. Where firms lack internal resources, external financing through public loans becomes a crucial substitute (Beck and Demirguc-Kunt, 2006). The issue here mostly is about whether firms are aware of these financial opportunities or not and what effect it does have on their entrepreneurial activity and growth. Some firms will face certain barriers that prevent them from grasping the opportunities immediately (Shane and Venkataraman, 2000; Dean and McMullen, 2007). These barriers may be due to unawareness about the changing circumstances in markets as well as externally determined institutional factors that firms have no control on.

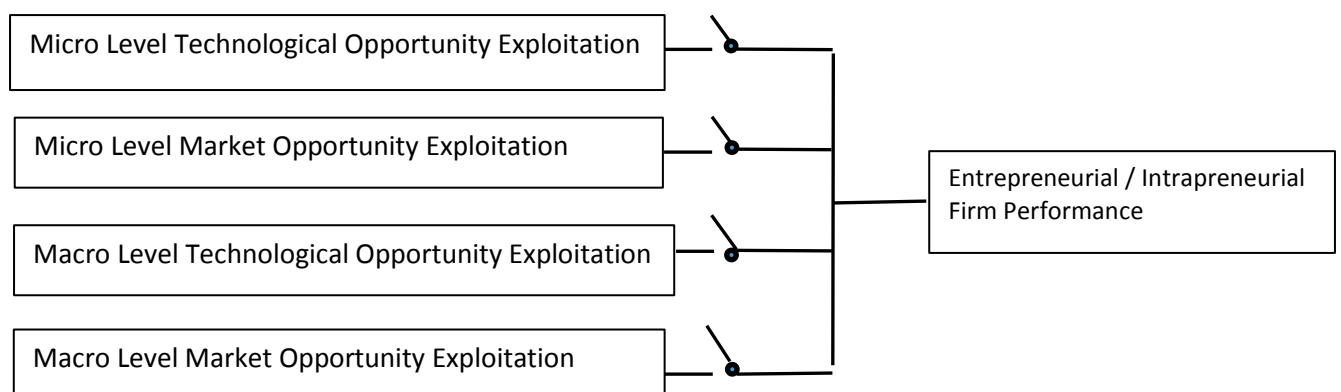
2.4 The fit between micro and macro level entrepreneurial opportunity exploitation

Insights from strategy literature provide very useful theoretical tools for entrepreneurship literature to advance further on the conceptualisation and analysis of simultaneous effects of micro and macro level opportunity exploitation on entrepreneurial performance, in other words looking for a fit

between micro and macro level opportunity exploitation. Strategic management literature puts forward the notion of ‘strategic fit’, which can be defined as the matching of internal resources of the firm with its environment, so as to generate the most optimal outcome in terms of performance (Zajac et al., 2000; Porter, 1996). Different conceptualisations of strategic fit have been proposed in the form of mediation, moderation, covariation, gestalts, etc. (Drazin and Van de Ven, 1985; Venkatraman, 1989; Venkatraman and Prescott, 1990).

Inspired by the concept of strategic fit, Figure 1 provides an analytical framework to empirically study fit between micro and macro level entrepreneurial opportunity exploitation to generate high rates of firm growth. These entrepreneurial opportunities are further embedded in technological and market-related domains as widely discussed in Section 2 above.

Figure 1. Analytical framework



Note: The switches denote that a condition (i.e. a particular type of opportunity exploitation) may take place or not to produce the outcome.

3. Methodology

A comparative multiple case studies approach is pursued for analysis of data in this study. Six cases are analysed based on the classification of entrepreneurial activity and technology types. Details about the research setting is provided in the below sections. Although not generalisable, case studies provide elaborate insights into how and why questions (Yin, 2003). They are uniquely positioned to provide new insights into theory and analysis by identifying new conceptual categories (Suddaby et al, 2015: 9). Based on Brown and Eisenhardt (1997), each of the cases provide a series of independent experiment. By adopting Yin (2003) and Eisenhardt (1989), we use the replication and discrepancy approach to conduct the analysis.

3.1 The research setting for cross-case analysis

The research setting for cross-case analysis is as follows in this research. Commonalities of the selected cases are being that firms are: (1) SMEs (with less than 500 employees), (2) engaged in production activities associated directly or indirectly with low carbon technologies field and (3) located in the CEECs. The framework for comparison is arranged as in Figure 2 and is based on two dimensions: (1) type of entrepreneurial activity and (2) type of technology.

Figure 2. The setting of cross-case analysis in this research by level of technology and type of entrepreneurial activity in firms.

Type of entrepreneurial activity Type of technology		Young Entrepreneurial (Age: 5 to 10)	Established Intrapreneurial (Age: over 20)	Established Conservative (Age: over 20)
Science-based		Case 1: ESB Surface engineering and ceramic coatings	Case 3: ISB Electro-technical ceramic components and ceramic coatings	
	Niche	Case 2: EN Electric vehicle	Case 4: IN Electric motors for alternative vehicles	
	Conventional			Case 5: CC1 Laboratory porcelains and ceramics Case 6: CC2 Technical ceramic parts and components

Type of entrepreneurial activity dimension: Young entrepreneurial and established intrapreneurial firms against established conservative firms

The research setting for cross-case analysis firstly differentiates between entrepreneurial, intrapreneurial and conservative types of activity by the firms. Entrepreneurship is about developing, starting a new independent venture. Intrapreneurship is an internal activity within an already existing venture. The significance of an individual or individuals (i.e. the role of human resources) championing new ideas within a corporate context is emphasized by Pinchot (1985), Shane (1994) and Sharma and Chrisman (1999) to bring out renewal within the organization. Following these contributions, intrapreneurship is a complex phenomenon, which extends beyond

the routine processes and involves embarking on more challenging and boundary-pushing activities such as diversification and moving into a new technology direction (Burgelman, 1983a, 1983b, 1991; Covin and Miles, 1999), a consequence of firm's scanning and sensing of the markets and the environment (Teece et al., 1997). It is more than an occasional attempt to innovate. It is not an intermittent activity. It is a lasting contribution to value creation, which aims at keeping the organization on the cutting edge in terms of proactively seeking new opportunities (Dess et al., 2003). Therefore, this research first differentiates between these two path-breaking activities and the conservative behaviour:

(a) Entrepreneurial activity as the start-up of a firm. Entrepreneurial ventures are considered as young firms beyond the age of 5 but below 10 for the purposes of this research. Thus, they are not brand new but *on-track* start-ups. Since this research aims at examining the factors influencing growth in sales and employment, it is reasonable to investigate young firms, which are on route to being established. The five-year survival rate of enterprises born in 2007 and still active in 2012 shows that only less than half (45 %) of them are still active at the end of five - year period (EUROSTAT, 2015), typically more than half of new entrants exit the market before they reach age 6 (Bartelsman et al., 2005).⁶

(b) Intrapreneurial activity within an 'established' organization entering a new line of technology by means of creating an independent unit or set-up of a new activity for the expansion of current business and diversification through internal development.

(c) Conservative activity of the established firm that aligns with the *status quo* in producing the same products by using same process technologies over time.

Conservative and intrapreneurial firms, in this research, are already established firms beyond the age of 20. Whilst intrapreneurial firms have taken the challenge of moving into a new and emerging technology area associated with their major technology field of production, conservative firms have been inert in taking such radical decision and cannot break their routines.

⁶ We should note that 'exit' does not necessarily mean 'failure'. For instance, some of the organisational exits may be due to a harvest sale, indicating success rather than failure, as consequence of an entrepreneurial exit (DeTienne, 2010; Wennberg et al., 2010). However, these firms are beyond the scope of this study.

Type of technology dimension: Science-based and niche against conventional in low carbon technologies

The research setting for cross-case analysis secondly differentiates between the contrasting science-based technology and the conventional/mature relatively lower-technology parts of the advanced ceramics and niche technology of electric vehicles and parts.

Manufacturing processes and products developed for aiming to generate the least possible greenhouse gas emissions are considered to fall into low-carbon technology category. Advanced ceramics and electric vehicles technologies today can provide feasible engineering applications to make the processes and products low-carbon. Particularly advanced materials play crucial role in transition to knowledge-based, low-carbon, cost-competitive and efficient technologies and is given priority as a focus sector in many countries' technology strategy plans. Based on the kind of product and process technologies, advanced ceramics technologies can broadly be classified into two:

(a) Conventional technology advanced ceramics⁷ (e.g. powder metallurgy parts, laboratory ceramics and porcelains, ceramic refractories) identified by their structural properties⁸ and by use of medium technology processes in production (e.g. wet/dry/hydraulic pressing, sintering, etc.); and by their application in medium technology sectors, such as the automotive sector, iron and steel, standard electronics, textiles, machine tools, etc.

(b) Science-based technology advanced ceramics (e.g. electro-technical ceramics such as piezoelectrics, sensors, ultra-hard thin film ceramic coatings), identified by their functional properties⁹ and by use of higher technology processes (e.g. injection moulding, resin transfer moulding, plasma spraying, ion implantation, chemical vapour deposition, magnetron sputtering, plasma-enhanced vapour deposition, etc.) and use of R&D; and by their application in high technology sectors such as telecommunications, complicated electronics, defense and aerospace, medical implants, etc.

(c) Niche technology electric vehicles and components. In energy transitions literature, more risky and novel innovations are associated with 'niche' technologies –i.e. a product designed for a small part of the technology market (Geels, 2002; Geels and Schot, 2007; Schot and Geels, 2007; 2008).

⁷ Note that conventional technologies within the advanced ceramics field are different from traditional ceramics technologies. The latter are about ordinary products such as tiles, sanitary ceramics, earthenware, etc. and are not within the scope of this research.

⁸ Structural properties of a material refer to mechanical and thermo-mechanical properties such as high strength, high-temperature strength, wear resistance and lightweight.

⁹ Functional properties of an advanced material refer to the physical, chemical and biological functions possessed by the material. These may relate to insulation, high electrical conductivity or resistance, high chemical stability, piezoelectricity, corrosion resistance, biocompatibility, etc.

Risk and uncertainty the niche innovation faces is not necessarily due to technologically complex or science-based nature of the product but it may well be due to fierce competition it faces from the already established products in the market. Recognition of new products by end-users generally requires their first appearance in a local niche market where a set of arrangements are needed to protect novel technologies and to provide them with attention, legitimation and funding (Bakker, Van Lente and Engels, 2012) to allow for the co-evolution of technology, user practices, and regulatory structures (Schot and Geels, 2008). Electric, hybrid and hydrogen cars are analysed widely within this context (Andrews and DeVault, 2009; Bakker, Van Lente and Engels, 2012; Bakker, Van Lente and Meeus, 2012). Schot and Geels (2008) differentiate between the local and global niche markets stating that niche ideas usually first emerge in the local markets. The electric vehicles case taken from Central and Eastern Europe examined in this paper sheds light onto a local niche market. Niche technologies can be captured by both new and established incumbents. Berggren et al. (2015) show that Swedish incumbents in heavy vehicles industry are perfectly able to exploit niche and markets.

3.2 Placing the research setting into firm life cycle model

Here, we incorporate Miller and Friesen's (1984) life cycle model into the research setting as a useful tool to pinpoint each of the six cases in terms of their specific stage in their own life cycle.¹⁰ This helps for better illustration of the cross-case configuration. Miller and Friesen (1984) identified five major stages in the life cycle of a firm, i.e. birth, growth, maturity, revival and decline phases. They attribute certain characteristics to firms, such as age, sales growth rate, structure and strategic behaviour, when identifying the stage that the firm is in during its lifetime. Based on the data available to us, we can use age and sales growth rates for our cases to pinpoint the particular stage that they are in. The upper graph in Figure 2 aims to illustrate this configuration. Both entrepreneurial firms are at growth stage; since either their sales or employment growth rates are above 15%.¹¹ The conservative firms appear to be in maturity stage with sales or employment growth rates lower than 15%, whereas the intrapreneurial firms can be placed at rejuvenation stage having achieved substantially higher growth rates than coetaneous conservative firms.

¹⁰ The life cycle model was purposefully developed to provide a dynamic analysis (over time analysis) of the firms. Although we do not conduct a dynamic analysis, since we do not investigate each case over their lifetime but at a specific point in time; we are interested in comparing firms at their different stages of life. Since, majority of firms will live through these stages, it is important to show that entrepreneurial and intrapreneurial firms bear differences from conservative firms.

¹¹ Miller and Friesen (1984: 1166) use 15% cut-off rate for sales growth to differentiate between growth, maturity and revival phases.

3.3 Sample and data collection

There is no category fully dedicated to advanced ceramics in ISIC or NACE industry categories. These technologies are scattered within several categories. Therefore, no existing source provides aggregate data for advanced ceramics activities. Moreover, not a list of low carbon activities in manufacturing industries is available, as opposed to green activities such as wind, photovoltaics, etc. These limitations adversely affect collection of aggregate and reliable quantitative data. The strategy in this research has been, therefore, to conduct an original survey targeting key informants in firms. Information gathered via surveys was complemented with data from Amadeus database and company websites to provide effective means for data triangulation to increase data reliability and validity (Miles, Huberman and Saldana, 2014).

Amadeus database holds information about firms based on NACE Rev. 2 primary codes. It is the main guide in this research, since it provides information about the main activity and main products of the firms. This allows us to reach firms that fall into the domain of this research. We first gathered primary information about the firms operating in the below sectors in Czechia, Hungary and Poland:

2343 - Manufacture of ceramic insulators and insulating fittings,
2344 - Manufacture of other technical ceramic products,
2561 - Treatment and coating of metals,
2910 - Manufacture of motor vehicles, and
2931 - Manufacture of electrical and electronic equipment for motor vehicles.

Table 1 illustrates the population and sample size. Using Amadeus database, we identified and contacted 52 firms operating in the above industry categories. A structured questionnaire¹² was e-mailed during November 2013 to January 2014 period to managers in three waves (i.e. two reminders) followed up by telephone calls. 7 valid questionnaire returns were obtained. This corresponds to 14% response rate. We excluded 1 firm from the conservative firms since it exactly repeated findings from other 2 firms and would not add much to analysis. As a characteristic of case study research, our sampling was based on theoretical and empirical reasoning (Makela and Maula, 2006) and not on statistical representativeness.

¹² The questionnaire is available from the author upon request.

Table 1. Population and sample size by technological activity.

	Population	Valid responds
Conventional technologies in advanced ceramics	28	3
Science-based technologies in advanced ceramics	26	2
Electric vehicles	3	1
Electric auto engines	5	1
TOTAL	52	7

Given the focus on domestic SMEs, a key informant being the manager/director was targeted.¹³ Reliability checks were conducted on key firm level indicators, available at Amadeus database and whenever available at firm's website, such as firm age, employment size, turnover and turnover growth rate looking for a match/mismatch with the director's answers. The correlations between the Amadeus database and data obtained from the key respondent was stronger than 0.8 in all cases, suggesting that the data obtained by survey questionnaire were reliable.

3.4 Operationalisation of the concepts

In this research, the concepts of technology, market and institutions related opportunities at micro and macro levels are operationalised by using the manifest indicators in Table 2.

Performance is measured by two indicators in this paper: Sales growth rate and employment growth rate. Employment figures were earlier used to assess performance in high-growth firms (Garnsey and Heffernan, 2005; Garnsey et al, 2006; Acs, et al, 2008; Delmar and Wiklund, 2008; Eckhardt and Shane (2010). Scaling-up measure of Coutu (2014) is adopted: Either a sales or employment growth rate higher than 20 percent indicates fast growth.

Technological and market opportunities at micro-level are operationalised by use of indicators such as innovations, patents, trademarks, design capability representing technology generation; number of employees with postgraduate degrees, R&D staff, extent of training provided to employees, brain drain and gain capturing different grades of human skills; type, extent and form of knowledge and value chain connections representing networks. To represent real demand we investigate share of exports of the firm and the demand that the firm generates for its products in the domestic and foreign markets. Source of funds to support innovation, networking and ease of access to other markets are used to explore the influence of finance markets.

¹³ The information on managers is available in Amadeus database.

Table 2. Indicators used in this research and their degrees.

		Component	Indicators	low	medium	high
Outcome indicator		Firm Performance	-Sales growth rate (2007-2012 pa) -Employment growth rate (2007-2012 pa)	<5% (slow)	5-20% (medium)	>20% (fast)
Intra-organisational (micro-level) opportunities	Technological	Technology generation	-R&D expenditures (% in turnover) (2012) -Design capability -Number of innovations (2007-2012) -Patents granted (2007-2012) -Trademarks granted (2007-2012) -ISO9001, 14001 certificates (2007-2012)	<5% Customer's design New-to-firm <1 <1 <1	5 to 10% Mostly customer's + some own design New-to-country 1 1 1	>10% Own design New-to-world >1 >1 >1
		Human skills and training	-Number of employees (with PhDs, Master's, Graduates) (2012) -R&D personnel (% in total employment) (2012) -Extent of staff training (WEF GCR Q.5.08) -Brain drain (WEF GCR Q.7.07)	<5% <5% 1,2,3 1,2,3	5-10% 5-10% 4 4	>10% >10% 5,6,7 5,6,7
		Knowledge networks and value chain	-Type of partner in research collaboration -Form of research collaboration -Value chain breadth (WEF GCR Q.11.05)	<4 partners Technical support 1,2,3	4 to 5 partners Licensing and subcontracting 4	>5 partners Research collaboration 5,6,7
	Market-related	Real market demand	-Share of exports in turnover (2012) -Foreign market demand -Domestic market demand	<10% 1,2,3 1,2,3	10-50% 4 4	>50% 5,6,7 5,6,7
		Finance market	-Source of funds: own financial sources -Source of funds: funding from a bank (WEFGCR Q.8.04)	1,2,3 1,2,3	4 4	5,6,7 5,6,7
Institutional (macro-level) opportunities	Technological	Technology generation	-Government procurement of advanced technology products (WEF GCR Q.12.05) -IPR protection (WEF GCR Q.1.02) -R&D tax incentive availability	1,2,3 1,2,3 1,2,3	4 4 4	5,6,7 5,6,7 5,6,7
		Human skills and training	-Quality of the educational system (WEF GCR Q.5.03) -Local availability of specialized research and training services (WEF GCR Q.5.07)	1,2,3 1,2,3	4 4	5,6,7 5,6,7
		Knowledge networks and value chain	-Quality of scientific research institutions (WEF GCR Q.12.02) -Local supplier quantity (WEF GCR Q.11.01) -Local supplier quality (WEF GCR Q.11.02) -State of cluster development (WEF GCR Q.11.03)	1,2,3 1,2,3 1,2,3 1,2,3	4 4 4 4	5,6,7 5,6,7 5,6,7 5,6,7
	Market-related	Real market demand	-Buyer sophistication: buyer's purchasing decision (WEF GCR Q.6.16)	1,2,3	4	5,6,7
		Finance market	-Venture capital availability (WEF GCR Q.8.05) -Source of funds: Public loan from national government or local authorities -Source of funds: Public grant from national government or local authorities -Source of funds: EU funds	1,2,3 1,2,3 1,2,3 1,2,3	4 4 4 4	5,6,7 5,6,7 5,6,7 5,6,7

To represent macro-level (institutional) opportunities, we used questions adapted from WEF GCR (2012) surveys to help formulate our questions.¹⁴ We measure the extent of institutional opportunities by investigating the government procurement of advanced technology products, IPR protection, R&D tax incentives, quality of educational system, local availability of specialized research and training services, quality of scientific research institutions, quantity and quality of local suppliers as well as state of cluster development. Buyer sophistication is used as the indicator influencing real market demand; venture capital availability and funds available from local, national and supranational bodies to assess finance market opportunities and efficiency. The higher the degree of these indicators, the less is the problem of missed opportunities by firms.

Table 2 provides the degree classification as low-medium-high for the indicators used in the cross-case analysis (see Table 2 and Figure 2). Micro-level and macro-level indicators are not causally antecedent of each other but are at the same level, which allows us to investigate the influence of both indicators on the outcome indicator (Baron and Kenny, 1986).

3.5 Cases

Table 3 informs about cases drawn from three Central and Eastern European countries. Yoruk (2015) provides a more detailed technical information on the cases.

Case 1 (ESB) is a Polish entrepreneurial science-based technology firm founded in 2004. Operations started directly in science-based field of technical ceramics and surface engineering. This process relies on powder/vapour deposition techniques of ceramics onto metal, glass or ceramic substrates. It provides products with anti-wear, frictionless surfaces, anti-corrosion, high thermal resistance functions desirable in the textile, automotive, defence, aircraft, machinery and cutting tools industries and bio-medical applications of hip and knee prostheses, bone joints. ESB focuses on laser cladding, laser hardening, high velocity oxy-fuel spraying and plasma spraying as process technologies.

Case 2, EN, is a Hungarian entrepreneurial niche technology firm producing diverse range of electric vehicles for use in niche markets of passenger transportation in golf courses, airports, national parks, historic quarters for tourist zones, castles, zoos, etc. Vehicle capacity of two to fourteen persons are available. Electric vehicles are classified as niche products, particularly after internal combustion engine's take over in the car industry. They are environmentally-friendly products by releasing less

¹⁴ Our questions and the original questions of WEF GCR (2012) are provided under Tables 4, 5, 6 and 7.

CO₂ and by conservation of energy, since an electric motor can convert the stored energy more efficiently into driving vehicle than an internal combustion engine and it does not consume energy whilst at rest position.

Table 3. Main characteristics of the cases.

	Technology	Case	Firm code	Country	Tech field	Products	Foundation date	Firm location	Number of employees (2013)
Entrepreneurial	Science-based	1	ESB	PL	Advanced ceramics	Surface engineering and ceramic coating	2004	independent location	80
	Niche	2	EN	HU	Auto	Electric vehicle	2004	independent location	12
Intrapreneurial	Science-based	3	ISB	CZ	Auto parts incl. advanced ceramics	Electro-technical ceramic components and ceramic coating	1996	independent location	409
	Niche	4	IN	HU	Auto parts	Electric motors for alternative vehicles	1992	industrial cluster open to any kind of firm	14
Conservative	Conventional	5	CC1	CZ	Advanced ceramics	lab porcelain/ceramics	1995	independent location	65
		6	CC2	CZ	Advanced ceramics	technical, electrical ceramics	1994	industrial cluster specific to technical ceramics	114

Case 3, ISB, is a Czech intrapreneurial science-based technology firm. Established in 1958 as a state-owned firm, it started operations by producing conventional components for motor vehicles industry such as fuses, ignition coils, etc. In 1996, it was privatised. Then, it embarked on the practice of state-of-the-art technologies and products such as optoelectronic devices, ceramic ferrites, thin film resistors, sensors, piezoelectrics and semiconductors produced mainly for automotive industry. The firm already achieved OEM supplier level for major car brands. Process technology is based on the thick and thin film vacuum deposition techniques.

Case 4, IN, is a Hungarian intrapreneurial niche technology firm. It has been producing conventional auto parts and motors since 1992. During the last few years it extended its operations into a new technology track comprising the production of electric motors for alternative vehicles.

Conservative firms, CC1 and CC2 are established Czech firms using conventional processes for technical ceramics. Both firms started operations during the mid-1990s as corporate spin-offs of large state-owned firms. This kind of firm formation has been a typical characteristic of Czech industry during the transition period. These firms usually accede to the practice and characteristics of the firm that they parted from. CC1 produces laboratory porcelains and ceramics. CC2 produces technical ceramic parts mainly high thermal resistance insulators. Processes used are classified as low to medium technology and involve powder metallurgy techniques of cold or hot pressing of ceramic powders. Products are sold to automotive, standard electronics, foundry, glass, textile industries.

4 Main Findings

The following discussion is organized to present the findings on the effects of micro-level technological and market opportunities on firm performance differentiating between entrepreneurial, intrapreneurial and conservative firms and the enhancing effect of macro-level technology and market-related institutional opportunities on these relationships.

Tables 4, 5 6 and 7 illustrate the descriptive data in three main columns. Column I lists the micro-level opportunities, Column II lists macro-level opportunities, and Column III illustrates the firm performance in sales growth and employment growth. This pattern repeats through Tables 4, 5, 6 and 7. Entrepreneurial and intrapreneurial firms with fast sales growth rates also exhibit high growth rates in employment. Slow sales growth rates of the conservative firms are reflected onto their employment growth rates as negative or nil.

4.1. Technological Opportunities

4.1.1. Technology generation

Data in Table 4 suggest effective exploitation of technological opportunities at intra-organisational level and firm performance are correlated, but there are differences among the categories of cases in terms of technology input, output and performance. Conservative firms, CC1 and CC2, exhibit significantly low intensities of technological input into R&D and design activities, which explains almost non-existent technological output as trademarks, patents and quality certificates.

Paradoxically, the conservative firms report the highest number of innovations introduced onto the market between 2007 and 2012. This is due to specialized supplier nature of these firms, which produce customized products. They regard each 'customer-oriented' product as an innovation,

although majority of the changes in the new product might be classified as nothing more than design alteration or products coming in different shapes. Products are solely based on design specifications supplied by customers. The firm fully relies on customer-guided designs, the recipes for powder mixtures in surface coating and all the technical drawings for ceramic product shape and tolerances are supplied by client firms. Conservative firms show rather poor rates of sales growth (albeit still positive) and no growth or contraction in employment suggesting a bottleneck regarding exclusive engagement in mature technologies and their related products.

Entrepreneurial firms, as compared to conservative firms, are characterized with high intensities of R&D investment, own design conduct, significant amount of patenting and innovation activity. This then reflects onto their high sales and employment growth rates. Intrapreneurial firms place less effort and resources into technological input activities, which may explain their lower amount of patenting and innovation output compared to that of entrepreneurial firms, but still higher than that of conservative firms. Payments and receipts of royalty are higher in niche technology firms compared to science-based technology firms. Sophisticated science based activities encourage to develop their own technologies more effectively compared to niche technology firms, which deal with rather less sophisticated technologies in this sample.

Among all the firms, ESB singles out with 4 new-to-world innovations, 12 patents and 7 trademarks registered during 2007-12 period. This firm has achieved remarkable sales growth rate of 50 percent per year along with 16 percent growth rate of employees from 2007 to 2012. EN has also attained around 10 percent sales growth and doubled its workforce based on commitment in innovation activities, creation and exploitation of firm level technological opportunities. Similar pattern is observed in IN. It did not inform about its R&D and design activity, but its one trademark and 8 new-to-firm innovations explain high rates of growth in sales and employment. Its innovative activity may also originate from its licensing activities. Despite input into R&D and design (albeit less than those of ESB and EN), ISB shows lower intensity innovative activity and 10 percent sales growth rate but a fall in employment figures.

Creating and exploiting the conditions for the conduct of design activity explains partly the difference between performances of ESB and ISB and the conservative firms. Design is particularly concentrated on product in materials industry, but is very closely related to enhanced human skills in process technology and ability to change process parameters, etc. Science-based technology firms are engaged in such complicated product design activities. Non-trivial design activities result in product innovation. These activities vary from original target design for ceramic coating processes to original ceramic mould design and original powder characterization. ESB shows superior design ability. ISB had to develop powder characterization capability using its existing human capital who

Table 4. Case-ordered descriptive matrix: The role of technology generation component of micro-level and macro-level technological opportunity exploitation on firm performance

		I. Intra-organizational (micro) opportunities						II. Institutional (macro) opportunities			III. Firm performance	
								A	B	C		
	Firm code	R&D expenditures (% of total sales in 2012)	Main source of design activity	Innovations (2007-12)	Patents filed (2007-12)	Trademarks (2007-12)	ISO9001/14001 (2007-12)	Government procurement of advanced technology products	IPR protection	R&D tax incentives	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	30%	Company's own designs	4 ntw*	12	7	1	3	6	2	50%	16%
	EN	15%	Company's own designs	5 ntf, 5 ntc	1	1	2	2	7	1	10%	48%
Intrapreneurial	ISB	10%	Company's own designs	2 ntf	0	0	1	2	3	5	10%	-4%
	IN	-	-	8 ntf	0	1	1	5	3	7	17%	27%
Conservative	CC1	0%	Customers' designs, other companies' designs, company's own designs	50 ntf	0	0	0	4	4	1	1.5%	0%
	CC2	3%	Customers' designs	150 ntf, 25 ntc	0	0	1	4	3	1	4%	-12%
		Average value for CZ, PL and HU A. Government procurement of advanced technology products and B. IPR protection (Source: WEF GCR, 2012)					2012-13	3	3.8	NA		

ntf: new to firm; ntc: new to country, ntw: new to world.

A. In your technology field, government procurement decisions result in technological innovation (1 = strongly disagree, 7 = strongly agree) (WEFGCR Q.12.05: Do government procurement decisions foster technological innovation in your country? [1 = no, not at all; 7 = yes, extremely effectively])

B. Intellectual property protection and anti-counterfeiting measures in your country are (1 = weak and not enforced, 7 = strong and enforced) (WEFGCR Q.1.02: How would you rate intellectual property protection, including anti-counterfeiting measures, in your country? [1 = very weak; 7 = very strong])

C. Availability of R&D tax incentives (1=not at all, 7=to a great extent)

were knowledgeable in relatively mature technology (see next section on the analysis of human skills). Faulkner and Senker (1995: 106) observed this kind of behaviour in some of the UK and US ceramics firms. They interpreted firms' preference for low technology design activities by their lack of qualified researchers and concern that their designs were easily copied and imitated by their rivals once the new design was introduced onto the market adversely affecting the firm's competitiveness. ESB's product designs are complicated, imitation threat is not readily possible, allowing the firm to register trademarks and patents giving it the first mover advantage to seize the technological opportunity.

Column II in Table 4 informs about the technology generation component of technological opportunities operating at macro-level. Government's procurement of advanced technology products, extent of IPR protection and availability of R&D tax credits are tools to support firms institutionally for their technology generation activities. Firms show heterogeneity in their decision for exploitation of these opportunities. Whilst the opportunity provided by government procurement of advanced technology products is exploited by conservative firms and IN, opportunities in terms of IPR protection measures are very highly rated by entrepreneurial firms with registered patents explaining the intensive technological activity in this cohort. R&D tax incentives are seized upon by intrapreneurial firms, which have embarked on R&D activity and carry the advantage of being better informed on the legislative environment as compared to entrepreneurial young firms. Conservative firms' low rating of R&D tax incentives is explanatory of their non-existent R&D activity. Data indicate that high-degree assessment of at least one or two of the institutional opportunities (i.e. IPR protection rating of ESB and EN, R&D tax incentives rating of ISB and IN and government procurement rating of IN and the conservative firms) suggest that firms tend to use the policy tool that is in most accordance with the extent of their firm level technological activity. In the particular cases of ESB and EN, satisfactory degree of IPR protection certainly has positive influence on incentive to innovate and apply for patents. In the case of IN, the positive effect of government procurement of advanced products and R&D tax incentives may be compensating for unreported R&D and design activities. Yet, the discrepancy between entrepreneurial firms' and conservative firms' assessment for government procurement of advanced technology products hints that the extent of advanced products supported by this policy tool may not be very sophisticated indeed in the CEE region. Apparently, conservative firms make use of this tool for compensating their non-existent technological activities. Their moderate rating illustrates its minor effects on slow growth rates, even if not able to prevent shrinking employment rates. Conversely, for the entrepreneurial firms, this tool could have been used effectively targeting

complex products, which could lead to higher growth rates for this cohort; however, it seems that this tool, in its current form, does not satisfy the needs of entrepreneurial firms.

In the last row of Table 4, we provide the average national figures for government procurement of advanced technology products and IPR protection for Czechia, Poland and Hungary as drawn from Global Competitiveness Report (WEFGCR, 2012). Firms in these countries consider government procurement of advanced technology products as a weak policy tool, i.e. a rating of 3 on a scale of 1 to 7. This partly explains why entrepreneurial firms and the science-based firms in our sample abstain in exploiting this institutional tool, which may need sector-specific approach especially targeting the procurement of products in the science-based segments of the sectors. As for IPR protection measures, entrepreneurial firms are far ahead of the national average (3.8 on a scale of 1 to 7) to exploit the opportunity to protect their original ideas. This comparison between the sample cases and the national level is important in the sense that if and when firms can break the routines and distinguish themselves from the majority by selecting and exploiting the suitable institutional opportunities, they can also create the opportunities to carry them to the next upper level.

4.1.2. Human skills

Table 5 informs about the firms' capacity of human capital endowment and exploitation. There is stark difference between conservative firms and the rest in terms of seizing the opportunities in employment of graduate and postgraduate skills. The maximum share of skilled personnel in total employees in the conservative firms ranges from 4 to 8 percent, whereas it is not below 9 percent in the entrepreneurial and intrapreneurial firms, and as high as 51 percent in ESB. This pattern repeats for the R&D staff in total employees. Entrepreneurial and intrapreneurial firms are distinguished from conservative firms with considerably higher shares of R&D personnel in their total workforce. The need for skilled researchers in science-based firms are self-explanatory, but such high degrees in niche technology firms also show that niche category is not at all confined to traditional firm approach. Highly skilled workforce is crucial in creating growth via its effect on technology generation.

Information was also sought about the firms' approach to retain valuable skills within the firm. This comprised the assessment of whether the firm invested in extensive workforce training, one of the measures, to avoid brain drain. Science-based technology firms' efforts outperform those of conservative and niche technology firms and also that of national average figure (3.9 on a scale of 1 to 7). They invest heavily in training and retaining their employees and employees usually remain in the firm. Conservative firms report medium to high-degree scores indicating that they have

mechanisms in place to effectively train and retain the workforce within the scope of their technological intensity. Niche technology firms, on the other hand, report lower degree scores for firm level training, which lag behind the average national figure. The employee-training environment, the challenge associated with the introduction of a novel technology and smaller size of these firms, prevent them from accessing resources as aggressively as larger firms. The effect of commitment on staff training in all of the sample firms is noticed on the very high rates of retaining employees in the firms. All firms, except IN, show considerably better achievements in retaining their workforce in the firm compared to national average (2.8 on a scale of 1 to 7).

Macro-level opportunities in relation to human skills are the quality of educational system in raising skills especially in the technology field of sample firms and local availability of specialised research and training services. Apart from conservative firms and ISB, educational system is regarded to be deficient in providing skills in the technology fields that the firms operate. The national average figure is at medium-degree (3.7 on a scale of 1 to 7). This is interesting in the case of CEE, which used to show high-degrees of educational attainment in the past. It seems that, at present, this is not reflected onto generation of skills associated with emerging technologies. Therefore, firms in our sample have difficulty in exploiting this opportunity, although their skilled workforce is higher than that of conservative firms.

With regard to specialized research and training services, even though all firms in the sample record lower rates than the average national figure (4.6 in a scale of 1 to 7), it is mostly the intrapreneurial firms that cannot make any use of the opportunities. Particularly in electric vehicle technology it is a major bottleneck, which indicates absence of institutional support for this specific niche technology. It seems that an intervention from the institutional aspect help alleviate the obstacle perhaps resulting in even higher growth rates. For conservative firms, own staff training efforts match with the local training availabilities, which suggests these firms can fully exploit available institutional opportunities. Conversely, science-based technology firms' own efforts outperform the local support. This is an issue closely linked to developing firm level technological capabilities (Bell and Pavitt 1993, Kim 1997) whereby advanced materials science-based firms in the field of advanced ceramics can show superior core competences (Yoruk, 2011). Therefore, medium-degree exploitation of skills related opportunities at macro-level enhance conservative firms' firm level skills, but they are not sufficient for entrepreneurial and intrapreneurial firms, which need higher-degree skills opportunities to exploit at macro-level.

Table 5. Case-ordered descriptive matrix: The role of human skills and training component of micro-level and macro-level technological opportunity exploitation on firm performance

		I. Intra-organizational (micro) opportunities				II. Institutional (macro) opportunities		III. Firm performance	
				A	B	C	D		
	Firm code	University graduates + postgraduates (% in total employees)	R&D personnel (% in total employees)	Extent of staff training in the firm	Brain retain in the firm	Quality of educational system in raising skills in your technology field	Local availability of specialized research and training services	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	51%	10%	6	6	3	4	50%	16%
	EN	17%	17%	2	2	3	1	10%	48%
Intrapreneurial	ISB	9%	8%	5	6	4	4	10%	-4%
	IN	14%	-	3	5	2	1	17%	27%
Conservative	CC1	8%	3%	4	5	4	4	1.5%	0%
	CC2	4%	4%	4	6	4	4	4%	-12%
Average value for CZ, HU and PL. A. Extent of staff training, B. Brain drain, C. Quality of education system, D. Local availability of specialized research and training services (Source: WEFGCR, 2012)			2012-13	3.9	2.8	3.7	4.6		

A. General approach of your firm to human resources is (1 = little in training and employee development, 7 = invest heavily to attract, train, retain employees) (WEFGCR Q.5.08: To what extent do companies in your country invest in training and employee development? [1 = hardly at all; 7 = to a great extent])

B. Your firm's talented people (1 = normally leave to pursue opportunities in other firms, 7 = almost always remain in the firm) (WEFGCR Q.7.07: Does your country retain and attract talented people? [1 = no, the best and brightest normally leave to pursue opportunities in other countries; 7 = yes, there are many opportunities for talented people within the country])

C. Educational system /raising skills in your technology field (1 = does not meet the needs of a competitive economy, 7 = meets the needs) (WEFGCR Q.5.03: How well does the educational system in your country meet the needs of a competitive economy? [1 = not well at all; 7 = very well])

D. Specialized research/ employee training services in your technology field are (1 = not available, 7 = available from world-class local institutions) (WEFGCR Q.5.07: In your country, to what extent are high-quality, specialized training services available? [1 = not available; 7 = widely available])

4.1.3. Knowledge and value chain networks

Networking and cooperation is key source for acquiring external knowledge into the firm. Table 6 shows that firms cooperate with both domestic and foreign partners ranging from universities and research institutes to customers and suppliers. Local connectedness of the firms seems stronger than foreign connectedness. Forms of cooperation, though, show heterogeneity between entrepreneurial, intrapreneurial and conservative firms.

ESB, ISB and IN are engaged in diverse forms of cooperation activities as well as more complex forms of interaction such as R&D agreement. Conservative firms, on the contrary, is characterized by lack of innovation cooperation. EN's cooperation forms are limited to technical support and licensing with suppliers and customers. Technical support, a form of cooperation, observed in all of the firms, relates to consultancy received from domestic institutes on how to operate and troubleshoot the state-of-the-art process technologies acquired from abroad. During the initial phases of process operation and troubleshooting, this appears to be a cheaper strategy for emerging market firms, compared to requesting support from the foreign technology supplier, which may incur very high costs. A deeper knowledge flow between the parties would comprise joint product innovation in the form of R&D agreement. Therefore, science-based firms and IN try to tap into knowledge sources of particularly domestic universities and research institutes.

Contrary to innovation and knowledge collaboration patterns observed in ESB, ISB and IN, CC2's activities are limited to technical support only and CC1 does not report any particular form of interaction. This is in accordance with its customers being the most important source of knowledge. CC1's products are solely customer-oriented and can be produced by the use of low and medium-degree process technologies that do not require further acquisition of complex knowledge for operation.¹⁵ CC2 is engaged in slightly higher value added activity – i.e. enhanced structural ceramic components which would demand some complex knowledge, thus this would mainly be an interaction for the operation and troubleshooting of processes and their related products, but would not go beyond operational capability acquisition.

Exporting firms (ISB and conservative firms, see Table 7) are very well embedded in value chains. This encompasses their primary activities related to inbound, outbound logistics, and marketing and sales as well as secondary stage value chain activities of human resource management and

¹⁵These are simple hot or cold pressing techniques used for production of technical ceramic parts with basic structural properties only.

technology development. Apparently, conservative firms seem to mostly exploit opportunities in the primary value chain activities, whilst ISB, for instance, as an exporting firm makes use of both primary and secondary value chain activities. As well as showing content with the local supplier quantity and quality, ISB can exploit scientific research institutions at medium-degree.

Among all firms, EN singles out both with low-degree activity in innovation cooperation and a very low rating of value chain embeddedness. Despite that, EN exhibits high performance. Previous analysis of technology generation and human resources indicated that EN's activities are mostly generated from within the firm itself and suggest that the firm is not making efficient use of macro-level opportunities, i.e. quality of scientific research institutions, local supplier quantity and quality as well as state of cluster development. In fact, EN reports much lower ratings for these opportunities than national average figures. EN has some connection with external knowledge networks and value chain partners, but this is not to full extent. It seems that high growth rates achieved by EN can be explained by its internal efforts into a niche technological activity as well as exploiting the very niche market as will be analysed in the next section.

The positive association between growth rates and the forms and intensity of knowledge and value chain networks is more stressed for ESB, ISB and IN. Absence of interactions explains low growth rates in conservative firms. Enhancing this relationship are the network-related institutional opportunities. Firms that benefit from being a part of knowledge networks, namely ESB, ISB and IN, highly rate scientific research institutions in terms of their quality in the field; firms that cannot develop such interactions rate low, namely EN and the conservative firms. Growth rates are markedly higher in ESB and IN, which exploit institutional opportunities to the maximum and have intense knowledge linkages with research institutions that are considered strong organizations in their field. There are not stark differences between entrepreneurial/ intrapreneurial firms and conservative firms in exploiting local suppliers' quantity and quality indicating the existence of strong supply chain in this sector. The average national figures (5 and 4.9 respectively on a scale of 1 to 7) also are very high indicating a favourable opportunity environment. Yet, in terms of opportunities for cluster development in their specific technology field, firms that are independently located, namely ESB, EN and IN (see Table 3) state that the opportunities are not existent. On the contrary, IN and CC2, those are located in industrial clusters, show that they exploit this opportunity. It must be noted that IN is located in an industrial cluster open to any kind of firm and CC2 is located in a technical ceramics cluster, where firms operating at low and medium technology segment of the ceramics sector gather. For ESB, ISB and EN to embark on a cluster opportunity, the clusters must accommodate sophisticated technology firms targeting specific emerging fields, such as technology parks.

Table 6. Case-ordered descriptive matrix: The role of knowledge networks and supply chain and training component of micro-level and macro-level technological opportunity exploitation on firm performance

		I. Intra-organizational (micro) opportunities			II. Institutional (macro) opportunities				III. Firm performance	
				A	B	C	D	E		
	Firm code	Partner for innovation cooperation*	Form of innovation cooperation	Value chain breadth	Quality of scientific research institutions	Local supplier quantity	Local supplier quality	State of cluster development	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	D. university D&F research institute D&F customer D&F supplier D. consultant	R&D agreement Licensing agreement Research contract-out Technical support Subcontracting	-	6	5	5	3	50%	16%
	EN	D. supplier D&F Customer	Technical support Licensing agreement	2	2	3	4	2	10%	48%
Intrapreneurial	ISB	D. university D. consultant D. research institute D&F Customer F. university	R&D agreement Research contract-out Technical support Subcontracting	6	4	4	4	3	10%	-4%
	IN	D university D Customer D Supplier D Consultant	R&D agreement Technical support Subcontracting Research contract-out	-	5	5	4	5	17%	27%
Conservative	CC1	D. customer D. university D. research institute D. supplier	none	5	2	4	6	4	1.5%	0%
	CC2	University Research institute Customer Supplier Consultant	Technical support	5	3	4	4	4	4%	-12%
Average value for CZ, HU and PL. A. Value chain breadth, B. Quality of scientific research institutions, C. Local supplier quantity, D. Local supplier quality, E. State of cluster development (Source: WEF GCR, 2012)			2012-13	3.9	4.7	5	4.9	3.5		

Notes: D=domestic; F=foreign. * Partners are listed in order of importance as rated by the respondent firm.

A. If your firm is exporting, you are (1 = primarily involved in individual steps of the value chain, 7 = present across the entire value chain) (WEFGCR Q.11.05: In your country, do exporting companies have a narrow or broad presence in the value chain? [1 = narrow, primarily involved in individual steps of the value chain (e.g., resource extraction or production); 7 = broad, present across the entire value chain (i.e., do not only produce but also perform product design, marketing sales, logistics, and after-sales services)])

B. Scientific research institutions related to your technology field are (1 = non-existent, 7 = the best in their fields internationally)(WEFGCR Q.12.02: How would you assess the quality of scientific research institutions in your country? [1 = very poor; 7 = the best in their field internationally])

C. Quantity of local suppliers in your technology field in your country are (1 = non-existent, 7 = numerous and include the most important materials, components, equipment, and services) (WEFGCR Q.11.01: How numerous are local suppliers in your country? [1 = largely nonexistent; 7 = very numerous])

D. Quality of local suppliers in your technology field in your country is (1 = very poor, 7 = very good) (WEFGCR Q.11.02: How would you assess the quality of local suppliers in your country? [1 = very poor; 7 = very good])

E. In your country, how widespread are well-developed and deep clusters with regard to your technology field? (1 = non-existent; 7 = widespread) (WEFGCR Q.11.03: In your country's economy, how prevalent are well-developed and deep clusters? [1 = nonexistent; 7 = widespread in many field])

4.2. Market Opportunities

4.2.1. Market demand

We examine whether firms exploit opportunities in the foreign and domestic markets as originating from their intra-organisational competences. We also examine to what extent the degree of buyer sophistication, represented by the tendency of buyers to demand high performance and value added products over the low-priced, has a role as an institutional factor for the firms' performance.

Table 7 informs that four out of six firms, namely EN, ISB and the conservative firms, are successful exporters. Exporting is customary activity for the conservative firms and ISB, old and established firms with secured clients abroad. Only the conservative firms have larger foreign market size than their domestic market size. Entrepreneurial and intrapreneurial firms, on the other hand, attract significant demand from the domestic market. Whereas ESB, IN and ISB report very low degrees of foreign market demand,¹⁶ EN enjoys exploiting opportunities for profit in both domestic and foreign markets.

Complemented with the previous findings for EN on the exploitation of micro-level technological opportunities, exploitation of both domestic and foreign markets based on a niche technology enables EN exhibit high growth rates. This is despite the fact that it is not efficiently making use of macro-level institutional opportunities, apart from IPR protection and buyer sophistication. The purposeful exploitation of IPR protection (i.e. by deciding to patent and trademark) and buyer sophistication towards electric vehicles is related to its successful exploitation of own intra-organisational technological opportunities, which can respond to sophisticated performance-conscious buyers and seize the market. EN has substantial share of the niche market in electric vehicles and thus can opt to make less use of macro-level opportunities, i.e. technological ones. This seems purely EN's contented choice based on a guaranteed market access, both domestic and foreign, in the current situation. If growth rates fall down EN could put effort into exploiting other available opportunities.

¹⁶ ISB's share of exports in its total turnover (73%) may seem as contradictory to its low foreign market demand. Its share of exports is mostly related to its conventional products that the firm has already been selling, whereas its low rating of foreign market demand for its high technology products is due to its new activity in producing science-based products as an extension to its existing conventional products.

Table 7. Case-ordered descriptive matrix: The role of market demand and finance availability component of micro-level and macro-level market opportunity exploitation on firm performance

		Market Demand				Finance Availability							
		Ia. Intra-organizational (micro) opportunities			Ila. Institutional (macro) opportunities	Ib. Intra-organizational (micro) opportunities (Private Finance)		IIb. Institutional (macro) opportunities (Public Finance)				III. Firm performance	
			A	B	C	D	E	F	G	H	I		
	Firm code	Exports (% in turnover in 2012)	Foreign market demand	Domestic market demand	Buyer sophistication	Own financial resources	Funding from a bank	Ease of access to venture capital	Public Loan from national government or local authorities	Public grant from national government or local authorities	EU funds (programs supporting SMEs, etc.)	Sales growth from 2007 to 2012 (pa)	Employee growth from 2007 to 2012 (pa)
Entrepreneurial	ESB	1%	2	7	4	5	4	5	5	6	6	50%	16%
	EN	60%	6	6	7	7	4	3	2	4	1	10%	48%
Intrapreneurial	ISB	73%	3	4	4	5	3	5	1	6	2	10%	-4%
	IN	none	1	5	5	7	5	4	7	7	7	17%	27%
Conservative	CC1	60%	4	3	4	7	4	4	1	1	1	1.5%	0%
	CC2	80%	7	2	1	7	4	4	1	1	4	4%	-12%
Average value for CZ, HU and PL. A. B. Domestic/foreign market size, C. Buyer sophistication, F. Venture capital availability (Source: WEF GCR, 2012)				2012-13	3.2		2.6	2.3					

A. Your firm sells its high technology products in the foreign market (1=none, 7= almost all production)

B. Your firm sells its high technology products in the domestic market (1=none, 7= almost all production)

C. Customers of your firm make purchasing decisions (1 = based solely on the lowest price, 7 = based on a sophisticated analysis of performance attributes) (WEFGCR Q.6.16: In your country, how do buyers make purchasing decisions? [1 = based solely on the lowest price; 7 = based on a sophisticated analysis of performance attributes])

F. How easy is it in your country for a firm with innovative but risky projects to find venture capital? (1 = impossible, 7 = very easy) (WEFGCR Q.8.04: In your country, how easy is it for entrepreneurs with innovative but risky projects to find venture capital? [1 = very difficult; 7 = very easy])

D, E, G, H, I: Availability of funding sources for innovation/networking/ease of access to other markets (1=not at all, 7=to a great extent) (WEFGCR Q.8.05: How easy is it to obtain a bank loan in your country with only a good business plan and no collateral? [1 = very difficult; 7 = very easy])

It seems that as complexity of processes and products increase, i.e. ESB and ISB, firms tend to serve the domestic market. Competition in the foreign market with advanced western counterparts operating at the technology frontier is fierce. These firms initially need to establish themselves within the domestic market in order to move successfully onto foreign markets. Exploiting domestic buyer's sophistication based on the product performance attributes, help them exploit greater opportunities in the domestic markets. Market demand data suggest striking differences between the conservative firms and entrepreneurial and intrapreneurial firms in the CEE in terms of their presence in different markets and the association of this presence with the context of products they produce. Relatively mature technologies are exported, but high technology high value added products are confined to the domestic market except for the very niche technologies. Firm growth rates are not higher in the mature technology exporter firms. Producing high technology value added products at least for the internal market brings in high growth rates, exporting these products would increase growth rates even higher.

4.2.2. Finance availability

As complementary to real demand markets, finance markets' efficiency is vital for firm growth and survival. All firms financed their start-up stage using their own finances complemented by borrowing from banks. Apart from EN, due to the risky nature of the niche technology, ease of access to venture capital is rated at medium to high rates. This compares well to the average national figure (2.3 on a scale of 1 to 7). Firms operating in the low carbon technologies field seem to face lower hurdles than those with ordinary entrepreneurship/intrapreneurship activities.

Major differences emerge among firms in terms of their financing of innovative activity. Conservative firms seem not to exploit available public funds efficiently for the purpose of innovation. EN shows similar pattern. This may well be due to their relatively not complex nature of innovation activities and thus do not fall into categories required for some specific public funds. This necessitates careful arrangements on the policy side specific to niche technologies. Whereas ISB is focused on public grants rather than loans, ESB and IN exploit all of the funding opportunities available to firms. This contributes to ESB's growth performance by leveraging its technology generation activities.

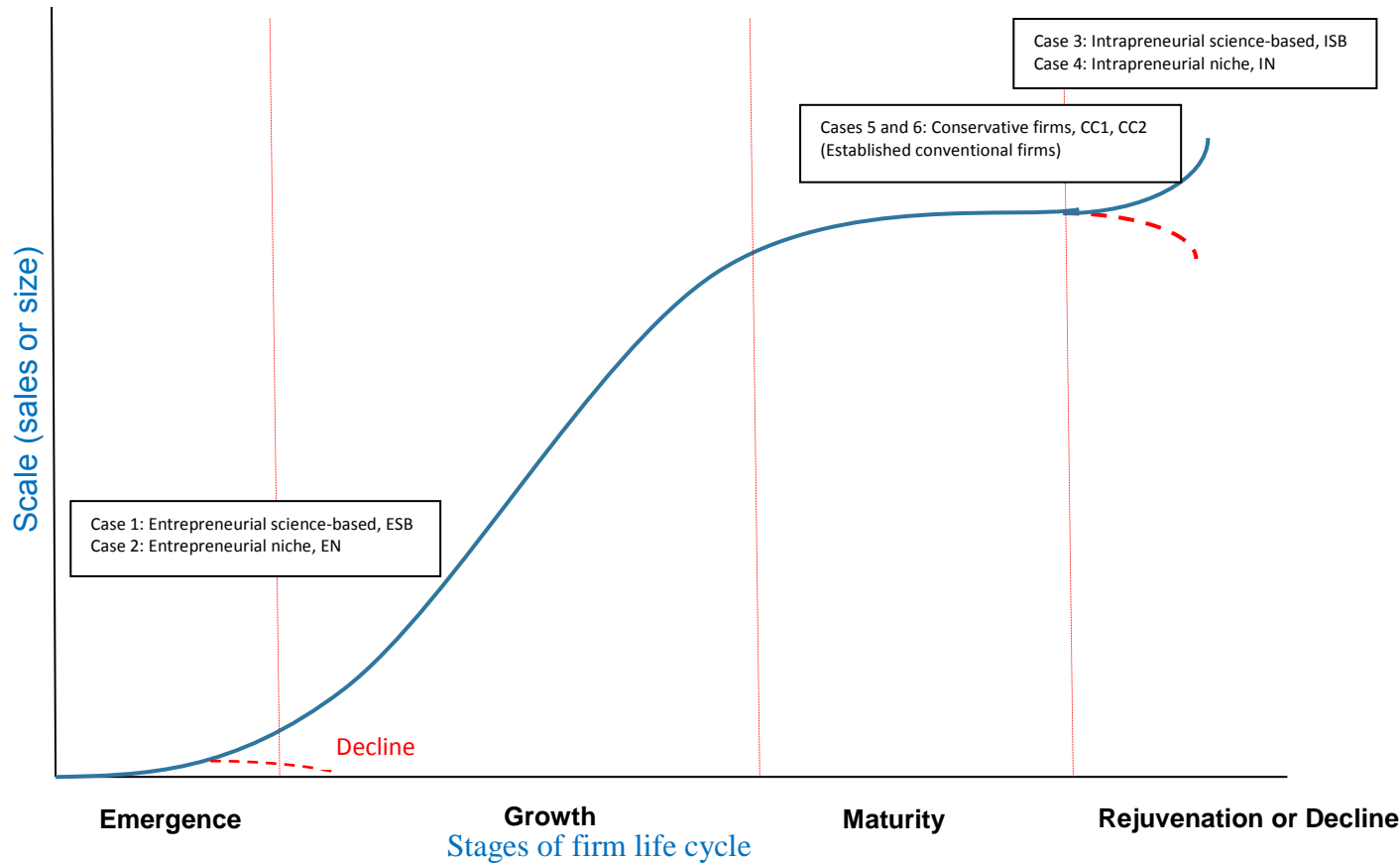
4.3 Synthesis

Figure 3 incorporates the data into a thematic conceptual matrix within the firm life cycle setting. Table 2 informs about the degrees for opportunity exploitation and seizing of the firms.

Departing from Figure 3, we construct the matrix analyses to help with mapping micro and macro level fit as presented in Figures 4, 5, 6, 7 and 8. We provide a visual presentation to look for alignment between the micro and macro environments stemming from the above discussion on the effects of micro and macro-level opportunity exploitation and seizing on the firm sales performance.

In Figure 4(I), it is the entrepreneurial firms that show the highest degree exploitation and seizing of micro-level opportunities in technology generation, whereas intrapreneurial firms show medium-degree exploitation. Figure 4(II) shows that IN is the only firm that is fully able to exploit macro-level technology generation opportunities. A careful examination of Figure 4(I) and Figure 4(II) shows the performance enhancing effects of macro-level opportunity exploitation particularly on IN, which can generate micro-level opportunities at medium degrees, but makes effective use of macro-level opportunities to elevate its sales growth rates. ISB, on the other hand, shows lower growth rate than that of IN, by medium-degree exploitation and seizing of both micro and macro-level technological opportunities. Both ESB and EN show high degrees of micro-level technological opportunities and complement this with high to medium-degree exploitation of macro-level technological opportunities in accordance with their intra-organisational competences. This, then, is evidenced in their very fast growth rates of either sales or employment. Even conservative firms seem to benefit from medium-degree macro-level opportunities as complementary to low degrees of micro-level opportunity seizing. This indicates to their efforts to fit their micro environment with the opportunities available in the macro environment to provide the optimal growth rates.

Figure 3. Thematic conceptual matrix for opportunity exploitation and firm performance relationship within the firm life cycle setting

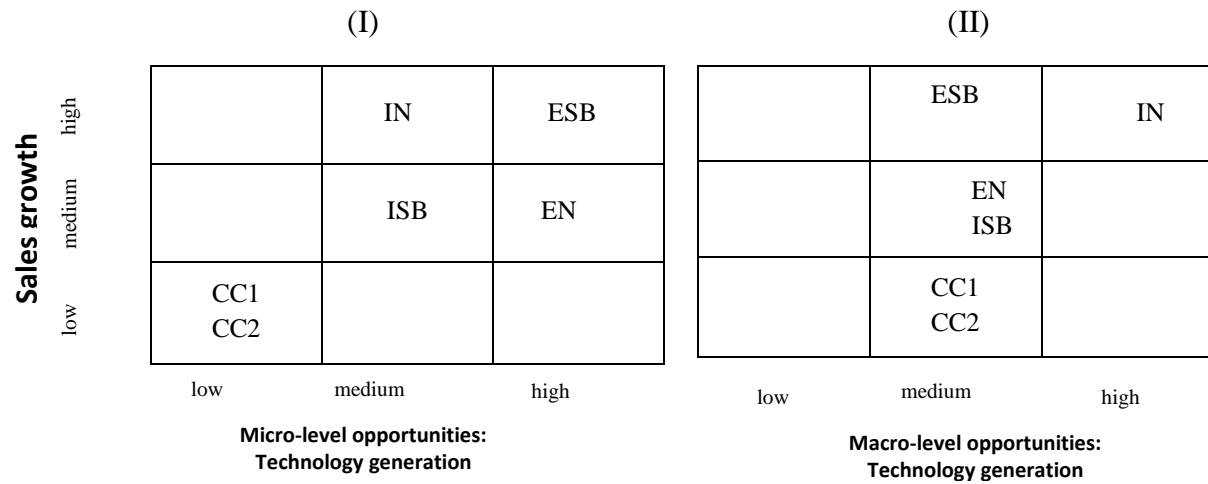


		Entrepreneurial firms		Conservative firms		Intrapreneurial firms		
		ESB	EN	CC1 and CC2		ISB	IN	
Micro-level opportunities	Technological opportunities	H1a	High level exploitation of R&D expenditures, design activities, patenting, new products		Low level exploitation of or no R&D expenditures, design activities, patenting, new products		Medium level exploitation of R&D expenditures, design activities, patenting, new products	
		H1b	High level exploitation of skilled workforce, staff training and retaining	High level exploitation of skilled workforce; low level exploitation of staff training and retaining	Low level exploitation of skilled workforce, medium level exploitation of staff training and high level staff retaining		Medium-High level exploitation of skilled workforce, staff training and retaining	High level exploitation of skilled workforce, medium level staff training and high level retaining
		H1c	High level exploitation of innovation cooperation	Low level exploitation of innovation cooperation and value chain	Low level exploitation of innovation cooperation, high level exploitation of value chain		High level exploitation of innovation cooperation and value chain	Medium-High level exploitation of innovation cooperation
	Market opp	H2a	High level exploitation of domestic market	High level exploitation of both domestic and foreign markets	Medium/High level exploitation of foreign market		Medium level exploitation of domestic market	High level exploitation of domestic market
		H2b	High level exploitation of own financial resources			High level exploitation of own financial resources		Medium level exploitation of own financial resources
Macro-level opportunities	Technological opportunities	H1a'	High level exploitation of IPR protection, low level exploitation of R&D tax incentives and government procurement of advanced technology products		Medium level exploitation of government procurement of advanced technology products and IPR protection, low level exploitation of IPR protection		High level exploitation of R&D tax incentives ,low level exploitation of IPR protection and government procurement of advanced technology products	High level exploitation of R&D tax incentives and government procurement of advanced technology products, low level exploitation of IPR protection
		H1b'	Medium level exploitation of skills in the educational system and specialised research and training services	Low level exploitation of skills in the educational system and specialised research and training services	Medium level exploitation of skills in the educational system and specialised research and training services		Medium level exploitation of skills in the educational system and specialised research and training services	Low level exploitation of skills in the educational system and specialised research and training services
		H1c'	High level exploitation of research institutions, local suppliers	Low level exploitation of research institutions, local suppliers and clusters	Low level exploitation of research institutions; medium level exploitation of local suppliers and clusters		Medium level exploitation of research institutions, local suppliers	High level exploitation of research institutions, local suppliers and clusters
	Market opp	H2a'	Medium level exploitation of buyer sophistication	High level exploitation of buyer sophistication	Low/Medium level exploitation of buyer sophistication		Medium level exploitation of buyer sophistication	High level exploitation of buyer sophistication
		H2b'	High level exploitation of public financial resources	Low/Medium level exploitation of public financial resources	Low level exploitation of public financial resources		Low/Medium level exploitation of public financial resources	High level exploitation of public financial resources
Sales growth rate		50% (fast)	10% (medium)	1.5% for CC1, 4% for CC2 (slow)		10% (medium)	17% (medium)	
Employment growth rate		16% (medium)	48% (fast)	0% for CC1, -12% for CC2 (no growth/shrink)		-4% (shrink)	27% (fast)	

Note for growth rate: Either sales or employment growth rate higher than 20% indicates fast growth (Coutu, 2014).

For Likert scale assessment: Low 1 to 3; Medium 4; High 5 to 7.

Figure 4. Mapping micro and macro-level opportunity exploitation related to technology generation and firm performance across cases.



As seen in Figure 5(I), ESB, ISB and IN can exploit micro-level opportunities in human skills, but ESB has clear advantages compared to the other two firms, particularly in terms of making the best out of the employment of highly skilled workforce. EN shows deficiencies in terms of staff training and brain retain. None of the firms can fully exploit the macro-level human skills opportunities.

A close examination of Figure 5(I) and Figure 5(II) shows that science-based firms can exploit macro-level opportunities at medium degrees, whereas niche technology firms comply with low degrees of human skills exploitation at macro-level. Particularly for EN, when this is led by medium-degree skills exploitation at micro-level, its combined effect on firm performance appears as lower growth rate compared to those of ESB and IN which show high-degree seizing of micro-level opportunities on human skills. For a good fit of micro and macro environments, firm level human skills need to be at high levels. Their level determines how much a firm can benefit from the institutional environment.

Figure 5. Mapping micro and macro-level opportunity exploitation related to human skills and firm performance across cases.

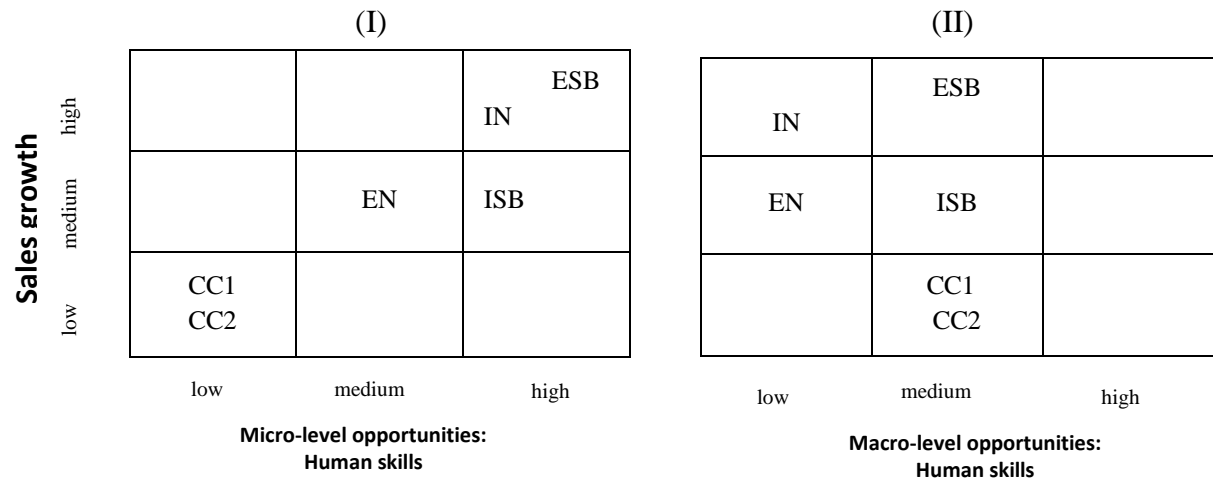


Figure 6(I) and 6(II) shows that exploiting network opportunities at the highest degree at both micro and macro-levels provides ESB and IN with high growth rates. EN, however, exhibits a paradoxical situation by not being able to make use of either micro-level or macro-level network related opportunities, despite considerably high growth rates. This compares to the conservative firms's opportunity exploitation and seizing degree, which is medium, but results in low growth rates. However, one must note that conservative firms are well embedded in the value chain that drives its strength in one aspect of networking. This observation takes us to fit issue, whereby firms' micro foundations determine their exploitation of macro environment to create the most optimal fit.

Figure 6. Mapping micro and macro-level opportunity exploitation related to knowledge and value chain networks and firm performance across cases.

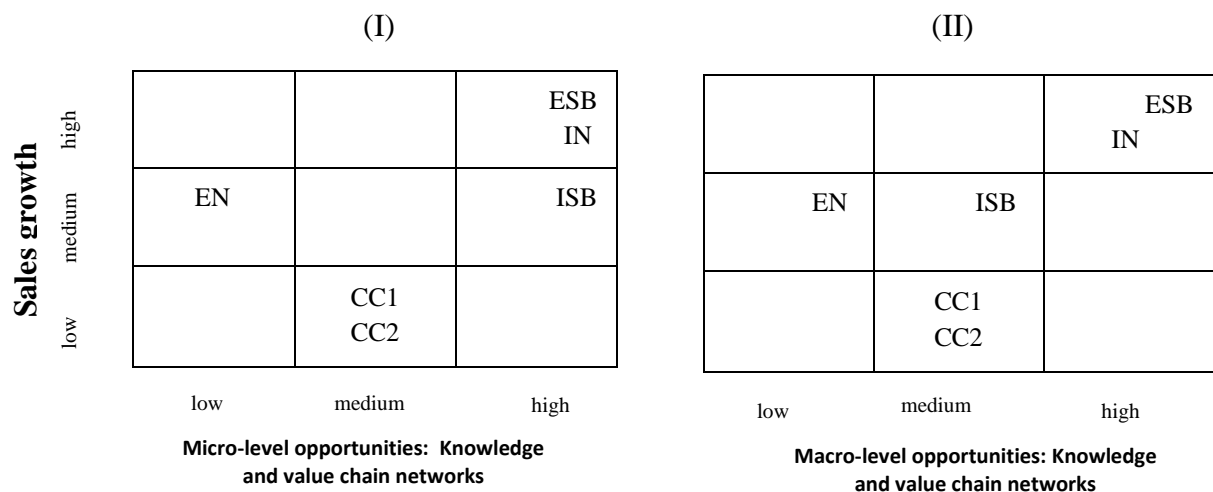


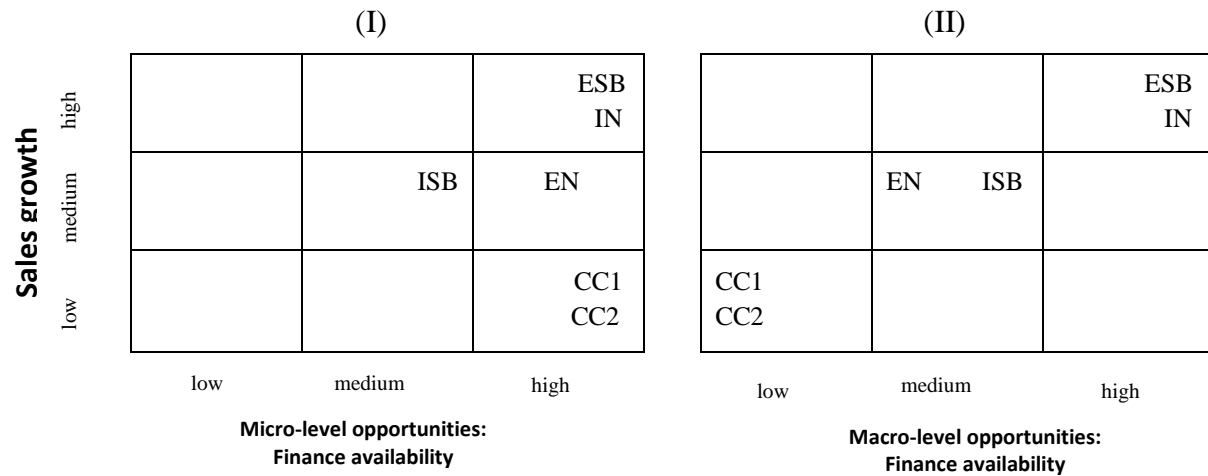
Figure 7(I) indicates each firm can exploit either domestic or foreign markets. EN singles out in exhibiting significant presence in both domestic and foreign markets in electric vehicles. Only conservative firms depict low-degree of opportunity exploitation at macro-level, which seems to drag down their growth rates (Figure 7(II)) due to mismatch between their micro and macro environments. The fit between micro and macro environments is very apparent for the entrepreneurial and intrapreneurial firms.

Figure 7. Mapping micro and macro-level opportunity exploitation related to real market demand and firm performance across cases.

		(I)			(II)		
Sales growth	high			ESB IN		ESB	IN
	medium		ISB	EN		ISB	EN
	low		CC1	CC2	CC2	CC1	
		low	medium	high	low	medium	high
		Micro-level opportunities: Real market demand			Macro-level opportunities: Real market demand		

Figure 8(I) and (II) show that all firms exhibit high-degree of micro-level finance opportunity exploitation to start their operations, but macro-level opportunity exploitation for innovation funding varies among firms. ESB with high-degree exploitation of available funding at macro-level is able to generate the highest growth rate, whilst ISB with medium-degree macro-level opportunity exploitation shows lower growth rates. Conservative firms' unawareness of available funding for innovation is largely reflected in its slow growth rates.

Figure 8. Mapping micro and macro-level opportunity exploitation related to finance availability and firm performance across cases.



Finally, Table 8 synthesizes the outcomes from the above analyses. Micro and macro-level opportunity exploitation not only complement each other, but also can only complement each other under certain circumstances. Firms sense, select and seize macro-level opportunities, which are closely associated with the strength of their seized micro-level opportunity. Where micro-level opportunity exploitation is high, the related macro-level opportunity exploitation is likely and most of the time it is either high or medium-degree exploitation. Firms are able to fully make use of macro-level opportunities once they have associated micro-level competences in place, i.e. ESB, a patentor, fully exploits IPR protection measures; whereas ISB, an emerging patentor, is focused on making use of R&D tax incentives policy tool. ESB, ISB and IN, as collaborators in innovation, exploit services provided by scientific research institutions; whereas the conservative firms focus on local supplier quality in the value chain, but not scientific collaborators, to gain any returns for their growth. EN focuses on macro-level opportunity exploitation for real market demand, i.e. buyer sophistication, which is its strongest competence.

Where micro-level opportunity exploitation is medium or low, the associated macro-level opportunity exploitation is either at the same degree or less. However, IN and conservative firms show that they can exploit technology generation related macro-level opportunities better than they can their own micro-level opportunities. This is a result of their relatively more mature activities and products, which comes along with lower expectations in the institutional framework.

Table 8. The fit between micro-level entrepreneurial opportunities and macro-level entrepreneurial opportunities exploitation.

	Micro-level opportunities		Macro-level opportunities		The fit between micro and macro level opportunity exploitation	Performance	
	Exploitation of technological opportunities	Exploitation of market opportunities	Exploitation of technological opportunities	Exploitation of market opportunities		Sales growth (%)	Employment growth (%)
ESB	High	High	Medium to high	Medium to high	Young entrepreneurial firms are characterized with high sales and employment growth rates. Their pattern of micro and macro environment fit shows that the higher degree their micro capacities, at a higher degree they can exploit macro level opportunities.	50	16
EN	Medium	High	Low to medium	Medium to high	This in turn helps them grow faster. These firms have taken the challenge to create the fit between their micro and macro environment to stay in the emergence/growth stage of their life cycle instead of exit.	10	48
ISB	Medium to high	Medium	Medium	Medium	Established intrapreneurial firms are characterized with high sales and employment growth rates compared to established conservative firms. Even though their degree of opportunity exploitation is lower than that of young entrepreneurial firms, their pattern of micro and macro environment fit also shows that the higher degree their micro capacities, at a higher degree they can exploit macro level opportunities.	10	-4
IN	Medium to high	High	Medium to high	High	This in turn helps them grow faster. These firms have taken the challenge to create the fit between their micro and macro environment to extend their life cycle to rejuvenation stage.	17	27
CC1 CC2	Low to medium	High	Medium	Low	Established conservative firms are characterized with low sales and employment growth rates compared to young entrepreneurial and established intrapreneurial firms. In terms of technological opportunities, a fit can be observed in the micro and macro environments, but this is rather in a reverse way compared to that of entrepreneurial and intrapreneurial firms. Their low to medium degree micro foundations help them to exploit macro level technological opportunities at medium degrees. In terms of their market opportunities, on the other hand, there is no fit between their micro and macro environment. Their high degree of market opportunity exploitation at micro level prevents them from seeking better opportunities at macro level. Along with low level of technological opportunity exploitation, the misfit between market opportunity exploitation at micro and macro levels prevent them from growing at rates as high as those of young entrepreneurial and established intrapreneurial firms. These firms will stay in the market with modest growth rates until their products phase away and then exit the market or they will take the route of intrapreneurship and grow again.	1.5 4	0 -12

5. Conclusions and Policy Implications

Firm growth is associated with entrepreneurial and intrapreneurial activity and it is not a linear process. On the contrary, it is very much a non-linear process shaped by complementarities between technological and market opportunities operating at both micro and macro-levels, if firms can exploit them. Effective exploitation of opportunities at macro-level may strengthen the effect of grasped firm level opportunities to generate faster firm growth by aligning micro and macro level opportunity exploitation. Missed opportunities, on the other hand, create negative effect on firm growth. Firms, however, are inclined to choose and use the institutional tool, which most strengthens their intra-organisational competence. Within that context, there are differences between entrepreneurial, intrapreneurial and conservative firms and major conclusions emerge from the above cross-case analyses.

Conservative firms exhibit slow sales growth rates and stationary or shrinking employment with low-degree of technological opportunity exploitation at micro-level. They have very low R&D investment, are engaged in trivial design activities, have low-degree of skilled labour in the firm and exhibit low or almost absent knowledge networking activity. The intensity of subcontracting activities linked to large western companies paving the way for easy access to export markets inhibits further investment in technological facets in conventional firms to achieve higher rates of growth. Their strong presence in foreign markets operating in more or less mature segments of the ceramics sector whereby buyers are price-conscious, but not performance-driven is influential factor for sustaining their sales growth. They are happy with the status quo and the degree of institutional support, which sustain slow sales growth rates over time. However, these factors do not affect their employment growth rates indicating long-term slow sales growth is not sufficient to create new jobs.

Entrepreneurial and intrapreneurial firms, which represent the experimental group, exhibit high sales growth conveying high employment growth rates in contrast to conservative firms. This growth can partly be explained by their capabilities in micro-level technological opportunity exploitation, i.e. technology generation activities measured by significant amount of investment in R&D, innovation, patenting, trademarks, investment in human capital, well-embeddedness in knowledge and value chain networks. There is discrepancy, though, among the four firms in their exploitation of macro-level opportunity exploitation. Whilst entrepreneurial firms exploit IPR protection policy tool to enhance their patenting and trademark activity, R&D tax incentives policy tool seems to push intrapreneurial firms to invest in R&D and innovate, perhaps a crucial factor as the source of their intrapreneurial activity, a diversion from their routine technological field. All four firms approach

human capital, particularly skilled labour, as a valuable resource at micro-level. Yet, they cannot take full advantage of macro-level opportunities positioned in education quality and specialised research and training services availability. These areas need attention on the policy side. Cases presented here confirm results of firm level surveys in CEE assessing the quality of labour skills, which either do not match the requirements of businesses or businesses are unwilling to offer sufficient remuneration to attract workers with skills they need (EBRD, 2013). In stark contrast to conservative firms and to compensate for highly skilled labour not available, entrepreneurial and intrapreneurial firms have strong connections with domestic research and value chain sources. Contributing to their intense local embeddedness, they fully take advantage of the quality and quantity of these sources as supported by the institutional environment.

In terms of market opportunities, the contrasts between entrepreneurial, intrapreneurial and conservative firms are striking. Apart from EN, all three firms are present only in the domestic market, but are able to respond very quickly to buyers' requests in terms of performance and quality of products. Despite their deficiency in the export markets, they have existence in their domestic markets and they exhibit higher sales and employment growth rates. In order to access export markets these firms would need supportive institutional environment. Access to funding for innovation activities is crucial factor in entrepreneurship and intrapreneurship process. Data indicate that this is major hurdle for conservative firms. All of the entrepreneurial and intrapreneurial firms, on the other hand, exploit public grants locally available to fund their innovation activities. Among them, ESB and IN differ with their aggressive approach to public loans and EU funds. This degree of awareness in fundraising is promising factor in innovative activity, which can further enhance growth rates.

Several policy implications can be drawn from these findings. Findings suggest that firm level technical progress, market control and development of new knowledge-based entrepreneurial or intrapreneurial forms of activity proceed in tandem with favourable conditions in the institutional structure and the extent that firms can exploit these favourable conditions; that is, progress in one field augments progress in the other.

There is need for carefully tailored institutional support for firms that embark on the challenge to start completely new line of activity in the firm to bring more growth in sales and employment. For EN this would be in improving human capital and knowledge networking in order to sustain growth by raising innovativeness. For IN this would be human capital and R&D support along with access to export markets. For ESB and ISB, this would be supporting them in joining into export and value chain networks. For the established conservative firms this would be encouraging them towards intrapreneurial activity, since it acts as a driver of sustained growth in both sales and job creation.

Making the most use of macro-level opportunities needs strong capabilities in exploiting micro-level opportunities. In other words, the best 'fit' between micro and macro-level opportunity exploitation depends on high-degree micro-level opportunity exploitation, which drives the purposefully selected tools from available macro-level opportunities and exploits them to the maximum.

References

- Acemoglu, D., Johnson, S., Robinson, J., 2001. The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*, 91, 1369–401.
- Acemoglu, D., Johnson, S., Robinson, J., 2002. Reversal of Fortune: Geography and Institutions in the Making of the Modern World Distribution of Income. *Quarterly Journal of Economics*, 117 (4), 1231–94.
- Acs, Z.J., Parsons, W., Tracy, S., 2008. High impact firms: gazelles revisited. *Small Business Administration: Office of Advocacy*.
- Acs, Z.J., Autio, E., Szerb, L., 2014 National systems of entrepreneurship: Measurement issues and policy implications. *Research Policy*, 43 (3), 476–494.
- Ahlstrom, D., Bruton, G.D., 2006. Venture capital in emerging economies: Networks and institutional change. *Entrepreneurship Theory and Practice*, 30 (2), 299–320.
- Alvarez, S.A., Barney, J.B., 2007 Discovery and creation: alternative theories of entrepreneurial action. *Strategic Entrepreneurship Journal*, 1(1-2), 11-26.
- Andrews, C., DeVault, D., 2009. Green Niche Market Development: A Model with Heterogeneous Agents. *Journal of Industrial Ecology*, 13(2), 326-345.
- Audretsch, D.B., 1995. Innovation, Growth and Survival. *International Journal of Industrial Organization*, 13, 441-57.
- Audretsch, D. B., 2007. Entrepreneurship Capital and Economic Growth. *Oxford Review of Economic Policy*, 23 (1), 63-78.
- Audretsch, D. B., Bönte, W., Keilbach, M., 2008. Entrepreneurship Capital and Its Impact on Knowledge Diffusion and Economic Performance. *Journal of Business Venturing*, 23 (6), 687-698.
- Autio, E., Acs, Z., 2010. Intellectual property protection and the formation of entrepreneurial growth aspirations. *Strategic Entrepreneurship Journal*, 4(3), 234–251.
- Autio, E., Kenney, M., Mustard, P., Siegele, D., Wright, M., 2014 Entrepreneurial innovation: The importance of context. *Research Policy*, 43: 1097-1108 .
- Bakker, S., Van Lente, H., Engels, R., 2012. Competition in a technological niche: the cars of the future. *Technology Analysis & Strategic Management*, 24(5), 421-434.
- Bakker, S., Van Lente, H., Meeus, M.T.H., 2012. Dominance in the prototyping phase—The case of hydrogen passenger cars. *Research Policy*, 41, 871– 883.

- Barney, J., 1991. Firm resources and sustained competitive advantage. *Journal of Management*, 17 (1), 99-120.
- Baron, R. M., Kenny, D. A., 1986. The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. *Journal of Personality and Social Psychology*, 51 (6), 1173-1182.
- Barrett, H., Weinstein, A., 1998 The effect of market orientation on organizational flexibility in corporate entrepreneurship. *Entrepreneurship Theory and Practice*, 23(1), 57-70.
- Bartelsman, E., Scarpetta, S., Schivardi, F., 2005. Comparative analysis of firm demographics and survival: Evidence from micro-level sources in OECD countries. *Industrial and Corporate Change*, 14(3), 365
- Becherer, R., Maurer, J., 1997. The moderating effect of environmental variables on the entrepreneurial and market orientation of entrepreneur-led firm. *Entrepreneurship Theory and Practice*, 22(1), 47-58.
- Beck, T., Demirguc-Kunt, A., 2006. Small and medium-size enterprises: access to finance as a growth constraint. *Journal of Banking and Finance*, 30, 2931–2943.
- Berggren, C., Magnusson, T., Sushandoyo, D., 2015. Transition pathways revisited: Established firms as multi-level actors in the heavy vehicle industry. *Research Policy*, 44, 1017–1028.
- BIS 2014. Strengthening the UK Supply Chains: Good practice from industry and government, Department for Business, Innovation and Skills, January 2014, London.
- Brown, S., Eisenhardt, K., 1997. The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations. *Administrative Science Quarterly*, 42(1), 1–34.
- Burgelman, R. A., 1991. Intraorganizational ecology of strategy making and organizational adaptation: Theory and field research. *Organizational Science*, 2, 239–262.
- Burgelman, R. A., 1983a. Corporate entrepreneurship and strategic management: Insights from a process study. *Management Science*, 29, 1349–1364.
- Burgelman, R. A., 1983b. A process model of internal corporate venturing in the diversified major firm. *Administrative Science Quarterly*, 28, 223–244.
- Burt, R.S., 1997. The contingent value of social capital. *Administrative Science Quarterly*, 42, 339–365.
- Busenitz, L.W., West, G.P. III, Shepherd, D., Nelson, T., Chandler, G.N., Zacharakis, A., 2003. Entrepreneurship Research in Emergence: Past Trends and Future Directions. *Journal of Management*, 29(3), 285-308.
- Carree, M., Thurik, A. R., 2003. The Impact of Entrepreneurship on Economic Growth. In Z. J. Acs and D. B. Audretsch (Ed.), *Handbook of Entrepreneurship Research. An Interdisciplinary Survey and Introduction*, Kluwer Academic Publishers, Boston, MA, 437-471.
- Casson, M., 1982. *The Entrepreneur: An Economic Theory*. Barnes and Noble Books, Totowa, NJ.
- Castellacci, F., Lie, C.M., 2015. Do the effects of R&D tax credits vary across industries? A meta-regression analysis, *Research Policy*, 44(4), 819–832.

- Chaston, I., Sadler-Smith, E., 2012. Entrepreneurial cognition, entrepreneurial orientation and firm capability in the creative industries, *British Journal of Management*, 23(3): 415-32.
- Coad, A., Frankish, J. Roberts, R.G., Storey, D.J., 2013. Growth paths and survival chances: An application of Gambler's Ruin theory, *Journal of Business Venturing*, 28, 615–632.
- Coad, A. and Rao, R. (2008) Innovation and firm growth in high-tech sectors: A quantile regression approach. *Research Policy*, 37, 633-648.
- Cohen, W.M., Levinthal, D.A., 1990. Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly*, 35, 128–152.
- Cohen, B., Winn, M.I., 2007. Market imperfections, opportunity and sustainable entrepreneurship. *Journal of Business Venturing*, 22, 29–49.
- Coutu, S., 2014. The Scale-up Report on UK Economic Growth. An independent report to the government. November 2014. Available at <http://www.scaleupreport.org>
- Covin J.G., Slevin D.P., 1986. The development and testing of an organizational-level entrepreneurship scale. In Ronstadt R., Horaday J.A., Peterson R., Vesper K.H. (eds), *Frontiers of Entrepreneurship Research*, Babson College: Wellesley, MA, 628-639.
- Covin, J.G., Slevin, D.P., 1989. Strategic management of small firms in hostile and benign environments. *Strategic Management Journal*, 10, 75–87.
- Covin, J.G., Slevin, D.P., 1991. A conceptual model of entrepreneurship as firm behavior. *Entrepreneurship Theory and Practice*, 16, 7–25.
- Covin, J. G., Miles, M.P., 1999. Corporate entrepreneurship and the pursuit of competitive advantage. *Entrepreneurship: Theory and Practice*, 23(3), 47–63.
- Dean, T.J., McMullen, J.S., 2007. Toward a theory of sustainable entrepreneurship: Reducing environmental degradation through entrepreneurial action. *Journal of Business Venturing*, 22, 50–76.
- Delmar, F., Wiklund, J., 2008. The Effect of Small Business Managers' Growth Motivation on Firm Growth: A Longitudinal Study, *Entrepreneurship Theory and Practice*, May, 2008, p.437-457.
- Dess, G. G., Lumpkin, G. T., Covin, J. G., 1997. Entrepreneurial strategy making and firm performance: Tests of contingency and configurational models. *Strategic Management Journal*, 18(9), 677-695.
- Dess, G.G., Ireland, R.D., Zahra, S.A., Floyd, S.W., Janney, J.J., Lane, P.J., 2003. Emerging Issues in Corporate Entrepreneurship. *Journal of Management*, 29, 351-378.
- DeTienne, D.R., 2010. Entrepreneurial exit as a critical component of the entrepreneurial process: Theoretical development. *Journal of Business Venturing*, 25(2), 203–215.
- Dimitratos, P., Lioukas, C., Carter, S., 2004. The relationship between entrepreneurship and international performance: the importance of domestic environment, *International Business Review*, 13 (1), 19-41.
- Drazin, R. & Van de Ven, A. H. 1985. Alternative Forms of Fit in Contingency Theory. *Administrative Science Quarterly*, 30(4): 514-539.

- Drucker, P. (1993). *Innovation and entrepreneurship*. New York: Harper Business.
- Eckhardt, J.T., Shane, S.A., 2003. Opportunities and Entrepreneurship. *Journal of Management*, 29(3), 333–349.
- Eckhardt, J.T., Shane, S.A., 2011. Industry changes in technology and complementary assets and the creation of high-growth firms. *Journal of Business Venturing*, 26(4), 412-430.
- Edquist, C., 1997. Systems of Innovation Approaches- Their Emergence and Characteristics' in *Systems of Innovation: Technologies, Institutions and Organisations*, C. Edquist (ed.), London, Pinter Publishers.
- Edquist, C., Zabala-Iturriagagoitia, J.M., 2012. Public Procurement for Innovation as mission-oriented innovation policy, *Research Policy*, 41(10), 1757– 1769.
- Eisenhardt, K., 1989. Building theories from case study research. *Academy of Management Review*, 14, 532–550.
- Estrin, S., Korosteleva, J., Mickiewicz, T., 2013. Which institutions encourage entrepreneurial growth aspirations? *Journal of Business Venturing*, 28 (4), 564–580.
- Estrin, S., Mickiewicz, T., Stephan, U., 2013. Entrepreneurship, Social Capital, and Institutions: Social and Commercial Entrepreneurship across Nations. *Entrepreneurship Theory and Practice*, 37(3), 479–504.
- EUROSTAT (2015). EUROSTAT Statistics Explained: Business Demography Statistics. http://ec.europa.eu/eurostat/statistics-explained/index.php/Business_demography_statistics. Accessed on 15 December 2015.
- Faulkner, W., Senker, J., 1995. *Knowledge Frontiers: Public Sector Research and Industrial Innovation in Biotechnology, Engineering Ceramics and Parallel Computing*, Clarendon Press, Oxford.
- Garnsey, E., Heffernan, P., 2005. Growth setbacks in new firms. *Futures*, 37 (7), 675–697.
- Garnsey, E., Stam, E., Heffernan, P., 2006. New firm growth: exploring processes and paths. *Industry and Innovation*, 13 (1), 1–20.
- Geels, F.W., 2002. Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research Policy*, 31 (8/9), 1257–1274.
- Geels, F.W., Schot, J., 2007. Typology of sociotechnical transition pathways. *Research Policy*, 36, 399–417.
- German, R. M., 1984. *Powder Metallurgy Science*, Princeton, New Jersey, Metal Powder Industries Federation.
- Geroski, P.A., 2000. The growth of firms in theory and practice. In: Foss, N., Mahnke, V. (Eds.), *Competence, Governance, and Entrepreneurship*. Oxford University Press, pp. 168–186.
- Gregoire, D.A., Shepherd, D.A., 2012. Technology-Market Combinations and the Identification of Entrepreneurial Opportunities: An Investigation of the Opportunity-Individual Nexus. *Academy of Management Journal*, 55(4), 753-785.

- Hagedoorn J., 1993. Understanding the rationale of strategic technology partnering: interorganizational modes of cooperation and sectoral difference. *Strategic Management Journal*, 14 (5), 371–385.
- Heinze, T., Kuhlmann, S., 2008. Across institutional boundaries? Research collaboration in German public sector nanoscience, *Research Policy*, 37, 888-899.
- Hekkert, M.P., Suurs, R.A.A., Negro, S.O., Kuhlmann, S., Smits, R.E.H.M., 2007. Functions of innovation systems: A new approach for analysing technological change. *Technological Forecasting & Social Change*, 74, 413–432.
- Hite, J.M., 2005. Evolutionary processes and paths of relationally embedded network ties in emerging entrepreneurial firms. *Entrepreneurship Theory and Practice*, 29(1), 113–144.
- Hobday, M., 1994. Export-led Technology Development in the Four Dragons: The Case of Electronics. *Development and Change*, 25(2), 333–361.
- Jackson, G., Deeg, R., 2008. Comparing capitalisms: Understanding institutional diversity and its implications for international business. *Journal of International Business Studies*, 39(4), 540–561.
- Khanna, T., Palepu, K., 1997. Why Focused Strategies May be Wrong for Emerging Markets? *Harvard Business Review*, 75 (4), 41-51.
- Kirzner, I.M., 1973. *Competition and Entrepreneurship*. University of Chicago Press, Chicago.
- Kirzner, I. M., 1979. *Perception, opportunity and profit*. Chicago: University of Chicago Press.
- Kirzner, I.M., 1985. *Discovery and the Capitalist Process*. University of Chicago Press, Chicago.
- Kirzner, I. M., 1997. Entrepreneurial discovery and the competitive process: An Austrian approach. *Journal of Economic Literature*, 35, 60–85.
- Klepper, S., 1997. Industry Life Cycles. *Industrial and Corporate Change*, 6 (1), 145-181.
- Kuhlmann, S., 2001. Future governance of innovation policy in Europe—three scenarios, *Research Policy*, 30, 953-976.
- Kuratko, D.F., Montagno, R.V., Hornsby, J.S., 1990. Developing an intrapreneurial assessment instrument for an effective corporate entrepreneurial environment, *Strategic Management Journal*, 11, 49-58.
- Leonard-Barton, D., 1992. Core capabilities and core rigidities: a paradox in managing new product development. *Strategic Management Journal*, 13, 111–125.
- Levie, J., Autio, E., 2008. A Theoretical Grounding and Test of the Gem Model. *Small Business Economics*, 31 (3), 235-263.
- Lockett, A. , Currie, G., Waring, J., Finn, R., Martin, G., 2012. The role of institutional entrepreneurs in reforming healthcare. *Social Science & Medicine*, 74, 356-363.
- Lumpkin, G.T., Dess, G.G., 1996. Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21 (1), 135–172.
- Lumpkin, G.T., Lichtenstein, B.B., 2005. The Role of Organizational Learning in the Opportunity-Recognition Process, *Entrepreneurship Theory and Practice*, 29(4), 451-472.

- Makela, M.M., Maula, M. V.J., 2006. Interorganizational Commitment in Syndicated Cross-Border Venture Capital Investments. *Entrepreneurship Theory and Practice*, 30 (2), 273-299.
- Mazzucato, M., 2013. Financing innovation: creative destruction vs. destructive creation. *Industrial and Corporate Change*, 22 (4), 851–867.
- Mazzucato, M., 2006 Introduction in Strategy for Business: A Reader, M.Mazzucato (ed.), Sage Publications, London.
- McKelvie, A., Wiklund, J., 2004. How knowledge affects opportunity discovery and exploitation among new ventures in dynamic markets. In J.E. Butler (Ed.), *Opportunity identification and entrepreneurial behavior* (pp. 219–239). Greenwich, CT: Information Age Publishing.
- McMullen, J.S., Plummer, L.A., Acs, Z.J., 2007. What is an entrepreneurial opportunity? *Small Business Economics*, 28(4), 273-283.
- McMullen, J.S., Bagby, D., Palich, L., 2008. Economic freedom and the motivation to engage in entrepreneurial action. *Entrepreneurship Theory and Practice*, 32(5), 875–895.
- McMullen, J.S., 2011. Delineating the domain of development entrepreneurship: A market-based approach to facilitating inclusive economic growth. *Entrepreneurship Theory and Practice*, 35(1), 185–215.
- Meyer, K.E., Peng, M. W., 2005. Probing theoretically into Central and Eastern Europe: transactions, resources, and institutions. *Journal of International Business Studies*, 35, 600-621.
- Miles, M.B., Huberman, A. M., 1994. Qualitative Data Analysis. 2nd edition, SAGE Publications, London.
- Miller, D., 1983. The correlates of entrepreneurship in three types of firms. *Management Science*, 29(1), 710-191.
- Miller, D., Friesen, P. H., 1982. Innovation in conservative and entrepreneurial firms: two models of strategic momentum. *Strategic Management Journal*, 3 (1), 1-25.
- Moreno, A.M., Casillas, J.C., 2008. Entrepreneurial Orientation and Growth of SMEs: A Causal Model, *Entrepreneurship Theory and Practice*, 32(3), 507-28.
- Nahapiet, J., Ghoshal, S., 1998. Social capital, intellectual capital, and the organizational advantage. *Academy of Management Review*, 23, 242–266.
- Nelson, R.R., Winter, S.G., 1982. *An Evolutionary Theory of Economic Change*. Belknap Press.
- Nielsen, R.P., Peters, M.P., Hisrich, R.D., 1985. Intrapreneurship Strategy for Internal Markets- Corporate, Non-Profit and Government Institution Cases. *Strategic Management Journal*, 6 (2), 181-189.
- North, D., 1990. *Institutions, institutional change, and economic performance*. New York: Norton.
- Patzelt, H., Shepherd, D.A., 2011. Recognizing Opportunities for Sustainable Development, *Entrepreneurship Theory and Practice*, 35 (4), 631-652.
- Penrose, E., 1995. *Theory of Growth of the Firm*, 3rd edition, Oxford, Oxford University Press.

Perry-Smith, J.E., Shalley, C.E., 2003. The social side of creativity: a static and dynamic social network perspective. *Academy of Management Review*, 28, 89.

Pinchot, G. III., 1985. *Intrapreneuring: Why you don't have to leave the corporation to become an entrepreneur*. New York: Harper and Row.

Porter, M. E., 1990. *The Competitive Advantage of Nations*, London, Macmillan Press.

Porter, M.E., 1996. What is strategy? *Harvard Business Review*, November/December.

Radošević, S., Yoruk, E., 2013. Entrepreneurial propensity of innovation systems: theory, methodology and evidence. *Research Policy*, 42, 1015–1038.

Radošević, S., Yoruk, E., 2015 Entrepreneurial orientation of knowledge-based enterprises in Central and Eastern European Countries. In *Dynamics of Knowledge-Intensive Entrepreneurship: Business Strategy and Public Policy*. Yannis Caloghirou, Franco Malerba, Maureen McKelvey, Slavo Radošević (eds), Routledge.

Rauch, A., Wiklund, J., Lumpkin, G.T., Frese, M., 2009. Entrepreneurial orientation and business performance: an assessment of research and suggestions for the future. *Entrepreneurship Theory and Practice*, 33, 761–787.

Rodrik, D., Subramanian, A., Trebbi, F., 2002. Institutions Rule: The Primacy of Institutions over Geography and Integration in Economic Development. Mimeo, Harvard University.

Sanders, M., 2007. Scientific Paradigms, Entrepreneurial Opportunities and Cycles in Economic Growth. *Small Business Economics*, 28(4), 339-354.

Schot, J., Geels, F. W., 2007. Niches in evolutionary theories of technical change. *Journal of Evolutionary Economics*, 17, 605–22.

Schot, J., Geels, F. W., 2008. Strategic niche management and sustainable innovation journeys: Theory, findings, research agenda, and policy. *Technology Analysis & Strategic Management*, 20, 537–54.

Schumpeter, J. A., 1934. *The theory of economic development*. Harvard University Press, Cambridge, Massachusetts.

Shane, S., 1992. Why do some societies invent more than others? *Journal of Business Venturing*, 7 (1), 29–46.

Shane, S., 1994. Are champions different from non-champions? *Journal of Business Venturing*, 9 (5), 397-421.

Shane, S., 1996. Explaining rates of variation in entrepreneurship in the United States: 1899–1988. *Journal of Management*, 22 (5), 747–781.

Shane, S., 2000. Prior knowledge and the discovery of entrepreneurial opportunities. *Organization Science*, 11 (4), 448–469.

Shane, S., 2012. Reflections on the 2010 AMR decade award: Delivering on the promise of entrepreneurship as a field of research, *Academy of Management Review*, 37(1), 10-20.

- Shane, S. and Venkataraman, S., 2000. The promise of entrepreneurship as a field of research. *Academy of Management Review*, 25(1), 217– 226.
- Shapira, P., Youtie, J., 2012. The economic contributions of nanotechnology to green and sustainable growth. OECD and US National Nanotechnology Initiative International Symposium on Assessing the Economic Impact of Nanotechnology, Background paper 3, 16 March 2012.
- Sharma, P., Chrisman, J. J., 1999. Toward a reconciliation of the definitional issues in the field of corporate entrepreneurship. *Entrepreneurship Theory and Practice*, 23(3), 11–27.
- Shepherd, D.A., DeTienne, D.R., 2005. Prior knowledge, potential financial reward, and opportunity identification. *Entrepreneurship Theory and Practice*, 29, 91–112.
- Sine, W.D., David, R.J. ,2003. Environmental jolts, institutional change, and the creation of entrepreneurial opportunity in the US electric power industry. *Research Policy*, 32, 185–207.
- Smits, R., Kuhlmann, S., 2004. The rise of systemic instruments in innovation policy, *International Journal of Foresight and Innovation Policy*, 1(1-2): 4-32.
- Stam, E., Wennberg, K., 2009. The roles of R&D in new firm growth. *Small Business Economics*. 33(1), 77-89.
- Suddaby, R., Bruton, G.D., Si, S.X., 2015. Entrepreneurship through a qualitative lens: Insights on the construction and/or discovery of entrepreneurial opportunity, *Journal of Business Venturing*, 30, 1–10.
- Teece. D., Pisano. G., Shuen. A., 1997. Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(1), 509-533.
- Ucbasaran, D., Westhead, P., Wright, M., 2008. Opportunity identification and pursuit: Does an entrepreneur's human capital matter? *Small Business Economics*, 30, 153–173.
- Valdez, M.E., Richardson, J., 2013. Institutional Determinants of Macro-Level Entrepreneurship, *Entrepreneurship Theory and Practice*, 37 (5), 1149–1175.
- Venkatraman, N. 1989. The concept of fit in strategy research: toward verbal and statistical correspondence. *Academy of Management Review*, 14: 423–444.
- Venkatraman, N. and Prescott, J. E. 1990. Environment-strategy coalignment: an Empirical test of its performance Implications. *Strategic Management Journal*, 11: 1-23.
- Von Hippel, E., 1986. Lead Users: A Source of Novel Product Concepts, *Management Science*, 32(7): 791-805.
- Wan, W. P., 2005. Country resource environments, firm capabilities, and corporate diversification strategies. *Journal of Management Studies*, 42(1), 161–182.
- Wennberg, K., Wiklund, J., DeTienne, D.R., Cardon, M.S., 2010. Reconceptualizing entrepreneurial exit: Divergent exit routes and their drivers. *Journal of Business Venturing*, 25(2), 361-375.
- Wennberg, K., Lindqvist, G., 2010. The effect of clusters on the survival and performance of new firms. *Small Business Economics*, 34 (3), 221-241.

- Wennekers, S., Thurik, R., 1999. Linking Entrepreneurship and Economic Growth. *Small Business Economics*, 13 (1), 27-56.
- Wernerfelt, B., 1984. A resource-based view of the firm. *Strategic Management Journal*, 5 (2), 171 - 180.
- Wiklund, J., 2007. Small firm growth strategies, In: Zackarakis, A., Spinelli, S. (Eds.), *Entrepreneurship and Growth: The Engine of Growth*, 2nd edition. Praeger, Westport, Connecticut, pp. 135–154.
- Wiklund, J., Shepherd, D., 2003a. Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic Management Journal*, 24, 1307–1314.
- Wiklund, J., Shepherd, D., 2003b. Aspiring for, and Achieving Growth: The Moderating Role of Resources and Opportunities. *Journal of Management Studies*, 40(8), 1919-1941.
- Wright, M., Filatotchev, I., Hoskisson, R. E., Peng, M.W., 2005. Strategy research in emerging economies: challenging the conventional wisdom. *Journal of Management Studies*, 26, 1-34.
- World Economic Forum 2012. Global Competitiveness Report 2012-2013. Geneva. Available at http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2012-13.pdf
- Yin, R.K., 2003. *Case Study Research: Design and Methods*. 3rd edition. Sage Publications. London.
- Yoruk, E., 2011. The influence of technological capabilities on the knowledge network component of innovation systems: evidence from advanced materials in Turkey. *International Journal of Technological Learning, Innovation and Development*, 4 (4), 330-362.
- Yoruk E. 2015. Entrepreneurial and Intrapreneurial Propensity of Low-Carbon Technologies in Advanced Materials and Automotive in Central and Eastern Europe. GRINCOH Working Paper Series, Paper No. 3.10.1
- Zajac, E. J., Kraatz, N. S. & R. K. F. Bresser 2000. Modeling the Dynamics of Strategic Fit: A Normative Approach to Strategic Change. *Strategic Management Journal*, 21(4): 429-453.
- Zahra, S., 1993. A conceptual model of entrepreneurship as firm behavior: A critique and extension. *Entrepreneurship Theory and Practice*, 14(4), 5-21.
- Zahra, S.A., Covin, J. G., 1995. Contextual influences on the corporate entrepreneurship-performance relationship: a longitudinal examination, *Journal of Business Venturing*, 10(1), 43-58.
- Zahra, S. A., Nielsen, A. P., Bogner, W. C., 1999. Corporate entrepreneurship, knowledge, and competence development. *Entrepreneurship Theory and Practice*, 23(3), 169–189.
- Zahra, S.A., Garvis, D.M., 2000. International corporate entrepreneurship and firm performance: the moderating effect of international environmental hostility, *Journal of Business Venturing*, 15(5/6), 469-492.
- Zahra, S.A., Korri, J.S., Ji, F.Y., 2005. Cognition and international entrepreneurship: Implications for research on international opportunity recognition and exploitation. *International Business Review*, 14, 129–146.
- Zahra, S. A., Sapienza, H. J., Davidsson, P., 2006. Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda. *Journal of Management Studies*, 43(4), 917-955.

Zahra, S.A., Wright, M., 2011. Entrepreneurship's next act, *Academy of Management Perspectives*, 25(4), 67-83.