

## **Entrepreneurial Orientation (EO) and Knowledge Creation (KC)**

**Franc Vidic<sup>1</sup>**

### **Abstract**

*There is wide acceptance of the precept that entrepreneurial orientation is associated with superior firm performance, and knowledge has been recognized as a key resource for preserving the competitive advantage. Enterprises must know what to do, how to do it, as well as when and where to do it. They must be able to identify and exploit opportunities.*

*This study explains the relationship between entrepreneurial orientation (EO) and knowledge creation (KC). It uses a sample of 195 items from SMEs to explore the relationship between entrepreneurial and knowledge creation orientation. Entrepreneurship orientation includes five dimensions: innovativeness, risk-taking, proactiveness, competitive aggressiveness and autonomy process, while the knowledge creation includes the following four processes: socialization, externalization, combination and internalization. The findings show the existence of a close relationship between entrepreneurial orientation and knowledge creation.*

**Keywords:** SMEs, entrepreneurial orientation (EO), knowledge creation (KC)

**JEL Classification:** M13, M130

### **1. Introduction**

The concept of entrepreneurial orientation aims to explain the mindset of firms, whereby knowledge generation is now widely accepted as a key determinant of economic performance. The production, acquisition, absorption, reproduction, and dissemination of knowledge are seen as the fundamental characteristic of contemporary competitive dynamics. Economic performance is not determined just by the creation of new knowledge, but also by the ability and the willingness of entrepreneurs to recognize and exploit new opportunities based on new knowledge (Audrech, Bonte, Keilbach, 2008).

An increasing number of studies considered the relationship between knowledge, and entrepreneurship (Moller, 2007; Miller, Fern & Cardinal, 2007). We believe that better understanding of the interaction between entrepreneurial orientation and knowledge creation processes impact the company performance. With better knowledge individuals, companies and the business sector can develop better skills that will contribute to higher

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<sup>1</sup> GEA College, Faculty for entrepreneurship, Dunajska cesta 156, 1000 Ljubljana, Slovenia, vidicfranc07@gmail.si

competitiveness. Based on a study of relationship between entrepreneurial orientation and creation of new knowledge, we determined the interconnections among individual factors.

This article has the following structure. The first part of this paper following the introduction comprises a theoretical background and discussion about EO and KC. The second part includes a brief presentation of the research method and the empirical findings. The empirical test is based on a sample with 195 items collected through a questionnaire submitted to entrepreneurs and executives from Slovenian SMEs. Finally, the conclusion summarizes the results along with their implications.

## **2. Research background and hypothesis**

“Knowledge has to be the key economic resource and the dominant – and perhaps even the only – source of competitive advantage” (Drucker, 2009). Knowledge-based economy is based on the creation, evaluation and trading of knowledge. Labour costs become decreasingly important and traditional economic concepts, such as scarcity of resources and economies of scale, cease to apply. Knowledge is an important production factor and the most strategically significant resource of a firm. It creates the longest lasting competitive advantage and serves as a source of sustainable differentiation due to immobility. Teece, Pisano and Shuen (1997) and others (Morgan, Vorhies & Mason, 2009) upgraded Knowledge based theory with Theory of dynamic firms capability. The theory assumes that heterogeneous sources are not sufficient in the dynamic market environment (Morgan et al., 2009; Teece et al., 1997). Trends, outlook and market information uses must be dynamic (Busenitz & Barney, 1997 in Holcomb, Ireland, Holmes & Hitt, 2009), whereby thinking along established routes is not sufficient (Nonaka, 1991).

The environment is changing constantly and rapidly along with the market and customers' needs (Prajogo & Ahmed, 2006). Constant and rapid changes in the present, networked knowledge society give rise to new challenges to human competencies (Paavaola & Hakkarainen, 2005). Audretsch (2010) describes an entrepreneurial society built upon the knowledge-based society. The entrepreneurial society assumes the role of physical capital and entrepreneurial capital upgraded with the knowledge capital, economic growth, job creation and competitiveness in a complex environment (Audretsch, 2010). The recognition of opportunities and the decision to commercialize them is the focal concern. Enterprises must know what to do, how to do it, as well as when and where to do it in order to successfully compete. Without knowledge, this is impossible (Korposh, Lee, Wei & Wei, 2011). Productive participation in knowledge intensive work requires that individual professionals, their communities, and organizations continuously surpass themselves, develop new competencies, upgrade their knowledge and understanding as well as produce innovations and create new knowledge (Paavola & Hakkarainen, 2005). Human work is increasingly focused on deliberate advancement of knowledge rather than mere production of material things (Bereiter, 2002 in Paavaola & Hakkarainen, 2005). Knowledge and innovation are widely considered as a key prerequisite for achieving organizational competitiveness and sustained long-term wealth in an increasingly volatile

business environment (Esterhuizen, Schutte & Toit, 2011). Organization learning improves the innovation process and its effectiveness (Huang & Wang, 2011), and competitive advantage (Barsh, 2007).

### **Entrepreneurial orientation (EO)**

EO refers to strategic orientation and entrepreneurial activities, which involve specific entrepreneurial decision-making, such as taking calculated risks, as well as being innovative and proactive (Covin & Slevin, 1989; Lumpkin & Dess, 1996). EO reflects how a firm performs rather than what it does (Lumpkin & Dess, 1996). The resource-advantage theory views EO as a resource to outperform other rivals and yield marketplace positions of competitive advantage (Hunt & Morgan, 1995). EO reflects leadership skills, the integration of proactive and aggressive initiatives and turning of competitive environment to their advantage (Atuathene-Gima, 2001). EO companies have competencies to respond quickly and take advantage in niche markets (Zahra & Covin, 1995). They innovate and take risks with the strategy for positioning of new products (Miller & Friesen, 1982).

EO is a multidimensional phenomenon composed of processes, structures and habits (Lumpkin & Dess, 1996). The conceptualization of EO has been the focus of systematic inquiry in literature (Miller, 1983; Covin & Slevin, 1991; Lumpkin & Dess, 1996; Lumpkin, Cogliser & Schneider, 2009; Wiklund, 1999). The concept of entrepreneurial orientation can apply to individuals as well as organizations (Bolton & Lane, 2012; Rauch, Wiklund, Lumpkin & Frese, 2009). In our research we accept that: competitive aggressiveness, autonomy, innovation, proactiveness and willingness to take risks are five of the characteristics commonly associated with entrepreneurial orientation (Bolton & Lane, 2012; Fillis, 2010; Lumpkin & Dess, 1996; Rauch et al., 2009; Ward, 2004). Each dimension is important, but they may not be important to the same degree (Kreiser, Marino & Weaver, 2002; Lamadrid, Heene & Gellynck, 2008; Lumpkin & Dess, 2001; Rauch et al., 2009). Each dimension can be reflected complementary to the others or in conjunction with them (Lyon, Lumpkin & Dess, 2000). The dimensions of EO are expected to vary independently on a range of possible environmental and organizational factors (Kreiser et al., 2002).

Innovation represents a firm's tendency to pursue creative and novel solutions to challenges faced by the firm: the successful generation, development and implementation of new and novel ideas which introduce new products, processes and/or strategies to enhance current products, processes and/or strategies leading to commercial success and possible marketing leadership, as well as the creating of value for shareholders, driving economic growth and improving standard of living (Katz, 2007). Firms use innovation to pursue new opportunities, which can keep them ahead of competitors and help them gain competitive advantages, consequently leading to improved financial performance (Wiklund, 1999).

Risk-taking (Cantillon, 1730 in Jun & Deshoolmeester, 2006) is associated with entering in an unknown field, with the involvement of one's own and others' resources to operate in an uncertain environment. It is important to reduce and manage risks (Lumpkin & Dess, 1996).

Proactiveness refers to a posture of anticipating and acting on the basis of future demands and needs in the marketplace, thereby creating first-mover advantage vis-à-vis competitors (Lumpkin & Dess, 2001). It is the response to and exploration of opportunities for products and services to achieve an advantage over its competitors while offering adjustments to future demand. Proactivity encompasses not only alertness to unnoticed opportunities, but also effort to capture these opportunities through monitoring and influencing trends, forward-looking activities, and assertively acting on future needs or changes (McMullen & Shepherd, 2006).

Competitive aggressiveness represents a firm's propensity to directly and intensely challenge its competitors to achieve an entry or improve position to outperform industry rivals (Lumpkin & Dess, 1996). Hence, competitive aggressiveness is a response to threats in hostile business environments where competition is intense and resources are constrained, whereas proactiveness is a response to opportunities (Lumpkin & Dess, 2001). Competitively aggressive firms direct their efforts toward outperforming of rivals (Covin & Covin, 1990).

Autonomy is the independent action of an individual or team in bringing forth an idea or vision and carrying it through to completion, as well as the ability and will to be self-directed in the pursuit of alternatives (Lumpkin & Dess, 1996). Autonomous entrepreneurs are inherently creative entrepreneurs; creative with a desire to be independent. Autonomus independence is thus important for entrepreneurs and entrepreneurial teams in the establishment and management of new business (Burgelman, 1984; Hart, 1992). Autonomy requires individuals' or groups' freedom to act independently in the decision making process to pursue entrepreneurial activities and achieve strategic advantages (Lumpkin et al., 2009; Rauch et al., 2009).

***H1: Entrepreneurial orientation consists of five dimensions.***

**Knowledge creation**

Knowledge is the fundamental source of competitiveness and success of the company. Knowledge is formed and exists in the minds of people; in the light of creation of new ideas it is an important form of interaction between individuals (Davenport & Prusak, 2000; Nonaka, 1994). Nonaka, Toyama and Konno (2000) note that knowledge creation is necessarily context-depend in terms of those who participate, as well as how they participate. From the perspective of resource-advantage theory, knowledge is not easy to transfer and can easily disperse due to its characteristics of tacitness and immobility (Grant, 1996; Hunt & Morgan, 1996). Knowledge creation (KC) process allows firms to amplify knowledge embedded internally and transfer knowledge into operational activities in order to improve efficiency and generate business value (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Nonaka, Toyama & Nagata, 2000). Knowledge creation, include elements of EO and market orientation, which are further converted into knowledge capital, which can be transmitted among other employees (Li, Huang & Tsai, 2009).

Organizational knowledge creation integrates context, knowledge assets, and knowledge creation processes throughout the organization (Von Krogh & Nonaka, 2011). Different factors affect the process of knowledge creation in organization. These factors include the organization's structure, culture, level of application of knowledge management, available technology, application of practice communities, and knowledge management methods (Korposch, Lee, Wei & Wei, 2011). Corporate culture and leadership encourage people to communicate, collaborate and engage in social interaction (Li, Huang & Tsai, 2009). Social cohesion provides an effective combination of knowledge from different areas of expertise (De Luca & Atuahene-Gima, 2007). Interacting with a combination of knowledge comes to the extent which results in good interpersonal relationships (Floyd & Lane, 2000, in De Clecq, Dimov & Thongpapanl, 2009), provided that organizational atmosphere is based on honesty, trust and support (Kuratko, Ireland, Covin & Hornsby, 2005). New insights affect entrepreneurial behaviour and allow for the ability to successfully exploit opportunities (De Clecq et al., 2009). The quantity and quality of information to be exchanged are important (Birckshaw, 2000 in Williams & Lee, 2009). If a proper knowledge creation process is implemented the knowledge, which a team can create, is more than just a sum of the knowledge created by all individuals (Lin, Lin & Huang, 2008). Entrepreneurs need to replace the existing knowledge with new knowledge, in order to recognize which positioning is no longer optimal for the organization, and develop the organization's ability to operate in tomorrow's market (Hamel & Prahalad, 1994). It is necessary to balance between research and development (Renko, Carsrud & Brännback, 2009).

Based on the Theory of knowledge creation, knowledge creation is a process involving a spiral of socialization, externalization, combination and internalization. According to Nonaka's knowledge creation (SECI) model an organization creates knowledge through a dynamic process including interactions amongst individuals and organizations, as well as the interaction between tacit and explicit knowledge (Nonaka, 1991; 1994; Nonaka & Takeuchi, 1995; Nonaka, Toyama & Konno, 2000; Lin, Lin & Huang, 2008). The interaction between the two types of knowledge is called 'knowledge conversion'. Through the conversion process, tacit and explicit knowledge expands in both quality and quantity. Within organizations, knowledge 'becomes' or 'expands' according to a four-stage conversion process (SECI) (Nonaka, von Krogh & Voepf, 2006): (1) socialization (from tacit knowledge to tacit knowledge); (2) externalization (from tacit knowledge to explicit knowledge); (3) combination (from explicit knowledge to explicit knowledge); and (4) internalization (from explicit knowledge to tacit knowledge). The knowledge spiral consists of two inter-related processes: knowledge conversion at the individual level and knowledge crystallization and transfer between the organization and its members (Nonaka & Kogut, 2009). The processes of knowledge conversion between its tacit and explicit forms and knowledge transfer between the organization and its members are not repeated at the same level but consist of an upward knowledge spiral through which the organization and its members create new knowledge beyond their existing knowledge.

Socialization is the process of converting tacit knowledge possessed by individuals through shared experiences (Nonaka, Toyama & Konno, 2000). Since tacit knowledge is

difficult to formalise and often time- and space-specific, it can be acquired only through shared experience, such as spending time together or living in the same environment. Socialization typically occurs in a traditional apprenticeship, where apprentices learn the tacit knowledge needed in their craft through hands-on experience, rather than from written manuals or textbooks. Socialization may also occur in informal social meetings outside of the workplace, where tacit knowledge, such as world views, mental models and mutual trust, can be created and shared. Socialization also occurs beyond organizational boundaries. Firms often acquire and take advantage of the tacit knowledge embedded in customers or suppliers by interacting with them (Nonaka, Toyama & Konno, 2000).

Externalization is the process of articulating tacit knowledge into explicit knowledge. When tacit knowledge is transformed into explicit, knowledge is crystallised; thus allowing to be shared by others, and becoming the basis of new knowledge. Concept creation in new product development is an example of this conversion process. The successful conversion of tacit knowledge into explicit knowledge depends on the sequential use of metaphors, analogy and models (Nonaka, Toyama & Konno, 2000).

Combination refers to the new explicit knowledge. It is the process of converting explicit knowledge into more complex and systematic sets of explicit knowledge by merging, categorizing, reclassifying, and synthesizing of existing explicit knowledge. Explicit knowledge is collected from within or outside of the organization and then combined, edited or processed to form new knowledge. The new explicit knowledge is then disseminated among the members of the organisation. (Nonaka, 1994; Nonaka, Toyama & Konno, 2000; Nonaka, Toyama & Nagata, 2000).

Internalization refers to the creation of new tacit knowledge from explicit knowledge (Nonaka, 1994). Through internalization, the created explicit knowledge is shared throughout an organisation and converted into tacit knowledge by individuals. Internalization is closely related to learning by doing. Explicit knowledge, such as the product concepts or the manufacturing procedures, has to be actualised by action and practice. By reading documents or manuals about their jobs and the organisation, and by rejecting upon them, trainees can internalise the explicit knowledge written in such documents to enrich their tacit knowledge base. Explicit knowledge can be also embodied in simulations or experiments that trigger learning by doing. When knowledge is internalized to become a part of individuals' tacit knowledge bases in the form of shared mental models or technical know-how, it becomes a valuable asset. Through internalization, knowledge is transformed into organizational memory and actualized in practical operations such as new product development or manufacturing procedure. This tacit knowledge accumulated at the individual level can then set off a new spiral of knowledge creation when it is shared with others through socialization (Nonaka, Toyama & Konno, 2000). The firm utilizes its human capital to transfer tacit knowledge, which becomes the base for further innovation and new routine (Nonaka, Toyama & Nagata, 2000).

***H2: Knowledge creation is a four-dimensional process***

## **Entrepreneurial orientation and knowledge creation process**

Entrepreneurial attitude and conduct are critical for new ventures to facilitate the utilization of new and existing knowledge resulting in the discovery of market opportunities (Wiklund & Shepherd, 2003). KC processes such as socialization, externalization, combination, and internalization (SECI) describe a spiral of interactions between explicit and tacit knowledge (Nonaka, 1994; Nonaka & Konno, 1998). Firms exchange and transform knowledge continuously through dynamic self-transcendental processes (Nonaka & Konno, 1998; Nonaka, Toyama & Konno, 2000). When developing EO, ventures can exploit the dynamic SECI spiral to create and share knowledge dispersed among individual members. Innovative firms may have a tendency to support new ideas and novelty, and further increase the engagement in development of new products, services, or processes (Lumpkin & Dess, 1996). They must be proactive, anticipate and act on future demands and needs in the marketplace, thereby creating first-mover advantage vis-à-vis its competitors (Lumpkin & Dess, 2001). The development of new products and services involves extensive and intensive knowledge activities. Knowledge conversion provides value to their customers and helps achieving a competitive position in the market (Griffith, Noble & Chen, 2006). The organization creates a new combination of resources and products, intended for upcoming changes, opportunities and entry into market, while taking advantage and exploiting opportunities (Lumpkin & Dess, 2001). New types of knowledge and new ways of organising the production thereof may emerge as knowledge generators' response to the challenges posed by a changing society (Fogerberg, Fosaas, Soprassart, 2012).

Knowledge exchange between the social system and the individuals' cognitive system is the basis for development of the new knowledge (Kimmerle, Cress & Held, 2010). The SECI spiral can facilitate knowledge conversion and transformation into new types of knowledge (Nonaka, Takeuchi, 1995). Knowledge conversion, new product development or marketing activities all start with socialization (Nonaka & Toyama, 2005). Socialization processes such as direct interaction, brainstorming, and informal meetings help employees to share and exchange valuable knowledge (Zhang, Lim & Cao, 2004).

Entrepreneurs should capitalize knowledge resources, as well as identify and exploit business opportunities (Griffith et al., 2006), promote innovation and motivate employees to take risks in order to deal with the challenging and creative activities (Lumpkin & Dess, 1996). Employees need socialization process to upgrade interaction for exchanging tacit knowledge, solving problems, and avoiding mistakes (Nonaka et al., 1996; Quinn, 1992).

Externalization activities articulate tacit knowledge into explicit forms. Through externalization employees can understand new product development and increase their involvement in the activities of articulating tacit knowledge into substantial concepts and notions (Nonaka & Konno, 1998; Nonaka & Takeuchi, 1995; Nonaka & Toyama, 2005). The newly created knowledge and existing knowledge are then combined, edited or processed to form more complex and explicit knowledge through the combination process.

Innovative ideas become more usable, thereby crystallizing knowledge into new products or services (Nonaka & Konno, 1998). Internalization process promotes the actualization of new product innovation or improvements within the organization.

Autonomy reflects the ability to be self-directed in the pursuit of market opportunities (Lumpkin & Dess, 1996). Employees need autonomy, as well as independent assortment and selection activities to achieve their goals (Li, Huang & Tsai, 2009). Socialization process makes employees set up interaction for the free exchange of advanced personal or professional knowledge. To translate tacit knowledge into understandable forms, the firm engages in externalization activities such as action, experimentation, and observation (Nonaka, Takeuchi & Umemoto, 1996).

The acquisition of knowledge is associated with learning at work, learning from work or learning by doing. In enterprises sharing knowledge within the company led to the creation of new knowledge and its diffusion across an enterprise (Cohen & Levinthal, 1990). This is reflected in the use of knowledge (Li, Huang, Tsai, 2009). Wiklund and Shepherd (2003) note a positive relationship between resources, knowledge-based orientation and performance of the organization.

However, there is considerable literature which attempts to define knowledge-based innovation and suggests that the process of innovation itself relies heavily on innovation knowledge that is usually created and transferred or disseminated within a company, between companies, or between companies and innovators (Nonaka and Von Krogh, 2009). Grant (1996), Teece (2000), Watson and Hewett (2006 in Li, Liu, Wang, Li & Guo, 2009) observed correlation with innovation and creation of knowledge through its collection and use within the enterprise. A high degree of entrepreneurial orientation involves long-term development vision, mission, and work with customers, as well as setting up of new capacities. Realizing the vision of entrepreneurs can be related to double loop learning (Cui & Zheng, 2007; Chaston & Scott, 2012). The knowledge creation process appears to be the key mechanism through which EO is developed and implemented (Griffith, Noble & Chen, 2006). Knowledge creation is of strategic value to the firm in order to maintain the achieved competitive advantage (Nonaka & Takeuchi, 1995; Tsai & Li, 2007). Kim, Song, Sambamurthy, and Lee (2011) find strong support for the relationship between entrepreneurial intensity and knowledge integration mechanisms.

According to the above, SMEs characterised by entrepreneurial orientation are more inclined to focus attention and effort towards the knowledge creation process. The SECI spiral can utilize the full potential of knowledge and further facilitate its creation and utilization within the firm, thus facilitating the transformation and activation of entrepreneurial orientation. We can reasonably expect a positive relationship between entrepreneurial orientation and knowledge creation process.

***H3: Entrepreneurial orientation is correlated with the knowledge creation process.***



### **3. Research design and methods**

#### **Sample selection and data collection**

The sample for this study is drawn from different places in Slovenia. A sample of 2500 questionnaires were sent to SMEs; firms with more than 6 and less than 250 employees from the Slovenian information system (IPIS). Classic mail was sent to the target respondents inviting them to participate in the survey by completing questionnaire. 203 responses were received, four of them were without any data on it and another four were incomplete. The remaining 195 valid and completed questionnaires were used for quantitative analysis. It represented a useable response rate of 7.8%. The comparison between sent and returned questionnaires is presented in Table 1.

**Table 1: Comparison between sent and returned questionnaires according to the number of full and part-time employees**

<b>No. of employees</b>	<b>Sent questionnaires</b>		<b>Returned questionnaires</b>	
	<b>Frequency</b>	<b>Percentage (%)</b>	<b>Frequency</b>	<b>Percentage (%)</b>
6–9	968	38,72	57	28,64
10–19	853	34,12	62	31,16
20–49	480	19,20	46	23,12
50–99	129	5,16	24	12,06
100–250	70	2,80	10	5,02
No answer			4	
Cumulative	2500		203	

We collected data of the measures of knowledge creation process and entrepreneurial orientation within each company.

#### **Measurement model**

For data collection we employed a questionnaire survey approach to collect data, and all items required five-point Likert-style responses ranged from 1 = “strongly disagree,” through 3 = “neutral,” to 5 = “strongly agree”. We requested respondents to evaluate their level of agreement with each question.

#### *Entrepreneurial orientation (EO)*

Drawing upon previous studies (e.g. Li, Huang, Tsai, 2009; Covin & Slevin, 1989; Lumpkin & Dess, 1996, 2001; Miller, 1983), entrepreneurial orientation was measured with five dimensions: innovation, risk-taking, proactiveness, competitive aggressiveness, and autonomy. Three items measure innovation, which refers to a willingness to support

creativity and experimentation in introducing new products/services, and novelty, technological leadership and R&D in the development of new processes. Risk-taking means the tendency to take bold actions, such as venturing into unknown new markets; committing a large portion of resources to ventures with uncertain outcomes; and/ or borrowing heavily. It is measured with two items. Three items measure proactiveness, which refers how firms relate to market opportunities by seizing initiative in the marketplace. Competitive aggressiveness refers to how firms react to competitive trends and demands that already exist in the marketplace. Autonomy is defined as independent action by an individual or team aimed at bringing forth a business concept or vision and carrying it through to completion. Competitive aggressiveness is measured with two items, whereby autonomy is measured with three.

Competitive aggressiveness is measured with competitive processes used by the founder-managers to pursue rivals or take up new competitors, since its point of reference is competition (Lumpkin & Dess, 1996). Autonomy is measured by independent action undertaken by founder-managers or teams directed at bringing about a new venture and seeing it to fruition (Lumpkin, Cogliser & Schneider, 2009).

#### *Knowledge creation process (KC)*

This study used a five-point scale to measure the knowledge creation process dimensions. The instrument was designed by Sabherwal and Becerra-Fernandez (2003), and adapted by Li, Huang and Tsai (2009). The four dimensions of the knowledge creation process are socialization, externalization, combination, and internalization (Nonaka, 1994; Nonaka, Takeuchi & Konno, 2000; Sabherwal & Becerra-Fernandez, 2003). Five items measured socialization: cooperative projects across directorates, the use of apprentices and mentors for knowledge transfer, brainstorming retreats or camps, and employee rotation across areas. Eight items measured externalization: a problem-solving system based on a technology-like case-based reasoning, groupware and other collaboration learning tools, pointers to expertise, modelling based on analogies and metaphors, and the capture and transfer of expert knowledge. Five items measured combination: web-based access to data, web pages, databases, and repositories of information, best practices, and lessons learned. Three items measured internalization: on-the-job training, learning by doing and learning by observation.

#### **4. Analysis and results**

We performed descriptive analysis of all items to establish their suitability for statistical analysis to use factor analysis. Afterwards we performed an explorative followed by a confirmative factor analysis, and in the end we used the structured modelling method to estimate the model and relationship between EO and knowledge creation.

**Descriptive analysis**

We analysed all variables of the construct of entrepreneurial orientation and knowledge creation. We checked their characteristics and whether they are suitable for factor analysis (normality, skewness, kurtosis). Assessment of normality showed that the ratio of the standard error of skewness and kurtosis of each variable has acceptable value. All skewness and kurtosis values are lower than 2 or greater than -2 (Table 2, Table 3).

**Table 2: Entrepreneurial orientation - descriptive analysis**

<b>Innovation</b>	<b>N</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Skewness</b>	<b>Standard error</b>	<b>Kurtosis</b>	<b>Standard error</b>
The top managers favour strong emphasis on R&D, technological leadership, and innovation	202	3.64	1.080	-0.496	0.171	-0.523	0.341
My firm owns many new lines of products/services which are marketed in the past 5 years	200	3.56	1.172	-0.505	0.172	-0.659	0.342
Changes in product or service lines are usually quite dramatic	197	3.02	1.120	0.048	0.173	-0.786	0.345
<b>Risk taking</b>							
My firm usually has a strong proclivity for high risk projects with chances of very high returns	201	2.67	1.115	0.230	0.172	-0.783	0.341
Due to the nature of the environment, bold, wide-ranging acts are required to achieve the firm's objectives	198	3.66	1.024	-0.559	0.173	-0.173	0.344
When decision is faced with uncertainty, preference is given to maximizing the possibilities of utilization of opportunities	198	3.48	0.949	-0.280	0.173	-0.303	0.344
<b>Proactiveness</b>							
In dealing with competitors, my firm usually initiates actions which competitors then respond to	200	3.47	1.084	-0.400	0.172	-0.513	0.342
In dealing with competitors, my firm is very often the first business to introduce new products/services, administrative techniques, operating technologies, etc	202	3.49	1.177	-0.426	0.171	-0.743	0.341

In general, the top managers of my firm have a strong tendency to be ahead of others in introducing novel ideas or products	197	3.83	1.130	-0.749	0.173	-0.390	0.345
<b>Competitive aggressiveness</b>							
My firm usually adopts a very competitive “undo-the-competitors” position	203	3.16	1.155	-0.050	0.171	-0.704	0.340
My firm is very aggressive and intensely competitive	198	2.96	1.096	-0.070	0.173	-0.551	0.344
<b>Autonomy</b>							
My firm promotes the independent action of an individual or a team in bringing forth an idea or a vision and carrying it through to completion	200	3.77	1.037	-0.772	0.172	0.046	0.342
My firm has the ability and will to be self-directed in the pursuit of opportunities	201	3.93	0.922	-0.857	0.172	0.594	0.341
My firm takes action free of stifling organizational constraints	198	3.86	1.006	-0.660	0.173	-0.218	0.344

All items were measured with five-point Likert scale.

**Table 3: Knowledge creation - descriptive analysis**

<b>Socialization</b>	<b>N</b>	<b>Mean</b>	<b>Standard deviation</b>	<b>Skewness</b>	<b>Standard error</b>	<b>Kurtosis</b>	<b>Standard error</b>
My firm usually supports cooperative projects and R&D across directorates	201	3,40	1,184	-0,430	0,172	-0,742	0,341
My firm usually supports brainstorming retreats or camps	199	3,03	1,376	-0,081	0,172	-1,260	0,343
My firm usually supports employee rotation across areas	200	2,91	1,261	0,004	0,172	-1,072	0,342
My firm usually uses apprentices and mentors to transfer knowledge	199	2,96	1,259	-0,046	0,172	-1,013	0,343
My company organize employee meetings to share and exchange their knowledge and experience	199	3,51	1,150	-0,562	0,172	-0,414	0,343

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<b>Externalization</b>							
My firm usually adopts a problem-solving system approach based on a technology like case-based reasoning.	200	3,34	1,157	-0,368	0,172	-0,778	0,342
My firm usually promotes groupware and other learn collaboration tools	199	2,94	1,236	-0,040	0,172	-0,970	0,343
My firm usually promotes pointers to expertise	198	2,82	1,264	0,048	0,173	-1,081	0,344
My firm usually promotes modelling based on analogies and metaphors	193	2,58	1,125	0,210	0,175	-0,807	0,348
My firm usually captures and transfers experts' knowledge	63	2,89	1,220	-0,057	0,302	-0,843	0,595
My firm usually forms discussion working group with a variety of techniques over the Internet	197	2,68	1,247	0,037	0,173	-1,121	0,345
My firm usually collects knowledge from experts and customers which is designed in an acceptable form	198	2,84	1,137	-0,159	0,173	-0,912	0,344
My firm usually shares information, experience, best practices and studies to solve problems	199	3,55	1,076	-0,641	0,172	-0,215	0,343
<b>Combination</b>							
My firm has open access to data via the Internet	198	3,60	1,293	-0,659	0,173	-0,634	0,344
My firm usually supports web-based access to data	197	3,56	1,117	-0,472	0,173	-0,528	0,345
My firm usually uses web pages	198	3,43	1,141	-0,395	0,173	-0,704	0,344
My firm usually uses databases	198	3,65	1,001	-0,625	0,173	-0,006	0,344
My firm usually promotes repositories of information, best practices, and lessons learned	198	3,24	1,227	-0,340	0,173	-0,860	0,344
<b>Internalization</b>							
On the job training	199	4,04	0,873	-1,036	0,172	1,380	0,343
Learning by doing	199	4,11	0,827	-0,912	0,172	1,138	0,343
Learning by observation	197	3,75	1,076	-0,856	0,173	0,286	0,345

All items were measured with five-point Likert scale.

Descriptive and factor analysis were performed with the SPSS 18 and EQS 16 software bundles. Factor analysis was utilised to examine the underlying patterns or relationships for a large number of variables and to determine whether the information can be condensed or summarized in a smaller set of factors or components (Hair, Black, Babin, Anderson, 2010). Data matrix has a sufficient number of correlations. We checked each theoretical construct. Where it was necessary, we reduced the number of variables. Four factors selection were taken into account: theoretical frameworks, preliminary scree test criterion, the eigenvalue greater than 0.8, and the explained total variance.

For the analysis of the constructs of EO, we keep five factors which represent five dimensions. Two of them are explained by two variables, while the rest are explained by three variables. To analyse of the constructs of knowledge creation we keep the four factors, which represent the expected four dimensions. One is explained by tree variables and all others with five dimensions. This is what we expected in accordance with theoretical standards. In both cases the Bartlet test of sphericity statistically verified the correlation between variables and showed that the correlation matrix has significant correlations (degree of freedom = 0.000). Furthermore, the Kaiser-Meyer-Olkin measure of sampling adequacy has a value higher than 0.80.

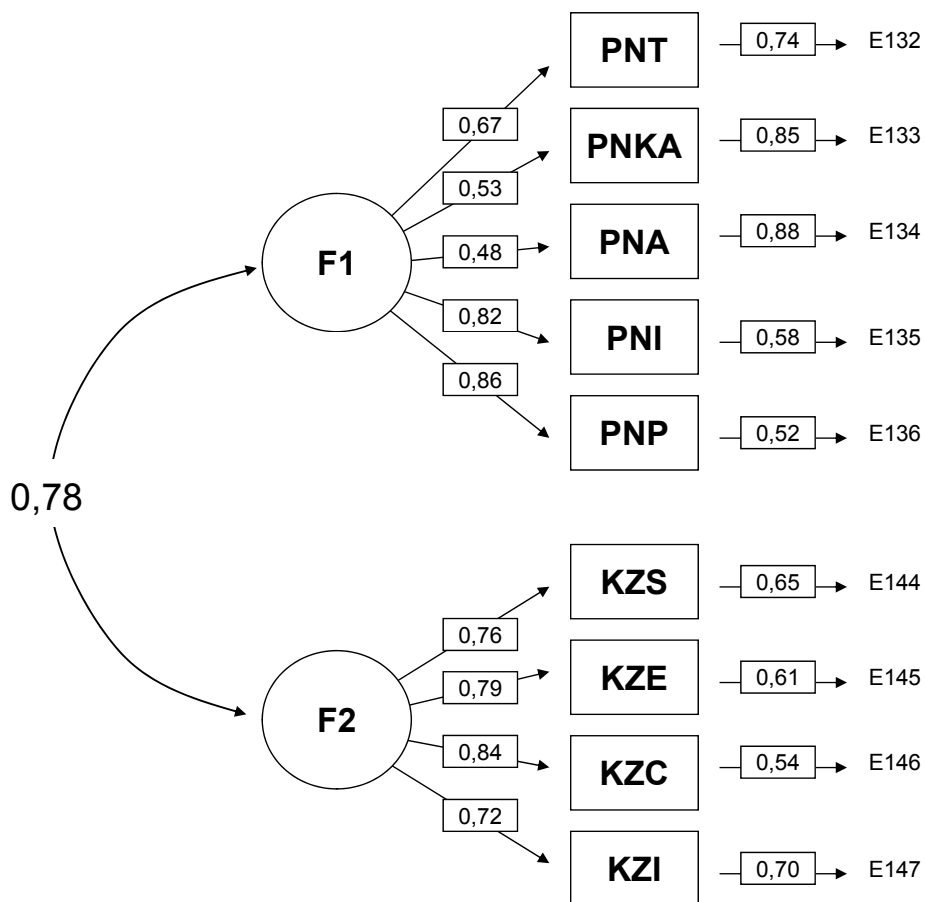
All the set constructs were verified by confirmatory factor analysis with the EQS 6.12 software bundle. We applied confirmatory factor analysis to test how the measured variables represent the construct with the aim to verify and acquire better understanding results of the explorative factor analysis. We confirmed the validity of the results of the exploratory analysis.

Reliability of the multi-item scale for each dimension was determined using Cronbach alphas and composite reliability measures. All measures of reliability are higher than 0.80 and thus higher than the recommended minimum standard of 0.60 (Hair et al., 2010).

EQS6.12 provides a chi-square value and five additional indices that assess the fit of path models, (RMSE), the Bentler – Bonett normed fit index (NFI), the comparative fit index (CFI), and the root mean square error of approximation (RMSEA). The fit indexes of confirmatory factor analysis for the measurement models ranged from adequate to excellent (construct EO: Chi Sq. = 91.65, 55 degrees of freedom, P = 0.00, CFI = 0.98, RMSEA = 0.06, NFI = 0.95, Crombach  $\alpha$  = 0.88, RHO = 0.93; construct KC: Chi Sq. = 242.523, 129 degrees of freedom, P = 0.00, CFI = 0.97, RMSEA = 0.07, NFI = 0.94, Crombach  $\alpha$  = 0.92, RHO = 0.94).

*Hypothesis H1: “Entrepreneurial orientation consists from five dimensions”, and hypothesis H2: “Knowledge creation is four-dimension process”, is support.*

**Figure 1: EQS 6.1, correlation between entrepreneurial orientation and knowledge creation**



**Notes:** F1 - EO with dimensions: PNT - risk-taking, PNKA - competitive aggressiveness, PNA - autonomy, PNI - innovativeness, PNP – proactiveness; F2 – KC with dimensions: KZS - socialization, KZE - outsourcing, KZC - combination KZI – internalisation

In the next step we express the dependence relationship among constructs of independent variables. For structured equation modelling, we use EQS software package 6.1. We measure the relationship model between EO and KC, and its convergent and discriminatory validity. Thus we have proved multidimensionality model and its comparability, as most indicates the suitability of the construct of integrated model of excellent value (Chi sq. = 48.94 degrees of freedom, P = 0.00, CFI = 0.96, RMSE = 0.11, NFI = 0.91, Crombach  $\alpha$  = 0.88, RHO = 0.90). The correlation relationships between constructs show high correlation between the construct of EO and knowledge creation with the value of 0.78 (Fig. 1, Table 4).

**Table 4: Iteratively reweighted least squares solution (elliptical distribution theory). Its decomposition of effect with standardized values parameter effects**

STANDARDIZED SOLUTION:				R-SQUARED
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PNPT	=V132=	0.673*F1	+ 0.739 E132	0.454
PNKA	=V133=	0.528*F1	+ 0.849 E133	0.279
PNA	=V134=	0.477*F1	+ 0.879 E134	0.228
PNI	=V135=	0.817*F1	+ 0.577 E135	0.668
PNP	=V136=	0.855*F1	+ 0.518 E136	0.731
KZS	=V144=	0.758 F2	+ 0.652 E144	0.574
KZE	=V145=	0.793*F2	+ 0.609 E145	0.629
KZK	=V146=	0.840*F2	+ 0.542 E146	0.706
KZI	=V147=	0.715*F2	+ 0.699 E147	0.512

**Notes:** F1 - EO with sub-dimensions: PNT - risk-taking, PNKA - competitive aggressiveness, PNA - autonomy, PNI - innovation, PNP – proactivity; F2 – KC with sub-dimensions: KZS - socialization, KZE - outsourcing, KZC - combination KZI – internalisation

Theoretical bases and empirical analysis confirm our position that hypothesis H3 “*Entrepreneurial orientation correlates with the knowledge creation process,*” is supported.

## 5. Discussion and limitations

In accordance with different theories of entrepreneurship, entrepreneurial spirit arises from eight differences among individuals, their entrepreneurial orientation and knowledge. EO increase collection and use of information, their activities, creativity, proactive orientation and readiness to take risks (Slater, Narver, 1998; Keh et al., 2007). Hurley and Hult (1998) found a correlation between high levels of innovation and a culture of learning. This is reflected in the use of knowledge (Li, Huang, Tsai, 2009). Grant (1996), Spender (1996), Teece (2000), Watson and Hewett (2006 in Li, Liu, Wang, Li & Guo, 2009) observed correlation between innovation and creating knowledge through the collection and its use within the organization. Organizations with innovative tendencies are more inclined to exchange and use information (Altman, 1986; Von Hipp, 1988 in Williams & Lee, 2009). In entrepreneurial firms sharing knowledge within the company led to the creation of new knowledge and its diffusion across an enterprise (Cohen & Levinthal, 1990). EO organization often directly supports generative learning by focusing on the identification and exploitation of new opportunities, while motivating employees to move from the pressure armour routine work (Cui & Zheng, 2007, Chaston & Scott, 2012). A high degree of EO involves long-term development guidelines, vision, mission, and work with customers, as well as setting up new capacities. Realizing the vision of entrepreneurs is related to the double loop learning (creating of knowledge) (Cui & Zheng, 2007).



The results of the study show close relationship and correlation between EO and KC. Empirical analysis supported all of three hypothesis: *H1: Entrepreneurial orientation consist of five dimensions; H2: Knowledge creation is a four-dimensional process; and H3: Entrepreneurial orientation correlates with the knowledge creation process.* The results allow for a better understanding of the development dynamics, proactive actions, knowledge creation and firm performance in a dynamic and competitive environment. Results help to improve the knowledge and close the gap, support the resource-advantage theory and add a piece of knowledge to the mosaic of researches in different countries, with a survey among Slovenian companies. Finally, this study contributes to the integration of the domains of entrepreneurial orientation and knowledge management research.

From a practical point of view, our study suggests that enterprises should be aware of the importance of the knowledge creation process and its connection with EO. Enterprises must facilitate a creative environment to supply for the dynamic knowledge creation process. In a low knowledge context, with a lack of new ideas, enterprises will not generate or recognize entrepreneurial opportunities.

From an academic perspective, this study has some inherent limitations. First, our cross-sectional design prevents us from studying causal relationships among variables. A longitudinal investigation would provide further insights into the dynamic nature of knowledge creation and different organizational levels. Future researches might use longitudinal design to draw causal inferences of our model. This study opens up several paths for future research. There is a need to expand the survey to other countries and investigate the relationship between different variables connected to business performance and entrepreneurship. A research gap exists in the link between the EO and KC and empirical research about the commercialization of knowledge.

## References

- Atuahene-Gima, K. & Ko, A., 2001, 'An empirical investigation of the effect of market orientation and entrepreneurship orientation alignment on product innovation', *Organization Science*, 12, 1, pp. 54-74.
- Atuahene-Gima, K., Slater, S.F. & Olson, E.M., 2005, 'The contingent value of responsive and proactive market orientations for new product program performance', *Journal of Product Innovation Management*, 22, 6, pp. 464-482.
- Audretsch, D.B., 2010, *The entrepreneurial society*. V.D.B., Audretsch, G., Battista Dagnino, R. Faraci & R.E. Hoskisson (ed.), New frontiers in entrepreneurship, international studies in entrepreneurship, New York: Springer.
- Audrech, D.B., Bonte, W. & Keilbach, M., 2008, 'Entrepreneurship capital and its impact on knowledge diffusion and economic performance', *Journal of Business Venturing*, 23, pp. 687-698.
- Avlontis, G.J. & Salavou, H.E., 2007, 'Entrepreurial orientation of SMEs, product innovativeness, and performance', *Journal of Business Research*, 60, pp. 566-575.

- Barsh, J., 2007, 'Innovation management: A conversation with Gary Hamel and Lowell Bryan', *The McKinsey Quarterly*, 3, pp. 1-10.
- Bereiter, C., 2002, *Education and mind in the knowledge age*, Erlbaum, Hillsdale, NY.
- Bolton, D. L. & Lane, M. D., 2012, 'Individual entrepreneurial orientation: Development of a measurement instrument', *Education and Training*, 54, 2, pp. 219-233.
- Burgelman, R.A., 1983, 'Designs for corporate entrepreneurship in established firms', *California Management Review*, 26, 3, pp. 154-166.
- Capedaa, G. & Vera, D., 2007, 'Dynamic capabilities and dynamic capabilities: a knowledge next term management perspective', *Journal of Business Research*, 60, pp. 426-437.
- Chaston, I., Scott, G.J., 2012, 'Entrepreneurship and open innovation in an emerging economy', *Management Decision*, 50, 7, pp. 1161-1177.
- Covin, J. & Covin T.J., 1990, 'Competitive aggressiveness, environmental context, and small firm performance', *Entrepreneurship: Theory and Practice*, 14, 4, pp. 35-50.
- Covin, J.G. & Slevin, D.P., 1989, 'Strategic management of small firms in hostile and benign environments', *Strategic Management Journal*, 10, pp. 75-87.
- Cui, Y. & Zheng, X., 2007, *An integration and empirical examination of entrepreneurial orientation, marketing orientation and firm performance*, Wireless communications, networking and mobile computing, WiCom, 2007.
- Davenport, T. & Prusak, L., 2000, *Working knowledge: how organizations manage, what they know*, Boston: Harvard Business School Press.
- De Clercq, D., Dimov, D. & Thongpapanl, N., 2009, 'The moderating impact of internal social exchange processes on the entrepreneurial orientation-performance relationship', *Journal of Business Venturing*, 17, pp. 87-103.
- De Luca, L.M. & Atuahene-Gima, K., 2007, 'Market knowledge dimensions and cross-functional collaboration: examining the different routes to product innovation performance', *Journal of Marketing*, 71, pp. 95-112.
- Drucker, P.F., 2009, *A century of social transformation: Emergence of knowledge society*. In *Managing in a time of great change*, Harvard Business Press, pp. 177-230.
- Essmann, H.E., 2009, *Toward innovation capability maturity*. Ph.D. thesis, University of Stelenbosch.
- Esterhuizen, D., Schutte, C.S.L. & du Toit, A.S.A., 2012, 'Knowledge creation process as critical enablers for innovation', *International Journal of Information Management*, 32, 4, pp. 354-364.
- Fillis, I., 2010, 'The role of creativity in entrepreneurship', *Journal of Enterprising Culture*, 18, 1, pp. 49-81.
- Fischer, M.M. & Fröhlich, J., 2001, *Knowledge complexity and innovation system*, Springer.
- Fogerberg, J., Fosaas, M. & Soprassart, K., 2012, 'Exploring the emerging knowledge base of "The knowledge society"', *Research Policy*, 41, 7, pp. 1121-1282.
- Gray, 2000, *Knowledge management overview*, IRWINE, CA: University of California.
- Grant, R.M., 1996, 'Grand, toward a knowledge-based theory of the firm', *Strategic Management Journal*, 17, pp. 93-107.

- Griffith, D.A., Noble, S.M. & Chen, Q., 2006, 'The performance implications of entrepreneurial proclivity: A dynamic capabilities approach', *Journal of Retailing*, 82, 1, pp. 51-62.
- Hair, J.F., Black, W.C., Babin, B.J. & Anderson, R.E., 2010, *Multivariate Data Analysis* (7th ed.), Upper Saddle River, NY: Pearson-Prentice Hall.
- Hamel, G. & Prahalad, C.K., 1994, *Competing for the future*, Boston: Harvard Business School Press.
- Hart, S.L., 1992, 'An integrative framework for strategy-making processes', *Academy of Management Review*, 17, 2, pp. 327-351.
- Hoegl, M. & Shulze, A., 2005, 'How to support knowledge creation in new product development: investigation methods', *European Management Journals*, 23, 3, pp. 263-273.
- Holcomb, T.R., Ireland, R.D., Holmes, R.M. & Hitt, M.A., 2009, 'Architecture of entrepreneurial learning: exploring the link among heuristics, knowledge, and action', *Entrepreneurship Theory and Practice*, January, pp. 167-192.
- Huang, S.K. & Wang, Y.L., 2011, 'Entrepreneurial orientation, learning orientation and innovation in small and medium enterprises', *Procedia Social and Behavioural Sciences*, 24, pp. 463-570.
- Hunt, D.S. & Morgan, R.M., 1995, 'The comparative advantage of competition', *Journal of Marketing*, 59, pp. 1-15.
- Jun, Z. & Deschoolmeester, D., 2006, 'Exploring entrepreneurial orientation (EO) in 3 dimensions: A new prospective for analysing the value of a company', Retrieved from [http://www.kmu.unisg.ch/rencontres/RENC2004/Topics/Deschoolmester\\_Renc\\_04\\_Topic\\_D.pdf](http://www.kmu.unisg.ch/rencontres/RENC2004/Topics/Deschoolmester_Renc_04_Topic_D.pdf).
- Katz, B., 2007, *Integration of project management processes with methodology to manage radical uinnovation project*, M.Sc dissertation University of Stelenbosch.
- Kim, Y.J., Song, S., Sambamurthy, V. & Lee, V.L., 2011, 'Entrepreneurship, knowledge integration capability, and firm performance: An empirical study', *A Journal of Research and Innovation*, Published online: 26 October 2011, Retrieved from <http://link.springer.com/article/10.1007/s10796-011-9331-z/fulltext.html>
- Kimmerle, J., Cress, U. & Held, C., 2010, 'The interplay between individual and collective knowledge: technologies for organisational learning and knowledge building', *Knowledge Management Research & Practice*, 8, pp. 33-40.
- Kleinsmann, M., Buijs, J. & Valkenburg, R., 2010, 'Understanding the complexity of knowledge integration in collaborative new product development teams: A case study', *Journal of Engineering and Technology Management*, 27, 1-2, pp. 20-32.
- Korposch, D., Lee, Y.C, Wei, C.C. & Wei, C.S., 2011, 'Modelling the effects of existing knowledge on creation of new knowledge', *Concurrent Engineering: Research and Applications*, 19, 3, pp. 225- 233.
- Kreiser, P., Marino, L. & Weaver, M.K., 2002, 'Assessing the relationship between entrepreneurial orientation, the external environment and firm performance, *Frontiers*

- of entrepreneurship research', Babson, Retrived from [http://www.babson.edu/entrep/fer/BABSON2002/X/X\\_P3/P3/html/x-p3.htm](http://www.babson.edu/entrep/fer/BABSON2002/X/X_P3/P3/html/x-p3.htm).
- Kuratko, D.F., Ireland, R.D., Covin, J.G. & Hornsby, J.S., 2005, 'A model of middle-level managers' entrepreneurial behaviour', *Entrepreneurship Theory & Practice*, 29, 5, pp. 699-716.
- Lamadrid, R., Heene, A. & Gellynck, X., 2008, *Rewiring business firms through an entrepreneurial - oriented strategy*, Working paper. Faculteit economie en edrijfskunde.
- Li, Y.H., Huang, J.W. & Tsai, M.T., 2009, 'Entrepreneurial orientation and firm performance: the role of knowledge creation process', *Industrial Marketing Management*, 38, pp. 440-449.
- Li, Y, Liu, X., Wang, L., Li, M. & Guo, H., 2009, 'How entrepreneurial effect on knowledge management on innovation', *System Research and Behavioural Science*, 26, pp. 645-660.
- Lin, F., Lin, S. & Huang, T., 2008, 'Knowledge sharing and creation in teachers' professional virtual community', *Computers and education*, 50, pp. 742-765.
- Lumpkin, G. T., Coglisier, C. C. & Schneider, D. R., 2009, 'Understanding and measuring autonomy: an entrepreneurial orientation perspective', *Entrepreneurship Theory and Practice*, 33, 1, pp. 47-69.
- Lumpkin, G.T. & Dess G.G., 2001, 'Linking two dimensions of entrepreneurial orientation to firm performance: The moderating role of environment and industry life cycle', *Journal of Business Venturing*, 16, 5, pp. 429-451.
- Lumpkin, G.T. & Dess, G.G., 1996, 'Clarifying the entrepreneurial orientation construct and linking it to performance', *Academy of Management Review*, 21, 1, pp. 135-172.
- Lyon, W.D., Lumpkin, G.T. & Dess G.G., 2000, 'Enhancing entrepreneurial orientation research: Operationalizing and measuring a key strategic decision making process', *Journal of Management*, 26, 5, pp. 1055-1085.
- Malone, D., 2002, Knowledge management: 'A model for organizational learning', *International Journal of Accounting Informational Systems*, 3, 2, pp. 111-123.
- McAdam, R., 2004, 'Knowledge creation and idea generation: A critical quality perspective', *Technovation*, 24, pp. 697-705.
- McMullen, J.S. & Shepherd, D.A., 2006, 'Entrepreneurial action and the role of uncertainty in the theory of the entrepreneur', *Academy of Management Review*, 31, 1, pp. 132-152.
- Miller, D., 1983, 'The correlates of entrepreneurship in three types of firms', *Management Science*, 29, 7, pp. 770-791.
- Miller D.J., Fern, M.J. & Cardinal, L.B., 2007, 'The use of knowledge for technological innovation within diversified firms', *Academy of Management Journal*, 50, pp. 308-326.
- Moller C., 2007, 'Process innovation laboratory: A new approach to business process innovation based on enterprise information systems', *Enterprise Information Systems*, 1, 1, pp. 113-128.
- Morgan, N.A., Vorhies, D.W. & Mason, C.H., 2009, 'Market orientation, marketing capabilities and firm performance', *Strategic Marketing Journal*, 30, pp. 909-920.

- Murphy, G. B., Trailer, J. W. & Hill, R. C., 1996, 'Measuring performance in entrepreneurship research', *Journal of Business Research*, 36, 1, pp. 15-23.
- Nonaka, I., 1994, 'A dynamic theory of organizational knowledge creation', *Organization Science*, 5, 1, pp. 14-37.
- Nonaka, I., 1991, 'The knowledge-creating company', *Harvard Business Review*, 69, pp. 96-105.
- Nonaka, I. & Konno, N., 1998, 'The concept of 'ba': Building foundation for knowledge creation', *California Management Review*, 40, 3, pp. 1-15.
- Nonaka, I. & Takeuchi, H., 1995, *The knowledge-creating company*, Oxford University Press.
- Nonaka, I., Takeuchi, H. & Umemoto, K., 1996, 'A theory of organizational knowledge creation', *International Journal of Technology Management*, 11, 7, pp. 833-845.
- Nonaka, I. & Toyama, R., 2005, 'The theory of the knowledge creation firm: Subjectivity, objectivity, and synthesis', *Industrial and Corporate Change*, 14, 3, pp. 419-436.
- Nonaka, I., Toyama, R. & Konno, N., 2000, 'SECI, ba and leadership: A unified model of dynamic knowledge creation', *Long Range Planning*, 33, 1, pp. 5-34.
- Nonaka, I., Toyama, R. & Nagata A., 2000, 'A firm as a knowledge-creating entity: A new perspective on the theory of the firm', Oxford university press, *Industrial and Corporate Change*, 9, 1, pp. 1-20.
- Nonaka, I. and Kogut G., 2009, 'Tacit knowledge and knowledge conversion: Controversy and advancement in organizational knowledge creation theory', *Organization Science*, 20, 3, pp. 635-52.
- Nonaka, I., von Krogh, G. & Voepel, S., 2006, 'Organizational knowledge creation: evolutionary paths and future advances', *Organization studies*, 27, 8, pp. 1179-1208.
- Paavola, S. & Hkkarainen, K., 2005, 'The knowledge creation metaphor – an emergent metaphor epistemological approach to learning', *Science & Education*, 14, pp. 535-557.
- Prajogo, D.I. & Ahmed P.K., 2006, 'Relationships between innovation stimulus, innovation capacity, and innovation performance', *R&D Management*, 36, 5, pp. 499-515.
- Quinn, J. B., 1992, *Intelligent enterprise: A knowledge and service-based paradigm or industry?* New York: The Free Press.
- Ramesh, S., 2012, 'Infrastructure, knowledge and economic Growth in China: 1953-2004', *International Journal of Economic Sciences and Applied Research*, 5, 1, pp. 23-50.
- Rauch, A., Wiklund, J., Frese, M. & Lumpkin, G.T., 2009, 'Entrepreneurial orientation and business performance: An assessment of past research and suggestions for the future', *Entrepreneurship Theory and Practice*, 33, 3, pp. 761-787.
- Renko, M., Carsrud, A. & Brännback, M., 2009, 'The effect of market orientation, entrepreneurial orientation, and technological capability on innovativeness; a study of young biotechnology ventures in United states and Scandinavia', *Journal of Small Business Management*, 47, 3, pp. 331-369.
- Sabherwal, R. & Becerra-Fernandez, I., 2003, 'An empirical study of the effect of knowledge management processes at individual, group, and organizational levels', *Decision Sciences*, 34, 2, pp. 225-260.

- Samaddar, S. & Kadiyala, S.S., 2006, 'An analysis of inter-organizational resource sharing discussion in collaborative knowledge creation', *European Journal of Operational Research*, 170, pp. 192-210.
- Spender, J.C., 1996, 'Making knowledge: The basis of dynamic theory of a firm', *Strategic Management Journal*, 17, pp. 45-62.
- Stuart, T.E. & Shane, S., 2002, 'Organizational endowment and the performance of university start-ups', *Management Science*, 48, pp. 151-170.
- Teece, D.F., 2000, 'Strategies for managing knowledge assets: The role of firm structure and industrial context', *Long Range Planning*, 33, pp. 35-54.
- Teece, D.J., Pisano, G. & Shuen, A., 1997, 'Dynamic capabilities and strategic management', *Strategic Management Journal*, 18, 7, pp. 509-535.
- Von Krogh, G. & Nonaka I., 2011, 'Leadership in organizational knowledge creation: A review and framework', *Journal of Management Studies*, 49, 1, pp. 240-277.
- Von Krogh, G., Ichijo, K. & Nonaka I., 2000, *Enabling knowledge creation: How to unlock the mystery of tacit*, Oxford university press, 292.
- Wang, H.C., He, J. & Mahoney, J.T., 2009, 'Firm-specific knowledge resources and competitive advantage: The roles of economic- and relationship-based employee governance mechanisms', *Strategic Management Journal*, 30, pp. 1265-1285.
- Ward, T., 2004, 'Cognition, Creativity, and Entrepreneurship', *Journal of Business Venturing*, 19, pp. 173-188.
- Wiklund, J., 1999, 'The sustainability of the entrepreneurial orientation-performance relationship', *Entrepreneurship Theory and Practice*, pp. 37-48.
- Wiklund, J. & Shepherd, D., 2003, 'Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses', *Strategic Management Journal*, 7, 24, pp. 1307-1314.
- Williams, C. & Lee, S.H., 2009, 'Resource allocations, knowledge network characteristics and entrepreneurial orientation of multinational corporations', *Research Policy*, 30, pp. 1376-1387.
- Zahra, S. A. & Covin, J. G., 1995, 'Contextual influences on the corporate entrepreneurship performance relationship: A longitudinal analysis', *Journal of Business Venturing*, 10, 3, pp. 43-58.
- Zhang, Q., Lim, J. & Cao, M., 2004, 'Innovation-driven learning in new product development: a conceptual model', *Industrial Management and Data Systems*, 104, 3, pp. 252-261.
- Yordanova, D.I., 2011, 'Entrepreneurial orientation in family and non-family firms: evidence from Bulgaria. International', *Journal of Economic Sciences and Applied Research*, 4, 1, pp. 185-203.