

Factors Affecting Technology Innovation and Its Commercialisation in Firms

Davar Azarmi¹

¹ Social Science Faculty, Universidad Europea de Madrid, Madrid, Spain

Correspondence: Davar Azarmi, Social Science Faculty, Universidad Europea de Madrid, C/ Tajo S/N, 28670 Villaviciosa de Odón – Madrid, Spain. E-mail: vaxent@yahoo.com

Received: January 29, 2015

Accepted: February 27, 2015

Online Published: April 28, 2016

doi:10.5539/mas.v10n7p36

URL: <http://dx.doi.org/10.5539/mas.v10n7p36>

Abstract

This article aims to form a comprehensive list of influential elements on technology innovation and its commercialisation in firms and furthermore categorises and ranks them to assist managers and technology entrepreneurs in their decision making. 46 elements are derived from the literature and are organised under nine major factors. Also, by the opinions of 108 computer science university professors and using Friedman test, they are ranked based on their importance. The results show that the top three factors are about the attitude of a firm toward technology innovation ('support', 'knowledge' and 'technology') while the least influential factor is the firm's 'ideology'. The results would help managers to assess their firms' abilities regarding technology innovation and its commercialisation and assist them to determine where and how they should distribute their resources and concentrate their efforts.

Keywords: technology innovation, commercialisation, technology entrepreneurship

1. Introduction

1.1 Problem Introduction

One of the main growth factors of economies is development of new technologies (Dew & Sarasvathy, 2007; Ács, 2006). Moreover, technology innovation and introducing those innovations into the market is an important element in firms' growth (Mazzarol, 2002) and a source of sustainable competitive advantage (Hall, 1993).

This article aims to provide a comprehensive list of elements which are influential on firms' ability of technology innovation and its commercialisation, categorise them and furthermore arrange them in an order of importance, so it could be of practical use for managers and technology entrepreneurs in their endeavours.

By doing an inclusive literature review, nine major factors are deduced and furthermore 46 constituents of those factors are derived. The results were handed to computer science and engineering faculty members in Complutense University of Madrid (Universidad Complutense de Madrid) to be ranked based on their experience in high-tech industry. The professors' responses has been analysed by using Friedman test.

1.2 Elements of Technology Innovation and Its Commercialisation

Technology entrepreneurship is one of the major sources of economic growth (Dew & Sarasvathy, 2007; Ács, 2006), job creation (Audretsch, 2008) and technological advancement (Mittal, Momaya, & Sushil, 2016; Bubou & Okrigwe, 2011; Qian & Ács, 2011). It also reinvigorates established firms when it is employed as a form of corporate entrepreneurship (Antoncic & Prodan, 2008).

Commercialisation of innovative technologies is the crux of technology entrepreneurship. It is the process of transforming an innovative technology into a commercial product/service or improving an existing product/service by incorporating the innovative technology into it for commercial gain (Dutta, Narasimhan, & Rajiv, 1999). Although there is an emphasis on technological innovation in current business theory and practice, the commercialisation of it carries the same weight of importance (Gans & Stern, 2003).

There are different elements that could affect technology innovation and its commercialisation in firms. Those elements could be organised under a classification that is composed of nine major factors and their constituents.

The first factor is 'individual' factor of a firm. This factor is about characteristics of individuals in a firm who have a role in the general scheme and process of technology innovation and its commercialisation. This factor

could be further decomposed into its constituents that are:

- social skills and teamwork: richness in social skills and ability to work in teams (Datta, 2012; Lai & Tsai, 2010; Markman & Baron, 2003; Baron & Markman, 2000),
- education: educational background (Kilelu, Klerkx, & Leeuwis, 2014; Baycan & Stough, 2012; Mars, 2013; Jaafar & Aziz, 2008),
- diversity: demographic diversity and diversity in professional, personal and cultural background and life experiences (Yang & Wang, 2014; Nathan & Lee, 2013; Aarikka–Stenroos & Sandberg, 2012; Lai & Tsai, 2010; Jo & Lee, 1996).

The second factor is ‘ideology’ factor of a firm. It deals with the foundation that a firm is built upon, the values it stands for, its approach toward business, its configuration and constitution and in general, its philosophical approach toward business. The constituents of this factor are:

- vision and mission: the ideal image that the firm holds and aspires to become and what it wants to fulfil by becoming that (Karami, 2012, pp. 166–170; Martins & Terblanche, 2003; Covin & Slevin, 2002; Kuratko, Ireland, & Hornsby, 2001),
- values: the principles that the firm stands for and conducts itself based on those (Callaway & Hamilton, 2006; Martins & Terblanche, 2003),
- culture: the manner by which the firm’s employees comport themselves, handle social transactions among each other and with outsiders (Casson, 2010; Martins & Terblanche, 2003),
- flexibility: the degree by which the firm’s organisation and structure could change to adapt itself to innovations and disruptive changes in the industry (Barrett, Balloun, & Weinstein, 2012; Barrett & Weinstein, 1998; Ghoshal & Bartlett, 1995).

The third factor is ‘organisation’ factor of a firm. It involves the structures and arrangements which put the ideology and philosophy of the firm into effect and brings them into practice. The constituents of this factor are:

- strategy: the business strategy that is formulated based on the firm’s long–term and mid–term objectives by considering its resources and the industry’s environment and is implemented through the firm’s organisation (Nasir, 2012; Ford, Garnsey, & Probert, 2010; Berry, 1996),
- learning: the ability of the firm to learn continuously from the environment and its own doings and moving the organisation forward based on what is learnt (Martín–Rojas, García–Morales, & Bolívar–Ramos, 2013; Zahra, 2010; García–Morales, Llorens–Montes, & Verdú–Jover, 2006),
- processes: the business processes which are implemented to carry out the firm’s activities (Cooke, 2013; Solaimani & Bouwman, 2012),
- stakeholders: the cooperation between the firm’s stakeholders, their relationship, their interaction, and their attitude and behaviour towards the firm and its objectives (Smirnova, Podmetina, Vaatanen, & Kouchtch, 2009; Dew & Sarasvathy, 2007; Ya & Rui, 2006),
- social capital: the formal and informal network of connections among the firm’s stakeholders and also their connection with members of other influential external entities and people (Xiao & Han, 2014; Audretsch, 2007; Audretsch & Keilbach, 2007; Chakrabarti & Santoro, 2004).

The fourth factor is ‘management’ factor of a firm. It is about how the management of the firm handles different aspects of it and deals with different situations. The constituents of this factor are:

- style: the management’s type of approach toward making decisions and also dealing with people (Thamhain, 2003; Ekvall, 1996; Covin & Slevin, 1988),
- knowledge management: capacity of managing knowledge–related activities and processes of the firm, from knowledge production up to capturing and sharing it. Also, taking advantage of external produced knowledge and knowledge spill overs (Chen & Huang, 2009; Nielsen, 2006; Skyrme, 2003; Harrison & Sullivan Sr, 2000; Thorburn, 2000),
- IP management: the ability of the management to handle and make proper use of different types of intellectual property such as patents, copyrights, trademarks and trade secrets (Paasi, Luoma, Valkokari, & Lee, 2010; Jennewein, 2005; Sullivan, 1998),
- HR (human resource management): ability to manage the employees and especially the firm’s talents and also spotting talented individuals outside the firm and attracting and employing them (Montoro–Sánchez & Soriano,

2011; Kaya, 2006; Schuler, 1986),

- risk management: minimising the impact of uncertainty in the internal and external environment on the firm's assets and resources (Genriha, Pettere, & Voronova, 2011; Koprinarov, 2005),
- financial management: managing the firm's financial resources to support and foster the firm's activities and also tapping into external financial sources if needed (Williams & Lee, 2009; Kelm, Narayanan, & Pinches, 1995).

The fifth factor is 'technology' factor of a firm. It involves the technological sphere in which the firm innovates. Moreover, it includes technological aspects that influence the ability of the firm to innovate. The constituents of this factor are:

- complexity: the amount of complexity in a technology in different facets of it such as production complexity, components numerousness and usage complexity (Anokhin, Wincent, & Frishammar, 2011),
- readiness level: the level of maturity of a technology from being still in basic research level up to being ready for lunch (Lin, Shih, & Sher, 2007; Heslop, McGregor, & Griffith, 2001),
- dependency: the reliance of a technology on other technologies and if those technologies are internal or external to the firm (Lichtenthaler & Ernst, 2007; Lambe & Spekman, 1997; Veugelers, 1997; Mansfield, 1988),
- transfer: the level of facility by which the technology could be transferred from or to the firm (Siegel, Veugelers, & Wright, 2007; Powers, 2003; Rogers, Takegami, & Yin, 2001),
- facilities: the technological facilities and instruments that the firm possess or have access to which could help the firm in creation and production of technology from doing research and development up to manufacturing (Bagchi-Sen, 2007; Cardinal & Hatfield, 2000).

The sixth factor is 'knowledge' factor of a firm. It incorporates all the aspects regarding the firm's knowledge which is the essence and foundation of technological innovation. The constituents of this factor are:

- acquisition: the ability of the firm in acquiring knowledge from external sources and benefiting from knowledge spill overs (Zhou & Li, 2012; Nielsen, 2006; Cassiman & Veugelers, 2006; Audretsch & Feldman, 1996),
- production: the capacity of the firm in knowledge creation and production by different processes such as research and development, know-how creation and organisational learning (Nielsen, 2006; Lööf & Heshmati, 2002; Hipp, 1999),
- HRD (human resource development): the improvement of human capital's knowledge by providing proper and relevant education (Chen & Huang, 2009; Torraco & Swanson, 1995),
- capture: the capacity of the firm in recording the produced and acquired knowledge in a usable and accessible manner (Nielsen, 2006; Zucker, Darby, & Armstrong, 2002),
- transfer: the ability of the firm to spread and share its knowledge capital among its human resources (Zhou & Li, 2012; Lin, 2007; Nielsen, 2006).

The seventh factor is 'support' factor of a firm. It deals with the firm's attitude toward technological innovation and how it embraces it and provides for it. The constituents of this factor are:

- encouragement: promotion of technology innovation in the firm and stimulating the employees participation in its process with permissive policies (Mazzarol, 2002; Niehoff, Enz, & Grover, 1990),
- communication: supporting the communication of the firm's technological requirements and obstacles. Also, making an environment in which the employees easily communicate and ideas, problems and solutions are discussed comfortably. Additionally, enhancing the communication among different departments and teams of the firm (Ebadi & Utterback, 1984; Rothwell & Robertson, 1973; Utterback, 1971),
- finance: supporting innovative technological initiatives and projects financially (Gumusluoğlu & Ilsev, 2009; Peneder, 2008; Czarnitzki, 2006).
- facilitation: Assisting innovative technological initiatives and projects by facilitating interdisciplinary relationships and enabling technological projects, events and programmes (Michaelis, Stegmaier, & Sonntag, 2010; Green, 1995),
- reward: implementing a reward system for initiators and participants in commercially successful innovations (Manso, 2011; Hopenhayn, Llobet, & Mitchell, 2006),

- failure: tolerating early failures in innovative projects and programmes and also ensuring that failed projects and programmes do not discourage the employees from further participation in innovation process (Manso, 2011; Cannon & Edmondson, 2005).

The eighth factor is ‘market’ factor. It is about keeping the firm’s technological innovative course in sync with the market needs and also learning from what is happening in the market and incorporating it in the innovation process. The constituents of this factor are:

- consumers: the firm’s understanding of the consumers and their needs (Priem, Li, & Carr, 2012),
- competitors: the firms’ knowledge of its competitors and their strengths and weaknesses (Schivone, 2011),
- trends: in which direction the market is moving and what kind of products and services are desired (du Preez & Louw, 2008; Pateli & Giaglis, 2005),
- position: the firm’s desired position in the market and also noticing unoccupied market positions (Chiesa & Frattini, 2011; Gans & Stern, 2003; Walsh, Kirchoff, & Newbert, 2002),
- demand: the appetite of market for a certain product or service (Godin & Lane, 2013),
- size: the total market size for a certain product or service (Stone, Iwamasa, Lundine, & Jasper, 2005),
- growth: the market’s potential size and demand for a certain product or service in the future (Klepper, 1997),
- substitutes: products and services which could take the market away from a certain technology and shrink the market size and demand (Zahra, Nash, & Bickford, 1995).

The ninth factor is ‘environment’ factor. This factor regards elements of the firm’s external environment which could affect the market or how the firm performs. Also, this factor could create new opportunities or diminish them. The constituents of this factor are:

- political: political stability, the government’s involvement in the economy in general and, especially the policies toward facilitation of technology innovation such as taxation policies and providing financial support (Avnimelech & Teubal, 2008; Mani, 2002; de S. Price, 1984),
- economic: the economic factors which affect the market and the firm’s decisions, such as interest rate and inflation (Eisenhauer, 1995),
- legal: the legal system affecting the firm, such as labour law, consumer law and environmental law (Malinowski & Rao, 2006; Waarden, 2001),
- social: the different aspects of the society in which the firm operates in and targets toward such as cultural aspects, age distribution, educational level and workforce status (Lee, Kozar, & Larsen, 2003; Venkatesh & Morris, 2000).

Innovation and its commercialisation is a major subject of research due to its expansive scope of benefits for different involved entities, from individuals up to societies (Dhewanto & Sohal, 2015). This unremitting and active research creates an ever growing body of literature in many different aspects and branches of innovation and its commercialisation. This research brings together the important elements and different focal points of the current literature and lays them in a practical order for applicable usage.

2. Method

A quantitative method is used to rank the major factors and their constituents in terms of importance of the influence that they have on technology innovation and its commercialisation. A questionnaire was designed which consisted of two parts. The first part was designed to collect demographic data of the participants (gender, age and working experience) and the second part to collect the ranking data regarding the major factors and their constituents.

The second part consisted of 10 segments of questions. In each segment a number of items were listed and the participants were asked to rank them in terms of importance by assigning a rank number to each item (1 being the rank of the most important item and incrementing by 1 for each less important item. Repetitive ranks were not allowed). First segment was to rank the nine major factors in technology innovation and its commercialisation by assigning ranks from 1 to 9 to each factor. Each one of the remaining nine segments was to rank each major factor’s constituents.

A Cronbach's Alpha (α) was run to measure the reliability of the questionnaire which was measured at 0.91. The content validity of the questionnaire was tested by using 10 experts’ opinion and Spearman’s rho (r_s) measured at 0.87.

The target population was computer science and engineering faculty members in Complutense University of Madrid. The faculty has 149 members in total. To make inference from that population with a confidence level of 95% and a margin of error of 5% – based on Cochran's sample size formula with finite population correction (Cochran, 1977, p. 25) – a random sample of 108 was required. To do the random sampling, a list of all 149 faculty members was created and 108 of them were selected randomly, using a computer program. Afterwards, the questionnaire has been sent to selected faculty members and by two rounds of follow up, all the selected faculty members responded to it.

The answers are analysed by using Friedman test to find out if the difference between the resulted mean ranks in each segment of the questionnaire's second part indicates something more than variability caused by chance and it is not just accidental (*significance level* < 0.05).

3. Results

Table 1 show a summary of the demographic information of the faculty members who participated in this research.

Table 1. Participants' demographic information

Sex	Number	Percentage
Male	82	75.9%
Female	26	24.1%
Age	Number	Percentage
up to 30	9	8.3%
31–40	37	34.3%
41–50	49	45.4%
51+	13	12.0%
Technology Related Working Experience	Number	Percentage
1–5 years	16	14.8%
5–10 years	18	16.7%
10–15 years	23	21.3%
16 and more years	51	47.2%

Source: Own study.

Table 2 shows mean ranks of the major factors and also their Friedman test statistics.

Table 2. Major factors' mean ranks and their Friedman test statistics

Factor	Mean rank	Friedman test statistics (N = 108)		
		χ^2	df	significance level
support	3.58	120.911	8	0.000
knowledge	4.06			
technology	4.39			
market	4.46			
management	4.68			
individual	5.53			
organisation	5.56			
environment	5.91			
ideology	6.82			

Source: Own study.

Table 3 shows mean ranks of the major factors' constituents and also their Friedman test statistics.

Table 3. Major factors' constituents' mean ranks and their Friedman test statistics

Factor	Factor's constituent	Mean rank	Friedman test statistics		
			χ^2	df	significance level
support	encouragement	3.10	30.813	5	0.000

	facilitation	3.32			
	failure	3.33			
	finance	3.50			
	reward	3.77			
	communication	3.97			
knowledge	HRD	2.61	6.093	4	0.192
	production	3.04			
	acquisition	3.10			
	capture	3.11			
	transfer	3.14			
technology	readiness level	2.78	10.592	4	0.032
	dependency	2.83			
	complexity	3.07			
	facilities	3.14			
	transfer	3.18			
market	trends	3.84	34.984	7	0.000
	consumers	4.17			
	competitors	4.31			
	substitutes	4.52			
	demand	4.63			
	position	4.77			
	growth	4.87			
	size	4.89			
management	IP management	3.10	13.151	5	0.022
	knowledge management	3.32			
	HR	3.47			
	style	3.67			
	financial management	3.80			
	risk management	4.06			
individual	education	1.92	4.795	2	0.091
	diversity	1.98			
	social skills and teamwork	2.10			
organisation	learning	2.72	30.113	4	0.000
	social capital	2.77			
	stakeholders	2.98			
	strategy	3.18			
	processes	3.34			
environment	social	2.07	23.553	3	0.000
	legal	2.44			
	economic	2.68			
	political	2.81			
ideology	flexibility	2.42	2.478	3	0.479
	culture	2.49			
	values	2.50			
	vision and mission	2.60			

Source: Own study.

4. Discussion

Based on Friedman test statistics shown in Table 2, the major factors have meaningful difference in the influence they have on technology innovation and its commercialisation. 'Support' factor is considered to be the most influential one while 'ideology' factor is the least influential one.

The interesting matter is that the 'support' which a firm shows for technology innovation and its commercialisation is considered to be even more influential than 'technology' factor itself. Also, it shows that the force which the firm puts behind supporting the innovative spirit and pushing innovations toward the market

is more important than what market landscape and its trends and needs are. In short, it demonstrates that it matters less what a firm does and what the external environment looks like in comparison to how much the firm is supportive of innovating spirit and offering the results of its innovation to the outside world.

Another interesting point is that 'ideology' of a firm is considered the least important factor. One explanation could be that as time passes usually the ideology of a firm fades away, its vision and mission get forgotten and turn into empty slogans and catchphrases which the firm has deviated from them (Mullane, 2002; Miller, 1992).

Additionally, it should not go unnoticed that the top 3 factors are about the attitude of a firm toward technology innovation and its commercialisation and the 'technology' and 'knowledge' which are used in. The firm's structure and organisation, the external environment including the market and also the individuals in the firm are considered factors of less importance.

As Friedman test statistics for the major factors' constituents shows (Table 3) – except for 'ideology', 'individual' and 'knowledge' factors – constituents of the other factors have meaningful difference in the influence they have on technology innovation and its commercialisation.

It is notable that among constituents of 'support' factor, supporting employees – when they fail to achieve desired results – considered more important than rewarding successes. Additionally, it is noticeable that encouraging employees to participate in innovation process is more important than rewarding successful results.

Among constituents of 'technology' factor, 'readiness level' is at the top of the list and shows that a firm's centre of attention should be maturing up their technology and making it ready for the market. Also, how dependent the firm's technology is to other technologies is considered the second important constituent of this factor and it could be due to limitation this dependency puts on commercialisation of a technology which is reliant upon other firms' technologies or availability of technological infrastructures in target markets which the firm's technology relies on them to operate properly.

Among constituents of 'knowledge' factor, 'HRD' and 'production' – which are approaches toward improving a firm's internal ability of knowledge creation – are considered superior to 'acquisition' which is an approach toward gaining knowledge from external sources.

It is noticeable among constituents of 'market' factor that 'size' and 'growth' are considered least important in technological innovation and its commercialisation, while trends in the market and consumers taste are the most significant ones. In other words, it is better for a firm to focus on following the market trends and the consumers' taste instead of looking for the most promising market in terms of size and growth potential.

Among constituents of 'management' factor, 'IP management' is ranked the highest, which essentially means management in a firm should protect its intellectual property and leverage them to gain competitive advantage. An interesting result is that although innovating is risky, but 'risk management' is ranked as the least important constituent of this factor.

It is recommended that managers who are trying to improve their firms' technology innovation capacity and/or their ability to commercialise their innovations, and also, innovators and technology entrepreneurs who are starting a firm, use the mentioned factors, their constituents and their respective rankings as an starting point to build/evaluate/improve their firms' competencies regarding technology innovation and its commercialisation. Also the rankings would be helpful in determining where should be the focal point of management attention and where and how they should distribute their resources and concentrate their efforts.

References

- Aarikka-Stenroos, L., & Sandberg, B. (2012). From New-product Development to Commercialization Through Networks. *Journal of Business Research*, 65(2), 198–206. <http://dx.doi.org/10.1016/j.jbusres.2011.05.023>
- Ács, Z. J. (2006). How Is Entrepreneurship Good for Economic Growth? *Innovations: Technology, Governance, Globalization*, 1(1), 97–107. <http://dx.doi.org/10.1162/itgg.2006.1.1.97>
- Anokhin, S., Wincent, J., & Frishammar, J. (2011). A Conceptual Framework for Misfit Technology Commercialization. *Technological Forecasting and Social Change*, 78(6), 1060–1071. <http://dx.doi.org/10.1016/j.techfore.2010.12.005>
- Antoncic, B., & Prodan, I. (2008). Alliances, Corporate Technological Entrepreneurship and Firm Performance: Testing a Model on Manufacturing Firms. *Technovation*, 28(5), 257–265. <http://dx.doi.org/10.1016/j.technovation.2007.07.005>

- Audretsch, D. B. (2007). Entrepreneurship Capital and Economic Growth. *Oxford Review of Economic Policy*, 23(1), 63–78. <http://dx.doi.org/10.1093/oxrep/grm001>
- Audretsch, D. B. (2008). The Entrepreneurial Society. *The Journal of Technology Transfer*, 34(3), 245–254. <http://dx.doi.org/10.1007/s10961-008-9101-3>
- Audretsch, D. B., & Keilbach, M. (2007). The Theory of Knowledge Spillover Entrepreneurship. *Journal of Management Studies*, 44(7), 1242–1254. <http://dx.doi.org/10.1111/j.1467-6486.2007.00722.x>
- Avnimelech, G., & Teubal, M. (2008). From Direct Support of Business Sector R&D/Innovation to Targeting Venture Capital/Private Equity: A Catching-up Innovation and Technology Policy Life Cycle Perspective. *Economics of Innovation and New Technology*, 17(1-2), 153–172. <http://dx.doi.org/10.1080/10438590701279417>
- Bagchi-Sen, S. (2007). Strategic Considerations for Innovation and Commercialization in the US Biotechnology Sector. *European Planning Studies*, 15(6), 753–766. <http://dx.doi.org/10.1080/09654310701214226>
- Baron, R. A., & Markman, G. D. (2000). Beyond Social Capital: How Social Skills Can Enhance Entrepreneurs' Success. *Academy of Management Executive*, 14(1), 106–116. <http://dx.doi.org/10.5465/AME.2000.2909843>
- Barrett, H., & Weinstein, A. (1998). The Effect of Market Orientation and Organizational Flexibility on Corporate Entrepreneurship. *Entrepreneurship: Theory and Practice*, 23(1), 57–58.
- Barrett, H., Balloun, J. L., & Weinstein, A. (2012). Creative Climate: a Critical Success Factor for 21st Century Organisations. *International Journal of Business Innovation and Research*, 6(2), 202–219. <http://dx.doi.org/10.1504/IJBIR.2012.045637>
- Baycan, T., & Stough, R. R. (2012). Bridging Knowledge to Commercialization: the Good, the Bad, and the Challenging. *The Annals of Regional Science*, 50(2), 367–405. <http://dx.doi.org/10.1007/s00168-012-0510-8>
- Berry, M. M. J. (1996). Technical Entrepreneurship, Strategic Awareness and Corporate Transformation in Small High-tech Firms. *Technovation*, 16(9), 487–522. [http://dx.doi.org/10.1016/0166-4972\(96\)00056-9](http://dx.doi.org/10.1016/0166-4972(96)00056-9)
- Bubou, G. M., & Okrigwe, F. N. (2011). Fostering Technological Entrepreneurship for Socioeconomic Development: A Case for Technology Incubation in Bayelsa State, Nigeria. *Journal of Sustainable Development*, 4(6), 138. <http://dx.doi.org/10.5539/jsd.v4n6p138>
- Callaway, S. K., & Hamilton, R. D. (2006). Exploring disruptive technology: the structure and control of internal corporate ventures. *International Journal of Organizational Analysis*, 14(2), 87–106. <http://dx.doi.org/10.1108/10553180610742746>
- Cannon, M. D., & Edmondson, A. C. (2005). Failing to Learn and Learning to Fail (Intelligently): How Great Organizations Put Failure to Work to Innovate and Improve. *Long Range Planning*, 38(3), 299–319. <http://dx.doi.org/10.1016/j.lrp.2005.04.005>
- Cardinal, L. B., & Hatfield, D. E. (2000). Internal Knowledge Generation: the Research Laboratory and Innovative Productivity in the Pharmaceutical Industry. *Journal of Engineering and Technology Management*, 17(3–4), 247–271. [http://dx.doi.org/10.1016/S0923-4748\(00\)00025-4](http://dx.doi.org/10.1016/S0923-4748(00)00025-4)
- Cassiman, B., & Veugelers, R. (2006). In Search of Complementarity in Innovation Strategy: Internal R&D and External Knowledge Acquisition. *Management Science*, 52(1), 68–82. <http://dx.doi.org/10.1287/mnsc.1050.0470>
- Casson, M. (2010). Entrepreneurship, Business Culture and the Theory of the Firm. In Z. J. Ács & D. B. Audretsch (Eds.), *Handbook of Entrepreneurship Research* (pp. 249–271). New York, NY: Springer. <https://doi.org/10.1007/978-1-4419-1191-9>
- Chakrabarti, A. K., & Santoro, M. D. (2004). Building Social Capital and Learning Environment in University-industry Relationships. *International Journal of Learning and Intellectual Capital*, 1(1), 19–36. <http://dx.doi.org/10.1504/IJLIC.2004.004421>
- Chen, C. J., & Huang, J. W. (2009). Strategic human resource practices and innovation performance - The mediating role of knowledge management capacity. *Journal of Business Research*, 62(1), 104–114. <http://dx.doi.org/10.1016/j.jbusres.2007.11.016>
- Chiesa, V., & Frattini, F. (2011). Commercializing Technological Innovation: Learning from Failures in High-Tech Markets. *Journal of Product Innovation Management*, 28(4), 437–454. <http://dx.doi.org/10.1111/j.1540-5885.2011.00818.x>

- Cochran, W. G. (1977). *Sampling Techniques* (3rd edition). New York, NY: John Wiley & Sons Inc.
- Cooke, F. L. (2013). Human Resource Development and Innovation in China: State HRD Policies, Organizational Practices, and Research Opportunities. *Journal of Chinese Human Resource Management*, 4(2), 144–150. <http://dx.doi.org/10.1108/JCHRM-05-2013-0016>
- Cooke, P. (2013). Business Processes in Regional Innovation Systems in the European Union. In Z. J. Ács (Ed.), *Regional Innovation, Knowledge and Global Change* (pp. 53–71). New York, NY: Routledge.
- Covin, J. G., & Slevin, D. P. (1988). The Influence of Organization Structure on the Utility of an Entrepreneurial Top Management Style. *Journal of Management Studies*, 25(3), 217–234. <http://dx.doi.org/10.1111/j.1467-6486.1988.tb00033.x>
- Covin, J. G., & Slevin, D. P. (2002). A Conceptual Model of Entrepreneurship as Firm Behavior. In N. F. Krueger Jr (Ed.), *Entrepreneurship: Critical Perspectives on Business and Management* (Vol. 3, pp. 5–28). London, UK: Routledge.
- Czarnitzki, D. (2006). Research and Development in Small and Medium-Sized Enterprises: The Role of Financial Constraints and Public Funding. *Scottish Journal of Political Economy*, 53(3), 335–357. <http://dx.doi.org/10.1111/j.1467-9485.2006.00383.x>
- Datta, A. (2012). Information Technology Based Knowledge Capability and Commercialization of Innovations: Modeling the Impacts on Ambidexterity and Absorptive Capacity. *Strategic Management Review*, 6(1), 75–97. <http://dx.doi.org/10.4128/1930-4560-6.1.75>
- de S. Price, D. (1984). The Science/technology Relationship, the Craft of Experimental Science, and Policy for the Improvement of High Technology Innovation. *Research Policy*, 13(1), 3–20. [http://dx.doi.org/10.1016/0048-7333\(84\)90003-9](http://dx.doi.org/10.1016/0048-7333(84)90003-9)
- Dew, N., & Sarasvathy, S. D. (2007). Innovations, Stakeholders & Entrepreneurship. *Journal of Business Ethics*, 74(3), 267–283. <http://dx.doi.org/10.1007/s10551-006-9234-y>
- Dhewanto, W., & Sohal, A. S. (2015). The Relationship Between Organisational Orientation and Research and Development/Technology Commercialisation Performance. *R&D Management*, 45(4), 339–360. <http://doi.org/10.1111/radm.12073>
- du Preez, N. D., & Louw, L. (2008). A Framework for Managing the Innovation Process. In *Portland International Conference on Management of Engineering Technology, 2008. PICMET 2008* (pp. 546–558). <http://dx.doi.org/10.1109/PICMET.2008.4599663>
- Dutta, S., Narasimhan, O., & Rajiv, S. (1999). Success in High-Technology Markets: Is Marketing Capability Critical? *Marketing Science*, 18(4), 547–568. <http://dx.doi.org/10.1287/mksc.18.4.547>
- Ebadi, Y. M., & Utterback, J. M. (1984). The Effects of Communication on Technological Innovation. *Management Science*, 30(5), 572–585. <http://dx.doi.org/10.1287/mnsc.30.5.572>
- Eisenhauer, J. G. (1995). The Entrepreneurial Decision: Economic Theory and Empirical Evidence. *Entrepreneurship: Theory and Practice*, 19(4), 67–80.
- Ekvall, G. (1996). Organizational Climate for Creativity and Innovation. *European Journal of Work and Organizational Psychology*, 5(1), 105–123. <http://dx.doi.org/10.1080/13594329608414845>
- Ford, S., Garnsey, E., & Probert, D. (2010). Evolving Corporate Entrepreneurship Strategy: Technology Incubation at Philips. *R&D Management*, 40(1), 81–90. <http://dx.doi.org/10.1111/j.1467-9310.2009.00580.x>
- Gans, J. S., & Stern, S. (2003). The Product Market and the Market for “Ideas”: Commercialization Strategies for Technology Entrepreneurs. *Research Policy*, 32(2), 333–350. [http://dx.doi.org/10.1016/S0048-7333\(02\)00103-8](http://dx.doi.org/10.1016/S0048-7333(02)00103-8)
- García-Morales, V. J., Llorens-Montes, F. J., & Verdú-Jover, A. J. (2006). Antecedents and Consequences of Organizational Innovation and Organizational Learning in Entrepreneurship. *Industrial Management & Data Systems*, 106(1), 21–42. <http://dx.doi.org/10.1108/02635570610642940>
- Genriha, I., Pettere, G., & Voronova, I. (2011). Entrepreneurship Insolvency Risk Management: A Case of Latvia. *International Journal of Banking, Accounting and Finance*, 3(1), 31–46. <http://dx.doi.org/10.1504/IJBAAF.2011.039370>

- Ghoshal, S., & Bartlett, C. (1995). Building the Entrepreneurial Corporation: New Organizational Processes, New Managerial Tasks. *European Management Journal*, 13(2), 139–155. [http://dx.doi.org/10.1016/0263-2373\(95\)00002-3](http://dx.doi.org/10.1016/0263-2373(95)00002-3)
- Godin, B., & Lane, J. P. (2013). Pushes and Pulls, History of the Demand Pull Model of Innovation. *Science, Technology & Human Values*, 38(5), 621–654. <http://dx.doi.org/10.1177/0162243912473163>
- Green, S. G. (1995). Top Management Support of R&D Projects: A Strategic Leadership Perspective. *IEEE Transactions on Engineering Management*, 42(3), 223–232. <http://dx.doi.org/10.1109/17.403740>
- Gumusluoğlu, L., & Ilsev, A. (2009). Transformational Leadership and Organizational Innovation: The Roles of Internal and External Support for Innovation. *Journal of Product Innovation Management*, 26(3), 264–277. <http://dx.doi.org/10.1111/j.1540-5885.2009.00657.x>
- Hall, R. (1993). A Framework Linking Intangible Resources and Capabilities to Sustainable Competitive Advantage. *Strategic Management Journal*, 14(8), 607–618. <http://dx.doi.org/10.1002/smj.4250140804>
- Harrison, S., & Sullivan Sr, P. H. (2000). Profiting from Intellectual Capital: Learning from Leading Companies. *Journal of Intellectual Capital*, 1(1), 33–46. <http://dx.doi.org/10.1108/14691930010324124>
- Heslop, L. A., McGregor, E., & Griffith, M. (2001). Development of a Technology Readiness Assessment Measure: The Cloverleaf Model of Technology Transfer. *The Journal of Technology Transfer*, 26(4), 369–384. <http://dx.doi.org/10.1023/A:1011139021356>
- Hipp, C. (1999). Knowledge-intensive Business Services in the New Mode of Knowledge Production. *AI & Society*, 13(1-2), 88–106. <http://dx.doi.org/10.1007/BF01205260>
- Hopenhayn, H., Llobet, G., & Mitchell, M. (2006). Rewarding Sequential Innovators: Prizes, Patents, and Buyouts. *Journal of Political Economy*, 114(6), 1041–1068. <http://dx.doi.org/10.1086/510562>
- Jaafar, M., & Aziz, A. R. A. (2008). Entrepreneurship Education in Developing Country: Exploration on Its Necessity in the Construction Programme. *Journal of Engineering, Design and Technology*, 6(2), 178–189. <http://dx.doi.org/10.1108/17260530810891306>
- Jennewein, K. (2005). The New Era of Intangible Assets. In *Intellectual Property Management* (pp. 1–21). Bonn, Germany: Physica-Verlag Heidelberg. <http://dx.doi.org/10.1007/b137956>
- Jo, H., & Lee, J. (1996). The Relationship Between an Entrepreneur's Background and Performance in a New Venture. *Technovation*, 16(4), 161–211. [http://dx.doi.org/10.1016/0166-4972\(96\)89124-3](http://dx.doi.org/10.1016/0166-4972(96)89124-3)
- Karami, D. A. (2012). *Strategy Formulation in Entrepreneurial Firms*. Ashgate Publishing, Ltd.
- Kaya, N. (2006). The Impact of Human Resource Management Practices and Corporate Entrepreneurship on Firm Performance: Evidence from Turkish Firms. *The International Journal of Human Resource Management*, 17(12), 2074–2090. <http://dx.doi.org/10.1080/09585190601000204>
- Kelm, K. M., Narayanan, V. K., & Pinches, G. E. (1995). Shareholder Value Creation During R&D Innovation and Commercialization Stages. *Academy of Management Journal*, 38(3), 770–786. <http://dx.doi.org/10.2307/256745>
- Kilelu, C. W., Klerkx, L., & Leeuwis, C. (2014). How Dynamics of Learning are Linked to Innovation Support Services: Insights from a Smallholder Commercialization Project in Kenya. *The Journal of Agricultural Education and Extension*, 20(2), 213–232. <http://dx.doi.org/10.1080/1389224X.2013.823876>
- Klepper, S. (1997). Industry Life Cycles. *Industrial and Corporate Change*, 6, 145–182. <http://dx.doi.org/10.1093/icc/6.1.145>
- Koprinarov, B. (2005). Entrepreneurship Risk in the Market Economy: Principles and Methods of Management. *Economic Studies Journal*, (3), 86–102.
- Kuratko, D. F., Ireland, R. D., & Hornsby, J. S. (2001). Improving Firm Performance Through Entrepreneurial Actions: Acordia's Corporate Entrepreneurship Strategy. *The Academy of Management Executive*, 15(4), 60–71. <http://dx.doi.org/10.5465/AME.2001.5897658>
- Lai, W.-H., & Tsai, C.-T. (2010). Analyzing Influence Factors of Technology Transfer Using Fuzzy Set Theory. *International Journal of Innovation and Technology Management*, 7(1), 71–87. <http://dx.doi.org/10.1142/S0219877010001830>

- Lambe, C. J., & Spekman, R. E. (1997). Alliances, External Technology Acquisition, and Discontinuous Technological Change. *Journal of Product Innovation Management*, 14(2), 102–116. <http://dx.doi.org/10.1111/1540-5885.1420102>
- Lee, Y., Kozar, K. A., & Larsen, K. R. (2003). The Technology Acceptance Model: Past, Present, and Future. *Communications of the Association for Information Systems*, 12(1), 50.
- Lichtenthaler, U., & Ernst, H. (2007). External Technology Commercialization in Large Firms: Results of a Quantitative Benchmarking Study. *R&D Management*, 37(5), 383–397. <http://dx.doi.org/10.1111/j.1467-9310.2007.00487.x>
- Lin, C.-H., Shih, H.-Y., & Sher, P. J. (2007). Integrating Technology Readiness into Technology Acceptance: The TRAM Model. *Psychology and Marketing*, 24(7), 641–657. <http://dx.doi.org/10.1002/mar.20177>
- Lin, H. (2007). Knowledge Sharing and Firm Innovation Capability: An Empirical Study. *International Journal of Manpower*, 28(3/4), 315–332. <http://dx.doi.org/10.1108/01437720710755272>
- Lööf, H., & Heshmati, A. (2002). Knowledge Capital and Performance Heterogeneity: A Firm-level Innovation Study. *International Journal of Production Economics*, 76(1), 61–85. [http://dx.doi.org/10.1016/S0925-5273\(01\)00147-5](http://dx.doi.org/10.1016/S0925-5273(01)00147-5)
- Malinowski, M. J., & Rao, R. (2006). Legal Limitations on Genetic Research and the Commercialization of Its Results. *The American Journal of Comparative Law*, 54, 45–65.
- Mani, S. (2002). *Government, Innovation and Technology Policy: An International Comparative Analysis*. Northampton, MA: Edward Elgar Publishing.
- Mansfield, E. (1988). The Speed and Cost of Industrial Innovation in Japan and the United States: External vs. Internal Technology. *Management Science*, 34(10), 1157–1168. <http://dx.doi.org/10.1287/mnsc.34.10.1157>
- Manso, G. (2011). Motivating Innovation. *The Journal of Finance*, 66(5), 1823–1860. <http://dx.doi.org/10.1111/j.1540-6261.2011.01688.x>
- Markman, G. D., & Baron, R. A. (2003). Person–entrepreneurship Fit: Why Some People Are More Successful as Entrepreneurs than Others. *Human Resource Management Review*, 13(2), 281–301. [http://dx.doi.org/10.1016/S1053-4822\(03\)00018-4](http://dx.doi.org/10.1016/S1053-4822(03)00018-4)
- Mars, M. M. (2013). Building Toward a Holistic Model of Innovation and Entrepreneurship Education: Transformation Before Commercialization. In M. M. Mars & S. Hoskinson (Eds.), *A Cross-Disciplinary Primer on the Meaning and Principles of Innovation* (Vol. 23, pp. 113–124). Emerald Group Publishing Limited. [http://dx.doi.org/10.1108/S1048-4736\(2013\)0000023010](http://dx.doi.org/10.1108/S1048-4736(2013)0000023010)
- Martín-Rojas, R., García-Morales, V. J., & Bolívar-Ramos, M. T. (2013). Influence of Technological Support, Skills and Competencies, and Learning on Corporate Entrepreneurship in European Technology Firms. *Technovation*, 33(12), 417–430. <http://dx.doi.org/10.1016/j.technovation.2013.08.002>
- Martins, E. C., & Terblanche, F. (2003). Building Organisational Culture That Stimulates Creativity and Innovation. *European Journal of Innovation Management*, 6(1), 64–74. <http://dx.doi.org/10.1108/14601060310456337>
- Mazzarol, T. (2002). Innovativeness in Small Firms: an Exploratory Study of the Perspectives of Growth Oriented Owner-Managers. *Innovation*, 4(1-3), 30–40. <http://dx.doi.org/10.5172/impp.2001.4.1-3.30>
- Michaelis, B., Stegmaier, R., & Sonntag, K. (2010). Shedding Light on Followers' Innovation Implementation Behavior: the Role of Transformational Leadership, Commitment to Change, and Climate for Initiative. *Journal of Managerial Psychology*, 25(4), 408–429. <http://dx.doi.org/10.1108/02683941011035304>
- Miller, D. (1992). The Icarus Paradox: How Exceptional Companies Bring about Their Own Downfall. *Business Horizons*, 35(1), 24–35. [http://dx.doi.org/10.1016/0007-6813\(92\)90112-M](http://dx.doi.org/10.1016/0007-6813(92)90112-M)
- Mittal, S. K., Momaya, K., & Sushil. (2016). A Framework Conceptualization for National Technological Competitiveness. In Sushil, K. T. Bhal, & S. P. Singh (Eds.), *Managing Flexibility* (pp. 245–270). Springer India. http://dx.doi.org/10.1007/978-81-322-2380-1_18
- Montoro-Sánchez, Á., & Soriano, D. R. (2011). Human Resource Management and Corporate Entrepreneurship. *International Journal of Manpower*, 32(1), 6–13. <http://dx.doi.org/10.1108/01437721111121198>
- Mullane, J. V. (2002). The Mission Statement Is a Strategic Tool: When Used Properly. *Management Decision*, 40(5), 448–455. <http://dx.doi.org/10.1108/00251740210430461>

- Nasir, S. (2012). E-Entrepreneurship and ICT Ventures: Strategy, Organization and Technology. *International Journal of E-Entrepreneurship and Innovation*, 3(3), 50–54. <http://dx.doi.org/10.4018/jeei.2012070105>
- Nathan, M., & Lee, N. (2013). Cultural Diversity, Innovation, and Entrepreneurship: Firm-level Evidence from London. *Economic Geography*, 89(4), 367–394. <http://dx.doi.org/10.1111/ecge.12016>
- Niehoff, B. P., Enz, C. A., & Grover, R. A. (1990). The Impact of Top-Management Actions on Employee Attitudes and Perceptions. *Group & Organization Management*, 15(3), 337–352. <http://dx.doi.org/10.1177/105960119001500307>
- Nielsen, A. P. (2006). Understanding Dynamic Capabilities Through Knowledge Management. *Journal of Knowledge Management*, 10(4), 59–71. <http://dx.doi.org/10.1108/13673270610679363>
- Paasi, J., Luoma, T., Valkokari, K., & Lee, N. (2010). Knowledge and Intellectual Property Management in Customer-Supplier Relationships. *International Journal of Innovation Management*, 14(04), 629–654. <http://dx.doi.org/10.1142/S1363919610002805>
- Pateli, A. G., & Giaglis, G. M. (2005). Technology Innovation-induced Business Model Change: A Contingency Approach. *Journal of Organizational Change Management*, 18(2), 167–183. <http://dx.doi.org/10.1108/09534810510589589>
- Peneder, M. (2008). The Problem of Private Under-investment in Innovation: A Policy Mind Map. *Technovation*, 28(8), 518–530. <http://dx.doi.org/10.1016/j.technovation.2008.02.006>
- Powers, J. B. (2003). Commercializing Academic Research: Resource Effects on Performance of University Technology Transfer. *The Journal of Higher Education*, 74(1), 26–50. <http://dx.doi.org/10.1353/jhe.2003.0005>
- Priem, R. L., Li, S., & Carr, J. C. (2012). Insights and New Directions from Demand-Side Approaches to Technology Innovation, Entrepreneurship, and Strategic Management Research. *Journal of Management*, 38(1), 346–374. <http://dx.doi.org/10.1177/0149206311429614>
- Qian, H., & Ács, Z. J. (2011). An Absorptive Capacity Theory of Knowledge Spillover Entrepreneurship. *Small Business Economics*, 40(2), 185–197. <http://dx.doi.org/10.1007/s11187-011-9368-x>
- Rogers, E. M., Takegami, S., & Yin, J. (2001). Lessons Learned about Technology Transfer. *Technovation*, 21(4), 253–261. [http://dx.doi.org/10.1016/S0166-4972\(00\)00039-0](http://dx.doi.org/10.1016/S0166-4972(00)00039-0)
- Rothwell, R., & Robertson, A. B. (1973). The Role of Communications in Technological Innovation. *Research Policy*, 2(3), 204–225. [http://dx.doi.org/10.1016/0048-7333\(73\)90003-6](http://dx.doi.org/10.1016/0048-7333(73)90003-6)
- Schiavone, F. (2011). Strategic Reactions to Technology Competition: A Decision-making Model. *Management Decision*, 49(5), 801–809. <http://dx.doi.org/10.1108/00251741111130869>
- Schuler, R. S. (1986). Fostering and Facilitating Entrepreneurship in Organizations: Implications for Organization Structure and Human Resource Management Practices. *Human Resource Management*, 25(4), 607–629. <http://dx.doi.org/10.1002/hrm.3930250408>
- Siegel, D. S., Veugelers, R., & Wright, M. (2007). Technology Transfer Offices and Commercialization of University Intellectual Property: Performance and Policy Implications. *Oxford Review of Economic Policy*, 23(4), 640–660. <http://dx.doi.org/10.1093/oxrep/grm036>
- Skyrme, D. J. (2003). Commercialization: The Next Phase of Knowledge Management. In P. C. W. Holsapple (Ed.), *Handbook on Knowledge Management* (pp. 639–655). Springer Berlin Heidelberg. http://dx.doi.org/10.1007/978-3-540-24748-7_31
- Smirnova, M. M., Podmetina, D., Vaatanen, J., & Kouchtch, S. (2009). Key Stakeholders' Interaction as a Factor of Product Innovation: the Case of Russia. *International Journal of Technology Marketing*, 4(2-3), 230–247. <http://dx.doi.org/10.1504/IJTMKT.2009.026872>
- Solaimani, S., & Bouwman, H. (2012). A Framework for the Alignment of Business Model and Business Processes: a Generic Model for Trans-sector Innovation. *Business Process Management Journal*, 18(4), 655–679. <http://dx.doi.org/10.1108/14637151211253783>
- Stone, H. J., Iwamasa, K. J., Lundine, S. S., & Jasper, J. W. (2005). Picking Winners: A Framework for Evaluating Success Potential of Technology Commercialisation. *International Journal of Technology Transfer and Commercialisation*, 4(3), 255–278. <http://dx.doi.org/10.1504/IJTTC.2005.006360>

- Sullivan, P. H. (1998). Extracting Value from Intellectual Property. In P. H. Sullivan (Ed.), *Profiting from Intellectual Capital: Extracting Value from Innovation* (pp. 103–118). New York, NY: John Wiley & Sons.
- Thamhain, H. J. (2003). Managing innovative R&D teams. *R&D Management*, 33(3), 297–311. <http://dx.doi.org/10.1111/1467-9310.00299>
- Thorburn, L. (2000). Knowledge Management, Research Spinoffs and Commercialization of R&D in Australia. *Asia Pacific Journal of Management*, 17(2), 257–275. <http://dx.doi.org/10.1023/A:1015861625956>
- Torraco, R. J., & Swanson, R. A. (1995). The Strategic Roles of Human Resource Development. *Human Resource Planning*, 18, 10–21.
- Utterback, J. M. (1971). The Process of Technological Innovation Within the Firm. *Academy of Management Journal*, 14(1), 75–88. <http://dx.doi.org/10.2307/254712>
- Venkatesh, V., & Morris, M. G. (2000). Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and Their Role in Technology Acceptance and Usage Behavior. *MIS Quarterly*, 24(1), 115–139. <http://dx.doi.org/10.2307/3250981>
- Veugelers, R. (1997). Internal R&D Expenditures and External Technology Sourcing. *Research Policy*, 26(3), 303–315. [http://dx.doi.org/10.1016/S0048-7333\(97\)00019-X](http://dx.doi.org/10.1016/S0048-7333(97)00019-X)
- Waarden, F. Van. (2001). Institutions and Innovation: The Legal Environment of Innovating Firms. *Organization Studies*, 22(5), 765–795. <http://dx.doi.org/10.1177/0170840601225002>
- Walsh, S. T., Kirchoff, B. A., & Newbert, S. (2002). Differentiating Market Strategies for Disruptive Technologies. *IEEE Transactions on Engineering Management*, 49(4), 341–351. <http://dx.doi.org/10.1109/TEM.2002.806718>
- Williams, C., & Lee, S. H. (2009). Resource Allocations, Knowledge Network Characteristics and Entrepreneurial Orientation of Multinational Corporations. *Research Policy*, 38(8), 1376–1387. <http://dx.doi.org/10.1016/j.respol.2009.05.007>
- Xiao, Y., & Han, J. (2014). Value Model of Knowledge Diffusion in High Technology Innovation Networks. In K. Liu, S. R. Gulliver, W. Li, & C. Yu (Eds.), *Service Science and Knowledge Innovation* (pp. 331–339). Springer Berlin Heidelberg. http://dx.doi.org/10.1007/978-3-642-55355-4_34
- Ya, S., & Rui, T. (2006). The Influence of Stakeholders on Technology Innovation: A Case Study from China. In *2006 IEEE International Conference on Management of Innovation and Technology* (Vol. 1, pp. 295–299). Singapore. <http://dx.doi.org/10.1109/ICMIT.2006.262171>
- Yang, L., & Wang, D. (2014). Characteristics on Entrepreneurial Strategic Orientation: the Moderating Effects of Industrial Environment and Corporate Ownership. *Management Decision*, 52(2), 378–409. <http://dx.doi.org/10.1108/MD-03-2013-0140>
- Zahra, S. A. (2010). Organizational Learning and Entrepreneurship in Family Firms: Exploring the Moderating Effect of Ownership and Cohesion. *Small Business Economics*, 38(1), 51–65. <http://dx.doi.org/10.1007/s11187-010-9266-7>
- Zahra, S. A., Nash, S., & Bickford, D. J. (1995). Transforming technological pioneering into competitive advantage. *The Academy of Management Executive*, 9(1), 17–31. <http://dx.doi.org/10.5465/AME.1995.9503133481>
- Zhou, K. Z., & Li, C. B. (2012). How Knowledge Affects Radical Innovation: Knowledge Base, Market Knowledge Acquisition, and Internal Knowledge Sharing. *Strategic Management Journal*, 33(9), 1090–1102. <http://dx.doi.org/10.1002/smj.1959>
- Zucker, L. G., Darby, M. R., & Armstrong, J. S. (2002). Commercializing Knowledge: University Science, Knowledge Capture, and Firm Performance in Biotechnology. *Management Science*, 48(1), 138–153. <http://dx.doi.org/10.1287/mnsc.48.1.138.14274>

Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/3.0/>).