Juha Hinkkanen

COOPERATIVE STRATEGY IN EMERGING MARKETS - ANALYSIS OF INTERFIRM R&D COOPERATION AND PERFORMANCE IN RUSSIAN MANUFACTURING COMPANIES

Thesis for the degree of Doctor of Science (Technology) to be presented with due permission for public examination and criticism in Room 1382 at Lappeenranta University of Technology, Lappeenranta, Finland on the, 31st of October, 2014, at noon.

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ABSTRACT

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Emerging markets have come to play a significant role in the world, not only due to their strong economic growth but because they have been able to foster an increasing number of innovative high technology oriented firms. However, as the markets continue to change and develop, there remain many companies in emerging markets that struggle with their competitiveness and innovativeness. To improve competitive capabilities, many scholars have come to favor interfirm cooperation, which is perceived to help companies access new knowledge and complementary resources and, by so doing, enables them to catch up quickly with Western competitors. Regardless of numerous attempts by strategic management scholars, the research field remains very fragmented and lacks understanding on how and when interfirm cooperation contributes to firm performance and competitiveness in emerging markets. Furthermore, the reasons why interfirm R&D sometimes succeeds but fails at other times frequently remain unidentified.

This thesis combines the extant literature on competitive and cooperative strategy, dynamic capabilities, and R&D cooperation while studying interfirm R&D relationships in and between Russian manufacturing companies. Employing primary survey data, the thesis presents numerous novel findings regarding the effect of R&D cooperation and different types of R&D partner on firms’ exploration and exploitation performance. Utilizing a competitive strategy framework enables these effects to be explained in more detail, and especially why interfirm cooperation, regardless of its potential, has had a modest effect on the general competitiveness of emerging market firms. This thesis contributes especially to the strategic management literature and presents a more holistic perspective on the usefulness of cooperative strategy in emerging markets. It provides a framework through which it is possible to assess the potential impacts of different R&D cooperation partners and to clarify the causal relationships between cooperation, performance, and long term competitiveness.

Keywords: cooperative strategy, firm performance, strategic management, innovation, dynamic capabilities, R&D cooperation, emerging markets, Russia

UDC 339(470+57):65.011.8:65.012.4:658.5
ACKNOWLEDGEMENTS

“Life is short – Eat cookies”

You are probably wondering what a dissertation has to do with cookies. On first consideration, probably not a lot. Long hours in front of the computer, nights at the office, weekends spend with revisions, critical comments during presentations… I admit, writing this thesis has not always been fun. However, it has also taken me to countries and places I could have hardly dreamed of, and enabled me to experience fantastic and fun new things. Most of all, it has enabled me to meet great, smart, generous, and unbelievable friendly people. It ended up being one of the best cookies I have ever had. It has been a journey that would never have taken place without numerous individuals who helped me along the way, and now it is time to acknowledge them.

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I want to thank all of my friends outside the office, and Ilkka both outside and inside it – our daily “breakout sessions” over lunch were the best! Thank you all for your support and encouragement, and for all the laughs we had over the years. That is what kept me going.

I wish to express my deepest appreciation to my parents. Thank you for letting me choose my own path in life and for your endless support along the way. You have given me everything for which one could ever ask. Also, thank you Olli for organizing extracurricular activities, sparring with me on our mountain bikes, going for runs, exercising in the gym, and for teaching me the spirit of “we started this together, we’ll finish it together”.

Last but by no means least, the biggest single thank you and expression of love and gratitude goes without question to Katja – for being there, for supporting me, and for believing in me. For us, the biggest adventure still lies ahead, and I am truly happy that I am going to share it with you.

In Parikkala, October 2014

Juha Hinkkanen
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<th>Acronym</th>
<th>Description</th>
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<tr>
<td>AC</td>
<td>Absorptive capacity</td>
</tr>
<tr>
<td>BEEBPS</td>
<td>Business, Environment, and Enterprise Performance Survey</td>
</tr>
<tr>
<td>BOP</td>
<td>Bottom of the pyramid</td>
</tr>
<tr>
<td>BRIC</td>
<td>Brazil, Russia, India, and China</td>
</tr>
<tr>
<td>CIS</td>
<td>Commonwealth of Independent States</td>
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<tr>
<td>EBRD</td>
<td>European Bank of Reconstruction and Development</td>
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<tr>
<td>FDI</td>
<td>Foreign direct investment</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and communication technology</td>
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<tr>
<td>MOI</td>
<td>Management, Organisation and Innovation Survey</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OLS</td>
<td>Ordinary least squares</td>
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<tr>
<td>R&amp;D</td>
<td>Research and development</td>
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<td>RBV</td>
<td>Resource-based view</td>
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<tr>
<td>SJR</td>
<td>Scientific Journal Rankings</td>
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<tr>
<td>SME</td>
<td>Small and medium-sized enterprises</td>
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<tr>
<td>SMS</td>
<td>Strategic Management Society</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
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<td>WEF</td>
<td>World Economic Forum</td>
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PUBLICATIONS

The thesis comprises the overview (Part I) and publications (Part II), which are listed below. The publications were written in cooperation with other authors and, hence, a statement of authors' contributions to each publication is included.

Publication 1


Publication 1 focuses on the internal components of R&D cooperation in Russian manufacturing companies. The idea for the paper originated from the first author. Work on the general framework, the literature review, and the hypothesis for the paper was also conducted by the first author, although in cooperation with the co-authors. The data analysis was performed mainly by the second author in cooperation with the other authors, and work on the discussion section was jointly conducted by all authors. The concluding chapter was mainly written by the first author.

Publication 2


Publication 2 focuses on the external components of R&D cooperation, and especially on the Russian market and innovation environment. The idea for the paper originated from the first author. The conceptual framework and the literature review on the Russian innovation environment was conducted cooperatively by all authors, although mainly written by the first author, who was also responsible for analyzing secondary data from the World Economic Forum. The primary data were analyzed by the third author. All authors participated in the discussion and conclusions chapters, although they were mainly written by the first author.

Publication 3


Publication 3 analyzes how different domestic R&D partners affect companies’ innovation performance in Russia. The topic for the paper was originated by the first author, although the conceptual framework was developed cooperatively by all authors. Data analysis was conducted by the first author. The discussion and conclusion sections were prepared cooperatively by all authors, although mainly written by the first author.
Publication 4


Publication 4 approaches R&D cooperation from an exploration-exploitation perspective and studies how domestic R&D cooperation enables companies to expand their business activities in foreign markets. The idea for the paper originated from the first author and was further conceptualized by all authors. The literature review was a joint effort by all authors, although the writing was mostly performed by the first author. Data analysis was the responsibility of the first author, as was the discussion section. All authors worked on drawing conclusions, although the conclusions chapter was mainly written by the first author.

Publication 5


Publication 5 studies the management aspect of cooperation in Russian manufacturing companies, and especially focuses on the importance of goal setting for improving innovation and firms’ performance. The idea for the paper was developed by the first author. The initial version of the conceptual framework and hypothesis was drafted by the first author and subsequently improved by the co-authors. Data analysis was conducted by the first author, who was also responsible for the discussion section. Conclusions were drawn cooperatively by all authors, although mainly written by the first author.
PART I: OVERVIEW OF THE THESIS
1 INTRODUCTION

How companies can navigate in times of turbulence has always been an essential question in strategic management research. Over the last decade, rapid development of technology combined with the rise of emerging markets has contributed to increased global market turbulence, which has not gone unnoticed by academics. Efforts have been dedicated to understanding what has enabled some companies from countries such as Brazil, Russia, India, and China to penetrate global markets and how they are able to challenge large multinationals in their well-established markets with innovative products and services. Regardless of developments that have occurred in the field of strategic management to address questions raised by the rise of emerging markets, many questions remain open. The large size and current level of development of these emerging countries suggests that most of their potential is still unmet and unseen, and that we have only seen the tip of the iceberg to date. This thesis aims to contribute to the strategic management literature by studying Russian manufacturing companies’ innovation and competitive capabilities during times when markets are changing, and the role played by interorganizational R&D cooperation in responding to these challenges.

1.1 Motivation and background

After decades of Western countries leading the way in economic development, emerging markets have reclaimed their position in the world through their rapid economic growth in the 21st century. A research report by the Goldman Sachs Global Economic, Commodities, and Strategy group predicted that, over the current decade, Brazil, Russia, India, and China (i.e., the BRIC countries) will contribute twice as much to global growth as the EU, the USA and Japan combined (Wilson, Kelston and Ahmed, 2010). However, the increasing role of these countries is not only limited to economic measurements such as GDP. Emerging markets are also more often the source of new innovative firms, services, and products. They no longer only remain as turbulent markets, but contribute to global market turbulence by disrupting existing products and technologies in other established markets. This innovation potential has also been noticed and recognized by Western firms, of which many have set up or transferred existing R&D activities to places such as Shanghai and Shenzhen in China, Bangalore in India, Campinas in Brazil, and Saint Petersburg in Russia.

In the midst of the rapid growth of these markets, one can easily forget that the road to growth has been anything but easy for many emerging countries, including the BRICs. This is especially true to those that have undergone a change of political system. Examples of such countries are China, which has gradually transferred from a fully centrally planned economy to a mix of market and planned economies (Siu, 2005), and Russia with its privatization process after the collapse of the Soviet Union (Black, Kraakman and Tarassova, 2000; Peng, Buck and Filatotchev, 2003). Many companies in these types of country still struggle with low productivity, poor management, and weak infrastructure. Also, their relatively weak institutional environments not only create challenges for domestic firms but also for international firms entering these markets. Often, when discussing successful and innovative
new enterprises from emerging markets, we tend to focus on a few case examples such as Tata (India), Huawei (China), Embraer (Brazil), and Kaspersky Lab (Russia). While their success cannot be denied, one can easily argue that they only represent a small minority of firms in the emerging market context. In comparison to their Western counterparts, most companies in emerging markets remain constrained by their internal resources and capabilities (Manolova, Manev and Gyoshev, 2010). Moreover, the opening of their domestic markets have subjected these firms to new competition from international companies and, in many cases, small local emerging market manufacturers now have to compete against multinationals based in large developed economies. Updating and building new competencies in this turbulent market environment is a matter of survival for many emerging market companies.

Management scholars have naturally been reviewing the strategic options of emerging market firms in this new situation. For example, Dawar and Frost (1999) produced an early paper on this topic that developed a typology for possible strategic responses available to emerging market firms. In brief, emerging market firms were identified as having four distinct strategic options based on their individual competitive assets and industry pressure to globalize; namely, dodger, defender, contender, or extender strategies (Figure 1). This typology was later empirically tested on Chinese manufacturing firms by Wu and Pangarkar (2006) who were able to show that the contender strategy, with which local companies focus on upgrading capabilities and resources, outperformed the other three strategies. However, the key questions concerning how to achieve this contender position and to upgrade capabilities were largely left unanswered. Innovation and a cooperative strategy have become promising approaches to this dilemma.

<table>
<thead>
<tr>
<th>Competitive assets</th>
<th>Customized to home market</th>
<th>Transferrable abroad</th>
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<tr>
<td>High Pressure to globalize in the industry</td>
<td>Dodger… focuses on locally oriented value chains, enters a joint venture, or sells out to an international competitor</td>
<td>Contender… focuses on upgrading capabilities and resources to match international competitors</td>
</tr>
<tr>
<td>Low Pressure to globalize in the industry</td>
<td>Defender… focuses on leveraging local assets in markets where international competitors are weak</td>
<td>Extender… focuses on expanding into markets similar to the home base that employ domestic competencies</td>
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**Figure 1.** Competitive strategy in emerging markets (Dawar and Frost, 1999, p. 122)

Innovation is a corner stone of the modern economy. Constant innovation simultaneously helps firms both to survive and thrive, while also contributing to increasing market turbulence. Joseph Schumpeter’s *Creative Destruction* (Schumpeter, 1942), and Edith Penrose’s *Theory of the Growth of the Firm* (Penrose, 1959) are just two of the most
important early works that laid the ground for innovation management and strategy research. Their work has been continued by numerous researchers from various angles and perspectives. The technology and innovation management literature in the 21st century has increasingly emphasized cooperative methods of operation and innovating to compete (Hagedoorn, 1993, 2002; Chesbrough, 2003; Dyer and Singh, 1998; Nieto and Santamaria, 2007; Laursen and Salter, 2006). In general, it is argued that developing new innovative products and services in today’s turbulent markets has become so demanding in terms of expertise, money, and risk that only a few firms internally possess the necessary knowledge, capabilities, and resources (Rese and Baier, 2011). Many studies have argued extensively in favor of utilizing interfirm partners, especially in new product development (Hagedoorn, 1993, 2002; Becker and Dietz, 2004; Miotti and Sachwald, 2003; Tether, 2002; Un, Cuervo-Cazurra and Asakawa, 2010; Petraite, 2013).

In the context of emerging market firms, interfirm cooperation has been proposed as a way to escape resource constraints, build skills and capabilities, enter new markets, and, most of all, access new knowledge (Luo and Tung, 2007; Li and Ferreira, 2008; Zeng, Xie and Tam, 2010). In other words, and as described by Dawar and Frost (1999), a cooperative strategy is regarded as a way to achieve contender and extender positions. Luo and Tung (2007) went as far as to argue that emerging market firms are able to “leapfrog” into the global market place by cooperating with international firms, which, in principle, means that a cooperative strategy can be a rapid way to upgrade resources and capabilities, and to achieve a globally competitive position. Hence the way we see the role of cooperation between firms as a source of competitive advantage is currently being influenced by studies on emerging markets and on companies that are building their first set of competitive capabilities.

While much of the literature supports cooperative forms of business, there are, however, many challenges associated with cooperation that are often not discussed. Typically reported problems are, for example, knowledge leakages, learning races, appropriability concerns, and opportunistic behavior (Kogut, 1988; Das and Teng, 2000; Cassiman and Veugelers, 2002; Bönte and Keilbach, 2005). On numerous occasions, scholars have identified negative effects among different interfirm relationships (e.g., Un et al., 2010; Santamaria and Surroca, 2011; Zeng et al., 2010). There is genuine reason to consider also the downsides of cooperation, at least before we begin recommending R&D cooperation as a form of business strategy to companies.

This is especially the case in the context of emerging markets where the business environment creates some specific challenges for focal firms trying or wishing to cooperate in business or innovation activities. For example, many companies in these countries find it difficult to source international partners with which to cooperate, and the weak institutional environments of emerging markets provide firms with few ways to protect themselves against possible unfriendly activities of cooperative partners (Jansson, Johanson and Ramström, 2007; Kaminski, de Oliveira and Lopes, 2008; Smirnova, Podmetina, Vääätäinen and Torkkeli, 2012). Thus, understanding R&D cooperation in situations where the business environment and institutions are not actively supporting cooperative behavior is important if we wish to understand the implications of building and pursuing cooperative innovation strategies.
Both within emerging markets and the innovation context, Russia is an interesting country in many ways. The country was a giant in terms of innovation during the Soviet Union era, and still, two decades after its dissolution, Russia boasts a large proportion of skilled engineers and scientists per capita (Desai and Goldberg, 2008). However, the transformation to a free market system has been difficult and has had long lasting influences on Russian firms, one of which being that firms’ internal R&D has produced relatively few tangible outcomes (Radosevic, 2003; Trifilova, Bartlett and Altman, 2013; Yegorov, 2009). There have been a number of studies focusing on the Russian innovation environment and activity (e.g., Michailova and Jormanainen, 2011; Klochikhin, 2012; Radosevic, 2003; Yegorov, 2009), and which have provided important insights on modern Russian companies. However, little quantitative research has been conducted on Russian companies, their use of internal and external R&D, and how these activities reflect company performance. For us to understand the causal effects of cooperative strategy in Russia and other emerging markets, we need more empirical evidence based on primary data from companies, their cooperative actions, innovation activities, and business performance.

This thesis will utilize two rapidly growing streams of the literature, one focusing on emerging markets and market turbulence, and the other focusing on R&D cooperation and cooperative strategy. It discusses why some companies are able to upgrade their capabilities and improve their performance, and, moreover, why it is difficult for some companies to benefit from cooperative innovation activities. The thesis studies in detail how R&D cooperation improves company performance, contributes to firms’ competitive capabilities and, by so doing, enables them to become international contenders in the long run as proposed by Dawar and Frost (1999) and Wu and Pangarkar (2006). Further, by employing empirical data, this thesis seeks to understand the underlying reasons for cooperation sometimes failing while being successful in other cases. The intended outcome is a more holistic perspective on interfirm relationships as a source of competitive advantage in emerging market companies.

1.2 Research gap and research questions

There are three main reasons that make this research timely and important. First, while the number of studies conducted on emerging markets has steadily increased in various academic journals, there has been a strong focus on China and India as the primary research contexts. A search on the Scientific Journal Rankings (SJR) reveals that, between 1996 and 2012, Russia produced only 2,048 citable documents relating to the Business, Management, and Accounting field, and ranked 30th on the global list. In comparison, the USA was ranked 1st with 129,909 citable documents, China was 3rd with 29,183, India was 7th with 10,819, and Brazil was 22nd with 2,877 citable documents (SCImago, 2014). Moreover, the number of citations per document in Russia was as low as 1.82. The comparable figures were 16.26 for the USA, 2.11 for China, 2.61 for India, and 9.16 for Brazil (ibid.). This can largely be credited to a few practical reasons: measured in terms of population, China and India are by far the biggest countries in the world, and are among the top 10
countries when measured by nominal GDP. They have also shown consistent and rapid economic growth over the last decade, which has encouraged scientific research. Although Russia has an extensive background in science and research, a large proportion of the research is still conducted and published in local journals in the local language, which, in turn, results in a low number of internationally reviewed and cited journal publications (OECD, 2013). In addition, the research emphasis in Russia remains strongly on fields such as chemistry, engineering, materials sciences and physics, and astronomy, instead of on management (SCImago, 2014).

With regard to the conducted research, a closer review of the papers focusing on R&D, innovation, and strategy in emerging markets reveals context-related limitations. For example, Wu and Pangarkar (2006) stated that “future studies need to test the key ideas proposed here [related to competitive strategy] in other geographic settings [outside China]”, and Zeng et al. (2010) report that their findings might only be specific to China. Li and Ferreira (2008) advise that nationality in international research partnerships should be addressed as a future research avenue. Indeed, regardless of the fact that emerging markets share many similarities, they also vary extensively in terms of, for example, institutional environment, business environment, and culture (Kearney, 2012; Wright, Filatotchev, Hoskisson and Peng, 2005). From the theory development side, for example, Tsang and Kwan (1999) highlighted the importance of replication studies, and suggested that their role in social sciences should not be downplayed as they are the only way to ensure that we do not address isolated coincidences. This concern becomes especially relevant in the contexts of different countries, regions, and cultures. For this reason alone, it is important to test the applicability of different propositions also in the context of Russia. The recent special issue in the Critical Perspectives on International Business journal focusing solely on Russia is an example of the attempt to expand academic interest to new geographical areas (Michailova, McCarthy and Puffer, 2013).

This takes us to the second reason for what makes Russia, and especially Russian firms, an interesting research topic: the historical, cultural, and geographical background of the country. Russia can be classified, in terms of living standards (i.e., GDP per capita adjusted with purchasing power parity), educated labor force (i.e., number of researchers per capita), and natural resources (i.e., oil, gas, and minerals), as one of the most advanced emerging market countries (OECD, 2013). Although being a resource rich country, Russia has not been very successful in realizing these assets and turning them into tangible outcomes of private enterprises (Desai and Goldberg, 2008; EBRD, 2012; OECD, 2013). Russia also plays an important role in the global economy. It is not only a market comprising 140 million people, of which the majority enjoys increasing income and wealth, but also a source of some sophisticated technologies employed in healthcare (e.g., pharmaceutical development and production), IT (e.g., Kaspersky Lab, the top player in internet security), space (e.g., GLONASS, a global navigation satellite system that competes with GPS), nuclear (e.g., ROSATOM, a state-owned nuclear developer), and nanotechnology (e.g., new start-ups supported by the state-owned RUSNANO company). Most of these examples are initiatives strongly supported by the Russian government and, as such, do not necessarily portray the
correct condition of the vast majority of Russian enterprises that are not directly receiving support for innovation activities. However, at the same time, they represent a fraction of the potential possessed by Russia and Russian companies. Unfortunately, to a large extent, general public opinion on business in Russia is still led by myths and assumptions such as it being impossible to conduct business on a fully legal basis, and that technologies currently developed by Russian firms are outdated and uncompetitive. Gaining new knowledge and better understanding on Russian companies’ innovation activities, and also their competitive strategies, will not only help them internationalize in the long term but also form interesting alliance opportunities for firms outside Russia.

Whereas the first two reasons justify the geographic context of the research, the third gap focuses on the field of study. Regardless of the extensive research conducted on cooperative strategy and, especially, on R&D cooperation, we do not yet have a holistic perspective on cases in which cooperation has either had a positive or negative effect on the focal firms. Most of the previous studies have focused on particular aspects of cooperation and on specific moderating factors in each type of relationship (e.g., Ahuja, 2000; Berchicci, 2013; Tomlinson, 2010; Tsai and Hsu, 2012). Moreover, applying our current understanding on interfirm cooperation to emerging markets lacks clear consensus. As a good example of this, many scholars have come to emphasize the positive effects of interfirm R&D cooperation partners as a source of innovativeness, growth, and performance (Laursen and Salter, 2006; Nieto and Santamaria, 2007; Rese and Baier, 2011), and recommend cooperation as a way of rapidly improving organizational capabilities in emerging market firms (Luo and Tung, 2007). However, at the same time, many scholars have come to show that, depending on the case context and perspective, interfirm partners can just as easily create negative effects on the innovativeness, growth, and performance of the focal firm (Un et al., 2010). Taking this into consideration, and even while being positive about the long-term implications of R&D cooperation, one cannot refrain from asking why, if interfirm cooperation is so beneficial and even necessary in many cases, is so little cooperative innovation seen to come from emerging markets? This hopefully becomes easier to understand by framing R&D cooperation as part of the cooperative strategy process and linking it with the general competitive strategy of the firm. Figure 2 presents the literature streams that are applied in this thesis and which form the basis for the existing gap in research.
Figure 2. Research streams and research gap

To contribute to the proposed issues, this thesis is guided by two specific research questions that can be divided into the following sub-questions:

1. As part of their competitive strategy, what role is played by interfirm R&D cooperation in emerging markets and, in particular, Russian firms?
   1.1. How extensively are Russian manufacturing firms involved in R&D cooperation?
   1.2. Under what conditions is R&D cooperation employed by Russian manufacturing companies?

2. Under what conditions does cooperative strategy and R&D cooperation in particular contribute to improved competitive capabilities and firm performance in emerging markets?
   2.1. How do different types of partner affect the focal firm’s performance?
   2.2. What factors moderate the effect of R&D cooperation on the focal firm’s performance?

1.3 Definition of key terms and their linkages

Three terms are of particular importance in relation to this thesis: emerging markets and market turbulence, cooperative strategy and R&D cooperation, and performance and competitive capabilities. As these are broad concepts, their meaning in the context of this thesis is explained below.
Emerging markets and market turbulence

As a term, ‘emerging markets’ is often employed to mean developing economies or newly industrialized countries. Also, various classifications exist by which countries are considered emergent; which are developing and the number of countries on these lists vary extensively\(^1\) (Kearney, 2012). In general terms, the world is typically divided into developed and developing countries, between which an emerging market is often perceived to be in transition from a developing country towards one that is developed (Schwab, 2013). The focus of this thesis is precisely on these types of country as they are facing large changes in their institutional and competitive environments, and thus are subject to high market turbulence (Wright et al., 2005). In general, companies from these countries are also in weaker competitive positions compared to firms in developed economies, and need to improve their products, technologies, and processes, and also their management capabilities (Luo and Tung, 2007).

To avoid confusion, if not otherwise defined, this thesis employs the term ‘emerging markets’ as meaning the four largest emerging countries: Brazil, Russia, India, and China (i.e., BRIC countries). ‘BRIC’ is a term originally coined by Goldman Sachs’ former Head of Global Economic Research Center, Jim O’Neill, in 2001. Reports published later have come to predict that these four countries have the potential to overtake traditional Western economies in terms of GDP, and that they are the spearheads of the developing countries (Wilson and Purushothaman, 2006; Wilson, Trivedi, Carlson and Ursua, 2011).

While limiting the terminology to particular countries, I simultaneously also wish to highlight that many of the results and implications of this thesis can be applied to other emerging countries and that, in addition, many of the results are generalizable both to developed and developing markets. This mostly applies to the theoretical contributions. However, I also acknowledge that although emerging markets share many similarities, in many ways they are different from one another. These differences have to be taken into account when making broad generalizations. This especially applies to practical contributions. Indeed, one of the questions in management research is the extent to which existing paradigms are content specific (Tsang and Kwan, 1999), and whether frameworks constructed for developed markets can be applied to emerging markets (Wright et al., 2005). This thesis also aims to add to this discussion.

Cooperative strategy and R&D cooperation

The terms ‘innovation’ and ‘emerging’ are extensively employed in this thesis; both refer to some form of change. *Innovation* is often associated with new products and technologies, and *emerging* often with new markets and business environments. Strategy is the combining factor between the two as it refers to business managers’ intended actions that involve the utilization of internal and external resources to improve performance (Nag, Hambrick and

\(^1\) For example: the International Monetary Fund emerging economies list, the Columbia University Emerging Market Global Players list, the S&P emerging market list, and the Dow Jones emerging market list.
Cooperative strategy is a particular subset of strategy that claims critical resources, which have to be utilized, span over firms’ boundaries (Dyer and Singh, 1998). The Strategic Management Society special interest group defines cooperative strategy very generally as including, among other things, inter-organizational alliances, joint ventures, federations, networks, vertical buyer-supplier relations, and franchises (SMS, 2014).

In this thesis, cooperative strategy refers both to informal and formal agreements concerning research and development (R&D) activities between two or more companies or organizations. R&D again refers to consistent efforts to conceptualize and produce new products and technologies. These types of innovation partnership have traditionally been regarded as a vital part of general strategy, especially when firms do not possess the necessary R&D capabilities or knowledge in-house (Jorde and Teece, 1990), which is often the case when technologies are developing rapidly (Rese and Baier, 2011). In other words, cooperation enables companies to access new information and complementary resources from external sources, and R&D helps to create, convert, and process new knowledge and turn it into tangible outcomes.

In particular, this thesis approaches cooperative strategy through dynamic capabilities and perceives R&D cooperation as strategic decisions made by companies to predict and adapt to changes within their operating environment (Christensen, 1997; Teece, Pisano and Shuen, 1997). Moreover, companies are able to shape their environment to their advantage by constant innovation and new product development, which contribute to sustained competitive advantage.

**Performance and competitive capabilities**

In the context of interfirm R&D cooperation, the measurement for performance often relates to innovation outcomes. Employed indicators include, for example, launch or number of new products, number of patents, novelty of innovation, and share of turnover from new products (Becker and Dietz, 2004; Nieto and Santamaria, 2007; Un et al., 2010; Berchicci, 2013). The underlying logic is that innovations provide firms with competitive advantages over competing products and services, and thus contribute to long-term firm performance. Moreover, when firms are able to innovate constantly, they stay one step ahead of their competitors, and are thus able to compete in wider markets (Prahalad and Hamel, 1990). In addition, organizations that acquire knowledge from outsiders can also strengthen their core competences and processes while innovating (Liao and Hu, 2007). Hence, in addition to direct performance improvements, interfirm cooperation is presumed to have various secondary effects that contribute to firms’ overall competitive capabilities.

As innovation is a complex and wide phenomenon that touches all aspects of business activities, it has been argued that it is difficult to quantify and measure (Smith, 2005). Acknowledging this argument, the thesis and, in particular, the publications look at interfirm cooperation from multiple perspectives, and employ different performance indicators that also enable the impact of cooperation at a more general level to be captured. In turn, following Teece (2007), the thesis assumes that firms are able to shape new rules of the game...
in their favor when they combine both internally and externally generated innovations. In other words, although the effect of R&D cooperation can be measured through performance improvement, in this thesis, it is regarded as a vehicle that enables companies to build and upgrade competitive capabilities that can be re-employed to expand business activities.

The proposed linkages and logic between the key terms of this thesis are presented in figure 3. Emerging markets are characterized by strong market turbulence, to which local companies have to find ways to adapt. This constitutes the **environment** in which companies plan and pursue their independent strategies. One of these strategic possibilities is to open business processes and increase the role of cooperative methods of operation that, in turn, can be facilitated through R&D cooperation. This constitutes the **action** taken by the respective companies. The proposed causal linkage is that R&D cooperation leads to improvements in performance that, in turn, makes companies more competitive both domestically and internationally, thus constituting the **effect** that can be observed by both practitioners and scholars.

![Figure 3. Key terms and proposed linkages](image)

### 1.4 Outline and structure of the thesis

The structure of the thesis is summarized in figure 4. Section two is a literature review on the importance of innovation and the current state and role of emerging markets in the world, both economically and in innovation. The section helps to understand why and how competitive advantage is build and lost, and also explains how studies on emerging markets have already contributed to the strategy and management literature. Section three focuses on cooperative strategy and, in particular, on the extant body of literature on interfirm R&D cooperation. The section presents recent empirical findings on cooperation and performance, and also on what moderates the causal relationship. The research methodology in section four describes the empirical approach employed in the publications, the study’s design, and also the data employed in this thesis. Section five comprises summaries of the five publications, and section six presents the general findings of the thesis and also answers proposed research questions.
Figure 4. Structure of the thesis
FIRM PERFORMANCE IN TURBULENT MARKETS

As markets are never stable, companies must learn to adapt to changes in their operating environment and be constantly ready to innovate new products and upgrade their competitive capabilities. Companies that rely on existing static capabilities and base their competitive advantage on single products, technologies, or services will face difficulties when markets change (Porter, 1985; Teece, 1988; Christensen, 1997). In comparison, companies that are able to adapt to change and base their competitive advantage on constant improvements and new innovations in products and technologies are much more likely to succeed in the long term (Teece and Pisano, 1994; Christensen, Johnson and Rigby, 2002). This section focuses on the interplay between firms’ environments, innovativeness, and how companies are able to survive and thrive while markets change. It begins by describing the Russian innovation environment and its associated problems. It then moves to showing how studies and success stories based on emerging markets have already shaped the innovation management literature and our thinking on how companies adapt to changes in their environment. The later parts of the section focus on the theoretical foundations of innovation-based competitive advantage.

2.1 Innovativeness in the Russian manufacturing sector

Russia forms an interesting case in the context of innovation activities. After the dissolution of the Soviet Union in 1991, the country went through a complete system change from a centrally planned economy to a market economy. Manufacturing companies had to be transferred from state ownership to private ownership, which also included many R&D facilities. Although the Soviet Union was able to develop and launch numerous technological innovations, the system change, privatization process, and general uncertainty concerning the operating environment had a strong negative effect on innovation activities (Klochikin, 2012; Radosevic, 2003; Radosevic and Auriol, 1999; Yegorov, 2009). The former innovation giant has not been able to transform its intangible assets, such as technological knowledge, into commercially successful global products.

The Russian government is again resuming investments in R&D and innovation, although a strong imbalance remains between resources devoted to knowledge creation and actual innovation output (Desai and Goldberg, 2008; Klochikin, 2012; Trifilova et al., 2013). Moreover, whereas the government is endeavoring to increase investments in R&D, the same is not the case for businesses. In 2011, Russian manufacturing companies invested 0.7% of GDP in R&D activities (Table 1) in comparison to the overall OECD average of 1.6% (OECD, 2013). Furthermore, this is less than the amount that Russian manufacturing companies invested in 2001, which indicates that R&D investments in companies have not increased at a rate similar to the growth of the economy.

From Table 1, it can also be seen that more than half (i.e., 58.7%) of all R&D conducted in the business sector in Russia is directly funded by the government. This is a staggering difference in comparison to other emerging markets, and also to Germany and the USA, and further
highlights the role of government in the innovation process. Consequently, only one in nine Russian manufacturing companies innovates in comparison to the ratio of more than three out of four in both Germany and the USA. In other words, there is a lack of turbulence when it comes to innovation activity.

**Table 1. Innovation investments in Russia and selected countries (OECD, 2013)**

<table>
<thead>
<tr>
<th></th>
<th>Russia</th>
<th>Germany</th>
<th>USA</th>
<th>Brazil</th>
<th>China</th>
<th>India</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross domestic expenditures on R&amp;D as % of GDP</strong></td>
<td>1.1</td>
<td>2.9</td>
<td>2.8</td>
<td>1.2</td>
<td>1.8</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>Business enterprise expenditure on R&amp;D as % GDP</strong></td>
<td>0.7</td>
<td>1.9</td>
<td>1.9</td>
<td>-</td>
<td>1.4</td>
<td>-</td>
</tr>
<tr>
<td><strong>Researchers per thousand employed</strong></td>
<td>6.3</td>
<td>8.1</td>
<td>9.5</td>
<td>1.5</td>
<td>1.7</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Direct government funding of business R&amp;D as % of R&amp;D performed in the business sector</strong></td>
<td>58.7</td>
<td>4.4</td>
<td>13.8</td>
<td>-</td>
<td>4.38</td>
<td>-</td>
</tr>
<tr>
<td><strong>Innovation in the manufacturing sector as % of firms innovating</strong></td>
<td>13.3</td>
<td>83.0</td>
<td>75.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

In addition, a survey jointly conducted by the New Economic School, PricewaterhouseCoopers Russia and Center for Technology and Innovation, the Russian Venture Company and Russian Corporation of Nanotechnologies (2010) showed that manufacturing companies which actively innovate in Russia are mainly the largest and, especially, those that either have foreign ownership or operate in international markets. Moreover, the Russian government has been criticized for its emphasis on supporting large and established firms in favor of new and smaller firms (Klochikhin, 2012). Overall, by examining the statistic, it becomes evident that although more than 20 years have elapsed since the dissolution of the centrally planned economy, much of Russian innovation and R&D activities are controlled or steered by the government to some extent.

The general situation in Russian manufacturing companies might be considered challenging in global comparison. However, there have recently been many positive signs indicating that Russian companies are building new innovation capabilities. For example, Podmetina, Väätänen, Torkkeli and Smirnova (2011) found that many Russian manufacturing companies have already reached a level of competitiveness at which they do not require foreign direct investment (FDI) spillovers to keep pace with their foreign competitors. Similarly, Smirnova et al. (2012) found that Russian manufacturing companies have been able to develop both their customer and competitor orientations, which has enabled new competitive strategies and increased strategic flexibility. Trifilova et al. (2013) also found that Russian R&D organizations have made progress in adjusting to the current global market situation, and that a “breed” of post-transition managers exists who more actively acknowledge the role of cooperation as a business strategy. Similarly, Shirokova, Vega and Sokolova (2013) stated that many company managers today are more capable of both opportunity recognition and creation, which are necessities in responding to tightening competition. In other words, not only are innovation activities becoming more common but there is also increasing emphasis
on improving the output side, which again creates a perfect opportunity to assess the impact of different approaches chosen by companies.

In relation to this, a recent report by the European Bank of Reconstruction and Development reveals that almost 40% of manufacturing firms are now introducing new products at least irregularly (EBRD, 2012), which is a significantly higher number than presented by the OECD. The same report also states that new government policies have enabled hundreds of new innovative start-ups to emerge. Whereas it is naturally hard to draw direct conclusions from these types of figures, they indicate that there is a lot of potential in Russian companies to innovate, grow, and compete internationally when their potential is harnessed, supported, and correctly managed. The key is how companies are able to adapt to changes in their market environment, spot possibilities and new business opportunities, and actively participate in market activities, thus turning the game to their advantage, as can be seen occurring in many emerging markets.

### 2.2 Emerging markets as game changers

Traditionally, developed economies such as the USA and old EU countries have been considered the sources of new technologies and new products, and thus also new competition. However, over the last decade we have witnessed a surge of new enterprises from emerging markets that are able globally to offer competitive new products and technological solutions (Corsi and Di Minin, 2013; Hart and Christensen, 2002; Prahalad, 2012). A quarter (24.6% in 2013) of companies on Fortune’s Global 500 list are now from emerging or developing markets, which illustrates how they are gaining momentum over companies from mature markets (Chen, Guo, Huang and Zhu, 2011; Tian and Slocum, 2014). In itself, this demonstrates that, while there is much discussion on the capabilities and competencies of emerging market firms, many are doing something correctly. Also, economically emerging and developing countries are gaining ground. Measured by GDP, China is already the world’s second largest economy, with Brazil seventh, Russia eighth, and India tenth (Figure 5).

Management scholars are employing new terms and perspectives to explain what has enabled emerging market companies to build new technological capabilities, to grow rapidly, and, in so doing, rise to compete with leading technology and manufacturing firms from North America and Europe. The *bottom of the pyramid (BOP) innovation* framework has, in many respects, paved the way for emerging market innovation research. In general terms, it suggests that, instead of emphasizing emerging markets’ growing middle classes that simultaneously still form a relatively small and overly competed market, companies should focus more on lower income classes as they are by far the biggest of all economic classes that, to date, are practically untouched (Prahalad, 2004; Prahalad and Hammond, 2002). Furthermore, Prahalad (2012) suggests that constraints which exist in developing markets

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2 Based on the author’s calculations, there were 123 companies from emerging markets on the rankings list in 2013. In addition to the BRICs, countries such as Columbia, Malaysia, Mexico, Thailand, Turkey, and Venezuela are included in this figure.
help firms to create new innovations and business models that can be employed not only in low income countries but also globally. In other words, the emerging market setting itself is not a constraint for firms but, instead, a possibility to build new types of competitive capability.

Figure 5. Role of emerging markets in the world economy (GDP billion USD in 2012, World Bank)

Whereas the bottom of the pyramid concept was originally developed as a wake-up call for established firms in Western economies, in reality, companies from emerging markets are those that have been more successful in its application (Markides, 2012). Tata from India is a typical example of success within the frameworks. Tata has been able to develop a wide portfolio of products that not only fit the needs of the world’s poorest inhabitants but can also be sold globally to different consumer groups. Tata has successfully built competitive capabilities and expanded its competitive strategy from local to global. By building dynamic capabilities, for example, through acquisitions, it has been able to challenge dominant players in the markets and change the markets to their advantage.

The term frugal innovation is often employed in connection to bottom of the pyramid innovation. It refers to the actual innovation process within the context of bottom of the pyramid customers. In other words, this means developing products for poor people. In frugal innovation, the general aim is to achieve extreme financial efficiency through cost cutting while also eliminating needless costs within the products and processes themselves (Cunha, Rego, Oliveira, Rosado and Habib, 2014; Sehgal, Dehoff, and Panneer, 2010). However, designing products to fit the needs and wealth level of the world’s poorest inhabitants does not mean that frugal innovations would and should only be sold in third world countries. On the contrary, cheapness and efficiency also make frugal innovations competitive in global markets. The process of exporting products developed mainly for low income countries to developed economies is termed reverse innovation by Immelt, Govindarajan and Trimble (2009). Further, they state that, in today’s world, “success in developing countries is a prerequisite for continued vitality in developed ones” (Immelt et al. 2009, pp. 3-4). Examples of products that address global needs include “The Embrace”, which is a small, light, and inexpensive incubator aimed at saving babies born with low birth weight, and “Driptech”,

Figure 5. Role of emerging markets in the world economy (GDP billion USD in 2012, World Bank)
which is an irrigation system with all the benefits of a regular large irrigation system while also being operable by small rural farms.

The abovementioned terms derive mostly from consumer markets and consumer targeted products; however, they also have significance for industrial firms. The key for emerging markets firms to succeeding with their products in international markets is that they have to be perceived as “good enough”, for which they need not to only maintain their price advantage but also to close performance gaps (Markides, 2012). To upgrade their skills, competencies, and technologies, many emerging market firms have come to employ systematic reverse discovery through studying products produced by more developed countries and companies (Chen et al., 2011). For example, many companies in China and India nowadays have specific “tear-down” factories in which they employ thousands of engineers to disassemble, not construct, products to learn how they were manufactured (Chu, 2012; Malik and Kotabe, 2009). After learning the technological details of existing products, the companies are able to reproduce them more cheaply, and in many cases even add new features or improve their performance in comparison to the original product. This imitative procedure is frequently termed reverse engineering, which is often perceived by many firms in developed economies as a direct violation of their intellectual property rights. While this might be true in some cases, studies have shown that reverse engineering has a strong positive effect on emerging market firms’ performance (Chen et al., 2011; Malik and Kotabe, 2009). Moreover, reverse engineering helps firms to reduce causal ambiguity in new product development and to access new knowledge relatively easily, which can be considered more sustainable than short-term cost advantages. Returning to the competitive strategy framework, as found by Wu and Pangarkar (2006), firms that focus on leveraging local assets, rely on their price advantages, and upgrade their capabilities, skills, and resources to match multinationals globally are those that can expect to survive and thrive both in domestic and international markets.

2.3 Theoretical approaches to market turbulence and sources of performance

Up to this point, we have mainly discussed emerging markets and product innovations taking place in these countries. However, for us to understand the big picture, we need to take a step back and also discuss the general features of markets and innovation. There can hardly be a better way to open this discussion than to quote Joseph Schumpeter (1942, p. 83): “The fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers’ goods, the new method of production or transportation, the new markets … [This process] incessantly revolutionizes the economic structure within, incessantly destroying the old one, incessantly creating a new one. This process of Creative Destruction is the essential fact about capitalism.”

Although modern emerging markets are challenging traditional perspectives on market-led capitalism (Siu, 2005), there remains little doubt concerning the power of innovations as a source of economic growth in the way stated in Schumpeter's (1942) classic book titled Capitalism, Socialism and Democracy. For example, the World Economic Forum Global
Competitiveness Report 2013-14 states that “although substantial gains can be obtained by improving institutions, building infrastructure, reducing macroeconomic instability, or improving human capital all these factors eventually run into diminishing returns. The same is true for the efficiency of labour, financial, and goods markets. In the long run, standards of living can be largely enhanced by technological innovation.” (Schwab, 2013, p. 8).

Following the philosophy of innovation-based competitive advantage, as stated in the previous sections, emerging markets have also begun to invest heavily in R&D activities and innovation-friendly business environments. However, in the long run, governments and institutions can only establish new policies and improve the general legislative business environment. To date, private companies remain the most efficient way through which to achieve technological innovations and higher productivity (Estrin, 2002). There is plenty of firm-level empirical evidence to support positive relationships between innovation and firm performance (see e.g., Colombelli, Haned and Le Bas 2013; Coad and Rao, 2008; Mansury and Love, 2008; Hashi and Stojcic, 2013; Damijan, Kostevc and Rojec, 2012; Hung and Chou, 2013; Cefis and Marsili, 2005, 2006; Zhang, Yu and Xia, 2014). However, from a strategic management perspective, the fundamental issue is not whether innovations lead to performance in different types of environment but how firms are able to achieve and sustain competitive advantage regardless of their geographic location or institutional environment (Rumelt, Schendel and Teece, 1994).

Within the Schumpeterian perspective on the world, whereby innovations are the source of growth, market turbulence, and change, the dynamic capabilities approach is especially relevant. It aims to explain the sources of wealth creation and capture by firms, and, moreover, why some firms are able to build competitive advantage even during times of turbulence (Teece et al., 1997). The concept of capabilities was first introduced by Penrose (1959) who originally suggested that they are created from bundles of potential services. However, the foundations of dynamic capabilities lie mainly in the resource-based view (RBV) of the firm. According to RBV, competitive advantage means that a company is following a strategy that creates value for it, that is not currently being pursued by any other company, and which is unduplicable (Barney, 1991; Eisenhard and Martin, 2000; Prahalad and Hamel, 1990; Teece and Pisano, 1994; Wernerfelt, 1984). In RBV, capabilities are described as intangible assets that can fall into three different categories: physical capital (i.e., company’s physical assets), human capital (i.e., know-how and social networks), and organizational capital (i.e., structures that delegate authority) (Barney, 1991, 2001). Regardless of being more structured and complete than Penrose’s (1959) original idea of capabilities, critics claim that RBV by itself does not adequately explain why and how some companies have competitive advantage in situations of rapid and unpredictable change (D’Aveni, 1994; Eisenhard and Martin, 2000).
2.4 Adapting to change through dynamic capabilities

Dynamic capabilities emphasizes two aspects, which are the changing nature of a firm’s environment (i.e., the “dynamic”) and the role of strategic management in adapting, integrating, and re-configuring the firm’s internal and external skills, resources, and competencies towards this environment (i.e., the “capabilities”) (Teece and Pisano, 1994; Teece et al., 1997). Change can occur in the form of external shocks such as new technologies, new products, new services, new markets, new competitive settings in home or global markets, or new value chain relationships. It can also take place internally; for example, in the form of new subsidiaries, acquisitions, public offerings, or personnel changes. How a company is able to anticipate these changes in their environment and adapt to them is crucial for long-term survival. This is especially true for established organizations that need to innovate to maintain their competitive position in the face of new and emerging or “disruptive” technologies (Christensen, 1997; O’Reilly and Tushman, 2008). In the innovation context, as framed by Prahalad and Hamel (1990), the essence of competition and survival is not new products and technologies per se but the capacity to develop new products and technologies repeatedly.

The key message of the dynamic capabilities perspective lies in three disaggregated organizational activities: sensing, seizing, and reconfiguring (see Figure 6) (Teece, 2007, 2014). Sensing or, as termed by some scholars, strategic sense-making capacity, refers to organizations’ capabilities to identify opportunities, threats, changes, and also competitors’ possible responses to the focal firm’s actions (Hitt, Keats and DeMarie, 1998; Li and Liu, 2014). It requires constant scanning, searching, and both external and internal exploration (Katila and Ahuja, 2002; March, 1991; O’Reilly and Tushman, 2008; Panzda and Thorpe, 2009). For example, within the innovation context, firms can explore products, technologies, services, and markets to discover and generate new opportunities for themselves. This sensing can take place through market presence and participation, interfirm cooperation, or personal networks and connections, and also internal R&D activities. Although sensing is necessary, problems lie in its inefficiency and its association with sourcing bad ideas. In comparison, concentrating on exploitation of what is already known and proved to work has a greater certainty of success in the short run (March, 1991; O’Reilly and Tushman, 2013). Furthermore, even continuous and well-managed sensing and exploration does not automatically lead to improved performance or innovativeness but only enables subsequent innovation activates to take place (Helfat and Peteraf, 2009).

To concretely benefit from sensing, firms need seizing, or decision-making, capabilities, which refers to making the correct decisions and executing them so that they simultaneously align with the organizations’ assets and strategic goals (Li and Liu, 2014; Teece, 2007). To capture value from opportunities, companies must be able to mobilize their existing resources towards these new innovative goals (Teece, 2014). Seizing new opportunities might actually be one of the hardest things for established firms. As stated by Christensen, Johnson and Rigby (2002, p. 22), “when times are good and the core businesses are growing robustly, starting new generations of growth ventures seems unnecessary”. However, they continue by stating that “when times are bad and mature businesses are under attack, investments to
create new growth business can’t send enough profit to the bottom line quickly enough to satisfy investor pressure for a fast turnaround” (ibid.). Thus, while seizing opportunities should be a priority in every firm, for this to happen requires that the company is future oriented, has good management capabilities and, furthermore, is ready to sometimes even cannibalize its own products to prosper over time (Christensen, 1997; McGrath, 2001). A number of prior studies have shown that, in reality, this is rarely the case (Henderson and Clark, 1990; Leonard-Barton, 1992; Tushman and Anderson, 1986).

Finally, reconfiguration, or change implementation capacity or asset orchestration, refers to the ability and inevitable need to recombine and reconfigure both tangible and intangible assets so that they meet the demands of markets and technological changes (Li and Liu, 2014; O’Reilly and Tushman, 2008; Teece, 2007). While a company’s competencies provide competitive advantage at a given time, the changing environment calls for new competitive assets, and thus new competencies. This is especially true today as product and technology lifecycles are shortening, becoming more interdisciplinary and thus more demanding, and also because financial requirements are rapidly rising (Rese and Baier, 2011; Santamaria and Surocca, 2011). To be able to respond to these continuous trends, companies need to be agile and ready to replace outdated business and management activities with new ones. As already stated, implementing change is, from the offset, difficult during both good and bad times. However, if assets are not constantly reorganized, they respond to old market conditions that might no longer exist. Instead, they become outdated, and thus an operational burden (Eisenhard and Martin, 2000; Levinthal and March, 1993).

![Figure 6. Organizational activities leading to dynamic capabilities](image)

All three dynamic processes are simultaneous, support each other, and contribute to achieving long-term performance. Companies must be ambidextrous to some extent; they must simultaneously pursue incremental and discontinuous innovation at both organizational and technological levels (O’Reilly and Tushman, 2013; Tushman and O’Reilly, 1996; Uotila, Maula, Keil and Shaker, 2009). However, observing the effects of incremental and discontinuous innovation at the empirical level is difficult, and even the term ‘sustainable
advantage’ has been challenged. For example, D’Aveni, Dagnino and Smith (2010) propose that long-term performance is merely a combination of numerous short-term advantages that are linked to each other within one organization, as are sensing, seizing, and reconfiguration.

When discussing innovations and performance, it should thus be kept in mind that, although innovating new products and technologies provides firms with numerous competitive advantages, producing innovations is not sufficient for firms to survive. Companies must also possess capabilities and competencies to exploit these innovations and create competitive advantage over new and old competitors (Cefis and Marsili, 2005; Teece and Pisano, 1994). Firms with strong dynamic capabilities do not only adapt to changes in their business environment but also utilize innovations and cooperation with other firms, organizations, and institutions to shape the environment to their benefit (Teece, 2007).

To some extent, the terms such as frugal, bottom of the pyramid, and reversed engineering that were introduced earlier are linked and also contribute to the dynamic capabilities perspective. They all include the phases of sensing, seizing, and reconfiguration. Also, firms from developed markets must look at developing markets, not only for sensing and seizing new business opportunities but to seek potential new competitors that will force them again to reconfigure their own tangible and intangible assets. Similarly, companies from emerging markets need to constantly utilize sensing and seizing to improve and update their internal innovative capabilities that enable long-term competitive advantage instead of short-term and short-lived price advantage. In so doing, they will constantly be more successful in disrupting the technological trajectories of products developed by international competitors. However, at the same time as developed economy firms are also expanding their R&D activities in emerging countries, both local and foreign companies need to be constantly able to establish new ways to sense, seize, and reconfigure (Keupp, Beckenbauer and Gassmann, 2009; von Zedtwitz, 2004; Quan and Chesbrough, 2010). Focusing on knowledge sourcing from corporate and personal networks, and thus knowledge intensive innovation, is the current challenge being proposed and simultaneously tackled by emerging market companies (Kumar, Mudambi and Gray, 2013). For this challenge, employing cooperative strategy and R&D cooperation in particular seems a viable option.

2.5 Beyond capabilities - typologies of competitive strategies in turbulent markets

Adapting to change, building management skills, developing new competitive capabilities, and establishing routines such as sensing, seizing, and reconfiguration as a concept appears logical and something that every firm should willingly pursue. However, this is not necessarily the case, especially in emerging markets. Although these markets have faced strong turbulence and increasing international competition for more than a decade, they still host many relatively successful companies that do not significantly invest in the abovementioned issues (Bloom, Genakos, Sadun and Van Reenen, 2012; Markides, 2012). This implies that they are pursuing strategies which, at least to some extent, differ from the
ideal conceptual models previously discussed in this thesis. It might be asked: what are they doing and why are they doing it?

Based on two distinct parameters - the strength of the globalization pressure within the industry and the transferability of the company’s assets - Dawar and Frost (1999) demonstrate that, instead of building new competencies, some companies in emerging markets choose to focus on leveraging existing local assets and are still profitable (see Figure 1). These types of company (i.e., defenders), operating in industries where both pressure to globalize and transferability of assets is low, neither innovate extensively nor assimilate the products or business models of international competitors. Rather, they fine-tune and modify their existing products to match the unique need of particular local customers.

At the other end of Dawar and Frost's (ibid.) typology are firms operating in industries where both pressure to globalize and transferability of assets is high (i.e., contenders). These firms need to move towards higher productivity, quality, and services levels to achieve a sustainable basis for competitiveness. As such, sensing, seizing, and reconfiguration becomes a much more important aspect of strategy for these types of firm. Between these two strategies, Dawar and Frost (ibid.) also identified dodgers that have low transferability of assets but which operate in global industries, and extenders that, conversely, operate in local industries but with highly transferrable assets. For these firms, building new competencies means different things. When studying the four different strategic options and their impact on firms’ performance, Wu and Pangarkar (2006) concluded that, while increasing market turbulence was not a “kiss of death” for local emerging market firms regardless of their strategy, a misfit between the chosen strategy and the context where that strategy was employed was what led to poor performance. In other words, firms that endeavor to compete in global industries with local assets, and vice versa, are those that will face difficulties in building long-term competitive capabilities. Hence, companies must identify what type of capabilities they need to build before they start building or acquiring them.

In another study, Lavie and Fiegenbaum (2000) approached local firms’ strategy options towards international competitors through the strategic reference point theory in the context of Israel that, during the 1990s, was opening to and integrating with global markets (Jaffe, Nebenzahl and Schorr, 2005), and was thus experiencing major market turbulence. The strategic reference point theory combines core competencies and competitive forces approaches, and thus offers internal, external, and also dynamic dimensions for understanding business strategy (Fiegenbaum, Hart and Schendel, 1996). Lavie and Fiegenbaum (2000) were also able to identify four distinct business strategies that they termed ‘myopic’, ‘amorphous’, ‘narcissistic’, and ‘adaptive’. According to them, myopic firms do not even attempt to develop internal strategic capabilities to serve external competitive markets, and this type of firm is least likely to adapt to large changes in its operating environment. Amorphous firms are more open to their external environment to determine where the market is developing, although they are not willing or able to actively change and upgrade their internal capabilities. This type of firm is constantly scouting for new business opportunities whereby it can apply its existing competencies. Narcissistic firms are able to develop new capabilities, although they lack the willingness and skills to match them to changes in their
operating environment. They concentrate mostly on internal efficiency and productivity. Finally, adaptive firms are able both to develop their internal and external capabilities and, according to Lavie and Fiegenbaum (ibid.), they are the firms with the ability to achieve long-term sustained competitive advantage.

By examining and comparing Dawar and Frost’s (1999) and Lavie and Fiegenbaum’s (2000) typology frameworks (see Figure 7), one comes to understand that whereas logic suggests all emerging market companies should upgrade and build new competitive capabilities, there are a number of firms that, for better or worse, choose a different strategy. As markets and technologies change, companies apply many different methods of coping with the change, with some strategies being more beneficial than others. Some companies also choose not to respond and keep hoping for a miracle. Thus, trying to find a single approach that can be employed to understand capability building in turbulent markets, and is applicable to all firms pursuing different strategies, is challenging. Depending on the chosen and applied strategy, sensing, seizing, and reconfiguration means different things to different firms. For example, whereas sensing, seizing, and reconfiguration can contribute to contenders upgrading capabilities to match international competitors, for dodgers, it can mean scouting for new business opportunities in local markets and establishing footholds in segments where international competitors do not yet exist.

Figure 7. Different strategic responses to rapid changes in business environment

Thus, the strategy that a company pursues also puts requirements on how it should approach cooperative strategy and on building its own set of dynamic capabilities. The choice of corporate strategy has direct implications for interfirm cooperation and its potential benefits, and hence links directly with the research questions proposed in this dissertation. Understanding the role of R&D cooperation in Russian firms and the conditions under which cooperative strategy improves competitive capabilities and firm performance can
significantly contribute to understanding the power of cooperation in general. Currently, from a theoretical perspective, transferring competitive capabilities across countries and regions is challenging and often resource demanding, which is why partnerships, alliances, and cooperation are more or less crucial for extenders and contenders (Dawar and Frost, 1999); although, in different ways, cooperation can also help companies that pursue dodger or defender strategies. Through cooperation, defenders can fortify their positions in their respective markets, and dodgers can fill gaps in their internal capabilities when they move to occupy new market segments not yet dominated by international contenders (ibid.). Indeed, empirical studies show that companies facing market turbulence and new international contenders most often respond to these changes by forming alliances and further cooperation (Poulis, Yamin and Poulis, 2012). However, just as a mismatch between internationalizing in an industry and transferability of competitive assets is risky, so is a mismatch between competitive and cooperative strategies, which is something that is not discussed or often considered in academic discussions.
3 INTERFIRM R&D AS PART OF COOPERATIVE STRATEGY

In the context of innovation capabilities and innovation performance, management research has come to regard highly the role of interfirm cooperation and the employment of cooperative strategy as part of competitive strategy (Chesbrough, 2003; Chen and Miller, 2012; Dyer and Sing, 1998). Whereas cooperative strategy refers to making a conscious decision to conduct one or more cooperative activities with a particular firm, R&D cooperation is a concrete and rapidly expanding activity practiced by firms. In other words, while not all firms employing cooperative strategy necessarily employ R&D cooperation, all companies that perform R&D cooperation employ, at least in some form, cooperative strategy. Thus, in this thesis, R&D cooperation is regarded as a major subset of cooperative strategy. A strong stream of the literature has been dedicated to analyzing different forms of interfirm R&D activities, and this section focuses on why and how R&D cooperation is employed, and also on its general performance implications.

3.1 Theoretical and empirical justifications for R&D cooperation

Interfirm R&D cooperation is by no means a new phenomenon; however, the rapid increase of cooperative arrangements between firms since the 1970s makes R&D cooperation an interesting research topic (Auster, 1987). For example, the number of new cooperative R&D activities in industrial firms grew more than five-fold between 1980 and 1998 (Hagedoorn, 2002). In turn, this has provoked a surge in cooperative research (Ahuja, 2000). While innovation has become increasingly distributed, firms’ boundaries are also becoming increasingly fuzzy (Tether, 2002). As a result, whole new paradigms have been developed based on utilizing external channels in innovation processes, such as open innovation (Chesbrough 2003; Chesbrough, Vanhaverbeke and West, 2006) and cooperative interactions between firms that are nowadays considered a vital aspect of competitive strategy (Chen and Miller, 2012; Rese and Baier, 2011; Teece, 2014).

Some early studies on the taxonomy of R&D cooperation include work by, for example, Auster (1987), Harrigan (1988) and Hagedoorn (1993). Their general aim was to help researchers understand this rapidly growing phenomenon and why firms choose to cooperate with each other in the first place. This critical question has been approached from a number of theoretical perspectives such as the transaction cost theory (Williamson, 1975, 1985), resource-based view (RBV) (Barney, 1991; Penrose, 1959; Wernerfelt, 1984), competitive forces and industrial organization (Harrigan, 1988; Porter, 1985), and dynamic capabilities (Teece and Pisano, 1994; Teece et al., 1997).

In the R&D cooperation context, the transaction cost theory suggests that cooperation can reduce transaction costs through better control and monitoring of technology transfer (e.g., Hennart, 1991; Pisano, 1990). In RBV, cooperation is perceived as a mechanism to maximize firms’ value through effective combination of resources possessed by partners employing complementarities (e.g., Das and Teng, 2000; Kogut, 1988). The competitive forces framework focuses on competitive relationships between firms and their environments, and
suggests that cooperative R&D is good, although it should be channeled through independent organizations to which all industry participants have access (Porter, 1985). The industrial organization literature also suggests that knowledge spillovers increase incentives to cooperate, in particular, if cooperation enables firms to enhance knowledge transfers between collaborative partners (Belderbos, Carree and Lokshin, 2004). However, from the standpoint of this thesis and thus, most importantly, the dynamic capabilities perspective, it is suggested that firms must remain flexible and be able to respond quickly to unexpected changes in their competitive environment (Hitt et al., 1998; Teece and Pisano, 1994; Teece et al., 1997). Moreover, the dynamic capabilities perspective states that although traditional elements of business such as tangible assets and optimizing remain important, superior performance depends upon the discovery and development of new opportunities (Teece, 2007).

From the dynamic capabilities perspective, R&D cooperation can be regarded as a vehicle for organizational learning, opportunity recognition, and transformation (Hagedoorn, Link and Vonortas, 2000). As firms can cooperate with different types of partner and thus facilitate technology transfers, they can more easily enter new technological areas, which in turn is crucial as the technology landscape is constantly changing (Christensen et al., 2002; Hagedoorn et al., 2000; Teece, 2007). In other words, R&D cooperation provides firms with knowledge and opportunities necessary to overcome market uncertainties, and thus helps the firms to be more dynamic in terms of their strategy (Un et al., 2010).

While it is clear that R&D cooperation offers many benefits, as so many firms engage in the practice, it is simultaneously logical that it also has downsides which limit companies’ willingness to partner. For example, while the transaction cost theory provides the reasoning for cooperation, it also suggests that exchange partners prioritize self-interest at the expense of the common interest in the relationship (Williamson, 1985). In turn, the competitive forces framework suggests that interfirm cooperation can lead to a decrease in competition between firms which, in turn, can lead to a decrease in industry competitiveness (Porter, 1985). Some studies have focused on these negative aspects of R&D cooperation and identified issues such as opportunistic behavior, learning races, and knowledge leakages in firms (Das and Teng, 2000; Doz, 1996; Dutta and Weiss, 1997; Hamel, 1991). Whereas R&D cooperation in general is not considered a zero sum game, sometimes individual cooperative arrangements can result in a lose-lose or, at best, a win-lose situation instead of a mutual win-win outcome. The fundamental dilemma of cooperation, as stated by Bönte and Keibach (2005), is that while they are associated with free flow of knowledge between partners, firms also try to avoid the outflow of their companies’ core competencies. For this reason, among others, cooperative relationships are, in general, relatively unstable and often unsuccessful (Das and Teng, 2000).

Theoretical developments have led to extensive empirical testing of the cooperation context, and efforts to understand and explain the conditions under which R&D cooperation can lead to desired positive outcomes. Tether (2002) studied innovative UK firms and their cooperation patterns, Miotti and Sachwald (2003) examined the underlying reasons for R&D cooperation in French firms, and Fritsch and Lukas (2001) analyzed German manufacturing enterprises to understand their propensity to maintain R&D cooperation with different
partners. Becker and Dietz (2004) focused on the impact of R&D cooperation on innovation activities and behavior in Germany. Fritsch and Franke (2004) took a different perspective and studied knowledge spillovers and R&D cooperation across three regions in Germany. Nieto and Santamaria (2007) focused on the diversity and extent of R&D networks and how they affect novelty in product innovation in Spain. Li and Ferreira (2008) expanded the geographic scope of R&D cooperation research and studied international R&D partner selection between US multinationals and firms from emerging economies. More recently, Tomlinson (2010) studied the impact of cooperative ties on product and process innovations in the UK, Zeng et al. (2010) studied the relationship between different partners and innovation performance in small and medium-sized manufacturing firms in China, and Rese and Baier (2011) studied the success factors behind cooperation in small and medium-sized enterprises in Germany. The results of these studies are discussed in more detail in section 3.3 and summarized in table 2. All in all, the extant literature on R&D cooperation is rich and vibrant.

Regardless of the vast body of the extant literature, a few important limitations must be noted. Most of the existing empirical studies seem to utilize secondary data that, while making the results more generalizable due to a large sample size, often limit the level of analysis on cooperation to the formal level. In other words, cooperation is mostly measured in terms of the number of firms’ alliances and joint ventures. In reality, firms also cooperate extensively in other ways, as described in the following section. Also, regardless of some recent exceptions such as Zeng et al. (2010) and Wu (2012), most of the studies are conducted in the geographic and cultural context of Western Europe or North America, and the extent to which these results can be generalized to emerging markets remains questionable. The rationale for R&D cooperation is presented in figure 8, and the following sections focus on the orchestration and potential effects in more detail.

Figure 8. Rationale for R&D cooperation: motivation, orchestration, and effect
3.2 Cooperative arrangements and different types of R&D partner

How to structure, coordinate, and govern cooperation is one of the essential aspects of interfirm R&D cooperation. When moving from employing individual cooperative partnerships to a portfolio of different partners, organizations also need to start making choices concerning the structure, formality, and duration of these relationships. Although short-term, unstructured, and informal cooperation plays a distinct role in business, formal and structured R&D cooperation is predominantly employed by established firms with internal R&D activities (Bönte and Keilbach, 2005).

There is an extensive list of ways to govern R&D cooperation that includes, for example, subsidiary relationships, equity and non-equity agreements, and cooperation between individual persons (i.e., trust). However, to be more specific, participants in formal innovation and R&D cooperation have generally agreed, at least to some extent, on the coordination of common activities and resources (Kingsley and Malecki, 2004). There are a few general forms of contractual categories that are typically employed to include formality in R&D cooperation; for example, licensing agreements in which firms only specify how subsequent results of the cooperation are to be shared, and R&D joint ventures that call for a whole common research strategy (Morasch, 1995).

The more tacit knowledge a firm possesses, the more likely it is also to protect this through contracts and agreements (Dutta and Weiss, 1997). However, the choice of a particular mode of cooperation and contract type varies extensively depending on a number of issues such as the specific industry and expected duration of the partnership. In short-term cooperation, firms often aim to achieve instant tangible results (Das and Teng, 2000), whereas, in long-term partnerships, the emphasis is more on relational exchange, which inherently offers more informal safeguards, and thus greater contractual flexibility (Lui and Ngo, 2012). However, for example, while joint ventures have been overly represented in mature industries, contractual alliances have traditionally dominated strategic technology partnering in more dynamic and turbulent high-tech industries (Hagedoorn and Narula, 1996).

Taking all types of cooperative arrangement and organizational form into consideration is important as both weak and strong ties between R&D partners have been found to have specific impacts and implications on the focal firm (Granovetter, 2005; Tomlinson, 2010; Pallotti and Lomi, 2011). The challenge for management researchers is to identify all contractual and organizational forms, and to understand both the individual effect on a single partner and also the combined effect on all partners. Indeed, just as companies can choose to employ different organizational forms, they can choose to employ various types of R&D partner. These include, for example, suppliers, customers, intermediaries, competitors, various research organizations, public bodies, universities, and marketing organizations.

It has been argued that different types of partner affect different parts of the innovation process and its outcomes (Hagedoorn, 1993, 2002; Miotti and Sachwald, 2003; Un et al., 2010). von Hippel (1988) has highlighted the role of customers within the innovation process as a source of new ideas, and Tether (2002) emphasizes the role played by customers when
expanding into new market segments. Supplier and intermediary cooperation has been suggested as a way to reduce costs and improve efficiency over the innovation process, and as a way for the focal firm to focus more on its core competencies (Bidault, Despres and Butler, 1998; Belderbos et al., 2004). Cooperation with competitors is often motivated by an aim to lower R&D costs through combining efforts in basic research, establishing industry standards, or to solve common problems (Nieto and Santamaria, 2007; Monjon and Waelbroeck, 2007; Ritala, 2012). In addition, private and public research institutes and also universities are perceived to play an important role in the creation and dissemination of scientific knowledge, which is necessary for radical technological advancements (Hemmert, 2004).

Instead of focusing on individual actors, many empirical studies group partners into vertical and horizontal partners to understand the importance of horizontal and vertical integration, and also the combined network effect of numerous partners. Vertical R&D cooperative partners are companies that typically have operations within the same industry, which are positioned either downstream of the value chain, such as customers and intermediaries (Belderbos et al., 2004; Howells, 2006; Nieto and Santamaria, 2007; Santamaria and Surroca, 2011), or upstream of the value chain, such as suppliers (Belderbos et al., 2004; Laursen and Salter, 2006; Tomlinson, 2010). Horizontal partners are companies that can be considered to operate at the same level as the focal firm, and even in the same industry, such as competitors (Belderbos et al., 2004; Clark and Fujimoto, 1991; Santamaria and Surroca, 2011), or in different, industries, such as external research centers, public institutions, and universities (Belderbos et al., 2004; Liefner, Hennemann and Xin, 2006).

3.3 Performance effects and moderating factors in R&D cooperation

The rather extensive research conducted on R&D cooperation and the effect of different types of interfirm partner on the focal firm’s business activities has resulted in contradictory findings that, in turn, have made generalizations concerning the impact of cooperation difficult. By taking the supplier cooperation context as a detailed example, Miotti and Sachwald (2003) found that cooperation with suppliers positively affects the share of innovative product turnover in the context of their French community innovation survey. Likewise, Nieto and Santamaria (2007) showed a positive relationship between supplier cooperation and the degree of product innovativeness in Spain. However, also employing Spanish data, Sánchez and Pérez (2003) found no significant effect between supplier cooperation and new product performance. Furthermore, in the case of Dutch manufacturing firms, Belderbos et al. (2004) found a negative, although non-significant, relationship between supplier cooperation and innovation performance. Similar examples exist for all partners.

In the customer cooperation context, Miotti and Sachwald (2003) found a positive relationship to product innovation performance, Belderbos et al. (2004) found a non-significant relationship, and Lööf and Heshmati (2002) found a negative relationship in the case of Swedish manufacturing firms. With regard to cooperating with competitors, Lööf and
Hesmati (ibid.) found a positive relationship whereas Miotti and Sachwald (2003), Belderbos et al. (2004), and Nieto and Santamari (2007) found a non-significant effect. For research organizations and universities, Belderbos et al. (2004) and Nieto and Santamari (2007) found a positive relationship. However, a negative relationship was found, for example, by Monjon and Waelbroeck (2003) in French firms, and Ledwith and Coughlan (2005) in Irish and UK electronic firms. Table 2 summarizes the findings of the most relevant studies conducted on R&D cooperation and the impact of different types of partner on the performance of the focal firm. As becomes evident, the studies largely focused on developed countries. Moreover, they present a wide array of contradictory results, based on which it is difficult to understand the rationale for different R&D partners in different situations. It should be noted, however, that the list does not include the general strategic alliance literature in which different partner types have not been under review.

Table 2. Summary of empirical studies on interfirm R&D cooperation with different types of partner and their effect on the performance of the focal firm

<table>
<thead>
<tr>
<th>Publication</th>
<th>Topic and focus</th>
<th>Data and context</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Becker and Dietz, 2004</td>
<td>Impact of R&amp;D cooperation and different partners on innovation input and output.</td>
<td>2,048 German manufacturing companies.</td>
<td>Joint R&amp;D is employed to complement internal resources in the innovation process, enhancing the innovation input and output. The intensity of in-house R&amp;D stimulates the probability and the number of joint R&amp;D activities with other firms and institutions.</td>
</tr>
<tr>
<td>Belderbos et al., 2004</td>
<td>Impact of different R&amp;D partners on firm performance.</td>
<td>2,353 Dutch manufacturing companies (Community innovation survey).</td>
<td>Competitors and suppliers improve productivity performance, university cooperation improves growth performance. Customers and universities are also important sources of knowledge for more radical innovations.</td>
</tr>
<tr>
<td>Belderbos et al., 2004b</td>
<td>Heterogeneities in the determinants of engaging in R&amp;D cooperation with different types of partner.</td>
<td>2,353 Dutch manufacturing companies (Community innovation survey).</td>
<td>Firm size, R&amp;D intensity, and incoming spillovers positively affect all different types of cooperation. However, the relationship in competitor cooperation is weaker, reflecting appropriability concerns.</td>
</tr>
<tr>
<td>Faria et al., 2010</td>
<td>The importance of cooperation partners for developing innovation activities.</td>
<td>766 Portuguese manufacturing firms (Community innovation survey).</td>
<td>High technology firms with high levels of absorptive capacity and with investments in innovation are more interested in R&amp;D cooperation. Cooperation with suppliers has a positive impact on the importance of developing innovation activities, whereas cooperation with other types of partner has a non-significant effect.</td>
</tr>
<tr>
<td>Fritsch and Franke, 2004</td>
<td>Regional knowledge spillovers and R&amp;D cooperation.</td>
<td>1,800 German manufacturing companies from three regions.</td>
<td>Only cooperation with public research institutes has a significant positive effect on patenting and received knowledge spillovers. The effect of other types of partner is non-significant.</td>
</tr>
<tr>
<td>Fritsch and Lukas, 2001</td>
<td>Propensity to maintain cooperative relationships with R&amp;D partners.</td>
<td>1,800 German manufacturing companies from three regions.</td>
<td>R&amp;D cooperation is mostly exercised by large R&amp;D intensive firms regardless of the type of R&amp;D partner. Cooperation with suppliers tends to substitute internal R&amp;D.</td>
</tr>
<tr>
<td>Ledwith and Coughlan, 2005</td>
<td>Impact of different cooperation partners on new product success.</td>
<td>60 Irish and UK based electronic firms.</td>
<td>Cooperation with customers is the most common form of innovation cooperation. The paper finds both positive and negative effects for different types of partner, and proposes that absorptive capacity, among other things, moderates the relationship.</td>
</tr>
<tr>
<td>Li and Ferreira, 2008</td>
<td>Partner selection in emerging economies.</td>
<td>286 international strategic alliances between US multinationals and local firms.</td>
<td>Companies are more likely to choose partners with which they have previously collaborated, especially when technological commitments are high and when there is a large institutional distance between countries.</td>
</tr>
</tbody>
</table>
Table 2. Continued…

| Authors, Year | Research Question | Sample Size | Sample Description | R&D Partners

| Li et al., 2008 | Why companies choose specific types of R&D partners. | 1,159 US high technology manufacturing and service firms. | R&D partners are chosen based on the radicalism of the intended innovation goals. Partner selection, governance structure, and alliance scope are employed to protect technological assets from appropriation. |
| Miotti and Sachwald, 2003 | The role of different types of cooperative network in achieving product innovations and novelty. | 4,215 French manufacturing firms (Community innovation survey). | The choice of partners is dictated by the complementary resources of the partners. Patenting is positively influenced by public institutions, whereas the share of innovative products in turnover is positively influenced by vertical cooperation. |
| Nieto and Santamaria, 2007 | Patterns of cooperation between innovating firms and external partners. | 1,300 Spanish manufacturing companies. | Cooperation with suppliers, clients, and research organizations has a positive impact on the novelty of innovation, whereas cooperation with competitors has a negative impact. Diversity of the partner network is important. |
| Santamaria and Surroca, 2011 | The role of technological goals in choosing R&D partners, and their impact on innovation performance. | 1,300 Spanish manufacturing companies. | Vertical partners are utilized to exploit existing competencies, which improves product and process success. Institutional partners are utilized to explore new ideas and improve patenting, and horizontal cooperation is employed to conduct pre-competitive research. Vertical and institutional cooperation have a significant positive effect on innovation performance, and cooperation with competitors has a negative effect. |
| Tether, 2002 | The impact of cooperative ties on innovation performance. | 1,270 UK manufacturing and service firms (Community innovation survey II). | Firms that are attempting to create radically new innovations are more likely to cooperate over R&D; however, their relationship between cooperation and innovation performance is not straightforward. Innovation spenders are more likely to cooperate with customers, competitors, consultants, and “others”, but not with suppliers. |
| Tomlinson, 2010 | Patterns of cooperation between innovating firms and external partners. | 436 UK manufacturing firms. | Strength of ties and also company industry influence the performance effect of different R&D partners. Vertical partners have a significant positive effect on performance, and cooperation with competitors has a negative non-significant effect on performance. |
| Tsai, 2009 | The role of absorptive capacity (AC) in moderating the impact of different R&D partners. | 753 Taiwanese manufacturing companies. | AC moderates the impact of different types of R&D partners on innovation performance. Firms with high levels of AC have positive effects from supplier and customer cooperation, and negative effects from competitor and research organizations. Firms with low AC have negative effects from supplier, customer, and research organization cooperation. |
| Un et al., 2010 | Impact of different cooperation partners on product innovation. | 781 Spanish manufacturing companies. | Cooperation with suppliers has the highest positive impact on product innovation, followed by cooperation with universities. Cooperation with customers is non-significant, and cooperation with competitors has a negative effect, although it is out-lived if the cooperation continues for a long time. |
| Zeng et al., 2010 | Cooperation and innovation performance. | 137 Chinese small and medium-sized enterprises (SMEs) in the manufacturing sector. | Cooperation with customers, suppliers, and other firms has a positive influence on the innovation performance of SMEs, and thus plays a more distinct role over the whole innovation process than horizontal cooperation with research organizations, universities, or governmental organizations. |

To explain some of these different outcomes, management researchers have suggested a number of factors that moderate relationships between R&D cooperation and the performance of the focal firm. Absorptive capacity (AC) is one of the most commonly employed capabilities, and refers to the firm’s own ability to recognize, assimilate, and utilize external knowledge for its own purposes (Cohen and Levinthal, 1990). Firms with high AC
are able to learn in cooperative relationships and to employ new knowledge internally so that it improves performance, whereas firms with low AC are less likely to recognize the value of new ideas and information (Tsai, 2009). A commonly employed method for assessing the existence and level of AC in firms is through the existence and level of internal R&D efforts (Schoenmakers and Duysters, 2006; Veugelers, 1997), as it has been stated that it is contingent on the level of internal technological knowledge (Cohen and Levinthal, 1990). Taking cooperation with customers as a practical example of this, companies with high levels of internal R&D are more likely to be able to convert customer information, such as latent needs, into technological advancements, thus affecting both innovation and market performance. However, companies with low-level internal R&D will find it hard to turn knowledge into product improvements, and thus cooperation can be non-significant or even detrimental for innovation performance, even though it helps companies to access new knowledge. A number of studies have found that companies need at least some level of AC to experience the positive effects of cooperation (e.g., Kim, 1998; Tsai, 2009).

Other generally suggested moderating factors include, for example, the industry, the extent and diversity of the cooperative network, and the competitive environment. For example, Tomlinson (2010) discovered that the importance of horizontal and vertical R&D partners is industry dependent. Different industries are characterized by differences in their technology levels, and, therefore, the general level of absorptive capacity is also different between industries. For example, the information and communication technology (ICT) industry is typically more technology and innovation driven than, for instance, the textile industry, and thus can be expected to develop and bring new innovations to markets at a faster pace. Berchicci (2013) found that the role of R&D capacity is equally significant in low, medium, and high technology industries, although the effect of R&D capacity is considerably stronger in high technology-driven industries. Similarly, cooperation is important in many industries, although the potential effect is stronger in high technology oriented industries (McGahan and Porter, 1997; Veugelers, 1997).

A number of scholars have focused more on the network aspect of cooperation. Among others, Ahuja (2000) found a positive relationship between the numbers of cooperative ties and patents, Laursen and Salter (2006) found a curvilinear relationship between the number of partners and performance, and Nieto and Santamaria (2007) found a positive relationship between the diversity of the partner network and innovation novelty. The general assumption in this perspective is that the impact of one individual partner is not as important as the combined effect of multiple, simultaneous, cooperative relationships that support and complement one another.

Finally, an important stream of the management literature has focused on the interrelationship between competitive intensity and cooperation. The employed rationale is double-sided: strong competition pushes companies to innovate more rapidly and, to achieve this, they need to employ cooperative R&D (Chesbrough, 2007). However, in fiercely competitive situations, companies are less likely to share information concerning their core technologies, and thus the prospects for successful cooperation diminish (Kline, 2003). For example, Wu (2012) found that market competition negatively moderates the effect of technological
cooperation, and Tsai and Hsu (2012) found that competitive intensity weakens the effect of cooperation on product innovation performance.

The number of moderating factors that have been studied in the context of R&D cooperation represents the complexity of cooperation as phenomena in management research. As the phenomena are complex, more research that combines different perspectives is needed to understand the possible causal relationship between R&D cooperation and performance. Only through replication it is possible to accumulate sufficient knowledge to draw consistent and valid conclusions on a specific phenomenon in organizational science (Tsang and Kwan, 1999).
4 RESEARCH METHODOLOGY

As presented in the previous sections, R&D cooperation is a relatively well-established topic in management research. This also means that numerous theoretical approaches, conceptual frameworks, and mathematical models that endeavor to explain the performance implications of R&D cooperation in firms already exist. In the case of a relatively mature field of study, the suggested approach is not the creation of new conceptual models through qualitative studies but the testing of the relevancy and applicability of existing models and their improvement, thereby also increasing their generalizability through quantitative analysis (Edmunson and McManus, 2007; Miller and Tsang, 2010). Indeed, since the 1990s, Eastern Europe, Russia included, has offered unique opportunities to test existing management theories (Meyer and Peng, 2005). There are, however, risks related to studying well-established concepts. The typical pitfall occurs when the applied research methodology does not fit the proposed research questions, and the research fails to advance knowledge on the topic (Edmunson and McManus, 2007). To ensure that this is not the case here, this section presents the general research approach employed in the thesis and in individual publications. The publications describe the respective methodologies employed in detail.

4.1 Research approach and strategy

The purpose of scientific research is often manifold. Typically, the aim of researchers is to explore new research issues and opportunities, describe phenomena, and explain the reasons and relationships that led to specific events and activities (Nardi, 2014). Depending on their purpose, scientific studies can be classified into two main groups: confirmatory or exploratory research. Confirmatory studies seek to test pre-specified relationships that exist in theory, whereas exploratory studies endeavor to define possible relationships only in their most general form, and then utilize multivariate techniques to later estimate that relationship (Hair, Anderson, Tatham and Black, 1995).

As previously mentioned, a number of studies exist that focus on Russian firms, their innovation activities and strategies, and also the Russian business and innovation environment in general. However, two issues concerning these studies, which have played a significant role in the methodological approach applied in this thesis, should be noted. First, the current understanding on managing R&D cooperation in Russia is mostly build on qualitative analysis and case studies (Trifilova et al. 2013), which play an essential role in theory generation (Murrey, 2003). Based on this type of studies, there is little doubt concerning the existence of R&D cooperation between Russian companies and organizations. However there has been a growing demand for studies that would confirm the proposed linkages between cooperation and performance, and which would connect the findings to the field to create a more holistic perspective on cooperative strategy in emerging market companies.
Accordingly, and as a second issue, collecting empirical data in emerging markets has been challenging and researchers have faced many problems, for example, in sampling, gathering, and financing data collection (Hoskinson, Eden, Lau and Wright, 2000), and these remain timely issues. As gathering reliable primary data has been challenging, many scholars have relied on secondary data collected either by international organizations or local institutions (Craig and Douglas, 2005; Wright et al. 2005). Secondary data have many advantages that help overcome the previously mentioned challenges in data collection, although also coming with some limitations; one of the biggest being that it rarely fits perfectly to the original research questions proposed by the researcher. Hence it is often a compromise between what scholars want to determine and what, based on the existing data, they can find. The general lack of primary data from Russian companies and the specific nature of the proposed research questions created the basis for primary data collection in Russia. This again enabled the best possible fit between research questions, applied methodology, and intended contribution.

In brief, the nature of this thesis is mainly confirmatory and, therefore, the employed research approach is quantitative. The term ‘quantitative’ refers to the use of statistical, mathematical, numerical, or computational data in understanding and explaining a particular phenomenon (Given, 2008) such as, in the case of this thesis, cooperative strategy. As this thesis is testing theory, the applied research approach is deductive, which is by far the most common in natural sciences as it enables the anticipation of a phenomenon, predicting its occurrence, and therefore enabling it to be controllable (Collis and Hussey, 2003). The key elements of the deductive research process are deducing hypotheses and expressing them in operational terms, testing them, examining the outcomes of the inquiry, and, if necessary, modifying theory in the light of new findings (Robson, 2002). This is also the process that has been applied in the publications relating to the thesis.

The thesis follows the method of theory triangulation, which refers to the use of more than one theoretical position in interpreting data (Denzin, 1970). The general idea behind triangulation is that one can be more content when similar results are achieved by employing different perspectives. According to Guba and Lincoln (1994, p. 105), “questions of methods are secondary to questions of paradigm, [which they define as] … the basic belief system or world view that guides the investigation, not only in choices of method but in ontologically and epistemologically fundamental ways”. Theory triangulation enables entities to be examined both independently of social actors and within their respective social contexts (Guba and Lincoln, 1994; Saunders, Lewis and Thornhill, 2009). This further enables us to understand cooperative strategy and R&D cooperation both in the Russian context and as a more general concept within other emerging markets. Moreover, it enables a more holistic perspective on cooperative R&D within the strategy literature.

In terms of the actual research conducted in the publications, the first two papers are more descriptive by nature as they address R&D cooperation within the sample context. They lay the ground for understanding R&D cooperation within the Russian business context. The two subsequent papers explain the reasons for performance differences inside the sample by analyzing causal relationships between numerous variables. Through these it becomes possible to understand when and how R&D cooperation benefits companies. The fifth paper
is more explorative by nature, and endeavors to establish a causal relationship between a new theoretical approach and R&D cooperation that, in turn, can be employed to explain R&D cooperation performance as a part of firms’ competitive strategies (Figure 9).

**Figure 9.** Research design in publications

### 4.2 Sampling and data collection

The primary survey data on Russian manufacturing companies employed in this thesis and in the respective publications were collected between December 2009 and February 2010 as a joint effort between researchers of Lappeenranta University of Technology and Saint Petersburg State University Graduate School of Management. Surveys were conducted in nine different regions that are considered innovative in Russia (see Hollanders and van Cruysen, 2008 for the definition of innovative regions), which comprised Saint Petersburg, Nizhny Novgorod, Rostov-on-Don, Saratov, Samara, Perm, Yekaterinburg, Novosibirsk, and Krasnoyarsk. One thousand manufacturing firms were randomly selected as potential respondents from these regions by employing the SPARK Business Database, which is Russia’s largest company database and is managed and updated by Interfax.

Collecting survey data is a challenge in any less developed or emerging country, and Russia is no exception. To maximize the reliability of the responses, we chose structured interviews as the survey method. Structured interviews are generally considered one of the best ways to increase the reliability and validity of research data (Lindlof and Taylor, 2002). To get a
representative sample of the population, we employed the stratified sampling method, which is a recommended method in populations that tend to vary considerably (Sudman, 1976), as it does in Russia. Some companies might have highly sophisticated production facilities and highly educated labor forces, whereas some might still be working in old Soviet-style factories and with little regard to market economy principles. Regional GDP was utilized as the stratification criterion to ensure that each of the nine regions was included in the sample. The minimum response limit was 20%, which was met with 206 random respondents from the original 1,000 manufacturing firms. A similar approach to data collection has been employed, for example, by the World Bank and the European Bank for Reconstruction and Development when conducting the Business Environment and Enterprise Performance Survey (BEEPS) and the Management, Organisation and Innovation Survey (MOI).

In the data collection phase, we employed a questionnaire that was based on OECD recommendations for conducting innovation surveys (Oslo Manual, 2007). As stated, responses were received through structured interviews by utilizing the developed questionnaire. Data from the Saint Petersburg area were collected by the research team while, in the other eight regions, data collection was outsourced to a third party. Because of this, all of the interviews were audio recorded and transcribed to maximize the reliability of the answers. The questions generally related to the previous three years of business activities. Respondents held high positions in their respective companies, mainly with job titles such as CEO, Executive Director, Head of Innovation, Technical Director, and Head of Sales.

In the context of this thesis and the topic of R&D cooperation, one of the biggest advantages of the dataset is that it includes information on both informal and formal R&D cooperation employed by firms. We also utilized Likert scales to evaluate the importance, effect, and implications of respondents’ different R&D partners, which aided understanding on the various roles of different partners within the cooperative strategy context.

This thesis also employs secondary data sources when describing the innovation and general business environment in Russia in comparison to other emerging countries. These data were retrieved from the online resources of the World Bank and the European Bank of Reconstruction and Development (i.e., Enterprise Surveys) and the World Economic Forum (WEF).

4.3 Analysis and limitations

The data were analyzed by employing various approaches within the five publications. Descriptive statistics, cross-tabulations, Pearson’s Chi-Square tests, Mann-Whitney and analysis of variance (ANOVA) tests were utilized to identify statistically significant differences between various subgroups in the data. This helped identify R&D intensive and innovative firms, and also to evaluate performance differences between different types of organization.

Cluster analysis played a significant role over the research process. By employing cluster analysis, it was possible to combine similar factors and variables into distinct groups
(Kaufman and Rousseeuw, 2009), which has a number of advantages. First, cluster analysis was employed to study the relationships between horizontal and vertical R&D partners, which made it possible to confirm that they indeed follow a similar pattern in our sample to that previously established in the literature. Second, when progressing the analysis and endeavoring to establish causal relationships with regression models, an issue of multicollinearity arises if a number of variables correlate, which again impacts the accuracy of the regression model (O’Brien, 2007; Krishna, 1975). By employing cluster analysis and combining similar variables, it was possible to avoid multicollinearity in the models, which increases the reliability of the results (Krishna, 1975).

As previously mentioned, the aim in this thesis is to form a more holistic picture of R&D cooperation in emerging market firms and, as part of the study, the causal relationships and moderating factors between R&D cooperation and performance in Russian manufacturing companies. To establish these relationships, correlation coefficients, bivariate correlations, and more importantly, regression models were employed. These models included ordinary least squares (OLS), logistic regression, and hierarchical regression. All approaches are well-established in the literature. Linear regression models have been the dominant technique in strategy research for decades (Shook, Ketchen, Cycyota and Crockett, 2003), and logistic regression is the most commonly employed method for predicting the outcomes of category-dependent variables (Agresti, 2002; Hilbe, 2009).

Although the data collection and analysis were conducted with the utmost rigor and established guidelines in the extant literature were followed, a few general limitations still remain. First, the data were collected in Russia although not from all Russian regions, each of which differ economically and culturally. Hence the question of generalizability remains. However, the data represent the key regions of Russia in terms of economic performance, inward and outward investments, and innovation activities. Thus, the results are less culturally dependent and can be regarded as more easily generalized to other more developed regions and areas in emerging markets.

Second, most of the dependent variables are perceptions of performance or perceptions of cooperation, and are thus subject to possible respondent biases. However, at the same time, by utilizing the respondents’ perceptions, the thesis is able to present far deeper insights on cooperation and performance in emerging market firms than would otherwise have been possible by only employing financial data. Employing the managers’ perceptions as primary data is also important because it helps to understand the state and role of innovation management in Russian manufacturing companies, which in turn contributes to making more practically oriented conclusions in addition to the presented theoretical implications.

The detailed limitations of each analysis are presented separately in each of the publications.
5 SUMMARY OF THE PUBLICATIONS

5.1 Publication 1 - Cooperation for R&D in Russian enterprises


**Objective**

The first paper of the thesis focuses on the internal components of R&D cooperation. It analyzes the level of R&D in Russian manufacturing companies and whether internal R&D activities significantly influence how cooperative R&D is managed in the respective firms. It describes the main processes of R&D cooperation and the main expected outcomes. Based on the existing literature, it formulates three hypotheses on the role and relationship of formality, internal skills and capabilities, and level of R&D intensity. Building on an underlying assumption that a company's internal innovation activities play an important role in defining when and how they can benefit from R&D cooperation, it employs correlation tests to study linkages proposed in the extant literature.

**Main contribution**

The paper’s key contribution lies in the finding that R&D cooperation takes place in many Russian firms, although there is a large variation in the extent to which it is engaged. While this is not a revolutionary finding, it sets the ground for understanding interfirm R&D activities in the Russian context.

The analysis shows that firms’ internal R&D activities correlate with the use of less formal types of cooperation. These cooperation forms include, for example, cooperation with trade associations, functional cooperation along the firms’ value chains, and different forms of partnerships. More formal modes of R&D cooperation, such as subcontracting, licensing, franchising, and joint ventures, do not significantly correlate with firms’ internal innovation activities. The paper also finds that when examining the stage at which new product development R&D-intensive firms employ cooperation, it is practiced more often during the preliminary development and project planning phases. At the same time, it was observed that, in general, the frequency of involvement was not very high during any of the possible involvement phases. The last aspect under analysis was knowledge transfers, and especially their context validity. The analysis showed that high internal R&D levels correlated with cooperative product development and organizational changes, thus indicating potential for knowledge transfers between cooperative partners.

In general, the paper shows that although most Russian manufacturing companies are hesitant to openly and extensively cooperate in R&D, it is still considered a possibility and an
opportunity for product, technology, and business development. Extensive internal R&D seems not to directly indicate extensive external R&D cooperation.

**Role in the thesis**

The paper plays an essential role in the dissertation by providing answers to research questions 1.1 and 1.2 (see section 1.2 above). The literature review addresses the key concepts relating to innovation and cooperative R&D. The empirical part of the paper studies the relationships between firms’ internal R&D activities and ways by which cooperative R&D is managed in Russia. As such, the paper gives a picture of the current state of the R&D management literature, and ties it to strategies employed by Russian manufacturing companies.

### 5.2 Publication 2 - The role of competitive pressure in R&D cooperation


**Objective**

The second paper focuses on the external components of R&D cooperation, and especially examines the Russian market and innovation environment. It makes a case for the role of competition and Schumpeterian “creative destruction” as the driving force behind product and technology innovation. It also suggests that competition pushes firms towards more collaborative methods of R&D (Figure 10). The paper classifies different types of competition and their potential effect on local firms in emerging markets.

**Main findings**

By studying the development of the Russian business and innovation environment over the last decade, it becomes clear that its development has not kept pace with the country’s general economic development. Russia suffers from low goods market efficiency and business sophistication, and is among the worst 20% of countries in the World Economic Forum Global Competitiveness rankings. In terms of innovation, Russia is ranked as average in the world. When evaluating Russia with regard to goods market efficiency, business sophistication, and innovation, there has been a steady decline from 2005 to 2012 in survey ratings instead of an incline. In other words, the economic upturn has not contributed to an improvement in the general innovation environment.

Empirical analysis shows that market competition has an effect on companies’ R&D cooperative activities. Moreover, this effect seems to be contingent on whether the pressure originates from domestic or international competitors. Bivariate correlations show that companies experiencing strong pressure from either foreign competitors in Russia or foreign competitors in international markets are also more successful in cooperative R&D in terms of product development, gaining new knowledge, accessing technical expertise, and
concentrating on their core competencies than companies with low international competitive pressure, which suggests that companies influenced by international competitors also more actively pursue benefits offered by R&D cooperation. However, at the same time, the results show that intensive competition and R&D cooperation do not automatically lead to better market performance and success. Thus, a competitive environment might push firms towards more collaborative methods of innovation, although simultaneously limiting their strategic options within their market environment.

Figure 10. Causal model for competition and cooperative behavior

The paper also shows how competitive pressure influences R&D partner selection and their respective importance. Companies that face strong domestic competition regard domestic suppliers, domestic clients, and domestic competitors as important R&D partners, whereas companies that face strong international pressure regard international suppliers, international intermediaries, and research and development organizations as more important partners. Thus, how companies perceive their product market also influences how they build and manage their cooperative innovation activities.

Based on the findings, a few key conclusions can be drawn. Companies that face international competition invest more in their internal R&D than companies with domestic competitors and companies with no competitors. Thus, international competition can be considered a push factor towards increased innovation activities in Russian manufacturing companies. When companies do not face strong product and technology competition, the need for knowledge transfers and R&D cooperation is also lower. The results indicate that Russian manufacturing companies do not pursue international R&D cooperation before they are confronted by international competition.

Role in the thesis

The second paper describes and analyzes the business environment in Russia. It presents the conceptual and causal linkage between markets, companies, cooperation, and innovation, and thereby helps to more deeply understand the reasons and motives behind R&D cooperation in an emerging market. As such, the paper compliments and supports the findings of publication 1, and helps to understand the Russian innovation environment as a whole. Especially, it provides answers to research question 1.2 (see section 1.2 above).
5.3 Publication 3 - R&D cooperation and innovation performance


**Objective**

The academic literature generally presumes a positive relationship between R&D cooperation and innovation performance; however, this is not always the case. Different types of partner play different roles in R&D, and their effect is contingent on a number of issues. Publication 3 argues that in emerging markets, and especially in Russia, a number of limitations for interfirm cooperation exist that affect the opportunities to cooperate at domestic and international levels, and also the outcomes of cooperation. In reality, most emerging market firms are unable to embark on cooperative R&D with international partners, and thus, for example, most Russian companies typically cooperate with other Russian companies. Employing multivariable regressions, the study focuses on the roles of these different domestic R&D partners and their impact on the focal firm’s new product development success. It also analyzes the linkage between a firm’s internal R&D efforts and its cooperative R&D efforts. The overall objective of publication 3 is to take theoretical frameworks, which have traditionally been developed on empirical evidence from developed markets such as the old EU countries and North America, and test their applicability in the context of Russian manufacturing companies.

**Main findings**

The publication shows that although R&D cooperation offers firms significant and multiple advantages in Russia, it is actually often utilized to compensate for non-existent or low internal R&D capabilities. This is an important finding that contributes to the discussion on how and when R&D cooperation can benefit firms. Whereas it is logical, understandable, and sometimes even smart that R&D cooperation is employed to compensate for low internal R&D capabilities, it simultaneously proposes multiple long-term strategic challenges. Internal R&D has been considered to play a vital role in interfirm R&D cooperation and in enabling companies to absorb and assimilate knowledge, to be utilized in internal activities, from cooperation. Thus, the low level of internal R&D capabilities in cooperation-intensive firms suggests that Russian manufacturing companies are less likely to be able to apply cooperative gains to their internal innovation and management processes. Similarly, extensive cooperation together with low levels of internal technology development can make companies dependent on their partners and their technology. If the general goal of emerging market firms is to upgrade and improve their skills and capabilities, and thus their competitiveness, companies should ensure that R&D cooperation is partnered with strong internal innovation activities and management processes.

The second key contribution of publication 3 focuses on the specific roles and influences of different domestic R&D partners. It classifies different types of partner such as clients,
suppliers, intermediaries, competitors, and research centers into vertical and horizontal linkages by employing cluster analysis. Regression analysis reveals that there are differences concerning which firms are chosen for cooperation and how they affect innovation performance. Innovation and R&D partners that have typically been considered the most important in the Western world, that is, clients, suppliers, and intermediaries, have a strong negative effect on new product performance. This suggests that strict focus on organizational efficiency, such as cost cutting, might actually have significant harmful effects on a firm’s innovation performance. In the long run, this can lead to a negative effect on firms’ overall performance if companies are unable to balance their needs between efficiency and innovation. However, results show a strong positive effect for R&D cooperation with competitors. This indicates that when companies step out from their comfort zone and consider new ways of innovation, R&D cooperation can be beneficial and help them to succeed better in their new product development. Somewhat surprisingly, the paper finds no significant relationship for cooperation with horizontal and institutional R&D partners. However, it does find that this type of cooperation is moderated by company-specific factors such as size and the level of internal R&D. Indeed, as external research centers most often provide partners’ basic research, this needs to be converted into actual products and technologies within new product development. Thus, companies that are likely to benefit from this type of cooperation are large, and those that have strong internal innovation activities.

As suggested by the topic of publication 3, R&D cooperation has often been perceived as a way to quickly improve innovation capabilities in firms that lack international competitive assets. However, as the results of the study show, R&D cooperation is by no means a beaten path to success in emerging markets. Companies remain limited by their own business environment, and this also affects the available types of cooperative opportunity. Partner selection and matching company’s internal skills and capabilities with the desired outcomes play crucial roles in companies wishing to succeed with new products.

**Role in the thesis**

Publication 3 provides important insights on and answers to research question 1.2 and 2.1 (see section 1.2 above) as it discusses the premises of R&D activities in Russian manufacturing firms, and analyzes the effect of different partners on companies’ innovation performance. The publication has both practical and theoretical implications that directly contribute to the conclusions of the thesis.
5.4 Publication 4 - International exploitation of domestic R&D exploration


**Objective**

Publication 3 shows that different partners have different effects on firms’ new product performance. However, developing new products is not the only reason behind R&D cooperation. Furthermore, different R&D partners contribute to various parts of companies’ business activities. Some R&D partners are not employed to develop new products and technologies but to access new business areas and opportunities. Publication 4 approaches R&D cooperation from an exploration-exploitation perspective, and studies how various domestic R&D partners affect international market expansion activities in Russian firms. The overall objective is to determine whether cooperative innovation strategies with different partners have an effect on the focal firm’s business activities outside the scope of new products and technologies. After all, the aim of every company should not only be new products *per se*, but to exploit these products as a part of their business strategy.

**Main findings**

Based on previous research and existing frameworks, the general hypothesis in the study is that R&D cooperation enables firms to expand into new international markets. Traditionally, horizontal cooperation is regarded as the coordination of skills and knowhow, and vertical cooperation as the exchange of resources along the company’s value chain. International expansion can be seen to need both. When companies enter new markets and expand their business activities, they need more information that can be obtained through networks and partners. Similarly, market expansion also requires resources in production, marketing, and distribution that can be obtained through close cooperation with partners.

The paper identifies various effects for different partners. However, their strength and direction differ from the effects observed in publication 3. First, there is a significant strong positive relationship between vertical R&D cooperation partners and international market expansion. This implies that Russian manufacturing firms do not cooperate in R&D only to innovate new products but also because, in so doing, they are able to combine resources from their surroundings that are needed for market expansion. However, when companies are expanding internationally, they also need to protect their domestic market position against local competitors. Cooperative ties along the value chain can be a source of stability on the home market while the main focus of business activities is turned elsewhere.

Second, the paper finds horizontal cooperation with research centers and universities positive, although only significantly when companies are expanding their operations beyond their closest markets. In this case, this means outside the Commonwealth of Independent States (CIS), which are former Soviet republics that gained independence after the dissolution of the Soviet Union. As such, they still share many similarities, including culture, language, and
general business environment, with the Russian domestic markets. This implies that the true value of external R&D organizations lies in their capability to provide novel information and research that helps firms to build competitive advantages in global markets, in which competition is fiercer than in domestic markets.

Third, the paper finds that whereas competitors were regarded as having a positive effect on new product development success, they have a negative although non-significant effect on international market expansion. Once again, this highlights the various roles of different partners in different performance contexts. It also implies that while expanding internationally, management and maintenance of relationships with domestic competitors is challenging. Competing firms in the Russian manufacturing sector might be less willing to share key resources and capabilities with each other. Therefore, maintaining a working R&D cooperation relationship during expansion might become more resource consuming than resource pooling.

The findings highlight the importance of both exploration and exploitation activities, and also the importance of their balance. Companies can employ cooperative R&D as a way to enforce and improve their exploration while simultaneously utilizing it to support exploitation; however, finding this balance between different types of R&D partner can be difficult. While choosing the correct time to include the correct partners can lead to improved competitive advantage in international and also domestic markets, choosing the wrong partners at the wrong time can have negative effects on a firm’s performance in different domains.

**Role in the thesis**

Publication 4 provides answers and implications relating to research questions 1.2, 2.1, and 2.2 (see section 1.2 above). It expands the discussion on the roles of different R&D partners and connects R&D cooperation more closely to corporate strategy. Manufacturing is a global industry and, as such, vulnerable to the actions of international companies. Internationalization of Russian companies has been previously studied by numerous scholars, although this discussion is surrounded by questions concerning why companies internationalize. Publication 4 endeavors to offer a perspective on the questions of how Russian manufacturing companies internationalize and how they utilize their domestic R&D partner networks.
5.5 Publication 5 - The will to win


Objective

Whereas publications 1-4 focus on the concrete factors of R&D cooperation such as internal R&D, the impact of different R&D partners, and the general innovation environment in Russia, publication 5 focuses on the management aspect of R&D cooperation. It examines how companies’ internal innovation orientation and goal setting moderates the relationship between R&D cooperation and improved performance. The underlying assumption in the study is that if companies and, in particular, managers are not precise in defining their innovation strategy and what they aim to achieve, extensive R&D cooperation can become a burden instead of a source of competitive advantage and improved performance. The paper opens up a new perspective towards collaborative R&D by approaching it from the standpoint of goal setting theory, which has its roots in organizational psychology and organizational behavior. By employing goal setting theory, the paper aims to understand the reasons why collaborative R&D so often leads to negative outcomes, and why, in some cases, companies are able to benefit from cooperation with particular partners while, in other cases, the same types of partnership fail.

Main findings

Goal setting theory states that setting goals is a crucial part of achievement strategy. If individuals, teams, or managers do not set unambiguous goals, good performance is very difficult to achieve. Moreover, the more difficult the goal, the more likely it is to be allocated with sufficient resources and receive proper attention. In the context of innovation, this means that organizations must set innovation goals as part of their innovation strategy, and actively ensure that goals are updated and progress towards their achievement is monitored. In many established companies, the importance of innovation is acknowledged although not treated as an important goal. Daily business operations and tasks are valued with the highest importance, and thus allocated most resources. As such, innovation activities are frequently left with too few resources. This situation is often also termed ‘the innovator’s dilemma’ (Christensen, 1997). The only plausible long-term solution to this dilemma is to raise and uphold innovation goals sufficiently high within the company goal hierarchy.

The paper analyzes the impact and performance differences of four goal-cooperation strategies, and finds that companies with no or only a few important innovation goals perform worse with regard to their expectations than companies with higher numbers of important innovation goals (Figure 11). Moreover, goal setting moderates the role of R&D cooperation and impact on company performance. Having few or no innovation goals while simultaneously cooperating extensively in R&D has a strong negative effect on firm performance, end market performance, and innovation performance. However, when
extensive cooperation is combined with having multiple important innovation goals, it has a
strong positive effect on performance in the same domains.

The results imply that companies’ internal approaches towards innovation play a crucial role
in determining their success in it. Out of four individual goal-cooperation strategies (i.e., little
to no important goals – little to no cooperation; multiple important goals – extensive
cooperation; little to no important goals – extensive cooperation; and multiple goals – little
to no cooperation), only one has a significant positive impact on performance. Thus, if R&D
coopération is perceived as a way to improve the innovativeness and performance of
emerging market firms, in this case Russian firms, it should be made clear that although it is
possible, it is by no means an easy solution to issues of competitiveness. Much work in
companies has to be put into prioritizing innovation, and into shifting time, effort, and
resources from daily business activities to innovation activities.

Figure 11. Firm performance averages between different goal-cooperation strategies
(scale: -2 to 2; 0 = expected performance)

Role in the thesis

Publication 5 plays an important role in the dissertation due to the fact that it turns the focus
of analysis to the management aspect of collaborative relationships. As such, it especially
corresponds to research question 2.2 (see section 1.2 above). The analysis and results clearly
indicate the importance of company managers and CEOs in increasing awareness towards
innovation activities and giving them high importance within the company. Moreover, the
failures that occur over the innovation process and in employing cooperative partners are
often due to the focal firm’s actions, not because of bad R&D partners or an unfriendly
innovation environment. The key challenge that seems to remain in emerging market
companies, or at least in Russian manufacturing companies, is changing the corporate culture.
Companies cannot anymore rely on old competitive assets and settle for the status quo; they
must constantly increase their efforts to improve internal and external knowledge flows, cost
control, processes, product and service development, and also quality, market performance, and the level of internationalization. Moreover, these tasks are interlinked. Companies that are able to set their priorities high and to pursue a number of things simultaneously are also likely winners in R&D cooperation.

5.6 Overall summary

The general perception that emerging market companies are bound by their history, and in particular, Russian companies by their Soviet legacy, no longer automatically holds. In the publications, it is possible to identify numerous active, international, and open companies that perceive business opportunities and practices in a similar manner as their Western counterparts. Nevertheless, the general business and operating environment in Russia still extensively influences these companies and puts numerous constraints and limitations on innovation and interfirm activities. The fact that the development of Russia’s innovation environment has not been able to keep pace with general economic growth has effectively prevented a wider surge of Russian companies onto the global marketplace. Many domestic Russian manufacturing companies have been able to profit from rising living standards and, to date, most have relied on their existing business activities. Opportunities and also the need and motivation to expand into new markets have been limited. However, as economic growth slows, and as Russia joined the World Trade Organization in 2012, the competitive situation is also changing. The external pressure to innovate and produce new technologies and products and, thus, also to enter new markets is increasing.

Empirical evidence shows that firms which actively engage in R&D cooperation often do so to compensate for low internal R&D capabilities. Whereas this can be regarded as a positive indication of an attempt to increase, update, and renew organizational competencies, it also forms a challenge for the long-term development of these firms as they soon become reliant on external knowhow. Finding a balance between in-house and external activities is an important part of these firms’ competitive strategy. They also need to balance the relationship between exploration and exploitation. As put forward by Dawar and Frost (1999), especially companies that pursue contender and extender strategies must find ways actively to adapt knowledge from markets and convert it into business advantages. Cooperative R&D has the potential to increase operational efficiency and exploitation of internal assets, while simultaneously also contributing to firms’ exploration activities.

Interestingly and notably, in Russia, there are many differences between the choice of organization with which to cooperate and the effect that this cooperation can have on the focal firm. For instance, commercial and state-owned R&D centers have traditionally been considered important sources of new knowledge within the R&D process, but the results of the empirical analysis show that they contribute little to new product development in Russia. Moreover, R&D cooperation with vertical partners such as clients, suppliers, and intermediaries has a strong negative effect on new product development. In addition, the results reveal numerous trade-offs between different partners. Vertical cooperation with domestic partners becomes important when companies expand to new markets, and when
they need to secure and defend their domestic market position. As another example, cooperation with competitors improves innovativeness and new product development in firms while simultaneously hindering international expansion activities, mostly for the same reasons as vertical R&D partners help in it. These types of finding contribute to the extant theories of absorptive capacity, resource dependency, and dynamic capabilities in emerging market firms, and especially to understanding Russian manufacturing companies’ cooperative innovation strategies.

Finally, the empirical analysis shows that although the external environment and R&D partner selection influence performance in different business activities, the way in which firms and also managers approach innovations and R&D cooperation plays a crucial role in how they prevail in it. For many established companies, it is difficult to prioritize innovation over other daily activities and thereby allocate sufficient resources to it. Furthermore, in many emerging markets, and particularly in Russia, corporate culture does not easily accept investments in risky innovation activities that might bear fruit in five to ten years’ time. The orientation of management culture has traditionally been more short term, and thus activities relating to long-term innovations have not been actively encouraged. However, the results show that combining goal setting and R&D cooperation can lead to significantly increased performance over various performance domains. At the same time, not setting goals or setting them too low puts companies at risk of negative performance. For example, companies can simultaneously employ a number of different R&D partners; however, if the cooperation takes place without goal setting, it has a strong negative effect on company performance, innovation performance, and end consumer performance. Conversely, when goals are perceived as important, extensive R&D cooperation can have a strong positive effect over the same performance domains. It might be that positioning innovations high in the company hierarchy and goal setting are indications of a change in Russia’s management culture. The emphasis is slowly turning towards creating and pursuing new business opportunities instead of passively observing small niches where companies can employ specific assets, and where profits and growth opportunities are modest. Publications are summarized in table 3.
### Table 3. Summary of the publications and their main findings

<table>
<thead>
<tr>
<th>Publication 1</th>
<th>Publication 2</th>
<th>Publication 3</th>
<th>Publication 4</th>
<th>Publication 5</th>
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</thead>
<tbody>
<tr>
<td><strong>Title</strong></td>
<td>Cooperative R&amp;D in Russian enterprises: motives, drivers, and outcomes</td>
<td>The role of competitive pressure in R&amp;D cooperation: evidence from immature markets</td>
<td>R&amp;D cooperation and innovation performance - a beaten path or a rocky road? A study on Russian manufacturing firms</td>
<td>International Exploitation of Domestic R&amp;D Exploration - New Insights from Russian Manufacturing Firms</td>
</tr>
<tr>
<td><strong>Research questions</strong></td>
<td>What is the level of cooperation for R&amp;D in Russian enterprises? How does R&amp;D input reflect R&amp;D cooperation?</td>
<td>How does the source of competitive pressure influence decisions to cooperate in R&amp;D? How does competitive pressure influence cooperative R&amp;D processes and outcomes?</td>
<td>Which are the best domestic partners for R&amp;D in emerging markets and why?</td>
<td>What role is played by domestic cooperative ties in the exploitation and international market expansion activities of Russian manufacturing firms?</td>
</tr>
<tr>
<td><strong>Research targets</strong></td>
<td>Understanding the level of R&amp;D cooperation in Russian manufacturing firms. Analyzing the linkage between R&amp;D investments and cooperation activities.</td>
<td>Understanding the Russian market and innovation environment, and also the linkage of competitive pressure to R&amp;D cooperation.</td>
<td>Understanding the effect of vertical and horizontal R&amp;D partners on new product development while taking into consideration the limitations of the turbulent business environment.</td>
<td>Understanding the effect of R&amp;D partners outside innovation performance. Understanding performance differences between vertical and horizontal cooperation.</td>
</tr>
<tr>
<td><strong>Main Results</strong></td>
<td>R&amp;D cooperation is employed in Russian manufacturing companies to some extent, although it does not seem to be a way to actively innovate. Internal R&amp;D investments lead companies to employ less formal methods of cooperation.</td>
<td>The development of Russia’s business and innovation environment has not kept pace with the development of the Russian economy. International competition has a strong positive effect on R&amp;D cooperation, processes, and, partly, also outcomes.</td>
<td>R&amp;D cooperation is employed to compensate for low internal R&amp;D capabilities, thus creating challenges for knowledge absorption. Impact on NPD is negative from vertical R&amp;D partners, positive from competitors, and non-significant from other horizontal partners.</td>
<td>Vertical R&amp;D partners have positive effect, competitors a negative effect, and horizontal partners a positive effect on international market expansion, which contradicts some of publication 4’s findings. Also, it matters where companies expand.</td>
</tr>
<tr>
<td><strong>Role in the thesis</strong></td>
<td>Provides answers to research questions 1.1 and 1.2 (see section 1.2). Presents a framework for understanding the benefits of R&amp;D cooperation in emerging market companies.</td>
<td>Provides answers to research questions 1.2 and 1.3 (see section 1.2). Presents conceptual and causal linkages between markets, companies, cooperation, and innovation.</td>
<td>Provides answers to research questions 1.2, 2.1, and 2.2 (see section 1.2). Expands the analysis of R&amp;D partners beyond the scope of exploration activities.</td>
<td>Provides answers to research question 2.2 (see section 1.2). Discusses and analyzes internal moderating factors on R&amp;D cooperation.</td>
</tr>
</tbody>
</table>
6 CONCLUSIONS

Regardless of the publications’ coherent themes presented in this thesis, they are all separate research papers with individual focuses. This section combines the findings of each article to provide a more holistic perspective on R&D cooperation both in Russian manufacturing companies and emerging markets in general. Based on the findings, it presents answers to the research questions proposed in the thesis (see section 1.2), and also novel practical and theoretical implications.

6.1 Answering the research questions

Among developments in the management research field, two rapid changes have occurred over the last two decades that are of particular importance in the context of this thesis. First, in addition to becoming economically significant global players, emerging markets are increasingly regarded as the origins of new products and technologies. The second change is the rapid opening of business and innovation processes in firms that, in turn, have led to more cooperative methods of operation. Both topics have received wide attention from academics, and there have already been some attempts to combine these two streams and study cooperative innovation strategy in the context of countries such as China and India. Regardless of these attempts, much still remains debatable, such as whether R&D cooperation can offer emerging market firms a quicker way to develop organizational and innovation capabilities, and whether cooperation enables these firms to challenge existing companies in international markets.

Although there are many unanswered questions, research conducted on the context of emerging markets has already contributed to the general innovation management literature. Through studying emerging markets firms and their cooperative behavior, we have learned, for example, about the various moderating factors that influence the relationship between R&D cooperation and firm performance. However, in many ways, the innovation management and cooperative strategy field in particular has developed towards more fragmentation. The general aim of this thesis is to bring together different aspects of cooperative R&D such as exploration, exploitation, vertical and horizontal linkages, business environment, internal innovation management, and competitive strategy, and thereby form a more holistic perspective on R&D cooperation.

Role of interfirm R&D cooperation in Russian manufacturing firms

By analyzing primary data from Russian manufacturing companies, the thesis brings forward new insight on R&D cooperation and its linkage to company performance. In the case of emerging markets and Russia in particular, it is traditionally considered that firms have short-term oriented mind-sets, and that interfirm cooperation and networks are managed between individuals with rather low levels of formal commitment (Jansson et al., 2007; Manolova et al., 2010). Also, a large proportion of research in these countries is seen to originate from
large industrial organizations that have their own R&D facilities, and is being guided by governmental initiatives (EBRD, 2012; OECD, 2013). With such a background, one might easily argue that the conceptual ideas of cooperative R&D and cooperative strategy fit poorly to the context of emerging market firms as, by definition, they include aspects of knowledge and resource exchanges between organizations, and typically require at least some level of formal commitment.

This thesis, however, finds that R&D cooperation is employed to some extent by many of the Russian sample companies, and thus it also forms a concrete and acknowledged strategic opportunity for these firms. Findings also show that R&D cooperation is often utilized to compensate low internal R&D activities (Figure 12). Companies that develop products in cooperation with local partners have significantly lower levels of internal R&D than companies which develop and launch products without any form of cooperation. Clearly, it should be kept in mind that R&D partners might be employed for a variety of reasons, such as to cut costs or to outsource some parts of the basic research, and thus R&D cooperation does not automatically mean co-development of new products and technologies. Indeed, R&D intensive firms state that a key reason for engaging with partners is to enforce organizational changes, and thereby to improve business processes, not to innovate new products. Also, when companies have higher internal R&D activities, they are also more likely to set up connections with public institutions and trade organizations. In general, it can be stated that companies which actively innovate and produce new products and technologies employ two strategies: either they do it completely by themselves and employ low levels of cooperation, or they cooperate extensively, and thus endeavor to minimize internal efforts and costs.

![Figure 12. Level of Internal R&D and innovation cooperation (see publication 3)](image)

R&D cooperation in firms also seems to be connected to the general competitive environment in which companies operate. The fact that the Russian business and innovation environment has not been able to develop over the last decade at the same pace as the overall economy
means that many Russian manufacturing firms have been able to survive and even flourish by utilizing their existing capabilities, skills, technologies, and products. As the business environment has remained challenging for international companies and multinationals, we are yet to witness a sharp increase in product market competition. This also reflects to R&D cooperation. Companies that face little to no competition employ less R&D cooperation than firms with domestic competitors. Furthermore, the most active cooperative R&D companies are those that face competition from international players.

The results confirm that competition works as a strong incentive in facilitating R&D cooperation. When companies are faced with strong local competition, they are more likely to establish R&D cooperation with local partners such as suppliers, clients, and even competitors. When companies face strong international competition, they more actively try to engage in R&D cooperation with international partners. Also, strong international competition pushes companies towards cooperation with R&D centers and institutions that are typically active in basic research. In turn, basic research helps firms to develop more radical new products. The results also indicate that although cooperation is a strategic possibility, R&D cooperation is not a concrete part of innovation strategy in companies that only compete with domestic firms. In contrast, when firms compete against international competition, R&D cooperation in all stages of the R&D and innovation process becomes a significant and important factor.

Russia joined the World Trade Organization in 2012 and, according to the agreement made, it will have removed multiple trade barriers and import customs by 2017. This is especially likely to have an effect on Russian manufacturing companies, subjecting them to increased international competition. As R&D cooperation seems to be a way to react to this type of competition, we can also expect to see more cooperation taking place in Russian firms in the future. However, at the same time, the low level of internal R&D in many cooperating firms raises concerns about their capability to absorb and integrate new knowledge into their internal processes. A low level of internal R&D might also be a weakness when firms seek R&D partners. Often, companies are less interested in extensive cooperation with weaker counterparts than themselves. Thus, the challenge for Russian manufacturing firms is not only to increase external R&D activities but also to bring internal R&D activities to a level that enables joint product and technology development with partners.

**R&D cooperation and performance**

Although understanding that the current state of innovation, R&D, and cooperation in Russian manufacturing companies are important, the performance implications of cooperation are even more important. After all, R&D cooperation is also risky and includes the possibly of negative performance effects. Previous management research has established numerous different performance implications for different R&D partners and, accordingly, it is not obvious what types of partner should be utilized in which kind of market conditions. Also, in many emerging markets, companies struggle to find international R&D partners, and most are more likely to cooperate with local firms and organizations. This brings its own
dimension to R&D cooperation if we consider the ultimate goal of firms is to succeed in international competition.

By employing cluster analysis, R&D cooperation partners were classified into three groups: vertical, horizontal corporate, and horizontal institutional partners. Regression analysis of these groups against different performance indicators showed them to have a fluctuating effect depending on the dependent variable. Within the innovation context, domestic vertical R&D partners tend to have a negative effect on new product development and performance, although they have a significant positive effect in the context of internal market expansion. Two explanations can be offered for this. Domestic vertical R&D partners are typically associated with attempts to improve organizational efficiency, material and resource flows, and to reduce costs. Thus, instead of a direct effect on innovation performance, they are more likely to have an indirect effect on company performance. In addition, vertical domestic cooperation is important during international market expansion when companies simultaneously try to protect their positions in their main markets. Having close cooperation in their home markets releases resources to be utilized in market expansion elsewhere.

Horizontal corporate partners were found to have a similar dual effect on performance. However, in contrast to vertical partners, competitors as R&D partners are found to have a significant positive effect on innovation performance and a significant negative effect on international market expansion. Within the innovation performance context, R&D cooperation with competitors has been found to be beneficial as it enables companies to gain new knowledge that might otherwise have been out of reach. Also, in cooperation with competitors, it is more likely that the cooperation has a specific, pre-determined goal towards which companies work and which helps to structure the cooperation and innovation process. The fact that competitors typically also work at similar industry levels enables companies to adapt more easily to each other’s processes. For the same reason, within the international market expansion context, competitor cooperation potentially endangers domestic market position. Also, due to the fact that competitor cooperation requires substantial management resources, it might be too difficult to manage the two processes simultaneously.

Cooperation with horizontal institutional partners has a significant positive effect on international market expansion but no significant effect on innovation performance, which can be considered somewhat surprising. Traditionally, R&D centers and organizations have been considered an important source of knowledge and scientific research in Russia. However, in connection to this, the results also imply that, with regard to innovation performance, relationships are moderated by the level of internal R&D in focal firms. This is logical as R&D centers primarily provide basic research, which still has to be converted into final products and technologies by the firms. Thus, companies with low internal R&D are less able to benefit from this type of cooperation. Nevertheless, within the international expansions context, R&D centers and universities seem to contribute to general success. There are manifold reasons for this; for example, typically, research institutes and universities are internationally connected to some extent, and can thus also provide companies with secondary capabilities that contribute to success in foreign markets. These capabilities
include, for instance, language skills, management skills, marketing information, and knowledge on export processes.

Although the performance effect differs between different partner types, due to a combination of the various roles played by different partners and what is being measured as performance in the focal firm, the internal approach of the focal firm similarly plays a crucial role in moderating the difference between success and failure. According to the findings, R&D cooperation only brings extra value for companies if they rank achieving new innovations as an important part of corporate strategy. The results show that while firms can employ extensive R&D networks without any internal innovation goal setting, it is much more risky than employing multiple innovation goals. This highlights the importance of good innovation management in companies. The best managers are able to push innovations sufficiently high in the priority list of their companies and, moreover, communicate the importance of different innovation goals to other managers and employees. The results show that companies with a multitude of very important innovation goals are able to match expectations, and that companies which also employ R&D cooperation in addition to goal setting exceed their performance expectations. A summary of empirical results is presented in figure 13.

**Figure 13.** Summary of empirical findings related to employing different types of domestic R&D partner, and exploration and exploitation activity
6.2 Theoretical contributions

Interfirm R&D cooperation and competitive strategy in emerging markets

In the context of business strategy and management, a key question in emerging markets has always been how local companies can overcome their differences with competitors from developed countries, turn disadvantages into advantages, and compete both in domestic and international markets (Dawar and Frost, 1999; Wright et al., 2005; Wu and Pangarkar, 2006). Previous studies have suggested that emerging market firms are more constrained by their organizational and managerial capabilities and, thus, if emerging market companies wish to survive in the long run, they must upgrade and reconfigure their resources and capabilities (Manolova et al., 2010; White and Linden, 2002; Wright et al., 2005). Interfirm R&D cooperation has been suggested as one way to increase strategic flexibility, learning, and internal competencies, and thereby upgrade skills while simultaneously gaining complementary resources that can help to reduce resource constraints (Chiu, 2009; Luo and Tung, 2007; Manolova et al., 2010; Wu, 2012; Zeng et al., 2010). Empirical studies have indeed shown that R&D cooperation impacts on a number of firms’ performance indicators, both in developed and emerging countries, although, at the same time, it includes a wide range of factors that moderate the direction of this impact (Drechsler and Natter, 2012; Tomlinson, 2010; Wu, 2012). Thus, interfirm R&D cooperation can have both negative and positive impacts depending on the case, context, and situation. By analyzing the role of different R&D partners in different situations and by fitting interfirm R&D cooperation within the general framework of competitive strategies in emerging market firms, it is possible to understand better the causalities between cooperation and performance.

By employing the strategy typology created by Dawar and Frost (1999), backed up by the work of Lavie and Fiegenbaum (2000), and later empirically tested and verified by Wu and Pangarkar (2006), this thesis analyzes the potential impact and applicability of interfirm R&D in emerging market firms. In general, R&D cooperation can lead to positive results only when it fits into the focal firms’ innovation, product, and technology strategies that, in turn, are connected to the firms’ overall competitive strategies. Depending on the competitive strategy, one can again see different R&D partners playing different roles, and when the strategy and role do not match, the benefits of cooperation quickly become disadvantages, just as when competitive strategy is mismatched with the competitive environment (Porter, 1985; Wu and Pangarkar, 2006). In other words, by identifying different strategies, one can also better understand different interfirm R&D strategies. The next chapters address different competitive strategies, and how cooperative strategy and R&D cooperation in particular fit with them. The discussion is summarized in table 4.
Table 4. A general typology for interfirm R&D cooperation in emerging markets

<table>
<thead>
<tr>
<th>Competitive strategy (Dawar and Frost, 1999, p. 122)</th>
<th>Myopic Dodger</th>
<th>Narcissistic Defender</th>
<th>Amorphous Extender</th>
<th>Adaptive Contender</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focuses on locally oriented link in the value chain, enters a joint venture, or sells out to a multinational.</td>
<td>Focuses on leveraging local assets in market segments where multinationals are weak.</td>
<td>Focuses on expanding into markets similar to those of the home base, employing competencies developed at home.</td>
<td>Focuses on upgrading capabilities and resources to match multinationals globally, often by keeping to niche markets.</td>
<td></td>
</tr>
<tr>
<td>Performance (Wu and Pangarkar, 2006)</td>
<td>On average, the weakest performer.</td>
<td>On average, the second worst performer.</td>
<td>On average, the second best performer.</td>
<td>On average, the best performer.</td>
</tr>
<tr>
<td>Internal R&amp;D and interfirm R&amp;D (Publications 1, 2, &amp; 3)</td>
<td>R&amp;D activities are not actively engaged and the cooperation that takes place focuses mostly on improving cost efficiency. Companies rely on their existing products and technologies.</td>
<td>Internal R&amp;D activities and cooperation might exist, but they mostly focus on improving existing processes, products, or technologies.</td>
<td>Companies focus more on internal R&amp;D activities and employ cooperative R&amp;D to “spice up” product lines and technologies to cover new markets and protect domestic ones.</td>
<td>Internal R&amp;D activities are supported by extensive R&amp;D cooperation that aims both at new product innovations and improving organizational capabilities.</td>
</tr>
<tr>
<td>Goals and strategy (Publication 5)</td>
<td>Innovation is not perceived as highly important, and operational goals and daily business activities exceed it in the company hierarchy.</td>
<td>Goal setting focuses on operational efficiency, and innovations are aimed at cutting costs. There are only very few important goals, if any.</td>
<td>Innovation is perceived as important in the organization, but it is focused on a number of activities such as product improvements or modifications.</td>
<td>Innovation is perceived as very important. A multitude of highly important innovation goals that relate to products, technologies, and also business processes.</td>
</tr>
<tr>
<td>Vertical R&amp;D partners (Publications 3 &amp; 4)</td>
<td>Employed, although not often, to improve processes and to keep clients and suppliers connected to the company.</td>
<td>Employed to improve existing products to fit the needs of existing customers and to cut costs of manufacturing and distribution.</td>
<td>Employed to improve operational efficiency and to secure the domestic market along the internationalization process.</td>
<td>Employed to learn from the markets and, based on that, to create new products that fit customers’ needs.</td>
</tr>
<tr>
<td>Horizontal corporate R&amp;D partners (Publications 3 &amp; 4)</td>
<td>Employed, although not often, for joint venture purposes.</td>
<td>Employed, although not often, for joint venture purposes.</td>
<td>Not often employed due to the risk of opportunistic behavior and losing domestic market share.</td>
<td>Employed for learning and as complimentary resources in strategically important product segments.</td>
</tr>
<tr>
<td>Horizontal institutional R&amp;D partners (Publications 3 &amp; 4)</td>
<td>Not typically employed as the focus is on operational efficiency.</td>
<td>Employed, although not often, to improve existing products and technologies by outsourcing their development.</td>
<td>Employed to upgrade and modify existing technologies to fit new customers and new markets.</td>
<td>Employed to co-develop new products and technologies, and to learn the latest scientific advancements.</td>
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</table>
Dodger firms, which choose to focus on locally oriented links in the value chain, can be considered firms that are not actively engaging either in R&D cooperation or internal R&D. Their competitive strategy concerning products and services relies on factors that already exist, and innovation is not perceived as high in the company hierarchy. Managers generally regard their technologies as “good enough”, and the market where they operate as relatively solid and stable. A dodger can be regarded as a traditional myopic firm, one that is not concerned with developing its strategic capabilities, which is thus likely to lose in the competition against other companies when markets develop (Lavie and Fiegenbaum, 2000). In rare cases, a dodger will employ interfirm R&D cooperation with other firms, although it is highly unlikely to benefit from it in terms of innovation performance. By committing to an R&D partnership, dodgers are mainly interested in forming long-term relationships with customers and suppliers to increase their bargaining power. Thus, short-term vertical R&D cooperation might have a positive impact on financial performance but contribute little to capability development or resource configuration. Horizontal R&D cooperation within the dodger context is not often employed, except for possible joint ventures with competitors. Without internal R&D activities and plans to expand operations, horizontal R&D cooperation with research centers or universities is unlikely to be beneficial.

Defender firms, which leverage local assets in market segments where foreign competitors are weak, are potentially more active in both internal R&D activities and interfirm R&D cooperation. However, innovating new products and technologies is still prioritized lower than achieving organizational efficiency. The focus on innovation activities is narrow, and thus the roles of interfirm partners are very specific. Vertical partners are employed to improve existing products, to improve customer loyalty over competitors’ products, or to cut costs within the value chain and thereby compete with lower prices and higher margins. Horizontal corporate partners are not often employed, unless for joint venture purposes. Horizontal institutional partners might be employed to improve products or for outsourcing some aspects of the development project to improve efficiency. In other words, defender firms prioritize on internal goals instead of external goals such as satisfying external stakeholders. Lavie and Fiegenbaum (2000) label these types of company “narcissistic” firms. As a consequence of their strategy, defender firms can achieve benefits from cooperation by accessing complementary resources, although knowledge spillover between R&D partners remains low, and thus the potential impact on long-term competence building is also low.

The competitive strategy of an extender firm is to expand operations to markets that are similar to those at home. For this type of company, innovations are important and are prioritized as high in the company hierarchy. However, innovations are not spread widely over numerous goals but, rather, focused on a few particular aspects such as improving products to modify them for different markets. For extender firms, both vertical R&D partners and horizontal institutional R&D partners provide specific advantages. Clients, suppliers, and intermediaries can be utilized to improve operational efficiency and to secure domestic market share along the internationalization process. However, as extenders still rely on domestic competencies, vertical domestic R&D partners are unlikely to be as useful in the
product and technology context due to their limited knowledge on international markets. Nevertheless, extenders also are more likely to have internal R&D capabilities and, for this reason, research centers and universities are a useful source of new scientific research and knowledge. They can be employed to upgrade and modify technologies and products to make them more competitive in international markets. This type of “amorphous” firm has higher external orientation but lower internal orientation (Lavie and Fiegenbaum, 2000). Although they have the potential to develop organizational competencies, they keep pushing forward utilizing existing capabilities. For this reason they remain vulnerable to changes in the operating environment and, for example, horizontal cooperation with competitors carries high risks of opportunistic behavior.

Finally, contender firms are the most active type of companies. These firms are adaptive and relate well to both their internal and external environments, and thus have the potential to achieve sustained competitive advantage, both in domestic and international markets (ibid.). Contender firms are likely to have both high levels of internal R&D and extensive R&D cooperation, and thus they have the highest potential to benefit from external knowledge flows. Contenders also want to prevail on numerous fronts in terms of innovation. They aim simultaneously to improve business processes, operating efficiency, and to generate new product and technology innovations. For contenders, all three types of R&D partner provide substantial benefits: vertical partners provide information from markets that can be employed to redesign and create products, horizontal corporate R&D partners can be employed for complimentary resources and to learn new processes, and horizontal institutional partners provide basic research that can be converted internally into new products and technologies.

By employing the competitive strategy framework, it becomes easier to understand that although interfirm R&D can be utilized by companies with completely different strategies, the potential contribution of different partners varies depending on how the company manages its business. Also, depending on their competitive approach and strategic behavior, some companies are more likely to be successful in cooperation than others. Employing cooperative R&D is not a solution to innovation problems in emerging market firms and, furthermore, the wrong partners combined with the wrong strategy can easily lead to negative performance influences. Only strategy and dynamic capabilities together determine firm-level sustained competitive advantage (Teece, 2014). For extender and contender firms, interfirm R&D cooperation seems a strong way to challenge competitors both in domestic and international markets; however, it provides less extra value for dodger and defender firms.

**Cooperative strategy and the development of dynamic capabilities in turbulent markets**

It is stated that the continuously changing and developing market conditions in emerging markets require companies to developed “strategic flexibility”, which will enable them to take advantage of new market opportunities that arise, for example, from economic growth or from the opening of a market (Singh, Oberoi and Ahuja, 2013; Uhlenbruck, Meyer and Hitt, 2003). Strategic flexibility is posited to be based on the inherent flexibility of resources that companies possess and on their respective managers’ flexibility to apply these resources in different ways to seize new business opportunities (Sanchez, 1995). When a company’s
environment keeps changing, it must reconfigure both its internal and external resources, and as the environment keeps constantly changing, this must be done repeatedly (Eisenhard and Martin, 2000; Hoskisson, Eden, Lau and Wright, 2000; Malik and Kotabe, 2009). In other words, emerging market companies need to develop dynamic capabilities as part of their corporate strategies.

However, this is known not to be easy. As markets have grown rapidly in the BRIC countries over the last decade, many managers have not perceived the urgent need to upgrade and improve organizational resources and competencies; at least, not before they confront international competition and their long-standing business model becomes disrupted. At the same time, it has been suggested that emerging market companies which build competencies and global strategies, and employ them to develop new products and technologies, have high potential to disrupt existing companies and technologies (Corsi and Di Minin, 2013; Markides, 2012). Strategy, strategic flexibility, and dynamic capabilities developed at home thus play an essential role with regard to performance, firm competitiveness, and sustained competitive advantage in turbulent market environments. For example, Singh et al. (2013) found that, to respond to market fluctuations, companies must themselves be capable of innovation, and also have good alliance and technological capabilities. Building R&D capabilities and external cooperative relationships is one way of moving towards this goal.

The operationalized dynamic capabilities perspective inside firms comprise three disaggregated organizational competencies (Li and Liu, 2014; Teece, 2007, 2014), in each of which interfirm R&D cooperation potentially plays a critical role. Whereas dynamic capabilities are a concept, interfirm R&D cooperation can be considered one of the tools that helps to realize that concept.

Sensing, or strategic sense-making capacity, concerns identifying opportunities, threats, changes, and developing new responses to competitors’ actions and activities (Teece, 2007, 2014). Interfirm cooperation has traditionally been considered a vehicle for organizational and technological learning (Hagedoorn et al., 2000; Hamel, 1991), and thus R&D cooperation is an obvious way to facilitate sensing. As a formal business activity, cooperation enables emerging market companies to build sensing skills, and to acknowledge its potential and importance as a source of new knowledge. When cooperation exists at formal and corporate levels, companies can begin to spread their sensing activities to less formal networks and connections. However, it should be noted that for firms to learn from interfirm cooperation, they must first want to learn. For this reason, interfirm cooperation needs to be paired with a competitive and cooperative strategy that supports and encourages organizational learning.

Seizing, or the mobilization of resources, to address opportunities identified though sensing (Teece, 2007) is a natural continuum for applying what has been learned from cooperative partners. After all, only knowledge that can in one way or another be turned into economic activity has an impact on the firm (Tang, 2006). Moreover, sensing activities are meaningless if they do not lead to concrete actions within firms. In other words, knowledge gained through R&D cooperation itself does not constitute an asset, only the operationalization of knowledge can do so. For knowledge to flow from the partners through the organization and
contribute to innovation and organizational processes, and thus to dynamic capabilities and strategic flexibility, companies must actively pursue various opportunities; not one or two but many, because not all opportunities become concrete. Moreover, when emerging market companies are finding their way through this myriad of opportunities, they need to have a clear vision of their technological priorities (Singh et al., 2013). A sound strategy will help with this, although when companies simultaneously perform a number of activities such as managing different interfirm R&D partnerships, recognizing and turning knowledge into opportunities and pursuing them, management also has to be ready for the challenge. Unfortunately, implementation of business plans and management practices remains one of the single biggest problems in emerging market firms (Bloom et al., 2012), which can affect the potential impact of interfirm cooperation. This also became evident in publication 5 when it was identified that Russian manufacturing companies with low or no innovation goals are likely to experience negative effects on their performance, which are even stronger when they cooperate extensively. In other words, the companies are actively sensing but failing to seize.

In the long run, firms are able to survive and compete not only because of their ability to employ existing resources but because of their ability to renovate and develop them (Teece et al., 1997). For this reason, the last operationalization relating to dynamic capabilities is the reconfiguration of both tangible and intangible assets, so that they remain relevant in the face of changing competitive conditions and threats (Hitt et al., 1998; Teece, 2007). Moreover, in an ideal situation, companies are able to utilize their capabilities and resources to change the environment in their favor and to cause disruption, typically by innovating new products (Christensen, 1997; Markides, 2012). Reconfiguration is a logical continuum for sensing and seizing, which happens in the context of cooperation when new knowledge gained and new opportunities pursued lead to the development of new and upgraded resources and capabilities. However, R&D cooperation can also be perceived as a way to directly increase organizations’ strategic flexibility by employing external resources (Fan et al., 2004; Hagedoorn et al., 2000; Rese and Baier, 2011). The results in publication 3 also support this perspective. For emerging market firms, neither of these paths is easy. Reconfiguration typically means breaking at least some path protocols and departing from some routines, which creates anxiety in an organization not shaped to accept high levels of internal change (Teece, 2007). If poor management is problematic for seizing opportunities in emerging market companies, it most certainly causes problems in attempts to reconfigure resources. Organizational culture in many emerging market companies is stiff and does not respond well to changes. For example, in the case of Russia, only recently have companies in larger numbers started to pay more attention to new business opportunities and begun to implement truly competitive strategies (Shirokova et al., 2013). For R&D cooperation to contribute to the reconfiguration of internal and external resources in emerging market companies, they must first pursue profit seeking growth strategies. For many companies, the biggest challenge to building dynamic capabilities still lies in their internal corporate culture and weakness in developing and implementing competitive strategies.

The general aim of dynamic capabilities is to help understand how companies can achieve sustained competitive advantage. With regard to resources and capabilities within the
sustained competitive advantage context, discussion often focuses on scalability and replicability (Teece et al., 1997). If an ordinal asset, either tangible or intangible, is replicable, it can also be scaled over markets and subsidiaries, thus creating competitive advantage. However, if an asset is replicable, it can also be imitated by competitors, and thus does not contribute to sustainable competitive advantage. This is why strong dynamic capabilities are a combination of signature practices and business models (i.e., processes), resources, and operating correctly, that is, implementing good strategy (Teece, 2014). Interfirm cooperation can be an essential part of and strong contributor to dynamic capabilities. While, in theory, R&D cooperation can be scaled up infinitely, it is hard to imitate due to the combination of partners in a given situation. Partnerships also include high levels of knowledge that are embedded in interactions among people and processes, and are therefore less likely to be available to competitors (Argote and Ingram, 2000; Hagedoorn et al., 2000; Tang, 2006; Teece, 2014). Emerging market firms that are able to build their operations on a combination of internal and external resources, strategic fit, and employing interfirm activities as part of their overall competitive strategies, are likely to be winners in the global marketplace in the long term. However, the complexity of R&D cooperation, strategy, and dynamic capabilities as presented in this thesis helps to understand why we still see little successful cooperative innovation coming from emerging markets.

6.3 Managerial implications

The practical purpose of the research and thesis is to understand the current state of R&D, innovation, and strategy in Russian manufacturing companies. As stated at the beginning of the thesis, the potential that Russia possesses in terms of scientific knowledge, education, and general living standards is high; however, the visible outcomes of this potential at the company level have been relatively modest to date. The general perception is that internationally competitive Russian companies mostly operate in oil, gas, and other raw material production. Whereas this might be the case to a large extent, it does not represent the whole truth. There are also a number of examples of Russian manufacturing companies that, through innovation and by upgrading capabilities, have been successful in international terms. For example, in 2011, PepsiCo acquired Wimm-Bill-Dann OAO, a Russian dairy and fruit producer, for a record price of 5.4 billion USD; in 2012, Renault-Nissan formed a strategic partnership with AvtoVAZ, which is Russia’s largest car manufacturer; and Kaspersky Lab, a Russian antivirus software manufacturer, is currently ranked as the sixth largest vendor globally according to Gartner (Messner, 2013). These examples and the results of the research conducted for the thesis show that potential still exists, and that Russian manufacturing companies can provide both opportunities for and competitive threats to established firms.

How to achieve a competitive market position remains a big question for Russian managers and also managers in other emerging markets. Although R&D cooperation is promoted as a way to quickly access new resources and build capabilities, and is generally regarded in a positive light, the results show that it is by no means a shortcut to improved innovativeness or performance. Cooperative strategy requires precisely what the name implies, proper strategic
planning. The results of the research, however, show that individual partners in R&D cooperation have different effects that depend on the respective company’s current situation and on what it aims to achieve. R&D cooperation with vertical partners is more beneficial when companies expand their activities and need to improve their supply chains and products, R&D cooperation with competitors helps companies in their innovation efforts, and institutional partners provide valuable insight when companies expand into distant international markets. The downside is that the same partners can have negative effects in different situations. This highlights the fact that R&D cooperation is risky and that benefits of cooperation need to be clearly stated and kept in mind. Regardless of good intentions and proper planning, cooperation might not realize anything extra for a company; however, it most certainly always requires expending some level of time and money. Thus the cost-benefit ratio of cooperation needs to be carefully evaluated.

Companies that are able to develop their strategies to include cooperative R&D for strategic flexibility can be considered to have an advantage, not only in domestic but also in international markets. However, companies that employ cooperative R&D without a clear strategic orientation are more likely to focus on the wrong things, and thus stand to lose in the long run.

6.4 Limitations and suggestions for future research

Although the research for the thesis has been conducted following well-established guidelines for innovation and management research, it naturally comes with limitations. I wish to mention the most notable ones here, so that they can work as guidelines in future studies focusing on similar issues. As so often happens, answering one question raises five new ones. This is the challenge of academic research, and also one of its greatest features. There are always new frontiers that can be studied and from which more can be learned, which is also the case with cooperative strategy and emerging markets.

First, I would like to mention the obvious geographic aspect of this study. The thesis discusses emerging markets, and aims to form a more holistic perspective on cooperative strategy within them. However, the empirical evidence comes only from one country, Russia. Thus, it would be an overgeneralization to state that the detailed findings of this thesis apply directly to all emerging countries. Most emerging markets share many similarities with the Russian business environment and economic development. However, countries differ from one another in terms of history, culture, management, and many other factors. Thus, research needs to be continued on all emerging markets and, for example, cross-country studies focusing on cooperation strategy and innovation would be highly welcomed. At the same time, while acknowledging this limitation, I also believe that the particular focus of this thesis on Russia brings much needed scale to R&D cooperation research that has to a large extent, in terms of emerging markets, focused on China and India. By employing primary survey data, it has also been possible to delve more deeply into Russian manufacturing firms’ R&D practices, and to create linkages to studies conducted in other countries’ contexts.
Second, while discussing the data, it also has to be acknowledged that the sample employed in this thesis is relatively high technology oriented and only focuses on a short period of time. Hence the long terms effects of R&D cooperation remain, to some extent, a mystery. To delve more deeply into strategic flexibility, reconfiguration of resources, and capabilities building, panel data would be most beneficial to determine the long-term effects of interfirm R&D cooperation. As so often in research, acquiring this type of data is challenging; nevertheless, it should be one of the priorities for researchers in the future.

This thesis has been a lengthy process, over which a number of issues have arisen that were not originally on the research agenda. However their importance has become clear along the course of the research. One of these aspects is leadership and management practices in R&D cooperation. Management, and especially the lack of good management practices, has been recognized as an issue in emerging market firms for quite some time. Even with the rapid development of these countries, their international integration, and improvements in their university and educational systems, they still lag behind developed countries (Bloom et al., 2012). In particular, the research conducted in publication 5 implies that Russian manufacturing companies’ management of innovation is connected to R&D cooperation and performance. Further studies focusing on the interplay between cooperative strategy and firm strategy would be most beneficial. The topic should also be approached from the perspectives of psychology, sociology, and organizational theory, such as the goal setting theory employed in publication 5, as they might reveal new insights on the dynamics of interfirm cooperation.

Finally, moving back to the big picture, although cooperative strategy has been acknowledged by academia as a particular focus area (e.g., the Strategic Management Society has a special interest group named Cooperative Strategies) there is still more to be done in developing adequate measurements with which to study the relationship between interfirm cooperation and strategy. For example, by definition, cooperation includes at least two parties. When asked, both of these two (or more) parties would state that they were in a cooperative relationship; however, each of their perspectives, approaches, and levels of participation might be totally different. Whereas one partner might find the relationship extremely beneficial, the other might consider it insignificant. Therefore, it would be extremely beneficial, if not critically important, for scholars to identify clearly which of these companies they are studying in order to understand the dynamics of the relationship and its impact on the focal firm. Furthermore, there are very few quantitative studies that simultaneously analyze both parties of a cooperation. With regard to this, we currently still lean heavily on a plethora of background assumptions.

Indeed, researchers’ work is never finished, and there are always new papers to be written. Existing theories will keep receiving new confirmation or they will be challenged by new paradigms that, in turn, increase our understanding on how business is conducted and managed. This thesis provides a perspective on R&D cooperation and cooperative strategy that hopefully will help us to understand the development of emerging market firms in the future; not only the reasons for their success, but also why many fail to fulfill their greatest potential.
7 REFERENCES


PART II: PUBLICATIONS
Publication 1

Hinkkanen, J., Jääskeläinen, M. and Väätäinen, J.

Cooperation for R&D in Russian enterprises: motives, drivers and outcomes

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Cooperation for R&D in Russian enterprises: motives, drivers and outcomes

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Abstract: Cooperation for research and development (R&D) has become a widely studied and distinctive characteristic in the discussion on innovation and competitiveness. So far, the R&D partnering ‘game’ has been played and studied in the connection of Western economies, but this study addresses it from the perspective of a developing economy. A survey of 206 Russian companies was done to analyse the level of cooperation for R&D in Russian firms. The aim was to find the link between increased R&D investments and collaborative actions taken by a firm. The results show that Russian firms use their R&D collaborations to a certain extent to gain knowledge absorption, and by so amend their own competencies and skills. A positive correlation between the ratio of R&D costs and cooperation with external partners for R&D was also found.

Keywords: R&D; research and development; cooperation; innovations; Russia; emerging economy.


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Cooperation has become a distinctive characteristic of research and development (R&D) and innovation in recent decades. Increased R&D competition, along with continually shorter product life cycles, has made the achievement of technological breakthroughs difficult (Kafouros et al., 2008). The innovation process, ideation and collaboration in new product development are becoming more and more open (Podmetina et al., 2011; Thrift, 2006). As Hagedoorn (2002) describes it, R&D partnering is nowadays a ‘game’ which is still dominated by companies in the most developed countries in the world. Collaborative R&D has been studied widely in the context of industries, e.g. in Germany (e.g. Becker and Dietz, 2004), the USA (e.g. Arora and Gambardella, 1994; Colombo, 1995) and the UK (e.g. Tether, 2002). It is to an extent surprising that it has not so far been discussed in the context of emerging economies, which are experiencing the strongest growth in R&D efforts and outputs even when looked globally. Moreover, the environment where economic activity takes place today is characterised in most countries by dynamism and complexity (Boujelpen and Fedhila, 2010; Rese and Baier, 2011), and this leaves the firms struggling with constant renewal of themselves (Sanchez-Gonzales and Herrera, 2010). Since this is, especially, true for economies of South-East Asia, China, Russia and South America, we believe that they should be taken into account in research efforts.

Cooperative networks are gaining importance as they seem to be the only way to succeed with technologically challenging and promising but also risky and expensive innovations (Rese and Baier, 2011). This study contributes to a better understanding of knowledge-intensive collaborations especially in the context of the rising economic power of Russia, and it indicates that companies should dedicate more resources into network management if they wish to improve competitiveness through innovative actions. Also the theoretical, methodological and practical implications of the study will be discussed and new insights brought to the field. This paper contributes to cooperative R&D research in emerging economies.

Current literature contains numerous studies on collaborative R&D mainly focusing on its benefits and possibilities (Hagedoorn et al., 2000; Sakakibara, 1997). It is widely acknowledged that collaboration for R&D offers a variety of advantages for firms (Aschhoff and Schmidt, 2008). Moreover, several studies have shown a distinctive connection with interfirm networks and firm outcomes. Firms team up with other institutions, such as companies, research centres and universities on local and in international level by establishing networks with them to develop something new that offers them competitive advantage (Arranz and Arroyabe, 2008).
The research questions of this paper to address the existing gap in emerging market research are: What is the level of cooperation for R&D in Russian enterprises? How does the amount of R&D input reflect on the amount of cooperation in Russian enterprises? What are the incentives for Russian firms to cooperate on R&D, i.e. do Russian firms cooperate to produce new innovations or do they cooperate to upgrade their capabilities and to stay competitive? To answer these questions, we first reviewed the theoretical literature on the driving forces for cooperation and thus established a conceptual framework for empirical study. Using this framework, we formed three hypotheses that were then empirically tested with a quantitative study of 206 Russian firms. The data revealed that many Russian enterprises have not yet grasped the idea of investing into R&D. Almost a fifth of the examined companies reported having no or only minor investments in R&D. We found a positive correlation between investments in own R&D and the number of cooperative R&D processes. Russian firms also involve partners in their R&D processes on various levels. Moreover, they wish to complement their own skills and capabilities in explicit parts of the process.

This paper is structured so that in Section 2, we present the theoretical literature on the reasons for R&D cooperation, thereby establishing the conceptual framework of reference and the working hypotheses to be tested. Section 3 focuses on the data used in the study and the chosen research methods. The findings are introduced and discussed in Section 4 and we finalise this paper in Section 5 with conclusions and implications.

2 Theoretical conceptualisation: the driving forces behind cooperative R&D

During past decades, the concept of innovation has experienced drastic changes as the focus of attention has shifted to the interactive nature of the innovation process and the role played by networks involving different organisations (Rese and Baier, 2011). Today, R&D partnerships are a specific set of different modes of interfirm collaborations, where two or more firms remain independent, but share some of their R&D activities (Hagedoorn, 2002). As innovation includes patterns of both formal and informal cooperative R&D, as a result of informal and formal innovation exchanges between firms, companies that are better positioned to access information should be more innovative (Bell, 2005).

R&D cooperation and innovation networks have been studied from a variety of theoretical perspectives. The most common ones include, e.g. industrial marketing, the game theory, the resource-based view and the social networks theory (for a summary see Ebers, 1997). Rather than going more deeply into the different theoretical aspects, we summarise the most important factors that, firstly, motivate a firm to cooperate for innovations and, secondly, enable them to take advance of cooperative networks. In the context of this paper, we define R&D cooperation as the collaborative actions taking place between two or more companies with an aim to provide combined innovation output. On the other hand, networks can be defined as a wide set of connected exchange relationships between firms (see e.g. Herrera-Bernal et al., 2002). In a flexible network, every member can focus on a specific service, production or process and share costs to gain quick response on new business opportunities (Indegaard, 1996; Podmetina et al., 2011). The importance of relationships and networks for business development has become widely acknowledged to a point where it has been described as a paradigm
change in the concept of competitive advantage from the company level to the network level (Lundberg, 2010).

Networking opportunities generally arise wherever firms draw on similar sources of information technology, capital equipment, labour supplies and materials, or face similar problems of distribution and marketing (Boujelpen and Fedhila, 2010; Dean et al., 1997). The R&D network is a way to access technological resources instead of acquiring or possessing them through the traditional path. Therefore, the partners take part in R&D networks to gain access to technological resources, external competencies, and thus improve their competitive position (Dhont-Peltrault and Pfister, 2011; Kortelainen et al., 2011). In a rapidly changing business environment, only a few companies can these days count on being self-sufficient and able to control the process from an innovative idea to a product, which includes a service and meets the customers. Interorganisational cooperation is considered to be good and worth encouraging (Chen et al., 2010; Schermerhorn, 1975). Networks are also seen vital to the discovery of new opportunities and to testing of developed ideas (Aldrich and Zimmer, 1986). Parts of the value chain are often outsourced to third parties, or governed cooperatively with the partners. New and old organisations alike cover only a part of the value chain where they operate and they always depend critically on their environment (Pfeffer and Salancik, 1978). Interorganisational relationships including R&D cooperation have become vital for success. Many scholars have even argued that cooperation is one of the key factors in the innovation process and management (e.g. Bullinger et al., 2004; Dhanaraj and Parkhe, 2006; Kokkonen and Kässi, 2010).

In situations of limited resources and technical and market uncertainties, firms that lack the critical assets needed in development and commercialisation innovations may prefer to acquire them through interfirm linkages (Ahuja, 2000a). From the opposite perspective, possessing these assets increases a company’s attractiveness to other partners, which do have technological capabilities and are able to introduce innovations, but lack the supporting assets (Teece, 1986). Whichever the situation is, cooperating to share R&D resources increases the strategic flexibility of the firm, when it can focus on its key competences and acquire secondary competences from partners. In the long run, focusing on core competences creates unique, integrated systems that reinforce the fit between firm’s diverse production and technology skills – a systematic advantage competitors cannot copy (Prahalad and Hamel, 1990).

In his very thorough study, Hagedoorn (1993) divided the motives for interfirm technology cooperation into three categories: motives related to basic and applied research, motives related directly to the innovation process and motives related to market access and search for opportunities. Even though, we do not wish to limit our research into any special group, noting their existence is important for understanding the underlying reasons for collaboration. On the firm level, the driving motivators for cooperation are most often identified as

1. decreasing R&D costs
2. intensifying technology life cycles
3. answering to the complexity of current technology
4. the globalisation of technologies and markets (Aschhoff and Schmidt, 2008; Coombs et al., 1996; Dodgson, 1993).
In emerging markets, the development of interfirm capabilities can be seen as a stepping stone for success (Hinkkanen and Väätänen, 2011). Moreover, the companies in those countries that focus on locally oriented value chains with existing capabilities are actually the poorest performing companies in emerging markets (Wu and Pangarkar, 2006). This applies to traditional business models as well as corporate level R&D. Especially, new and small ventures in developing economies are less resource-endowed compared to small- and medium-sized enterprises in developed economies, they have fewer internally generated sources of competitive advantages and they face increased costs of doing business because of an underdeveloped institutional infrastructure (Manolova et al., 2010). Earlier research has already established overall that emerging market companies tend to develop their skills, capabilities and R&D activities in small local networks (Cuervo-Cazurra and Genc, 2008; Hinkkanen and Väätänen, 2011), but the research has not specifically focused on R&D cooperation and knowledge transfers in the same networks.

In principle, cooperative R&D can lead to three different positive outcomes: technological success, such as product improvements, direct economic success, such as increased sales due to product innovations or indirect economic success, such as increase of productivity (Aschhoff and Schmidt, 2008). Figure 1 illustrates an R&D cooperative process with multiple participants based on existing literature and understanding. A firm signs a cooperative R&D arrangement with a partner or with some of the partners from its network. The partner can be, e.g. a customer, a supplier or a competitor. The firm contributes to the cooperation with its marketing, R&D and production resources, and together they combine an innovation input and engage in cooperative R&D activities. These activities lead to R&D outputs. During the cooperative R&D arrangement, knowledge transfer occurs, which companies are able to absorb into their own processes.

Figure 1 Cooperative R&D process (see online version for colours)

Source: Partly adapted from Aschhoff and Schmidt (2008) and Sanchez-Gonzales and Herrera (2010).
3 Hypotheses

This paper builds on an extensive survey of Russian firms. When discussing R&D cooperation, its motives, drivers and outcomes in a specific environment, we base our analysis on testing proposed explanations that rise from existing generalised literature. These proposed explanations, our hypotheses, are presented in the following.

3.1 Status of an R&D relationship

When networks result in different forms of concrete outputs, such as alliances, internationalisation and knowledge sharing, they can be considered being on a formal level. In formal networks, the participants have agreed on a certain extent of coordination of common activities and resources (Kingsley and Malecki, 2002). The number of any kind of collaborative relationships that a company establishes seems to have a positive relationship with innovation output (e.g. Shan et al., 1994), but whereas direct networks serve as sources of resources and information, indirect ties serve primarily only as sources of information. Both direct and indirect networks and ties influence the innovation output positively, but the impact of indirect networks is decreased by the number and level of the firms’ direct ties (Ahuja, 2000b).

Even though the number of formal partnerships correlates with the innovation output, it should be kept in mind that organising and managing cooperative networks is time-consuming and it binds the firm to the cooperation with the partner. Just simply increasing the level of cross-functional cooperation is not sufficient enough to improve cooperative processes (Gemser and Leenders, 2011). In practice, the number of joint ventures that are very formal by nature has decreased heavily, whereas various R&D projects and pacts have become more popular (Boujelpen and Fedhila, 2010; Hagedoorn, 1996; Narula and Hagedoorn, 1999). This leads us to our first hypothesis

Hypothesis 1: Firms wish to form formal relationships with their R&D partners but at the same time preserve their own flexibility in R&D processes.

3.2 Engaging in cooperative processes with partners

In the technologically complex industrial sectors, it is necessary to collaborate with the firms of other sectors to have access to new technological knowledge and complementary technologies, which makes it possible to follow different research ambitions (Bayona et al., 2001). Firms need to open themselves to external networks and relationships because without them they are in danger of missing too many important opportunities (Chesbrough, 2003). Actually, most new innovations happen when boundaries of knowledge domains are crossed (Carlile, 2004). Even for more diversified firms, it is necessary to cooperate with others to achieve scale and scope (e.g. Teece and Pisano, 1994; Tidd and Bessant, 2009).

It has been noted that ventures in developing economies use networks primarily to decrease costs and to develop the resources and capabilities needed for internationalisation (Manolova et al., 2010). Networks also help to identify new market opportunities and contribute to building market knowledge and thus these emerging market firms often seek partners who complement their own competencies in lead markets (Mort and Weerawardena, 2006). For companies to actively search and involve partners in their R&D processes will follow their specific ad hoc needs not only in
innovations, but also in innovation processes as well. The probability of an innovation enjoying success thus depends also on such aspects as the complementarity of the resources and not only the increase in R&D investments (Sinha and Cusumano, 1991). This takes us to our second hypothesis

**Hypothesis 2:** Firms engage other firms in their R&D processes in accordance with their own capabilities and skills.

The risks in innovation are mostly connected with its unpredictability. This includes not meeting the set goals, delayed introduction to market time or exceeding planned budgets. By combining the efforts of individual firms, R&D firms can reduce uncertainties and increase the likelihood of a positive result (Dodgson, 1992; Hagedoorn, 1993). Pérez-Luño et al. (2011) found that even in the most innovative industries, firms that generate innovations also balance their activities with a reliance on the adaptation of innovations developed by other firms. In relation to the R&D process, some firms may also decide to cooperate with the aim of absorbing as much of the available tacit knowledge as they can (Bayona et al., 2001; Waychal et al., 2011), and not be involved directly with the actions taking place in it. In this case, the cooperative partner can have other skills and capabilities to offer.

### 3.3 Absorbing knowledge transfer in R&D cooperation

Cooperation by itself does not automatically lead to better performance or a higher innovation output. To succeed in the partnership, a company must not only be capable of offering something into the process, but also it has to be able to absorb the incoming activities, the spillover effects of the cooperation (Lopez, 2008; Steurs, 1995). Absorptive capacity is the firm’s ability to identify, assimilate and exploit knowledge from the environment (Cohen and Levinthal, 1989). In the end, a firm’s performance will depend on how it can not only find, but also handle these external sources for innovations (Cohen and Levinthal, 1990). Various researchers have stated that in order for this absorptive capacity for R&D cooperation to exist, and for a company to be able to participate in R&D cooperation, it is necessary to have certain internal capacities in this area (Bayona et al., 2001; Cincera et al., 2003; Tether, 2002). Simplified, a firm has to have some R&D of its own. For example, Okamuro et al. (2011) found that Japanese firms making larger R&D investments tended to engage also in R&D cooperation. As most technologically, highly advanced firms tend to put more efforts into R&D, they will most likely also have a better absorptive capacity, as they already have an existing knowledge base. If R&D cooperation is used to complement in-house R&D, it is more likely that the adaptation of external resources within the framework of such interorganisational collaboration will encourage the firm’s innovation input (Becker and Dietz, 2004). This leads us to our third hypothesis

**Hypothesis 3:** A firm’s own R&D intensity has a positive effect on the level of interorganisational R&D cooperation activity.

Combining the theoretical understanding and our hypothesis, we are able to form logic to understanding firm level R&D cooperation in emerging economies. This logic aims at increasing the output of the original firm, whether it is financial, innovative or technological. The connections between the theory, hypothesis and output are shown in Figure 2.
Data and method

The empirical study which this paper builds on was conducted between November 2009 and February 2011. It included altogether 206 Russian companies from different industries. The interviews were conducted as structured interviews and the respondents were holding key positions in their companies and were involved with top level management or the innovation department. A number of criteria were used to select the companies, including the region, industry and annual revenue of the company. The sampling method was based on the stratified sample approach, which means not a representative, but a meaningful structure of the sample. The questionnaire consisted of 110 questions (some questions included two or more subquestions). The questionnaire structure was developed according to the recommendations for conducting innovation surveys (Frascati Manual, 1993; Oslo Manual, 2007) and using the constructs and scales for analysing cooperation of the companies with internal and external partners, international activities of the companies and the number of other indicators. Due to the selection of key respondents, it was possible to obtain information on the innovation activities of the companies and on the cooperation with external partners in relation to R&D.

The interviewed companies were from various industries as follows: 27.2% represented production and construction, 10.2% chemical industry, 13.6% machinery, 5.3% information technology, 4.9% telecommunications, 5.3% oil industry, 17.5% metallurgy and 16% reported being from other industries. Out of the 206 companies in the sample, 1.9% assessed their economic situation as ‘near bankruptcy’, 10.7% as ‘bad’, 53.4% as ‘satisfactory’, 28.6% as ‘good’, and only 3.9% as ‘excellent’.

The variables used to study the involvement of external companies in the firms’ R&D processes (cooperation indicators, see Table 1) were measured with a Likert scale from 1 to 5, with values from 1 ‘never’ to 5 ‘on a regular basis’. Using the Likert scale, subjugates the results to subjectivity by the respondents, but it also empowers comparisons between different variables. The variable describing the ratio of R&D costs and company sales volume in percentages was measured with a nominal scale. As an independent variable, we employed the ratio of R&D costs and company sales volume in percentages. From the answers, we created a variable that had three categories, the ratio...
between 0% and 1.5%, the ratio between 1.5% and 3% and the ratio of over 3%. According to OECD definition, a company that invests 4% or more of its sales volume in R&D qualifies to be titled as a high-tech firm. For the Russian firms in the context of this study, we set the limit for a high technology firm to 3%. In our survey, 18.4% of the companies belonged to a group with no or only a few R&D activities. Around 33% of the firms belonged to the middle group with some R&D activities and the last 34% belonged to a group which actively invests in R&D, thus being titled high-tech firms. Even though the majority of enterprises were active in R&D or shared at least a moderate interest towards it, we still found the group of few investments in R&D to be surprisingly large. The deviation is presented in Figure 3.

To test our hypothesis, we used three survey questions as dependent variables that indicated the amount of cooperation. These questions were divided into separate statements that the respondents had to evaluate with the Likert scale. The number of statements in each question varied from 7 to 9. The answers to these statements were then cross-referred with the R&D ratio to find correlations. The main variables and their roles are presented in Table 1. The statements under these main questions that the respondents had to evaluate are presented in Section 5.

By using cross-tabulation, we identified correlations between our independent variable and the cooperation indicator statements. The correlations were calculated with Spearman’s rank correlation coefficient (rho) with significances (sign) of 0.05 and 0.01. The dependency between the variables with strong correlation was then tested with Pearson’s chi-square test analysis.

**Figure 3** The ratio of R&D costs and company sales volume
Table 1  Summary of the used variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of statements</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>v0  What is the ratio of R&amp;D costs and company’s sale volume (%)?</td>
<td>–</td>
<td>Independent variable</td>
</tr>
<tr>
<td>v1  What is the form of cooperation with external partners?</td>
<td>9</td>
<td>Dependent variable (cooperation indicator)</td>
</tr>
<tr>
<td>v2  In what stages of R&amp;D does your company usually involve external partners to R&amp;D processes?</td>
<td>7</td>
<td>Dependent variable (cooperation indicator)</td>
</tr>
<tr>
<td>v3  In what cases is it most common to involve external partners in R&amp;D processes?</td>
<td>7</td>
<td>Dependent variable (cooperation indicator)</td>
</tr>
</tbody>
</table>

5 Results and discussion

The statements, that we based our results on, were easy to comprehend and unambiguous. We formed the statements so that they would give a clear picture of the whole field that was studied, and thus they varied from each other notably. For example, when analysing the form of cooperation with external partners, the statements (v1) varied from collaboration with trade associations (vague cooperation) to mergers and acquisitions (intensive cooperation). The statements were evaluated by the respondents on the Likert scale of 1 to 5, 1 being ‘never’ and 5 being ‘on a regular basis’. The same method was applied for the other two dependent variables (v2 and v3).

5.1 Testing the status of an R&D relationship

Addressing the first hypothesis (H1) in the first correlation test done with the cross-tabulation, we found a positive correlation between firms with higher own R&D ratio and the statements collaboration within trade associations (rho 0.177, sign. 0.028), functional cooperating (rho 0.192, sign. 0.015) and a very strong correlation with partnerships (rho 0.279, sign. 0.000) (Table 2). The direction of the correlation is that the R&D ratio influences the form of the cooperation.

The results imply that greater R&D investments influence the committed partnerships so that they are more flexible by nature. Moreover, flexibility in R&D partnerships is tied into a more general demand for flexibility in many industries, where interfirm competition is affected by increased technological development, innovation races and the constant need to generate new products (Hagedoorn, 2002). Being aware of the environment and markets of the firm through cooperation supports the notion of openness in the innovation and R&D process. Openness and flexibility have been addressed by other scholars as well. The R&D processes are granted more autonomy and empowerment by their original owner, and as these processes are integrated into cooperative activities and R&D networks, their flexibility is improved and creativity flourishes (Gassman and Zedtwitz, 1999).
Table 2  Correlation between R&D ratio and the form of cooperation (v1)

<table>
<thead>
<tr>
<th>The form of cooperation with the external partners</th>
<th>Frequency of involvement (mean, scale 1–5)</th>
<th>Significance</th>
<th>Pearson’s chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collaboration within the trade association</td>
<td>2.2078</td>
<td>X</td>
<td>0.016</td>
</tr>
<tr>
<td>Functional cooperation (marketing, supply, etc.)</td>
<td>2.6250</td>
<td>X</td>
<td>0.035</td>
</tr>
<tr>
<td>Subcontracting</td>
<td>2.5944</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outsourcing</td>
<td>2.2914</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Licenses</td>
<td>2.1675</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Franchising</td>
<td>1.710</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partnership</td>
<td>2.7204</td>
<td>X</td>
<td>0.007</td>
</tr>
<tr>
<td>Joint venture</td>
<td>1.7931</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mergers and acquisitions</td>
<td>1.5705</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comparing the results of the correlation test and the hypothesis that was set in the beginning on the basis of the existing literature, we can conclude their accuracy. As to H1, based on our results of the form of cooperation activities, we can see implications that it holds true. According to the cooperative theory, contractual R&D partnerships enable companies to increase their strategic flexibility through short-term joint R&D projects with a variety of partners (Hagedoorn, 2002). Russian firms that are involved with R&D, and thus can be regarded as having stronger tendencies towards cooperative processes, wish to preserve their own flexibility.

Emerging economy markets can be regarded as highly volatile, as they are often strongly influenced by the prices of raw materials, like, e.g. in the case of Russia by the price of oil. Flexible positioning for cooperative actions empowers the firm to change its strategy according to the developments in its environment. Actually, this relative flexibility of cooperative agreements has been underscored as one of the main reasons for their remarkable development (Kotabe and Swan, 1995). Then again a formal relationship helps the participating firms to agree on the inputs and outputs of the process and thus set the goals for cooperation, and in the long term this helps the allocation of resources. It also clarifies the ownership of intellectual property rights.

5.2 Testing the engagement in cooperative processes with partners

For testing the second hypothesis (H2) in the correlation drive between the R&D ratio and involvement stage of external partners, we found a correlation with preliminary development and project planning statement only (Table 3). However, as Smirnova et al. (2009) state, the role of external cooperation is still very important for the most successful firms.

The companies with higher investments in R&D are also more likely to be involved in innovation activities with their partners. If the company has more R&D of its own it can also be considered as a potential candidate for other firms who are looking for firms to form a partnership with. Then again, when companies want to complement their own skills and capabilities, this is decided more in case-by-case situations. The same kinds of results have been found in several studies with different countries and industries, e.g. the German car industry (Becker and Dietz, 2004) and Dutch manufacturing and service industries (Belderbos et al., 2006).
Table 3  Correlation between R&D ratio and involvement stages (v2)

<table>
<thead>
<tr>
<th>Stage of R&amp;D to involve external partners</th>
<th>Frequency of involvement (mean, scale 1–5)</th>
<th>Significance</th>
<th>Pearson’s chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Idea creation</td>
<td>2.5212</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Preliminary development and project planning</td>
<td>2.4842</td>
<td>X</td>
<td>0.046</td>
</tr>
<tr>
<td>Preliminary assessment of the project</td>
<td>2.5185</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design and engineering development</td>
<td>2.3894</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Testing the prototype or market testing</td>
<td>2.6963</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Launching the product</td>
<td>2.5873</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After sale services</td>
<td>2.4486</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

On the basis of our study, H2 holds true. In Russia, the stage where firms with R&D involve external partners into their processes is highly variable. As the only correlation could be found with preliminary development and project planning, this can imply that, in general, Russian firms lack capabilities in that sector and these lacks have to be replaced with cooperating. Also logically, the preliminary development phase in R&D is a critical step where firms need to be able to produce lots of new ideas and plan ahead. This requires wide resources and knowledge that can be acquired through cooperative arrangements.

5.3 Testing knowledge transfer in R&D cooperation

In testing the third hypothesis (H3), we found a significant positive correlation between the statements mutual development of new products (rho 0.234, sign. 0.002), modification and improvement of the existing products and services (rho 0.263, sign. 0.001) and organisational changes and improvements of business processes (rho 0.270, sign. 0.000) in the correlation test between the firm’s own R&D cost ratio and the statements relating to the process of involvement of partners in the R&D (Table 4). The direction of the correlation was that the R&D ratio influences the involvement.

The results imply that in Russia, when a company increases its own R&D investments, it is more likely also to develop its own skills and capabilities through mutual projects. Actually, earlier research has stated that the role of cooperation depends heavily on the type of innovations that they are after (e.g. Smirnova et al., 2009). The companies in our survey seemed to be able to reply to the competition in their local market and stay one step ahead of their competitors. This supports the resource-based view (Barney, 1991; Wernerfelt, 1984) and the dynamic capabilities view (Teece and Pisano, 1994).

Our third hypothesis on the R&D intensity of Russian firms holds true. On the basis of the above-mentioned cross-references and the resulted significant correlations, we were able to identify that Russian companies with R&D input of their own are more likely to cooperate with partners in R&D processes. The cooperation expresses itself in different forms, depending on the current needs of the companies.
Table 4  Correlation between R&D ratio and involvement of external partners (v3)

<table>
<thead>
<tr>
<th>Cases to involve external partners in R&amp;D processes</th>
<th>Frequency of involvement (mean, scale 1–5)</th>
<th>Significance</th>
<th>Pearson’s chi-square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mutual development of the new products</td>
<td>2.8418</td>
<td>x</td>
<td>0.004</td>
</tr>
<tr>
<td>Modification and improvement of the existing</td>
<td>2.9536</td>
<td>x</td>
<td>0.018</td>
</tr>
<tr>
<td>Technologies development</td>
<td>2.8082</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buying technologies</td>
<td>2.4816</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modification of existing technologies</td>
<td>2.8324</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisational changes and improvements of business processes</td>
<td>2.5767</td>
<td>x</td>
<td>0.014</td>
</tr>
<tr>
<td>Marketing innovations (implementing new methods of promotion, brand enhancing, etc.)</td>
<td>2.5751</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6  Conclusions and implications

In this study, we set out to understand the level of interorganisational cooperation for R&D in Russian enterprises. We wanted to find out how the increase of internal R&D shows in the level of cooperative R&D affiliations. We based our study on a survey of 206 Russian companies from various industries and different backgrounds. With the help of an extensive literature review, we were able to identify the main developments that have occurred in cooperative R&D research, as well as to understand the motives for embarking on such ventures. On the basis of the literature review, we created three hypotheses and tested them for correlations and significances.

Even though Russia has been developing fast as an economy, Russian companies are still not widely engaged in R&D, as almost 20% of our respondents reported that they had no R&D activities, or only minor ones. According to our survey, those companies that are actively investing in R&D are also more likely to cooperate with various partners in the process. This implies that the theoretical models for R&D cooperation apply in the Russian business environment as well, although not as strongly as in western countries. A remarkable finding is that there are hardly any significant correlations between R&D activity and the stages where cooperative partners are brought into the process. Based on the survey and existing knowledge, it seems that by cooperating Russian enterprises are looking for spillover effects through which they can upgrade their own skills and capabilities. This is a major contribution to the existing emerging market literature and will help to understand the behaviour of firms in practise, and also gives insights for researchers who seek to find answers to the success of emerging market firms.

Firms employ formal but not tight relationships with their chosen partners. Firm’s that invest in own R&D are likely to set up partnerships and functional cooperation activities, and have close ties with public institutions, such as trade organisations. This implies that the product-to-market perspective is valued by R&D-intensive firms. Cooperation in the form of subcontracting, outsourcing and joint ventures, all of which require a great amount of dedication and involvement, are not popular choices for cooperative actions. Actually, strong moves, such as mergers, acquisitions and
franchising, are rarely employed as a means to cooperate for R&D. Russian firms want to keep the strings in their own hands.

Our study implicates that Russian firms should put more resources into first setting up their own R&D departments or at least activities, and secondly to increase the level of their own R&D so that it attracts other firms as potential partners. The firms should also have a positive, explorative attitude towards R&D cooperation and improving own capabilities through spillover effects should not be the primary goal. A fruitful partnership needs two active players that both have something to offer to the other.

In the future, additional research should be dedicated to analyse the real outputs of the cooperative R&D process. Some good indicators have already been developed, but they have not yet been implemented in emerging economies. The results should then be compared with the results received from developed economies. Nevertheless, we are certain that our study has been able to pinpoint several new important aspects of cooperative R&D and we hope that this research inspires a new wave of research into R&D functions in emerging economies.

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The Role of Competitive Pressure in R&D Cooperation: Evidence from Immature Markets

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The role of competitive pressure in R&D cooperation: evidence from immature markets

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Abstract: Competition has been regarded as a cornerstone behind innovativeness, but the relationship between competition and R&D cooperation has been overlooked. We study the topic in the context of the emerging economy of Russia. The findings are based on an analysis of countries’ competitiveness rankings and on a survey of 206 Russian firms and their innovation activities. On the basis of the results, the source of competition is important when looking at an R&D cooperation process and its results. Firms tend not to employ international R&D cooperation before they are confronted by international competition. After confronting international competition, it shows across the whole R&D cooperation process and the company’s perception of its success. We conclude that in immature markets it is crucially important to increase the level of international competition in order to improve the organisational capabilities and skills needed in R&D cooperation.

Keywords: competition; R&D cooperation; innovations; Russia.


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1 Introduction

Competition has been a carrying force in economic thinking for centuries. It has been proposed that competition forces companies to allocate resources in the most productive way, and that it encourages firms towards constant improvements in efficiency (Schumpeter, 1934). Competition has also been regarded as a cornerstone behind innovativeness and it has attracted scholarly attention, and debate, throughout the past decades (e.g., Aghion et al., 2005; Castellacci, 2011; Boone and van Dijk, 1998). In the current turbulent environment, technologically oriented firms are struggling with the increased costs of producing new innovations, and cooperation seems to be the only way to succeed with technologically promising, but also high risk and high expense innovations (Rese and Baier, 2011). If competition is essential for innovation, as it seems to be, and today technological innovation requires more and more often R&D cooperation, there should be a link between competition and R&D cooperation as well. The interaction between R&D cooperation and product market competition has been dealt with in the literature mostly from the economic and policy perspective (e.g., Li, 2012; Martin, 1995; Wu, 2012). There are still many unanswered questions from the strategic management perspective, however.

Russia as an emerging economy stands on the transformation of developing new innovation activities and by this it challenges traditional innovation and competitiveness theories (Podmetina et al., 2011). Furthermore, emerging markets are more and more often the source of innovative and competitive firms, and Russia is no exception. Russia’s position as one of the fast growing emerging markets has already been recognised in the business community, but so far it has represented only a fraction of emerging market research, where China and India are by far the dominating geographical areas (Filippov, 2010; OECD Science, Technology and Industry Scoreboard, 2011). Russia as a relatively new market economy with a rigid, centrally planned economic background and immature markets forms an excellent setting for studying the relationship between competitive pressure and cooperation.

In the traditional competition literature some researchers state that there is no evidence of a generally valid relationship between competition and innovation activity (Baldwin and Scott, 1987; Kamien and Schwartz, 1982). These studies are mostly outdated, however, and do not take the complex nature of innovation into account. Empirical evidence has for example showed that competitive pressure may in fact decrease monopoly rents, and thus reduce firms’ incentives to engage in R&D activities (Castellacci, 2008). On the other hand, Aghion et al. (2009) found that product market competition can boost R&D investments, thus influencing the innovation input of the firm. From the cooperation point of view, there is a significant amount of literature examining the influence of strategic alliances on innovation activities and outcomes (e.g., Brown and Eisenhardt, 1995; McGill and Santoro, 2009; Li, 2012), and their positive impacts seem quite evident (Wu, 2012). Still, neither the competition perspective nor the perspective of strategic alliances explains the dynamics between the two, which again
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stresses the existence of a research gap. To understand fully what drives firms to cooperate on R&D and with whom, it is essential to understand the role of the external environment in the R&D decision making process.

This paper contributes to a wider understanding of the external factors that push companies toward increased innovation activity and R&D cooperation in emerging markets. The paper provides answers to two research questions:

1. how does the source of competitive pressure influence the decisions to cooperate on R&D?
2. how does the pressure from different competitors influence cooperative R&D processes and their outcomes?

We employ a survey data collected in 2009–2010, which covers 206 Russian firms from various industries and geographical areas. We found that the intensity of competition is not the only thing that matters, but also the source of competition is important when looking at the R&D cooperation process and its results. Russian firms do not employ international R&D cooperation before they confront international competition. Secondly, after confronting international competition this shows across the whole R&D cooperation process and the company’s perception of its success. Firms that have international competition also employ R&D cooperation more often and they are more likely to reach better results from that cooperation. The paper is structured as follows: Section 2 is a literature review of the relationship between competition, cooperation and innovation, Section 3 describes the special characteristics and development of the Russian market, Section 4 contains the description of the data and the employed method, and Section 5 focuses on the results of the statistical analysis and discussion. The paper ends with Section 6 and the conclusions.

2 The multidimensional relationship between competition, innovation and cooperation

Market competition through technological change has been at the core of most theoretical paradigms, including for example the neo-Schumpeterian and evolutionary economics analysis (Nelson and Winter, 1982). The basic presumption is that firms undertake innovation because they seek profitable opportunities that arise from monopoly power (Grossman and Helpman, 1991; Romer, 1990). Numerous scholars have conducted empirical analysis of the relationship between innovation and competition (e.g., Aghion et al., 2009; Geroski, 1994; Wu and Pangarkar, 2010), all pointing to a positive correlation between competition, innovation output and growth. Various frameworks have also been developed to explain the relationship between the two concepts, resulting in different models, such as the inverted-$U$ (Levin et al., 1985; Li, 2012) and the bell-shape (Aghion et al., 2005). Scholars using empirical evidence have also found for example that in some industries and markets, competitive pressure may in fact decrease monopoly rents, and thus reduce firms’ incentives to engage in R&D activities (Castellacci, 2008). Other studies have identified that periods of increased competition correspond to greater innovation output, but the same cannot be unambiguously said for periods of cooperation (Hoekman and Javorcik, 2006). In sum, the literature on the
relationship between competition and innovation is fragmented and disordered at best. No clear implications exist of how new firms from emerging markets position themselves, and how they react to various forms of competition.

In emerging markets, the competitive challenges posed by global firms and entries by multinationals have increased competition, correlating simultaneously with improved financial performance of some local firms that are ready to develop their skills and capabilities (Dunning, 1993; Wu and Pangarkar, 2006). On the other hand, those firms that are slow to react to competition, and continue to focus on locally oriented value chains are the lowest performing firms in emerging markets (Wu and Pangarkar, 2006). Comparative experiences and even logics suggest that an effective means of improving long-term economic health in all markets should come from cooperating more (Kenworthy, 1996). Competitive advantages in emerging market firms are often actually based on network relations (Boujelpen and Fedhila, 2010; Wright et al., 2005; Johanson, 2008) rather than pure internal R&D activities (Hinkkanen and Väätänen, 2011). No matter how competitive the environment, if the innovating firms do not have the necessary R&D capabilities in-house, they need to engage in various forms of restrictive contracts with the providers of these complementary assets (Jorde and Teece, 1990).

What combines and links innovation with cooperation and competition is knowledge. After all, innovation is about turning knowledge into economic activity (Tang, 2006), and cooperation is about sharing and acquiring this knowledge through partnerships. According to the knowledge-based view, knowledge-based competitive advantage is sustainable because the more a firm already knows, the more it can also learn (Zack, 1999). Further, by possessing knowledge a firm becomes an attractive partner in R&D for other firms. Current competitive pressure drives firms to introduce higher-quality products faster and more cheaply than their closest rivals (Nieto and Santamaria, 2007). Thus knowledge must be acquired and turned into economic gains more and more rapidly, stressing the importance of partnerships and knowledge networks. An organisation acquiring knowledge from outsiders can strengthen its core competences and also develop its own competitive advantage (Liao and Hu, 2007). As market competition constantly intensifies, firms’ performance becomes heavily influenced by the actions performed by their competitors. In such circumstances firms have again a greater need for collaborating with each other, in order to reduce competitive uncertainty and to lower the risks associated with innovation (Uzzi, 1997). Intensifying competition this way creates a self-enforcing circle (Figure 1), which pushes firms to adopt cooperative strategies, as it helps the firm to gain new knowledge of the markets and enhance its organisational competence (Ang, 2008).

Figure 1  Competition, R&D cooperation and innovation (see online version for colours)
Competition is naturally a double-edged sword. Research has identified various challenges associated with technological and R&D cooperation related to knowledge transfer. These are, for example, opportunistic behaviour, learning races and knowledge leakages (Das and Teng, 2000). It has been further proposed that these challenges are stimulated by intense market competition (Das and Teng, 2000). According to Dutta and Weiss (1997), protection of tacit technological knowledge from potential opportunism is important for most technologically innovative firms. Thus, intensified competition can have a strong influence on the outcomes of R&D cooperation if protectionism wins over collaborative learning. Also under high environmental uncertainty, such as in an intense competitive setting, organisations may acquire knowledge from their divisions or subsidiaries (Liao and Hu, 2007) rather than through inter-firm collaboration. It is also possible that knowledge providers will protect the knowledge related to their core competence. Therefore, firms may wish to develop knowledge by themselves. Finally, collaboration often means high costs because of monitoring, enforcing and regulating each individual agreement. This may further prevent firms from opening their R&D processes for others. In sum, even though many researchers acknowledge competition as an important push factor towards innovativeness, the above-mentioned challenges have convinced many scholars that intense rivalry is an obstacle for the adaptation of openness and cooperative activities between firms (Chesbrough, 2007; Drechsler and Natter, 2012).

Research on the sources of competition in emerging economies has predominantly focused on multinational enterprises (MNE), and foreign direct investment effects of MNEs in host countries (Buckley et al., 2002; Sinai and Meyer, 2004). Depending on the MNEs’ entry strategies, competition can also originate from exports (Johanson and Vahlne, 1977). Also regional or local competition can be fierce (Peng et al., 2004), and firms rely on local advantages such as networks (Lu and Xu, 2006). Especially in large economies, such as in Brazil, China, India and Russia, regional or local competition has to be accounted for due to large regional differences (Chen et al., 2007). Regardless the sources of competition, firms tend to view and react to competition individually (Chen, 1996). The research framework based on the existing literature is presented in Figure 2.

**Figure 2** Research framework for this paper

3 Competition, innovation and business sophistication – the immaturity of the Russian market place

Innovation, performance, and competition depend significantly on the maturity of the market (Dosi, 1982). Russia went through an economic system reform from a centrally
planned to a market economy in the 1990s. So, even though the Russian GDP per capita measured at purchasing power parity is currently relatively high (19,891 USD in 2010 according to the World Bank) compared to many other emerging markets, the market can hardly be regarded as a mature one. From the perspective of Russian R&D and the whole innovation process, change in the economic system has had deep and long lasting influences (Gokhberg and Kuznetsova, 1999; Klochikhin, 2012). During and after the system change, the general uncertainty in the operative environment of Russian firms led to coordination failures and short-term orientation, which again inhibited long-term innovation activities in many firms (Radosevic, 2003; Yegorov, 2009). Moreover, the Russian institutional environment actively prevented entrepreneurial development (Aidis et al., 2008), which is essential for innovativeness and cooperation. Progress was sluggish at best. According to Dyker (2001), and also noted by the OECD (2011) later on, particularly R&D collaboration was hampered by the weakness of the Russian business environment, the general sense of political instability in the country, and by the fear that firms’ knowledge of science and technology will be stolen. Moreover, Dyker states that explicitly R&D -oriented policies can do little to solve such encompassing problems. Even with many structural reforms, in the beginning of the 21st century, R&D was still carried out outside enterprises in independent but state-owned R&D institutes which based their operations on R&D contracts with different industries (Gianella and Thomson, 2007; Jääskeläinen et al., 2013; Radosevic, 2003). With little or no competition, private ownership in Russia had mainly created rent-seeking oligarchs instead of R&D -oriented growth ventures (Sedaitis, 2000; Hinkkanen et al., 2012).

The Global Competitiveness Report (GCR, 2012) organised annually by the World Economic Forum (WEF) assesses the level of economic development and competitiveness in 144 countries (in 2012), allowing longitudinal comparisons between nations. In the context of this paper, the GCR of 2012 provides three interesting indicators for analysis. Good market efficiency measures both domestic competition and foreign competition. The business sophistication indicator measures two elements that are intricately linked: the quality of a country’s overall business networks and the quality of individual firms’ operations and strategies. Finally, the innovation indicator assesses the environment that is conducive to innovative activity, supported by both the public and private sectors.

As the number of countries in the GCR varies annually, we have calculated a relative ranking for Russia by dividing its real rank in each indicator with the number of participating countries. The actual score that Russia scores in each indicator is evaluated on a scale of 1 to 7 (1 = lowest possible, 7 = highest possible). Looking at how Russia ranks in the three indicators globally we can see that the situation in Russia is rather weak (Figure 3). Russia ranks very low on both the goods market efficiency (competition) and business sophistication (networks and strategy). The innovation (R&D) indicator is roughly the world average or slightly better. What is concerning is that the relative ranking in all three indicators has deteriorated between 2006 and 2012. The most significant change can be observed in the actual scores that Russia gets in each indicator. Between 2006 and 2012 the score of the goods market efficiency indicator has come down from 4.2 to 3.6, business sophistication from 3.8 to 3.3, and the innovation indicator from 3.3 to 3.0, although peaking at 3.4 in 2008 and 2009.

Some presumptions can be made on the basis of the GCR ranking. First of all, the goods market efficiency and local competition in Russian markets is low in global comparison, thus the pressure to innovate is likewise lower than in many other countries.
As the scores represent averages, there are probably considerable differences between industries and firms, as most likely some industries and firms face considerable pressure (such as the IT industry which tends to be global by nature). Secondly, as the business sophistication in Russia is low on average, firms that operate only on local markets and do not face any form of international competition are also most likely not to employ R&D cooperation. This is supported by the earlier findings of Dyker (2001) that the sectors where firms in transitional countries have traditionally employed strategic and technological alliances are low tech sectors where R&D is hardly a key business area. Finally, the relatively good ranking in the innovation indicator shows that the capacity to produce innovations does exist, but it is either focused poorly, or is in the hands of a few organisations.

Figure 3  Russia’s GCR rankings and scores in 2005–2012, selected indicators (see online version for colours)

Note: The relative rank has been calculated based on the yearly rank of Russia in each indicator and the total number of participating countries each year. 0.01 in the best country, 1 = the worst country

4 Data and method

The data used in this research was collected in 2009–2010. It covers 206 Russian firms that were selected from different industries and geographical areas using numbers criteria. The size of the participating companies was determined on the annual revenue. Information was received by structured interviews, which were recorded and transcribed to ensure the reliability of the answers. The questionnaire consisted of 110 questions (some including two or more sub-questions) and it was developed according to the recommendations for conducting innovation surveys (see the Frascati Manual, 1993; Oslo Manual, 2007).

In the context of this paper, it needs to be acknowledged that the relationship between collaboration and product innovation can be moderated by the technological characteristics of the industry (Sampson, 2007). For example Wu (2012) proposes that the positive effects of collaboration on firms’ innovativeness will increase in high-tech
industries due to the fact that high-tech industries are characterised by a rapid rate of technological change and that the learning effect of collaboration on product innovation is stronger in them. To take this into account, our survey covers various industries in Russia and allows thus an unbiased perspective on the relationship between competition, collaboration and innovation. The interviewed companies were from various industries as follows: 27.2% represented production and construction, 10.2% chemical industry, 13.6% machinery, 5.3% information technology, 4.9% telecommunications, 5.3% oil industry, 17.5% metallurgy, and 16% from other industries. In our survey the share of companies associated with R&D activities was also high; 78.9% of the respondents had at least some level of internal R&D. The intensity of R&D in the companies was also high when measured by the ratio between the company’s R&D costs and the sales volume; 34% reported it to be over 3%, which corresponds with the OECD definition of a high-technology firm.

The leading premise for our empirical testing was the positively correlating relationship between competition and innovation, which previous literature has largely demonstrated (e.g., Geroski, 1994; Blundell et al., 1999). Our descriptive illustrations of the data sample also underline this view. Adopting such a presumption, we took a more detailed approach for our analysis by focusing on the influence of different competitive pressures for external R&D cooperation. From the extensive data we hoped to find out how certain aspects of R&D cooperation differ along the sources of competitive pressure. We used quantitative methods to analyse bivariate correlations between key variables (Table 1).

**Competitive pressure** was measured by three different aspects. The respondents were asked to evaluate to what extent pressure from Russian competitors, pressure from foreign competitors in Russia, and pressure from competitors on the international market influenced their decision to implement innovation (scale 1 to 5). The sources of competitive pressure were then analysed in relation to indicators of external R&D cooperation. The respondents were asked to assess the results of R&D cooperation (impact on 7 aspects, see Table 2), the experienced importance of different R&D partners (16 alternatives), the frequency of involving external R&D partners by case nature (7 cases), and the frequency of involving external R&D partners by the stage of R&D (7 stages). All indicators were scaled 1 to 5.

**Table 1** Variables and indicators used

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. of indicators</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure from Russian competitors</td>
<td>1</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Pressure from foreign competitors in Russia</td>
<td>1</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Pressure from competitors on international</td>
<td>1</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Assessed results of R&amp;D cooperation</td>
<td>7</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Experienced importance of R&amp;D partners</td>
<td>10</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Cases to involve partners into R&amp;D</td>
<td>7</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Stages to involve partners into R&amp;D</td>
<td>7</td>
<td>Likert scale 1–5</td>
</tr>
<tr>
<td>Controls</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Firm size</td>
<td>No. of employees</td>
<td></td>
</tr>
<tr>
<td>Profitability</td>
<td>Sales</td>
<td></td>
</tr>
<tr>
<td>R&amp;D intensity</td>
<td>Ratio of R&amp;D costs and sales</td>
<td></td>
</tr>
</tbody>
</table>
We then ran bivariate correlations for a two-tailed test of significance using Pearson’s correlation coefficients. That is, the correlations between different sources of competitive pressure and different indicators of external R&D cooperation were captured. We adopted a typical significance level of 95% for the analysis. Control variables were used to check the possible influence of firm size (number of employees), sales profitability, and R&D intensity (ratio of R&D costs and sales volume) to the observed significant correlations between the key variables. Partial correlation analysis to control these firm characteristics is presented in Appendix.

5 Results and discussion

As Tang (2006) points out, firms’ perceptions about their competitive environment is important for innovation. Furthermore, based on the perception and on the specific innovation activity that the firm employs, the relationship between innovation and competition can be either negative or positive. Following this typology, our analysis based on the data helped us to understand the competitive situation as experienced by Russian firms, and by so also their innovation activities. In our survey, most of the respondents confronted both local and international competition (Figure 4), which in itself denotes the assumption of Russia as a closed market with no competitive push towards efficiency and innovativeness.

However, even with competition, if market efficiency is low it is logical that the motivation to implement R&D increases only when the firm is confronted by international competitors. Figure 5 illustrates how different competitor settings influence the ratio of firms implementing R&D in our data. The differences between the ratios are not colossal but they certainly show the trend in firm-level R&D when the competitive landscape changes. Firms with no competitor implement less R&D than those with international competitors, firms with domestic competition positioning in the middle.

In order to understand the link between competition and cooperation we estimated the impact of different forms of competitive pressures on different forms of R&D cooperation and the results of this cooperation (Table 2). There are high significances especially when comparing the international competition on the results of R&D cooperation and on the stages to involve partners into firms’ R&D processes. From the opposite perspective, the domestic local competition correlates with very few R&D cooperation indicators.
Figure 5  The ratio of R&D implementation in firms confronting different competitors (see online version for colours)

Table 2  Bivariate correlations

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of pressure to innovate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Pressure from Russian competitors</td>
<td>3.589</td>
<td>1.328</td>
<td>.040</td>
<td>.249**</td>
<td>.222**</td>
</tr>
<tr>
<td>2 Pressure from foreign competitors in Russia</td>
<td>2.875</td>
<td>1.476</td>
<td>.159**</td>
<td>.234**</td>
<td>.162*</td>
</tr>
<tr>
<td>3 Pressure from competitors on the international market</td>
<td>2.613</td>
<td>1.430</td>
<td>.190**</td>
<td>.256**</td>
<td>.278**</td>
</tr>
<tr>
<td>Assessed results of R&amp;D cooperation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 More successful product development</td>
<td>3.665</td>
<td>1.095</td>
<td>.070</td>
<td>.232**</td>
<td>.227**</td>
</tr>
<tr>
<td>5 New knowledge</td>
<td>3.694</td>
<td>1.127</td>
<td>.154</td>
<td>.272**</td>
<td>.263**</td>
</tr>
<tr>
<td>6 Access to new technical expertise</td>
<td>3.382</td>
<td>1.186</td>
<td>.168</td>
<td>.216**</td>
<td>.217**</td>
</tr>
<tr>
<td>7 Access to new markets and clients</td>
<td>3.406</td>
<td>1.220</td>
<td>.095</td>
<td>.234**</td>
<td>.162*</td>
</tr>
<tr>
<td>8 Decreasing R&amp;D risks</td>
<td>3.358</td>
<td>1.225</td>
<td>.116</td>
<td>.175</td>
<td>.115</td>
</tr>
<tr>
<td>9 Opportunity to concentrate on core competences</td>
<td>3.492</td>
<td>1.165</td>
<td>.209*</td>
<td>.000</td>
<td>.027</td>
</tr>
<tr>
<td>10 Higher guarantees for success on the market</td>
<td>3.489</td>
<td>1.203</td>
<td>.219*</td>
<td>.083</td>
<td>.170</td>
</tr>
<tr>
<td>Experienced importance of R&amp;D partners</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 Suppliers in Russia</td>
<td>3.939</td>
<td>1.138</td>
<td>.235*</td>
<td>.041</td>
<td>.151</td>
</tr>
<tr>
<td>12 Suppliers abroad</td>
<td>3.745</td>
<td>1.398</td>
<td>.116</td>
<td>.322*</td>
<td>.308*</td>
</tr>
<tr>
<td>13 Clients in Russia</td>
<td>4.210</td>
<td>1.044</td>
<td>.095</td>
<td>.209*</td>
<td>.000</td>
</tr>
<tr>
<td>14 Clients abroad</td>
<td>3.902</td>
<td>1.315</td>
<td>.168</td>
<td>.091</td>
<td></td>
</tr>
<tr>
<td>15 Research and development</td>
<td>4.284</td>
<td>0.919</td>
<td>.154</td>
<td>.252*</td>
<td>.165</td>
</tr>
<tr>
<td>16 Intermediaries in Russia</td>
<td>3.953</td>
<td>1.188</td>
<td>.219</td>
<td>.083</td>
<td>.170</td>
</tr>
<tr>
<td>17 Intermediaries abroad</td>
<td>3.718</td>
<td>1.395</td>
<td>.115</td>
<td>.290</td>
<td>.360*</td>
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<tr>
<td>18 Stakeholders</td>
<td>3.927</td>
<td>1.331</td>
<td>.132</td>
<td>.144</td>
<td>.192</td>
</tr>
<tr>
<td>19 Competitors in Russia</td>
<td>3.578</td>
<td>1.373</td>
<td>.429**</td>
<td>-.062</td>
<td>-.062</td>
</tr>
<tr>
<td>20 Competitors abroad</td>
<td>3.179</td>
<td>1.611</td>
<td>.182</td>
<td>.233</td>
<td>.342</td>
</tr>
</tbody>
</table>

Note: *p < 0.05; **p < 0.01
The role of competitive pressure in R&D cooperation

Table 2  Bivariate correlations (continued)

<table>
<thead>
<tr>
<th>Cases to involve partners in R&amp;D</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>21  Mutual development of the new products</td>
<td>2.842</td>
<td>1.407</td>
<td>.004</td>
<td>.147*</td>
<td>.163*</td>
</tr>
<tr>
<td>22  Modification and improvement of existing products/services</td>
<td>2.954</td>
<td>1.367</td>
<td>-.075</td>
<td>.138</td>
<td>.133</td>
</tr>
<tr>
<td>23  Development of technologies</td>
<td>2.808</td>
<td>1.418</td>
<td>-.145*</td>
<td>.204**</td>
<td>.166</td>
</tr>
<tr>
<td>24  Buying technologies</td>
<td>2.482</td>
<td>1.472</td>
<td>-.040</td>
<td>.118</td>
<td>.020</td>
</tr>
<tr>
<td>25  Modification of existing technologies</td>
<td>2.832</td>
<td>1.377</td>
<td>-.058</td>
<td>.067</td>
<td>.042</td>
</tr>
<tr>
<td>26  Organisational changes and improvements of business processes</td>
<td>2.577</td>
<td>1.337</td>
<td>.038</td>
<td>.189**</td>
<td>.196**</td>
</tr>
<tr>
<td>27  Marketing innovations (new promotion methods, branding etc.)</td>
<td>2.575</td>
<td>1.402</td>
<td>.193**</td>
<td>.261**</td>
<td>.221**</td>
</tr>
</tbody>
</table>

Stages to involve partners in R&D

<table>
<thead>
<tr>
<th>Stages to involve partners in R&amp;D</th>
<th>Mean</th>
<th>SD</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>28  Idea creation</td>
<td>2.521</td>
<td>1.318</td>
<td>.034</td>
<td>.173*</td>
<td>.198**</td>
</tr>
<tr>
<td>29  Preliminary development and project planning</td>
<td>2.484</td>
<td>1.312</td>
<td>.061</td>
<td>.192**</td>
<td>.163*</td>
</tr>
<tr>
<td>30  Preliminary assessment of the project</td>
<td>2.519</td>
<td>1.295</td>
<td>-.015</td>
<td>.235**</td>
<td>.228**</td>
</tr>
<tr>
<td>31  Design and engineering development</td>
<td>2.389</td>
<td>1.312</td>
<td>.076</td>
<td>.244**</td>
<td>.243**</td>
</tr>
<tr>
<td>32  Testing prototypes or market testing</td>
<td>2.696</td>
<td>1.366</td>
<td>-.128</td>
<td>.258**</td>
<td>.263**</td>
</tr>
<tr>
<td>33  Launching the product</td>
<td>2.587</td>
<td>1.372</td>
<td>.034</td>
<td>.235**</td>
<td>.275**</td>
</tr>
<tr>
<td>34  After-sales services</td>
<td>2.449</td>
<td>1.318</td>
<td>.176*</td>
<td>.222**</td>
<td>.284**</td>
</tr>
</tbody>
</table>

Focusing first on how market competition influences the results of R&D cooperation, there is strong correlation across the R&D indicators when comparing them to the variables ‘pressure from foreign competitors in Russia’ (2) and ‘pressure from competitors on the international market’ (3). On the other hand ‘pressure from Russian competitors’ (1) correlates only with ‘access to new markets and clients’ and ‘decreasing R&D risks’. Foreign competition thus increases the assessed results of R&D cooperation over domestic competition significantly. The only variable that does not correlate in this category is ‘higher guarantees of market success’. This is in line with previous findings in the literature that cooperation by itself does not automatically lead to better performance or a higher innovation output (Hinkkanen and Väätänen, 2011). The results also support our theoretical framework presented in Figure 1. When international competition is not introduced to the market, this breaks the causal relationship between innovation and increased competition in the product market place. Thus also the pressure for succeeding in R&D collaboration is weakened. From another point of view, those firms that deal with domestic competition only are typically the ones that would require the most significant improvement in their R&D capabilities (Gianella and Thomson, 2007), and would also benefit most from R&D cooperation.

Secondly, looking at the importance of different R&D partners, the correlations are on average less significant and more scattered. They do follow a logical pattern, however. When Russian firms face domestic competition from local firms, they value Russian suppliers, Russian clients and Russian competitors as R&D partners. This can be seen as a way to achieve competitive advantage over the closest rivals. Similarly, foreign competition in Russia correlates with suppliers abroad and also research and development
indicators. International market pressure correlates with suppliers abroad, as well as with intermediaries abroad. The results are supported by the earlier findings of Cabral (2000), where he states that R&D partners are frequently competitors in the product market. In other words, firms with local competitors have local partners and vice versa, and firms with international competitors have international partners.

Focusing on the cases where it is more typical to involve R&D partners, we found strong correlations on the 'marketing innovation' indicators and all three competitive pressure variables. Most interestingly, there is a negative correlation between local competition and 'development of technologies' in this category. This indicates possible concerns for opportunistic behaviour and knowledge leakages inside the Russian markets (Das and Teng, 2000). Local firms seem to be somewhat protective over their technological capabilities. Interestingly, there is a positive correlation for the same indicator and 'pressure from foreign competitors in Russia'. We have come to the conclusion that international competition as such is similar to the domestic one, but much stronger. It forces firms out of their comfort zone and makes them take the risks that are included in R&D cooperation in order to survive.

Finally, in the fourth category, stages where partners are involved in the R&D process, there is a correlation in all the indicators from 'idea creation' to 'after-sales' and the variables 'pressure from foreign competitors in Russia' and 'pressure from competitors on international market'. When looking at the local competition that the firms face, it correlates only with the after-sales phase of R&D cooperation. The findings stress the fact that it is not only important that there is competitive pressure in the market, but also where this pressure comes from. This also confirms our previous comment on the fact that international competition forces firms out of their comfort zone.

In sum, looking at the bivariate correlations, a couple of issues can be raised for discussion. First of all, it seems on the basis of the results that Russian firms do not employ international R&D cooperation before they face some sort of international competition. This again can be due to various reasons. It may be that Russian firms which do not face international competition operate in markets and industries which are not R&D intensive, and thus these firms do not seek R&D partnerships. Likewise, these firms and industries are not attractive to other firms as R&D partners as they have little to offer. On the other hand, Russian firms that face only domestic competition can be worried about possible knowledge and technology leakages to the closest domestic rivals, and by so focus more on internal rather than cooperative R&D. Companies that face international competition one way or another cannot rely only on their own skills and capabilities any longer, but must adapt to the more global business environment. They are also already on a more sophisticated level regarding technological capabilities and have something to offer to their R&D partners as well. Actually, many international companies already use emerging markets and emerging market firms to supplement their capabilities in R&D (Mahidhar et al., 2009). When international firms enter an emerging market, they are most likely to seek partnerships from firms that operate in similar lines of business, and this typically also includes direct competitors.

Secondly, what can also be clearly observed is that when a Russian firm starts to feel pressure from foreign competitors, either operating in their domestic market or in international markets, it shows in the whole R&D process of the respective firms. Most clearly it affects the outcomes of R&D cooperation and at what stage partners are involved in the R&D processes. Competition has an important role in introducing the right market signals, and it forces companies to allocate resources in the most effective
way. Whereas domestic competition only signals the needs of domestic markets, international competition, especially in high tech industries, helps to signal global trends. As Russian consumers and firms are becoming more aware of global trends and existing levels of technology, they are also becoming more demanding. Thus only international competition can help the firms to aim high enough to fulfil the demands of customers.

6 Conclusions

This paper is one of the very few studies that look into the relationship between R&D cooperation and market competition [see Wu (2012) and his evidence based on China]. Moreover, it discusses the topic in the context of the emerging market of Russia, which has been underrepresented in academia over the rising economies of China and India. We have based our findings on an analysis of countries’ present competitive rankings as reported by the World Economic Forum’s Global Competitiveness Report. We have also employed a survey of 206 Russian firms and their innovation activities to assess how competitive pressure from different competitors influences R&D cooperation.

The paper has some important findings to be highlighted. First of all it adds to the existing competition, cooperation and innovation literature by showing that it is not only the intensity of competitive pressure that matters, but also the source where this competition originates from. Competition in the local market from local competitors hardly plays a role for decisions to cooperate on R&D, but foreign competition in the local markets, as well as international competition correlates strongly with R&D cooperation, its results and the firms’ commitment to it. Many researchers have so far failed to take this into account, especially in the emerging market context, as they have looked more at competition as a whole (e.g., Wu, 2012; Wu and Pangarkar, 2010).

Secondly, following the first conclusion we found that Russian firms do not pursue international R&D cooperation before they are confronted by foreign competition, regardless of the total competitive intensity in the market place. This is an important implication in relation to the ‘catch-up effect’ between emerging economies and developed economies. R&D cooperation is about knowledge transfer, and in order for emerging economy firms to reach the levels of developed economy firms they need to gain access to them. R&D cooperation at the local level without international competition prevents firms from reaching sufficient levels of technological and organisational capabilities and skills, which again does not make them interesting R&D partners for successful firms operating in broader markets. In order for firms and economies to rise from being technologically backward they need to make the risky jump from small-scale domestic competition to larger-scale international competition. This is also an implication for policy makers. Where it is hard to force someone to cooperate on R&D, especially at an international level, different forms of competition can be more simply regulated by the surrounding institutions.

Finally, looking at the current state of the competitiveness of Russia according to the GCR and based on our results we cannot refrain from commenting on the role of trade barriers and tariffs in the innovation policy of the country. The firms that succeed without facing international competition are in a very weak position when these protective fences are removed. Russia has been accepted as a member in the World Trade Organization (WTO), and as a result of this it has been forced to open up its borders. In practice this
means that the competition that Russian firms are confronting will most likely dramatically increase. Based on our results we can thus expect to see a large increase in cooperative R&D as well. This will create potential for Russian firms that seek to internationalise and become globally competitive. It will also increase Russia’s potential as an R&D partner for developed economy firms. Naturally this happens on the expense of firms that are not able to upgrade their capabilities to a required level.

This research has been largely descriptive by nature, but previous literature offers the analysis some explanatory power. That is, we can clearly see that firms encountering certain competitive pressures act in a certain way as regards R&D cooperation. However, further research is required to explain the link between competitive pressure and external R&D cooperation for innovation in detail. This further explanatory research needs to exclude the possible moderating factors of the phenomenon in order to underline the significance of the causality between competitive pressure and R&D cooperation that we strongly believe to exist.

Further research on the topic should be conducted. In the future the analysis needs to be extended and e.g., regression models employed to study the possible multivariate relationships between the variables. However, we believe that this paper contributes to the existing literature and has many implications that researchers, policy makers and business managers can benefit from.

Acknowledgements

We wish to thank the anonymous referees for their valuable comments on the earlier versions of this paper. They have helped the paper to shape into the form that it now is. Any remaining errors are of our own.

References

The role of competitive pressure in R&D cooperation


Appendix

Bivariate correlations when controlling for firm size, sales profitability and R&D intensity

<table>
<thead>
<tr>
<th>Control variables: Firm size (number of employees), sales profitability, R&amp;D intensity (ratio of R&amp;D costs and sales volume)</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sources of pressure to innovate</td>
<td></td>
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<td>1  Pressure from Russian competitors</td>
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<td>.146</td>
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<td>2  Pressure from foreign competitors in Russia</td>
<td>.285*</td>
<td>.121</td>
<td>.175</td>
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<td>3  Pressure from competitors on the international market</td>
<td>.043</td>
<td>.348*</td>
<td>.272*</td>
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<td>Assessed results of R&amp;D cooperation</td>
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<td>4  More successful product development</td>
<td>.160</td>
<td>.169</td>
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<td>5  New knowledge</td>
<td>.216</td>
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<td>6  Access to new technical expertise</td>
<td>.093</td>
<td>.034</td>
<td>.032</td>
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<tr>
<td>7  Access to new markets and clients</td>
<td>.123</td>
<td>.078</td>
<td>.063</td>
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<tr>
<td>8  Decreasing R&amp;D risks</td>
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<td>9  Opportunity to concentrate on core competences</td>
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<tr>
<td>10 Higher guarantees for success on the market</td>
<td>.058</td>
<td>–.983</td>
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<td>Experienced importance of R&amp;D partners</td>
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<td>11 Suppliers in Russia</td>
<td>.999*</td>
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<td>12 Suppliers abroad</td>
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<td>13 Clients in Russia</td>
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<td>14 Clients abroad</td>
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<td>–.958</td>
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<td>17 Intermediaries abroad</td>
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<td>18 Stakeholders</td>
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<td>.929</td>
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<td>.290</td>
<td>–.986</td>
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<td>20 Competitors abroad</td>
<td>.997*</td>
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<td>Cases to involve partners in R&amp;D</td>
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<td>22 Modification and improvement of existing products/services</td>
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<td>.268*</td>
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<td>–.060</td>
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<td>.229*</td>
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Notes: *p < 0.05
Publication 3

Hinkkanen, J., Vääätänen, J. and Podmetina D.

R&D cooperation and innovation performance – a beaten path or a rocky road? A study of Russian manufacturing firms

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R&D cooperation and innovation performance – a beaten path or a rocky road?

A study of Russian manufacturing firms

Abstract:  
Purpose – Interfirm R&D cooperation has been suggested as a way to improve the innovativeness of emerging market firms. However this suggestion is based mostly on research done in developed economy context which already by itself is contradictory at best. We argue that in emerging markets a number of limitations for interfirm cooperation exist, including such as access to international partners, which affect both the possibilities to cooperate and the outcomes of that cooperation.

Design/methodology/approach – We employ primary survey data of 206 Russian manufacturing firms. First we analyse the role of domestic interfirm cooperation in comparison to the internal R&D capabilities of firms. After that we focus on the effect of domestic vertical and horizontal R&D partners on new product performance.

Findings – Our analysis shows that even though R&D cooperation offers firms significant and multiple advantages in emerging markets it is actually mostly used to compensate non-existent or low internal R&D capabilities. This is an important finding which contributes to the discussion about how and when R&D cooperation can benefit firms. Furthermore we show that contradictory to many previous studies vertical R&D cooperation has a negative impact, cooperation with competitors a positive impact, and cooperation with research institutions a non-significant impact on new product development.

Research limitations/implications – The limitations of this study include survey and responded biases which might affect the final outcomes of the analysis. However, using primary data we are able to gain new insights to interfirm R&D cooperation in emerging markets which would not be possible otherwise. Our data is from Russia but due to our approach we believe that the general results of the study are applicable in a wider context.

Practical implications – Our research provides important practical insights for managers both in emerging markets as well as outside them by describing the limitations as well as possibilities of R&D cooperation. Furthermore we are able to not only identify the successful R&D partners but also the ones that have a negative effect on new product development and offer explanations that can be applied in firms.

Social implications – The social implications of the study highlight the role of emerging markets in global R&D and innovation. As the role of these countries is constantly growing they also are more and more often the source of new innovative products and technologies. Harnessing and accessing the talent and potential of these countries is important for countries, communities and firms.

Originality/value – We combine unique firm level data with existing literature of interfirm cooperation and are able to provide new results which partly support and partly challenge some of the existing assumptions about R&D cooperation. By focusing our analysis on domestic R&D partners in Russia we are able to more accurately evaluate the true existing strategic possibilities that the majority of emerging market firms have.

Keywords:  
R&D; Innovation; Manufacturing industries; New product development; Product Innovation
1 Introduction

Emerging markets have lately become to play an essential role in global economic growth. There are a number of examples of successful firms that have originated in countries like China, India, Russia and Brazil, and which are now known as global innovative multinational enterprises. They have been considered to enjoy considerable home field advantages deriving from a strong economic growth, steady investment flows and low manufacturing prices (Lyer et al., 2013). However, when looking at emerging market firms in general they are often perceived as the underdogs in comparison to Western firms when developing new products and competing for the "top of the pyramid" customers due to factors such as low productivity and innovativeness. While currently serving thousands if not millions of customers in their local markets many of them are confronted by the challenge of internationalisation and by so entering into direct competition with more advanced firms from developed countries. Thus how to make this transformation successful and how to balance between the home market advantages such as low manufacturing costs and home market size, and disadvantages such as low productivity and innovation capabilities has become a crucial question for both innovation management as well as international business scholars.

Some recent studies have tried to rationalize how emerging market firms could upgrade their technological capabilities and improve their innovativeness (Uzkurt et al. 2013; Luo and Tung, 2007; Li and Ferreira, 2008; Tsai, 2009; Zeng et al. 2010; Markides, 2012). One promising stream of literature has focused on R&D cooperation between different interfirm partners as it has been stated that through cooperation firms can improve productivity and innovativeness, increase market knowledge, and improve organisational learning etc. (Okamuro 2007; Chiu, 2009; Mort and Weerawardena, 2006; Becker and Dietz, 2004; Wong and Tong, 2012). As cooperation is deemed beneficial, some scholars have even suggested that utilising it creates possibilities for emerging market firms to leapfrog some parts of the technological catch-up process that they face and challenge Western firms in their own turf (Luo and Tung, 2007). However with some recent exceptions (such as Tsai, 2009 and Zeng et al. 2010) most of the studies done on R&D cooperation and innovation performance have taken place in developed countries (e.g. Tether, 2002; Becker and Dietz, 2004; Belderbos, 2004; Nieto and Santamaria, 2007; Okamuro, 2007; Tomlinson, 2010; Un et al. 2010; Rese and Baier, 2011) and furthermore yielded contradictory results. Sometimes some R&D partners can be extremely beneficial in new product development, while other times the same types of partners can significantly harm innovative efforts (Un et al. 2010; Zeng et al. 2010).

Whereas the pros and cons of different R&D partners are well described in developed country context, we argue that these results are not directly generalizable to emerging markets because of their specific characteristics and nature. For example due to the weak institutional environment enforcing cooperative contracts can be more difficult than in developed countries (Janson et al. 2007). Due to the underdeveloped business environment companies do not possess similar complementarity resources and knowledge as firms generally do in developed countries (Manolova et al. 2010). And due to the lower internationalisation level of the markets firms have fewer opportunities to partner with international firms than in developed countries (Kaminski et al. 2012; Smirnova et al. 2012). All of these are factors can directly as well as indirectly influence the reasons, impacts and outcomes of cooperative R&D.

In this paper we study local vertical and horizontal R&D cooperation in Russian manufacturing firms by taking into account the studies done in developed economies. By focusing on interfirm cooperation inside a specific market area we aim to validate the argument of the differences between developed economies and emerging markets in terms of R&D cooperation. Furthermore taking into consideration the assumption of the differences between regions we ask, who are the best domestic partners for R&D in emerging markets and more importantly why? The answers to these questions are not important only to emerging market firms and their managers but also to Western firms who have to take into account the new competitive threats arising from the East.

We base our empirical findings on a survey of 206 Russian manufacturing firms. First by comparing non-innovative and innovative firms distinguish significant differences between firms who cooperate over new products, those who do not and their internal innovation capabilities. Secondly by using ordinary least square regression we are able to show that different types of R&D partners have significant positive effects and different partners significant negative effects in NPD performance. By comparing the results to our hypothesis derived from existing
research and from developed economy context we show that we only find partial support for them. We conclude that R&D cooperation in the emerging market context seems to be a way to escape resource constraints faced by individual firms, and that this proposes a challenge for the firm's performance and survival in the long run. Our results also help to explain why cooperation is not successful in emerging markets and by so contribute to the existing management literature, as well as why we regardless of all the proposed benefits of cooperation see little tangible outcomes and collaborative innovations coming out from emerging markets.

2 Possibilities and hurdles of innovation and cooperation in emerging markets

Emerging markets have established themselves as the new forefront of academic research, which offer a platform to test existing theories and assumptions in order to gain deeper insights about the way that the world works (Kearney, 2012). A perfect example of this is China, which with its centrally led market economy is redefining the way markets, businesses and transactions are managed (Siu, 2005). Similarly emerging economies are challenging conventional wisdom in academic thinking and the theories we have in management strategy (Wright et al. 2005). Using these countries as “lab rats” researchers have conceptualised and tested frameworks and roadmaps which would empower firms from these countries to developed competitive advantages that are also applicable in global markets (e.g. Wu and Pangarkar, 2006; Luo and Tung, 2007). One aspect that has received considerable attention is how to improve the innovativeness emerging market firms by using the things that we know from developed economies. Countries such as China and Russia have significant resources in terms of intellectual capital but they have not been very successful in channelling these resources to benefit private enterprises. As an example Russia has as many researchers as Germany when measured in terms of population, but the productivity of Russian manufacturing firms is only 15 percent of the productivity of the German manufacturing industry when measured as value added (Desai and Goldberg, 2008).

In the context of new product development researchers have suggested that interfirm cooperation can help firms to improve their innovativeness and performance (Belderbos et al., 2004; Un et al. 2010). In counties of high intellectual resources this would also be a logical approach to disseminating information between firms and institutions. Through R&D cooperation firms are able to share knowledge and resources between each other’s and this in turn should lead to improved innovation performance (Okamuro, 2007; Chiu, 2009; Becker and Dietz, 2004). However research seldom addresses the challenges that the emerging market context sets for cooperation.

First, the number of private high technology firms in emerging markets is still significantly lower than in developed economies limiting cooperative knowledge diffusion from taking place (Shirokova et al. 2013). Even though research activities can be successfully carried out in public institutions or research centres, it is often the role of private enterprises to turn research results into new products and services and to deliver them to the markets. Naturally this gives the existing firms a possibility to cooperate with public institutions and research centres as the competition for their time is lower, but it simultaneously limits possibilities for cooperation between private firms. The low number of high tech enterprises in the economy also means that finding R&D partners with complementary skills and knowledge is more difficult than in developed economies (Manolova et al. 2010).

Secondly, even with the developments in the institutional and business environment in emerging markets they still lag behind develop countries in terms of legislation and legal protection in business to business partnerships (Jansson et al. 2007; Rodrik, 2008). There have been numerous cases of conflicts in which contracts and terms of cooperation have been violated without any significant implications to the violator. This is especially true in cases where the violator is from the local country and the second party is foreign. The lack of legal protection can be a strong incentive not to share information and limit the interest to cooperate in the first place.

Thirdly, even though emerging markets are attracting significant amounts of foreign investments and the number of international firms operating in these markets keeps rising constantly, cooperation between international and local firms is mostly limited to formal contracts where the foreign company acquires the ownership of the local firm and by so forms a formal subsidiary arrangement with it. For emerging market firms which aim to stay independent possibilities for international cooperation are still very limited (Kaminski et al. 2012; Smirnova et al.
This is in contradiction with the majority of previous research which emphasises the significant role of international cooperation partners in building innovation capabilities (e.g. Luo and Tung, 2007).

In addition to these three general differences between developed and emerging markets there are a number of country specific factors that can influence the willingness to cooperate with different types of partners as well as the outcomes of cooperation. These are such as culture, language, level of technology and infrastructure. In our opinion due to the significant differences between emerging and developed economies in the cooperation context more detailed attention needs to be given to the effects of R&D cooperation and innovation performance these countries. We believe that studies with an emerging market focus can give us new and important insights about the dynamics of cooperative strategy, innovation and firm performance.

3 R&D Cooperation and innovation performance – what goes in and what comes out?

Internal R&D capabilities in emerging markets

Internal R&D has been regarded as a crucial component not only in innovativeness in general, but also in interfirm R&D cooperation as it acts as the catalyst for absorptive capacity. Absorptive capacity was originally defined as by Cohen and Levinthal (1990) as the firm’s ability to “recognise the value of new external knowledge, assimilate it and apply it to commercial ends” (p.128). In other words firms which have high absorptive capacity are able to understand the value that cooperative partners might bring, learn from them and most important put that learning into use also internally and outside the cooperative arrangement. Then again, firms with low absorptive capacity might be able to identify newness, but they cannot turn it into an internal asset and are limited to only utilizing learning’s within the existing cooperative contexts. When the cooperative arrangement with the partner end those firms without absorptive capacity also lose the possible experiences and learning’s that came with the partnerships (Zahra and George, 2002). In other words, firms cannot benefit from R&D cooperation only by being exposed to it (Lin et al. 2012).

In the traditional R&D cooperation context high absorptive capacity would imply that a company is able to recognize and assimilate knowledge, and thus those firms with high absorptive capacity should also be those who are more likely to cooperate over R&D. However, as discussed in the previous section in the context of emerging markets the environment sets a number of limitations. First of all literature has acknowledged that R&D cooperation with external interfirm partners can be used to complement internal R&D (Hagedoorn, 2002). Thus it is also likely that some firms will try to pursue opportunistic approach to cooperation with other firms and instead of mutual investments to new product development they leave the R&D responsibility to partners.

Secondly, in many emerging markets and especially in Russia R&D has traditionally been government led and carried out in state owned R&D institutions (Gianella and Thomson, 2007; Jääskeläinen et al. 2012). Situation is changing as more R&D centres are being set up in emerging markets by international corporations, but for most local emerging market firms’ access to these R&D centres is still limited. Thus those emerging market firms which collaborate on R&D do it often with the local R&D institutions. As these horizontal collaborative arrangements are normally long term oriented and they have lesser risk of opportunistic behaviour focal firms might not recognize the reason to uphold expensive internal R&D activities.

Hypothesis 1: Instead combining strong internal R&D skills with external cooperative R&D that brings added value to the new product development process, emerging market firms primarily cooperate with other firms and organisations in order to compensate the lack of internal R&D capabilities.

Vertical versus horizontal interfirm R&D cooperation

There are a number of studies that focus on specific types of cooperative arrangements with different interfirm partners (e.g. Dittrich and Duyesters, 2007; von Hippel 1988). A classical typology used to study interfirm partners is to divide them to vertical and horizontal ties (Belderbos, et al. 2004). In general, vertical ties are conceived to
include suppliers and customers (e.g. Belderbos et al. 2004; Laursen and Salters, 2006; Tomlinson, 2010) as well as intermediaries (e.g. Howells, 2006; Nieto and Santamaria, 2007). Horizontal ties again comprise from competitors (e.g. Belderbos et al. 2004; Clark and Fujimoto, 1991) and from external research centres, public institutions and universities (e.g. Belderbos et al. 2004; Liefner et al. 2006).

Many scholars have come to argue that these different partners have different effects on the focal firm. For example Zeng at al. (2010) stated that in the innovation process vertical cooperation plays a more distinct role than horizontal cooperation. Un et al (2010) again proposed that horizontal cooperation with institutional partners has the highest impact on NPD, followed by vertical partners, and finally horizontal competitors. Due to similar controversies efforts have been dedicated to understanding in detail which type of ties exist inside partner networks and how these ties might affect knowledge flows between individual partners in cooperative relationships. Ties are suggested to act as conduits for information, knowledge, organizational practices, and material resources, and thus also reflect on the innovation outcomes of focal firms (Pallotti and Lomi, 2011). Perhaps the most referred stream of research is the one of strong ties versus weak ties as defined originally by Granovetter (1982). In the context of cooperation, strong ties are considered easier due to the fact that they include a relatively high amount of trust, common aims, and the same kind of language for communication (Tomlinson, 2010; Uotila et al. 2012). Then again in the context of innovation it has also been argued that strong ties are likely to make the partners more homogeneous in terms of performance and by so result in fewer radical innovations (Pallotti and Lomi, 2011). Companies in the same strong networks tend to share the same knowledge basis, which prevents the Schumpeterian knowledge-combining innovation processes from emerging (Uotila et al. 2012). In comparison, even though sustaining weak ties is harder than strong ties, they are also suggested to be more fruitful for innovations because more novel information flows to through them (Granovetter, 2005).

Taking the theoretical argumentation behind weak and strong ties and lining it with vertical and horizontal cooperation partners we suggest that vertical partners typically represent strong ties and that horizontal cooperation represent typically weak ties. This is due to the fact that companies are expected to be in close connections to their customers, supplier and intermediaries’ sometimes even daily basis but the information exchange is more generic by nature. In comparison communication and information exchange with external research organisations and competitors might be less frequent but more insightful in terms of the novelty of information.

Due to the limited possibilities of cooperating with international partners emerging market firms must to a large extent rely on their domestic networks. Especially in manufacturing context cooperation with clients and suppliers is logical in order to address the needs of the customers and to rationalize internal processes, but simultaneously the cooperation is bounded by the limitations of strong ties. Even though cooperation with these types of partners allows firms to improve their existing products, the possibility of accessing truly novel information becomes lower as the partner firms are bounded by the same limitations as the focal firm. This in turn can lead to the cooperation not significantly affecting the overall innovation performance of the firm. In comparison even though horizontal partners would be bounded by similar limitations as the focal firm, the fact that they operate in different fields (R&D centres) or with in similar fields but with different processes, products, clients or suppliers (competitors) increases the likelihood of gaining novel knowledge. Accordingly due to the assumptions of weak ties this novel knowledge is more likely to lead to improved innovation performance.

**Hypothesis 2:** In emerging market context domestic horizontal R&D cooperation is more beneficial than domestic vertical R&D cooperation

**Vertical R&D cooperation and innovation performance**

Previous studies have found vertical R&D partners to both have positive effects as well as negative effects on firm performance (e.g. Belderbos et al. 2004; Fritsch and Lukas, 2001). In the studies focusing on vertical types of R&D cooperation’s the key benefits of customer cooperation is seen in them helping to define the course of innovations early on and in doing so they help to reduce the risk of introducing new products and services to the markets (von Hippel, 1988). Supplier cooperation is again traditionally linked with to cost reduction or to an attempt to focus on
core competencies by outsourcing some parts of the new product or technology development (Belderbos et al. 2004). Similar arguments can be made for intermediaries. As such these types of ties are less likely to directly affect the number of new products or radically new technologies, in other words to the innovation performance of the firm. However, they are more likely to help to improve firm performance either directly by cutting down cost or indirectly by limiting the number of failed products. There is no question that both innovation performance and firm performance are important. However as innovation performance is easier to turn in to firm performance than firm performance to innovation performance, we argue that for emerging market firms it is more important to focus on other types of R&D collaborations.

Hypothesis 3: R&D cooperation with domestic vertical partners has no significant impact on the new product (innovation) performance of emerging market firms.

Horizontal corporate R&D cooperation and innovation performance

Horizontal corporate cooperation or in other words cooperation with competitors has become substantial area of research in recent years (Chen and Miller, 2012). Like vertical cooperation, coopetition can be a positive-, zero- or negative-sum game for the firm, depending on how they approach it (Ritala, 2009). Typically the purpose of collaboration with competitors has been considered to be in order to carry out basic research, to establish standards or to solve common problems that are out of the reach of individual companies (Nieto and Santamaria, 2007; Tether 2002). However, for example Gnyawali and Park (2011) found that even though cooperation with competitors can be challenging, it can also be beneficial for innovation performance and can lead to technological advancements in participating firms. Also for example Tether (2002) stated that competitors that are in a cooperative arrangement can share technological knowledge and skills with each other, producing synergies that benefit both participants without compromising their competitive position. In emerging markets with rapidly developing and growing internal markets these synergies are more likely to exist as the danger of market saturation is significantly lower.

Hypothesis 4: R&D cooperation with domestic competitors (corporate horizontal ties) has a positive impact on the new product (innovation) performance of emerging market firms.

Horizontal institutional R&D cooperation and innovation performance

Besides corporate partners, firms can also seek to cooperate horizontally with external research centres. The potential impact of horizontal institutions on product innovation is significant due to the fact that their knowledge base it very broad (Un et al. 2010) and because their primary objective is often to create and disseminate scientific knowledge (Hemmert, 2004; Lind et al. 2013). In some cases cooperation with these types of centres is to some extent necessary just in order to not to fall behind other companies in technology development. In emerging markets, R&D centres and institutes have traditionally played a significant role in scientific research and innovation (Radosevic, 2003). Even still R&D centres are considered as an important part of national innovation system in countries such as Russia and China. Due to the factors which limit cooperation possibilities in emerging markets these centres can also work as hub firms between various networks and allow international linkages which would otherwise not be possible.

Hypothesis 5: R&D cooperation with domestic R&D centres (institutional horizontal ties) has a significant positive impact on the new product (innovation) performance of emerging market firms.
3 Data and methodology

The study is based on a sample of Russian manufacturing companies, collected from the nine regions in Russia in 2009-2010. The regions were chosen based on using regional innovation rankings and the European Union’s Innovation Union Scoreboard methodology (see Hollandeers and van Cruysen, 2008). They included Saint Petersburg, Nizhny Novgorod, Rostov-on-Don, Saratov, Samara, Perm, Ekaterinburg, Novosibirsk and Krasnoyarsk. We employed SPARK Business Database, which is Russia’s largest company database, and preselected 1000 firms in these regions as potential respondents. Using the regional GDP as a baseline, we employed the stratified sampling method (Sudman, 1976) to collect the data, and ended up with a total of 206 respondents. In the data collection phase itself, we employed a questionnaire that was based on OECD recommendations for conducting innovation surveys (Oslo Manual, 2007). It included 109 questions with additional sub questions. The actual answers were received through structured interviews by using the questionnaire. In the Saint Petersburg area the data was collected by the authors, and in other regions the data collection was outsourced to a third party. Because of this, all the interviews were also sound recorded and transcribed in order to maximize the reliability and traceability of each individual answer. The questions themselves were related to the previous three years of business activities. The respondents were positioned high in the company and included mainly titles such as the CEO, Executive Director, Head of Innovation, Technical Director, and Head of Sales.

The collected sample was divided by industries as follows: electronics and optics equipment (11.2%), electronic equipment (7.3%), rubber and plastic industry (3.9%), machine building (13.6%), chemical industry (10.2%), aircraft (3.9%), IT and telecommunications (10.2%), metallurgy (17.5%), and others (16%). The share of companies conducting at least some internal R&D in the sample was high; 78.6%. A full 100% of the IT companies had internal R&D. The figure was 93.3% for electrical machinery firms, 91.3% for the electrical and optics industry, 87.5% for the rubber and plastics industry, 86.1% for metallurgy, 75% both for the aircraft and machinery and equipment industries, and 72.7% for the oil refinery industry. The R&D intensity (ratio of R&D expenditures and company’s sales) was between 1.5% and 3.0% for 38% of the companies. This corresponds with the average level of R&D intensity in most of the high and medium technology industries in the EU countries. The R&D intensity ratio was lower than 1.5% in 20.7% of the companies, above 3% was registered for 34.5% of the companies.

In the analysis we followed the general approach of Tomlinson (2010). In order to categorize and compare the levels of internal R&D in firms which cooperate and which don not we used the Mann-Whitney Test. In order to see whether different R&D cooperation partners have the suggested influence on innovation performance we used the ordinary least squares (OLS) method.

Figure 1. Conceptual model
To measure the success of new product development, we employed the company’s perception of the change that had happened in the number of successful new products in comparison to its main competitor’s. This could subject the study for possible response biases, but it also provided better insights into the true success of NPD by taking into consideration the market position of the focal firm (Tang, 2006). We also used a category variable to identify individual firms which had developed and launched new products by themselves from those which had developed new products in cooperation with local partners. Internal resources and innovation investments were measured and compared with the internal R&D investment variable. As explanatory variables we looked at the most commonly used groups of R&D partners; suppliers, clients, intermediaries, competitors, state R&D centres, and commercial R&D centres (Hakansson and Eriksson, 1993; Clark and Fujimoto, 1991; von Hippel, 1988; Belderbos et al. 2004). The partner’s involvement in R&D and perceived importance was measured on a Likert scale from 1 to 5. To control the effects, we also included internal R&D, firm size and firm age as control items, as suggested for example by Tomlinson (2010) and Pangarkar and Wu (2012).

Before performing regression analysis, several steps were taken in order to obtain explanatory variables to the OLS model. In order to avoid multicollinearity between the explanatory variables a factor analysis was performed using principle components extraction and varimax normalized rotation. The results for these tests can be found in Appendix 1. During the first factor analysis, the competitors were loaded to the same factor as the vertical partners. As competitors are perceived as horizontal partners, we redid the factor analysis without the competitors. On the basis of the analysis of these results, we were able to group the variables into vertical ties (including suppliers, customers and intermediaries), corporate horizontal ties (competitors) and institutional horizontal ties (including commercial and state R&D centres). The Kaiser-Meyer-Olkin (KMO) score was checked for the adequacy of the correlation structure, and Cronbach’s alpha was examined for signs of internal consistency.

In the regression model, residual histograms and residual plots were used to assess the results of the modelling and to check the assumptions of normality, homoscedasticity and independence of the error terms. A check for multicollinearity was also performed using the variance inflation factors. Casewise diagnostics was used to assess the models’ utilities. All variables applied in the Mann-Whitney Test and in the OLS models are described in detail in Table 1.

Table 1. Description of variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPD performance</td>
<td>New product development success in comparison to the company’s main competitors.</td>
<td>Likert scale*</td>
</tr>
<tr>
<td>NPD launches</td>
<td>Firms which have launched new products either alone or in cooperation</td>
<td>Nominal</td>
</tr>
<tr>
<td>Vertical partners</td>
<td>Importance of clients, intermediaries and suppliers</td>
<td>Likert scale**</td>
</tr>
<tr>
<td>Competitors</td>
<td>Importance of competitors as R&amp;D partners</td>
<td>Likert scale**</td>
</tr>
<tr>
<td>Horizontal partners</td>
<td>Importance of commercial and state-owned R&amp;D centers as R&amp;D partners</td>
<td>Likert scale**</td>
</tr>
<tr>
<td>Age</td>
<td>Company age</td>
<td>Continuous</td>
</tr>
<tr>
<td>Size</td>
<td>Number of employees</td>
<td>Ordinal</td>
</tr>
<tr>
<td>Internal R&amp;D</td>
<td>Share of R&amp;D from sales as %</td>
<td>Ordinal</td>
</tr>
</tbody>
</table>

Note: * scale -2 (significantly worse) to 2 (significantly better), ** scale 1 (not important) to 5 (very important)
4 Results

Table 2 shows the number of responses, means, standard deviations and correlations for each of the variables after the factor analysis. When comparing two groups, the one that includes firms which have launched new products and developed the products by themselves with the ones that have launched new products developed in cooperation with domestic partners, there is a considerable difference (Figure 2). Firms which develop products by themselves dedicate considerably more internal resources to R&D than the firms which employ cooperative actions (51% and 25%, respectively). Again of those firms which cooperate to develop new products, almost 40% have no or very low internal R&D. The difference is also statistically significant using Mann Whitney test with U(2)=887.5, Z=-3.075, p=0.004. The Mann-Whitney test does not allow testing for the direction of the relationship. In other words, based on the results we cannot say whether low levels of internal R&D are due to the decision to cooperate, or whether the firm has decided to cooperate precisely due to a low internal R&D. However, in the context of this paper, the direction of the relationship is irrelevant as we hypothesized only that cooperation and internal R&D are an inverse function of each other. Thus this result supports our first hypothesis.

Table 2. Descriptive statistics

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NPD performance</td>
<td>0.57 (0.98)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>NPD launches</td>
<td>1.22 (0.41)</td>
<td>.026</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Vertical partners</td>
<td>3.98 (1.00)</td>
<td>.037</td>
<td>.201</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Competitors</td>
<td>3.58 (1.37)</td>
<td>.040</td>
<td>.256</td>
<td>.648*</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Horizontal partners</td>
<td>3.86 (1.22)</td>
<td>.114</td>
<td>.057</td>
<td>.695**</td>
<td>.571**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Firm size</td>
<td>2.33 (0.67)</td>
<td>.113</td>
<td>.144</td>
<td>.286</td>
<td>.224</td>
<td>.169</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Internal R&amp;D</td>
<td>2.18 (0.76)</td>
<td>-.034</td>
<td>.033</td>
<td>-.005</td>
<td>-.325**</td>
<td>-.324**</td>
<td>.097</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Firm age</td>
<td>40.49 (43.37)</td>
<td>-.044</td>
<td>.039</td>
<td>.098</td>
<td>.157</td>
<td>.185</td>
<td>.292**</td>
<td>.140</td>
</tr>
</tbody>
</table>

* p<0.01, *p<0.05

Figure 2. Level of internal R&D and cooperation
In order to understand the influence of different innovation partners to the NPD performance of the firm, OLS analysis was conducted. We used two models, the first one with only the partners as explanatory factors, and a second model which included the partners as control variables (Table 3).

Looking at model one, it is significant with \( p<0.10 \) and with an adjusted \( R^2 \) of 0.30. Looking at the explanatory variables, there is a strong negative correlation for vertical partners, those being clients, suppliers and intermediaries (-1.145, \( p<0.05 \)). This does not support our third hypothesis with vertical partners having no significant effect on NPD. The result is interesting and suggests that the benefits normally associated with customer, supplier and intermediary cooperation do not necessary apply in the emerging market and new product development context.

In the model 1, we also observe a strong positive correlation for competitors as R&D partners (1.013, \( p<0.05 \)), and this supports our fourth hypothesis about the positive effect of coopetition and NPD. In model 1, the horizontal institutional partners, state and commercial R&D centres have a minor negative (-0.083) but non-significant effect on NPD. This does not support, and partly opposes, our fifth hypothesis of institutional horizontal partners having a positive effect on NPD.

Looking at model 2 with age, size and internal R&D as control variables, the model is strongly significant with \( p<0.05 \) and with a high adjusted \( R^2 \) (0.75). In the explanatory variables, vertical partners have a negative, significant effect on NPD (-1.429, \( p<0.01 \)). This further validates our point about the surprising role of customers, suppliers and intermediaries in the NPD context when taking into consideration the age, size and level of internal R&D in firms. Likewise, competitors have a positive, highly significant effect on NPD (1.524, \( p<0.01 \)). This further validates our fourth hypothesis of coopetition having a positive effect on NPD when taking into consideration the age, size and level of internal R&D in firms. In the second model there is also a positive but still non-significant relationship with horizontal partners and NPD (0.115). Although the relationship is non-significant the result point to a direction that horizontal cooperation is more strongly dependent on firms’ internal skills and capabilities. All the three control variables are also non-significant (\( p>0.10 \)).

<table>
<thead>
<tr>
<th>Table 3. OLS model results, dependent variable NPD performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model 1</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Vertical partners</td>
</tr>
<tr>
<td>Competitors</td>
</tr>
<tr>
<td>Horizontal partners</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Internal R&amp;D</td>
</tr>
<tr>
<td>Size</td>
</tr>
<tr>
<td>( R^2 )</td>
</tr>
<tr>
<td>Adjusted ( R^2 )</td>
</tr>
<tr>
<td>( F )</td>
</tr>
</tbody>
</table>

**p<0.01, *p<0.05, †p<0.10**

The OLS model also provides partial support for our second hypothesis of horizontal cooperation being more beneficial in NPD than vertical cooperation. However, due to the variation in the commercial and state-owned research centres variable, we cannot fully confirm the hypothesis, even though it seems that when taking into account the size, age and level of internal R&D, the younger and smaller firms and firms with low internal R&D benefit positively from cooperation with horizontal partners. Noticeable in the model is that internal R&D does not significantly affect NPD performance, opposite to what could have been expected.
5 Discussion

Due to the rapid growth of emerging markets academics and practitioners alike have been waiting and preparing for a surge of new firms from these countries to the international market place. Even though examples of successful innovative companies from these countries are already plenty and even though many emerging market firms enjoy considerable advantages in their home markets utilizing them in the global markets is not that easy. Innovative emerging market firms have to find a way to maintain their price advantage but at the same time improve their innovation performance so that customers in more advanced economies begin to see their products as “good enough” (Markides, 2012). In achieving this many scholars have suggested interfirm cooperation as a path to improved innovation performance. However whereas in theory R&D cooperation seems like a clear-cut strategy to improve new product development performance, there are many practicalities and moderating factors which play a role in the outcomes of the cooperation.

By analysing domestic R&D connections we are able to focus on the actual strategic possibilities that most emerging market firms have instead of emphasising the role of international partners which is what the previous research to a large extent has done. Even though international partners could be the best possible partner in cooperative R&D in many ways, not many companies have the possibility to cooperate with international partners. Based on our results we are able to distinguish that there is a difference with whom you cooperate in the case of domestic R&D partners. Whereas vertical R&D partners are often considered the most important ones in our study we observed a strong negative effect with supplier, client and intermediaries signalling that there are limitations in what domestic firms which are positioned closely on the value chain can teach to the focal firm. Furthermore it provides insights about the strategic directions firms should take. In other words focusing on organizational efficiency such as cost cutting or avoiding risks might actually have significant harmful effects on firms innovation performance, which in turn in the long run can lead to a negative effect on overall firm performance.

The risk and learning aspects are highlighted as we observe a significant positive effect on new product development when firms cooperate with competitors. It seems that in order to gain new information that can be helpful in new product development emerging market firms have to step outsider the traditional concepts of cooperation with only who we know and by so “playing it safe”. On the other hand this is also a positive signal about the possibilities that R&D cooperation can offer at its best.

Rather surprisingly we found no significant relationship between cooperation with R&D centres and institutions and new product performance. Traditionally their role has been seen as significant in providing firms with basic research and scientific knowledge that could help firms to come up with new innovations. What our results partly suggest is that R&D cooperation with these types of R&D partners is at least to some extend more moderated by firms specific factors such as size and internal R&D than cooperation with competitors or vertical partners is. This would also be to some extent logical as if R&D centres provide firms with basic research, it still requires quite extensive internal capabilities to turn that research into actual new products. Larger firms and firms with strong internal R&D would thus be more likely to benefit from this type of cooperation.

This takes us to our final point and to the relationship between internal R&D capabilities and R&D cooperation. In our sample we were able to observe that those firms who are innovative and who cooperate over R&D actually have significantly lower levels of internal R&D than those firms who innovate and who do not cooperate over R&D. Whereas this implies that R&D cooperation is used to complement the lack of internal capabilities to developed new products, and by so support the existing theories about why firms cooperate, it also at the sometime proposes interesting strategic dilemmas. As it has been found that internal R&D capabilities plays a significant role in absorbing and assimilating knowledge from cooperation, the lack of these capabilities would suggest that many of these emerging market companies who cooperate over R&D are in risk of losing these aspects of the cooperation. This result is partly in line with the suggestions related to the reasons why vertical partners have a negative effect on innovation performance. Using external interfirm partners to carry our R&D can help to save costs and to reduce risks similarly as integrating clients, suppliers and intermediaries as cooperation partners can. However, if and when emerging market companies wish to compete globally or even within domestic markets long
term they have to be able to utilize the benefits of external R&D cooperation partners in a wider scale. Building and maintaining internal R&D capabilities is an integral part of this.

6 Conclusions, implications and limitations

Based on our results we find support that R&D cooperation can be a beneficial way to improve innovation performance within emerging market firms even when taking into consideration the limitations of these markets. Cooperation with domestic competitors has a significant positive influence on new product performance. Then again we also observe that R&D cooperation with domestic vertical partners has a significant negative, and that cooperation with horizontal research centres has no influence on new product performance. These results highlight that fact that R&D cooperation is by no mean a quick fix or an easy solution to the competitiveness and innovativeness challenges faced by emerging market firms. Companies seem to be more willing to use cooperative ties as a way to escape internal resource constraints or to improve organizational efficiency than to be more innovative with their products. Even though these are important aspects of business management they should not be confused with the aims of improving the innovativeness of organisations.

The positive relationship between R&D cooperation with competitors and new product performance gives as important implications of when and why R&D cooperation can be beneficial in emerging markets. First of all when cooperating with competitors over R&D firms must step out of their comfort zone and commit to the relationship. When firms explore to new areas where there are associated with significant risks they are also more likely to access new knowledge. Secondly when working with competitors as cooperative partners firms are more likely to possess significant internal R&D capabilities. This is mainly because the competitors are most likely not interested in cooperating over R&D with someone who does not have their own internal R&D and thus who cannot contribute to the relationship, but also because when cooperating with competitors firms are less likely to completely rely on external R&D by the partner. Thus while accessing new and novel knowledge this happens in an environment where firms have the possibility to turn this knowledge into tangible outcomes, in other words new innovative products. As an implication to managers we would conclude that whereas this in our paper the positive relationship between cooperation and innovation performance is illustrated and visible in the case of competitors it does not have to limit to it. If managers are able to understand the reasons behind successful cooperation with particular types of partners they can take them and apply them with cooperation with all types of partners. And maybe in the future we will see more collaborative innovation between emerging market firms.

Our paper has naturally some limitations. The most obvious ones come from using primary survey data which subject both the data as well as the answers to biases. However we did not observe any implication of this during the data gathering and analysis which were done following existing guidelines. Also a question can also be raised about the generalizability of our results over all emerging markets. However, whereas differences between these counties exist we believe that our research setting and perspective is generalizable across multitude of countries including China, India, Brazil, Indonesia, South Africa etc. However future research covering these areas would be warmly welcomed. Also we would like to make a point about the observed negative effects of R&D cooperation. Whereas there are a number of studies focusing on the positive aspects, in the future diving more deeply into the looser aspect of cooperative R&D might offer new insights. Finally we would also encourage looking into how R&D cooperation’s are managed as poor management skills has been indicated as a general source of problems in emerging countries. However we believe that our contributions in this paper are significant and work as a ground to build future research on.

References


## Appendix 1. Results of the factor and reliability analyses

Factor loadings for all the partner variables after rotations

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppliers</td>
<td>.793</td>
<td>.428</td>
</tr>
<tr>
<td>Clients</td>
<td>.880</td>
<td>.309</td>
</tr>
<tr>
<td>Intermediaries</td>
<td>.789</td>
<td>.416</td>
</tr>
<tr>
<td>Competitors</td>
<td>.792</td>
<td>.294</td>
</tr>
<tr>
<td>Commercial research centres</td>
<td>.351</td>
<td>.906</td>
</tr>
<tr>
<td>State research centres</td>
<td>.399</td>
<td>.877</td>
</tr>
</tbody>
</table>

Kaiser-Meyer-Olkin Measure of Sampling Adequacy 0.821**

**p<0.01. *p<0.05

Factor loadings after rotations when the competitor variable is excluded

<table>
<thead>
<tr>
<th></th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suppliers</td>
<td>.830</td>
<td>.393</td>
</tr>
<tr>
<td>Clients</td>
<td>.883</td>
<td>.270</td>
</tr>
<tr>
<td>Intermediaries</td>
<td>.682</td>
<td>.458</td>
</tr>
<tr>
<td>Commercial research centres</td>
<td>.312</td>
<td>.954</td>
</tr>
<tr>
<td>State research centres</td>
<td>.429</td>
<td>.767</td>
</tr>
</tbody>
</table>

Kaiser-Meyer-Olkin Measure of Sampling Adequacy 0.778**

**p<0.01. *p<0.05

Reliability analysis for the factors

<table>
<thead>
<tr>
<th></th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vertical partners</td>
<td>0.821</td>
</tr>
<tr>
<td>Suppliers</td>
<td></td>
</tr>
<tr>
<td>Clients</td>
<td></td>
</tr>
<tr>
<td>Intermediaries</td>
<td></td>
</tr>
<tr>
<td>Horizontal partners</td>
<td>0.865</td>
</tr>
<tr>
<td>Commercial research centres</td>
<td></td>
</tr>
<tr>
<td>State research centres</td>
<td></td>
</tr>
</tbody>
</table>
Publication 4

Hinkkanen, J., Väätänen, J. and Podmetina D.

International Exploitation of Domestic R&D Exploration – New Insights from Russian Manufacturing Firms

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International Exploitation of Domestic R&D Exploration: New Insights from Russian Manufacturing Firms

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In this paper, we approach R&D cooperation and international market expansion from an exploration-exploitation perspective and look how various domestic R&D partners affect international market expansion activities in Russian firms. Our findings, based on a data survey of 206 manufacturing companies, show that different partners affect differently when it comes to market expansion and that their effect depends on a number of things such as the proximity of the international market. Using the exploration-exploitation approach, we are able to explain the phenomenon in more detail and so contribute to the existing international business and innovation management literature.

KEYWORDS exploitation, exploration, international market expansion, R&D cooperation, Russia

INTRODUCTION

Emerging markets and emerging market firms have been under increasing interests among management and strategy scholars due to their rising role in global business (Jormanainen and Koveshnikov 2012; Lu and Tung 2007; Seth 2011; Volchek, Henttonen, and Edelmann 2013; Wright et al. 2005). Still, academic research on emerging markets has been skewed, focusing on countries such as China and India and overlooking many other emerging and developing countries (Kearney 2012). One of these countries is...
Russia which geographically, culturally, as well as economically forms an interesting research setting. It is situated between Southeast Asia, which is generally perceived as an area of lower manufacturing costs, and the European Union, which again is generally perceived as a home of high-tech manufacturing. For Russian manufacturing firms, this proposes many competitive challenges. They have to be able to upgrade their organizational and technological skills and capabilities to compete in international markets and at the same time worry about foreign low-price manufacturing competitors entering their domestic markets.

In order for emerging market firms to catch up with developed economy firms but also to compete against the rising number of competitors, the role of interfirm cooperation and networks has been widely studied and promoted as a source of competitive advantage (Li and Ferreira 2008; Luo and Tung 2007; Manolova, Manev, and Gyoshev 2010; Wright et al. 2005). By cooperating with other companies and organizations, firms can learn new skills, share and combine resources, focus on value creating activities, and rationalize internal R&D processes (Hagedooorn, Link, and Vonortos 2000; Miotti and Sachwald 2003; Rese and Baier 2011). Research results from multiple developing countries show that cooperation can be beneficial when it comes to improving organizational and technological capabilities (Bonaglia, Goldstein, and Matthews 2007; Chang 2011; Luo and Tung, 2007). This seems to be the case for Russian firms, too, as there is growing evidence of cooperation taking place between Russian firms in order to improve their innovativeness (Jääskeläinen, Hinkkanen, and Väätäinen 2013; Smirnova et al. 2012).

However, important as value creation is, so is value capture and the exploitation of the learning and innovations that happens in cooperative relationships (Lavie and Rosenkopf 2006; March 1991). That is why it is surprising that most of the current cooperation research focuses mostly on one side of the coin by either looking at exploration activities (e.g., Faria, Lima, and Santos 2010; Laursen and Salters, 2006; Tomlinson, 2010) or exploitation activities (e.g., Fink, Harms, and Kraus 2008; Manolova et al. 2010; Vasilchenko and Morrish, 2011). To the best of our knowledge, there is little research done on how cooperation with different R&D partners affects possibilities of emerging market firms not only to innovate but to exploit these innovations in new markets. In this article, we want to focus on this strategically important issue by asking what role different domestic cooperative R&D ties play in the exploitation activities of Russian manufacturing firms and more specifically in international market expansion.

Following the seminal work of March (1991) and his definitions of exploration and exploitation activities, we consider cooperative R&D as exploration, and international market expansion as a part of innovation strategy as exploitation. To study how these two are interlinked, we employ survey data from 206 Russian manufacturing firms collected in 2009–2010.
Using the vast existing innovation management literature (Faria et al. 2010; Hagedoorn et al. 2000; Häkansson and Eriksson 1993; Laursen and Salter 2006; Nieto and Santamaria 2007; Miotti and Sachwald 2003), six different groups of domestic cooperative R&D partners were identified as potentially influencing the exploitation and internationalization activities of Russian firms. Using factor analysis, we group these partners to vertical ties, horizontal firm ties, and horizontal institutional ties. To study the effect of these ties, we conducted two independent regression analyses, one with international market expansions in Commonwealth of Independent States (CIS) and one with international market expansion in other international markets, excluding the CIS to control for cultural proximity. We would like to emphasize that this paper does not look at internationalization per se. In other words, we do not limit our study to firms who are doing their first push to go international. Our sample includes firms with no previous international activities as well as firms with previously existing international activities. By including this in our model, we are able to see how existing exploitation activities affect the role of cooperation and exploitation. We also look at internal exploration activities and how internal technology development affects the exploitation of cooperative R&D activities.

Our analysis shows that, in general, vertical R&D cooperation and horizontal institutional R&D cooperation are beneficial when Russian companies enter new markets abroad. Only horizontal firms as cooperative R&D partners do not have this affect, which can be explained by the competitive setting of the partners and the focal firm. In more detail, vertical domestic cooperation is beneficial when Russian firms enter both new CIS countries and new international countries. However, cooperation with horizontal partners is only useful when entering new international countries excluding the CIS, which can be explained by cultural and geographical distance and by the fact that different cooperation partners have different roles in exploration and exploitation. We also found that existing international operations correlate with market expansion both in the CIS and in other new international markets speaking on behalf of a learning effect taking place. Then again, the level of internal technology development is found non-significant, which highlights the basic differences between exploration and exploitation activities. Based on the results, we make contributions to the existing management literature and especially to what we know about the role of cooperative ties in emerging market firms.

This article is structured so that section two is a literature review. In section three, we develop hypotheses about the different roles of different cooperation partners and about their possible effects in international market expansion. Section four focuses on describing the data and employed methodology, and section five presents the results of the analyses and discusses them. The paper ends with section six, which discusses the conclusions.
Voluntary agreements and cooperation have become a noteworthy issue in exploration-exploitation research because cooperation with different partners enables firms to access and leverage new knowledge outside firm boundaries (Lavie and Rosenkopf 2006). In his seminal work, March (1991) originally defines exploration as “including things captured by terms such as search, variation, risk taking, experimentation, play, flexibility, discovery and innovation.” Exploitation again includes “refinement, choice, production, efficiency, selection, implementation and execution” (March 1991). Thus, in the context of this paper, we also consider R&D cooperation as an explorative activity as it is directly linked with search efforts to improve innovativeness. On the other hand, when firms push for new markets, it is more often linked to efforts to improve efficiency and implementation and execution of business activities. Thus, in the context of this paper, we consider international market expansion mainly as an exploitative activity.

Both exploration and exploitation are in a crucial role when emerging market firms are developing their internal and external skills and capabilities. Moreover, they are also directly linked. For example, Luo and Tung (2007) state that emerging economy enterprises have hugely benefited from cooperation with global players who have transferred their technological and organization skills to local firms, allowing these firms to undertake their own internationalization activities later on. In other words, interorganizational exploration has enabled internal exploitation. However, drawing direct conclusions from findings such as Luo and Tung’s is not simple as the general operating environment in emerging markets is different from developed ones and because the realities of cooperation can be far from the theories of cooperation. For example, in reality, not many emerging market firms have the possibility to cooperate with international partners (Di Minin and Zhang 2010; Filippov 2011), and also many of them actually rather cooperate with domestic partners due to lower cultural and organizational barriers than with international companies (Jääskeläinen et al. 2013; Smirnova et al. 2012). There seems to be a gap between what we know about large emerging market multinational that are able to cooperate with international partners, and what we know about firms that cooperate with mostly domestic partners. However, there are some frameworks that do support the notion of domestic exploration and international exploitation such as the network theory.

The network theory suggests that firms internationalize their activities mainly using domestic business networks (Johanson and Mattsson 1988). When cooperating firms obtain knowledge, learn from experiences, and pool resources with other actors in the same network (Chetty and Holm 2000), this again enables international expansion. Cooperation in other
words allows companies to participate in internationalization opportunities that they would otherwise not be able to take on by themselves (Fink et al. 2008; Rese and Baier 2011). It has even been argued that the critical resources and by so the sustained competitive is actually embedded in these interfirm partnerships instead of the internal resources of the firm (Dyer and Singh 1998). This by itself implies that domestic cooperative ties should also play a significant role in emerging market firms and in their international market expansion.

In many emerging market firms, an emphasis has been given on the role of social relationships and informal networks of firms instead of direct interfirm cooperation (Ahlsrtom and Bruton 2010; Kiss and Danis 2010). It has been stated that these "types of relationships help emerging market firms to overcome institutional barriers and that leveraging them is essential in exploring and exploiting prospects for growth and success over marketplaces" (Vasilchenko and Morrish 2011). In the context of cooperation and internationalization, emphasis has again been given on international experience, international networks, and international partnerships (Luo and Tung 2007). All of these help firms to acquire information about their target markets, which helps them to plan internationalization strategies. However, more often the roots and reasons for internationalization can be traced down to each firm's current markets and to their position on those markets rather than to an analysis of foreign market characteristics and international partnerships (Johanson and Mattsson 1988). Firms enter new markets because they are faced either by the need or possibility of doing it (Ellis and Pecotich 2001), and this need or possibility just as well presents itself through nurturing and developing existing domestic relationships (Johnsen and Johnsen 1999).

What makes cooperation over exploration and exploitation activities challenging both from a practical standpoint as well as from a research perspective is that it also comes with multiple risks such as opportunistic behavior, learning races, and knowledge leakages (Das and Teng 2000; Doz 1996; Hamel 1991). Moreover, it matters with whom you cooperate (Miotti and Sachwald 2003; Tomlinson 2010). Research done in developed economy settings shows that different cooperative partners affect firms in different ways when it comes to exploration activities (Laursen and Salters 2006; Nieto and Santamaria 2007; Rese and Baier 2011; von Hippel 1988), and some similar results have been found in emerging market context as well (Hinkkanen, Podmetena, and Väätänen 2013). Still, to the best of our knowledge, there is little research done on how cooperation with different exploration partners might affect exploitation activities especially in terms of market expansion and internationalization. As emerging market firms are increasingly becoming prominent players in global markets, understanding not only what motivates them to expand to new markets, but more importantly, what enables them to expand internationally becomes a genuine task.
Russia as a research arena offers an interesting setting for exploration and exploitation. Due to the quick growth of the Russian markets and the relative stabilization of the political and business environment after 2001, the country has started to attract more interest in terms of business activities by foreign firms. For example, many retail chains have successfully entered the Russian market using exports and direct investments (Gurkov and Filippov 2013). This has resulted in Russian firms facing increasing international competition in their domestic markets, which again has contributed to a push towards internationalization (Filippov 2011; Shirokova and McDougal-Covin 2012). Many Russian consumers as well as corporate clients are also becoming more demanding and prefer foreign-produced goods and products over domestic ones. For many Russian manufacturing firms, it has become important to explore and develop new innovative products and to enter new markets in order to achieve economies of scale and sustained competitive advantage but also an international brand image.

The role of cooperation in Russia has often been dismissed as a research topic because it is thought that in Russia information is not shared between partners and managers (Radosevi 2003; Spiesberger 2011). In reality, however, it has been found that today most entrepreneurs and managers of successful Russian companies have created an environment that has led to the formation, cooperation, and delegation of authority between various stakeholders that support cooperative forms of business (Shirokova, Vega, and Sokolova 2013). This makes research on cooperative relationships in Russia timely and valuable.

HYPOTHESES

Typically, management literature divides firm connections into vertical and horizontal linkages. Vertical boundaries refer to the relationships that are situated on the relevant industry value-chain (Porter 1985). These are such as suppliers, customers, and intermediaries (Belderbos, Carree, and Lokshin 2004; Håkansson and Eriksson 1993; Laursen and Salters 2006; Nieto and Santamaria, 2007). Horizontal boundaries again refer to business activities that are at the same level of the value chain either in similar or different industries as the focal firm. These include competitors, external research centers and institutions, and universities (e.g., Belderbos et al. 2004; Clark and Fujimoto 1991; Liefner, Hennemann, and Xin 2006). Often these two axes are used together as a general proxy for cooperation. However, this approach fails to take into account the interdependencies between these two dimensions, which are especially crucial in the exploration-exploitation context. Horizontal exchange is most often seen as the coordination of the skills and functions that are needed in the production of a certain resource, whereas vertical cooperation is more about the exchange of resources.
between the different levels of the value chain (Elf and Johansson 2001). Due to their different roles, one can also expect differences on how they affect the exploration and exploitation activities of firms. This is why we in this paper look at the effects of cooperation on the horizontal and vertical axes separately and so try to derive more detailed insights about the role of cooperation in the context of this paper.

Vertical cooperation has often been perceived useful in the innovation literature as it empowers firms to access new knowledge relatively easily by utilizing already existing relationships (Laursen and Salter 2006; von Hippel 1988). However, cooperation with vertical partners, such as clients, suppliers, and intermediaries, offers numerous advantages during internationalization. They can be used not only to improve new product development capabilities but to collect and pool resources as well as outsource some internal activities to partners, which again can help to free more resources to international activities (Rese and Baier 2011). Entering new markets also typically creates turbulence and increases the complexity in the focal firms operating environment. In these kinds of situations, it also becomes essential to maintain and strengthen those domestic relationships that are strategically important and difficult to replace (Elf and Johansson 2001). Having well-established relationships with suppliers and clients on domestic markets can thus help firms to more easily manage activities both in domestic as well as in new international markets.

Hypothesis 1: Vertical R&D cooperation in domestic markets helps firms to enter new markets abroad.

Horizontal cooperation with other firms from the same industrial background as the focal firm has been a growing area of academic research (Walley 2007). It has been stated that as with vertical cooperation, cooperation with competitors (coopetition) provides companies with access to unique and essential resources (Ritala 2012; Spence, Coles, and Harris 2001). Furthermore, it enables firms to focus on their core activities and at the same time to improve competitive potential. Previous studies have also found coopetition beneficial when it comes to innovation performance in Russian firms (Hinkkanen et al. 2013). Furthermore, if Russian companies are cooperating with competitors, this itself implies that they must be able to benefit from it somehow.

Hypothesis 2: Horizontal R&D cooperation with firms in domestic markets helps focal firms to enter new markets abroad.

Horizontal cooperation with universities and institutional R&D centers have the potential to boost up firms innovation activities as they are the primary
source of basic research. Several positive linkages have been found between these types of organizations and innovation performance of firms both in developed as well as in emerging economies (Zeng, Xie, and Tam 2010). Especially in Russia, institution-led R&D has had a strong role (Radosevic 2003). In the international exploitation context, cooperating with public institutions and external R&D centers could be seen important as it relieves focal firms' resources to be used for other purposes without compromising itself to similar opportunistic behavior as when cooperation is with firms. Institutions and universities are also in a position where they are likely to help firms to access complementary skills, such as language training and new personnel. They are also more likely to be internationally oriented than, for example, small or medium-size domestic firms due to their role as the spearheads of national technology development. This again can help firms set up new activities in outside their domestic market.

Hypothesis 3: Horizontal institutional R&D cooperation domestically helps firms to enter new markets abroad.

If we wish to understand the extra value that cooperation over exploration activities brings for exploitation, we have to also take into account the internal exploration that takes place inside the focal firm. Internal exploration activities not only help firms to innovate new and improved products and processes by themselves but they also enable the firm to identify and assimilate knowledge gains that derive from cooperation (Cohen and Levinthal 1990). This ability, often referred to also as absorptive capacity, is stated to be vital in exploitation of cooperative relationship (Cohen and Levinthal 1990; Jorde and Teece 1990). Firms with low levels of internal exploration activities can thus be expected to perform worse also in their exploitation activities. Then again, firms with low levels of internal exploration are likely not to be perceived as interesting cooperation partners by other firms, thus making them poor performers in the number of cooperative ties as well. In sum, we expect internal exploration activities to moderate the role of cooperative partners in exploitation and in particular in international market expansion. Typically, in-house R&D activities are perceived as an indicator of the existence of internal exploration and absorptive capacity (Tether 2002). In other words, firms completely without or with low levels of internal R&D are not seen as capable to be internally explorative or to assimilate the knowledge gains from cooperation, and so they are also expected to perform worse also when it comes to exploitation activities. However, firms with a low level of internal R&D are also more likely to pursue cooperative exploration.

Hypothesis 4: Level of internal R&D has a positive effect on firms' international market expansion.
Then again, if we wish to understand the extra value that cooperation over exploration activities brings for exploitation, we need to understand not only existing internal exploration but also current existing exploitation activities. As stated earlier, this study does not focus on internationalization per se but on the relationship between exploration and exploitation activities and how that relationship can be perceived by looking at international market expansion of Russian manufacturing firms. Thus, in the context of the article, it is also important to recognize the role of current international activities of these same firms. Earlier research has established that previous international experience has an effect on how companies enter other new markets (Luo and Tung 2007). When a company has already established itself once outside its domestic market, it is easier to enter new markets due to a learning effect. However, new markets also always require new complementary skills, so being present in one market does not automatically mean that a firm is able to establish a presence in another. Existing international activities combined with domestic cooperative exploration activities are thus likely to reinforce one another and by so lead to new market expansion. Figure 1 presents the conceptual model and expected causal linkages for the study.

Hypothesis 5: Existing international activities positively affect cooperation and further market expansion abroad.

DATA AND METHODOLOGY

In order to study the interlinkages of exploration and exploitation in the international expansion context, we employed a survey of Russian manufacturing companies collected from the most innovative regions in Russia in 2009–2010. The regions were categorized by the authors using the European Union’s Innovation Union Scoreboard methodology (see Hollanders and van

**FIGURE 1.** Conceptual model with hypothesized effects on market expansion.
Cruysen 2008) and ended up including Saint Petersburg, Nizhny Novgorod, Rostov-on-Don, Saratov, Samara, Perm, Yekaterinburg, Novosibirsk, and Krasnoyarsk. After identifying the most innovative regions, we employed the SPARK Business Database, which is Russia’s largest company database, and preselected 1,000 firms from these regions as potential respondents. Because we were not able to interview all of these companies, we employed stratified sampling, which is a recommended method of sampling a population that varies considerably (Sudman 1976). Stratification as a process groups members of the population into relatively homogeneous subgroups. We used regional GDP as stratification criteria and ended up with a total of 206 random respondents. Similar approach has been used for example by the World Bank and European Bank for Reconstruction and Development while conducting the Business Environment and Enterprise Performance Survey. In the data collection phase itself, we employed a questionnaire that was based on Organisation for Economic Co-operation and Development (OECD) recommendations for conducting innovation surveys (Oslo Manual 2007). The actual answers were received through structured interviews by using the questionnaire. In the Saint Petersburg area, the data were collected by the authors, and in other regions, the data collection was outsourced to a third party. Because of this, all the interviews were also sound-recorded and transcribed in order to maximize the reliability of answers. The questions themselves were generally related to the previous 3 years of business activities. The respondents were positioned high in the company and included mainly titles such as the CEO, executive director, head of innovation, technical director, and head of sales.

The companies in our sample are from various industries as follows: 27.2% represented production and construction, 10.2% chemical industry, 13.6% machinery, 5.3% information technology, 4.9% telecommunications, 5.3% oil industry, 17.5% metallurgy, and 16% from other industries. The share of companies associated with R&D activities was high; 78.9% of the respondents had at least some level of internal R&D. The intensity of R&D in the companies was also high when measured by the ratio between the company’s R&D costs and the sales volume; 34% reported it to be over 3%, which corresponds with the OECD definition of a high-technology firm. The range of companies by age varied from 4 years up to almost 300 years providing us with a large variation according to their historical background.

To measure the internationalization of Russian firms, we employed two different dependent variables due to the special structure and history of the Russian market place. First of all, we looked at internationalization of Russian firms to the CIS, which constitute from former Soviet Union countries, namely Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Tajikistan, and Uzbekistan. They are important to separate because of the many similarities with Russian domestic market such as language, culture,
and the general business environment. As a second dependent variable we used internationalization to other international countries, excluding the CIS countries. This is a better indicator for true international expansion.

We used factor analysis with varimax normalized rotation to group our independent variables into vertical and horizontal cooperation proxies. The results for these tests can be found in Table 1. During the first round of factor analysis, competitors were loaded to the same factor as vertical partner’s suppliers, clients, and intermediaries. In order to be able to test all of our hypothesis and also due to the fact that competitors are generally perceived as horizontal partners instead of vertical (Evers and O’Gorman 2011), we redid the factor analysis without the competitors. Based on the second analysis, we were able to group our independent variables into vertical (including suppliers, customers, and intermediaries), horizontal firms (competitors), and horizontal institutions (including commercial and state R&D centers and universities) that also reflect our hypothesis. The Kaiser-Meyer-Olkin score was checked for the adequacy of the correlation structure, and Cronbach’s alpha was examined for signs of internal consistency between the variables. We also checked for multicollinearity using linear regression model and found none between our variables. The final variables employed in the regression models are presented in Table 2. We also included the level of internal R&D measured as the percentage of R&D expenditure from sales to see the effect of internal exploration and absorptive capacity (Boujelpen and Fedhila 2010; Cohen and Levinthal 1990) and already existing international activities to catch the effect of existing exploitation (Evers and O’Gorman 2011; Lu and Tung 2007). Firm size and firm age were also included in the models to control for their possible effect due to the large variation between Russian firms (e.g., Shirokova et al. 2013).

As our dependent variables were binary (entering a new market), we used logistic regression to test for the hypotheses. Logistic regression is commonly used for predicting the outcomes of categorical dependent variables based on one or more predictor variables (Agresti 2002; Hilbe 2009).

**TABLE 1** Factor Loadings Using Varimax Rotations with Kaiser Normalization

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 1</th>
<th>Factor 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russian suppliers</td>
<td>0.725</td>
<td>0.186</td>
<td>0.190</td>
<td>0.726</td>
</tr>
<tr>
<td>Russian clients</td>
<td>0.778</td>
<td>–0.047</td>
<td>–0.062</td>
<td>0.827</td>
</tr>
<tr>
<td>Russian intermediaries</td>
<td>0.708</td>
<td>0.201</td>
<td>0.167</td>
<td>0.759</td>
</tr>
<tr>
<td>Russian competitors</td>
<td>0.594</td>
<td>0.012</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>External commercial R&amp;D centers</td>
<td>0.259</td>
<td>0.725</td>
<td>0.737</td>
<td>0.227</td>
</tr>
<tr>
<td>State R&amp;D centers</td>
<td>0.042</td>
<td>0.820</td>
<td>0.823</td>
<td>0.038</td>
</tr>
<tr>
<td>Universities</td>
<td>–0.001</td>
<td>0.784</td>
<td>0.770</td>
<td>0.045</td>
</tr>
<tr>
<td>Kaiser-Meyer-Olkin Measure</td>
<td>0.705</td>
<td>0.689</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cronbach’s $\alpha$ for vertical factor</td>
<td>0.675</td>
<td>0.667</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cronbach’s $\alpha$ for horizontal factor</td>
<td>0.763</td>
<td>0.763</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RESULTS AND DISCUSSION

Table 3 presents basic descriptive statistics of our data and variables. By looking at the means and standard deviations, we can make some insights about our sample. First of all, the mean for entering new markets in the CIS is as

<table>
<thead>
<tr>
<th>Variable</th>
<th>Measurement</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CIS</td>
<td>As a result of innovation strategy company entered new markets in CIS</td>
<td>0 = no, 1 = yes</td>
</tr>
<tr>
<td>New INT</td>
<td>As a result of innovation strategy company entered new international markets</td>
<td>0 = no, 1 = yes</td>
</tr>
<tr>
<td>Vertical</td>
<td>Russian suppliers, clients and intermediaries are involved in R&amp;D processes</td>
<td>0 = no, 1 = yes</td>
</tr>
<tr>
<td>Horizontal (firms)</td>
<td>Russian competitors are involved in R&amp;D processes</td>
<td>0 = no, 1 = yes</td>
</tr>
<tr>
<td>Horizontal (institutional)</td>
<td>Russian external commercial R&amp;D centers, state R&amp;D centers, and universities</td>
<td>0 = no, 1 = yes</td>
</tr>
<tr>
<td>Level of internal R&amp;D</td>
<td>Share of internal R&amp;D from sales</td>
<td>1 = &lt; 1.5%; 2 = 1.5–3.0%; 3 = &gt; 3%</td>
</tr>
<tr>
<td>Already international</td>
<td>Is the company already international</td>
<td>0 = no, 1 = yes</td>
</tr>
<tr>
<td>Size</td>
<td>Number of employees</td>
<td>1 = &lt; 20 employees, 2 = from 20 to 50 employees, 3 = from 50 to 100 employees, 4 = from 100 to 250 employees, 5 = from 250 to 500 employees, 6 = from 500 to 1000 employees, 7 = from 1000 to 3000 employees, 8 = &gt; 3000 employees</td>
</tr>
<tr>
<td>Age</td>
<td>Company age from establishment</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>New CIS</td>
<td>172</td>
<td>0.622</td>
<td>0.486</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>New INT</td>
<td>165</td>
<td>0.448</td>
<td>0.499</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Vertical</td>
<td>142</td>
<td>0.282</td>
<td>0.451</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Horizontal (firms)</td>
<td>141</td>
<td>0.220</td>
<td>0.416</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Horizontal (institutional)</td>
<td>154</td>
<td>0.169</td>
<td>0.376</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Level of internal R&amp;D</td>
<td>176</td>
<td>2.182</td>
<td>0.764</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Already international</td>
<td>203</td>
<td>0.468</td>
<td>0.500</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
<td>197</td>
<td>40</td>
<td>43</td>
<td>4</td>
<td>293</td>
</tr>
<tr>
<td>Size</td>
<td>205</td>
<td>5.010</td>
<td>1.884</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>
high as 0.622, and the mean for entering new markets in countries that are not a part of the CIS is as high as 0.448, both implying that our sample is very actively participating in international business activities. This is most likely due to the sampling method applied, where we focused on the most innovative regions in Russia and used stratified sampling to choose respondents. Also, on average, firms in the sample are large, from 250 to 500 employees, and well established (mean age, 40 years). Almost half of them have at least some prior international activities in forms of export, direct sales, or existing subsidiaries (mean, 0.468). These descriptive results imply that at least some firms that are active in international operations are at least to some extent also successful in them due to the expansion rate. These factors are to be taken in account especially when generalizing the results of the regression models to other emerging markets as well as inside Russia, which in itself already forms a vast and diverse entity. When from one hand our sample offers a possibility to analyze internationally operating firms and so to dive deeper into the success factors of Russian firms, our results should not be interpreted as a method of first-stage internationalization.

The results of the logistic regressions provide interesting results in the light of our hypothesis (Table 4). In the first model, we tested for vertical cooperation, horizontal firm cooperation, and horizontal institutional cooperation and their influence on new market expansion in the CIS countries, while controlling for firm size and age. The Nagelkerke $R^2$ for the model is 0.24, and the model predicts 67.9% of the variation correctly, the valid number of cases being 112. It is noticeable that, due to missing values, the

<table>
<thead>
<tr>
<th>TABLE 4 Regression Results</th>
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</thead>
<tbody>
<tr>
<td>Model 1</td>
</tr>
<tr>
<td>------</td>
</tr>
<tr>
<td>New CIS</td>
</tr>
<tr>
<td>Estimate</td>
</tr>
<tr>
<td>Vertical</td>
</tr>
<tr>
<td>Horizontal (firms)</td>
</tr>
<tr>
<td>Horizontal (institutional)</td>
</tr>
<tr>
<td>Level of internal R&amp;D</td>
</tr>
<tr>
<td>Already international</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>Nagelkerke $R^2$</td>
</tr>
<tr>
<td>Hosmer &amp; Lemeshow test</td>
</tr>
<tr>
<td>Correct percentage</td>
</tr>
<tr>
<td>N</td>
</tr>
</tbody>
</table>

*p < 0.01; **p < 0.05; ***p < 0.10.
regressions are not run with the full 206 respondents. The results show that while vertical cooperation and horizontal institutional cooperation have a positive effect on entering new CIS markets, horizontal firm cooperation with competitors has a significant negative effect. The negative effect on international exploitation is interesting especially since earlier research has provided evidence that R&D cooperation with competitors in Russia can help firms with their exploration activities (Hinkkanen et al. 2013). One possible explanation for this difference is that when firms pursue internationalization and market expansion, they are faced with different kinds of problems than while innovating, even though cooperation by itself enables them both. As March (1991) stated, systems that engage in either exploitation while excluding exploitation, and vice versa, “are likely to find themselves trapped in suboptimal stable equilibria” (March 1991, 71). Then again, when entering new CIS markets that are similar to those of the Russian domestic markets, Russian competitors especially in the manufacturing sectors might be less willing to share key resources and capabilities, so the cooperative relationship is more resource consuming rather than resource pooling. Also when firms’ domestic competitive conditions become more turbulent and more difficult to control, firms face the challenge of moderating and stabilizing their domestic competition (Elf and Johansson 2001), which in turn could partly explain the result. In general, model 1 proposes that coopetition in the context of internationalization might not be the best strategy Russian firms can choose even though it would enable exploration activities.

This result, however, should be dealt with under certain precautions, as the relationship is non-significant when we also include the effect of internal R&D and existing international activities (model 2). The Nagelkerke R² for the model is 0.49, and it predicts 75.7% of the variation correctly, the valid number of cases being 103. We notice that only vertical cooperation remains as a significant positive factor, whereas both firm and institutional horizontal cooperation are non-significant. Also, the level of internal R&D is non-significant. This result in turn suggests that in the context of CIS market expansion the role of domestic interfirm linkages is limited. What firms can take advantage from is the existing supply chains they have established in their domestic markets and use those while pursuing new markets and exploitation activities. If we consider cooperation as an enabler of learning in exploration (Cohen and Levinthal 1990; March 1991), our results imply that what actually matters is the experience that the firm itself has gathered by already operating in international markets, not the information it can learn from horizontal partnerships. As CIS markets represent in many ways similar markets as Russia also, the level of information needed is lower than when compared to other, more distant markets that might have different historical, cultural, and environment from Russia and where the Russian language is not commonly spoken.

Whereas Russian firms entering CIS markets could perhaps be compared to a situation where a U.S. firm enters Canadian market, entering
countries outside CIS represents a much higher leap. The focal firm is faced with new types of customers, it has to establish relationships with new supply chains, and it has to compete with new types of competitors. The information the firms require is, thereby, much higher. In this context, exploration activities become much more important and an enabler of exploitation activities. Model 3 shows that both vertical and horizontal institutional cooperation has a positive and significant effect on entering new international markets when controlling for firm age and size and that cooperation with horizontal firms remains slightly negative but non-significant. The Nagelkerke $R^2$ for the model is 0.29, and it predicts 71.8% of the variation correctly, the valid number of cases being 110. When including the level of internal R&D and existing international activities to the model (Model 4), we notice that vertical and horizontal institutional cooperation both remain significant and that previous international presence is a strongly significant explanatory factor in entering new international markets. The Nagelkerke $R^2$ for the model rises to 0.40, and it predicts 70.6% of the variation correctly, the valid number of cases being 102. However, the level of internal R&D remains a non-significant factor even though it contributes to the general model.

Based on our results, both vertical and horizontal cooperation can have a positive effect on entering new international markets, supporting H1 and H3, but this relationship is dependent on the markets where the firm is expanding. International expansion models such as the Uppsala Model (Johanson and Vahlne 1977) suggest that firms internationalize and expand to new foreign markets gradually starting from countries that are close by and where the operating environment is similar to domestic markets, moving on to new, farther-away countries as they build up knowledge, skills, and capabilities. Based on our results, domestic exploration becomes more important when firms reach farther away, and especially horizontal institutional cooperation becomes important when the markets are more unfamiliar. Our results support H5 and that existing international activities help firms entering new international markets while cooperating domestically.

Noticeably, we do not find support for H2 and H4; that is, that cooperation with horizontal firms would help focal firms or that the level of internal R&D would have a moderating effect on international expansion. One way to look at this result is that cooperation can be beneficial for firms regardless of their internal technology development level. Then again, these results highlight the basic differences that exist between exploration and exploitation (March 1991). Maintaining an appropriate balance between these two activities is a primary factor in the survival and prosperity of cooperative relationships also in emerging markets, and positive outcomes from cooperation should not be taken as granted. Still, they do enable many firms to push toward new international markets while preserving domestic market presence.
CONCLUSIONS

Our article offers a number of important theoretical and practical implications. First of all, using an exploitation approach of innovation cooperation instead of exploration, we are able to demonstrate not only why emerging market firms expand to new markets abroad but how they enter new markets by making use of their domestic assets. Second, we contribute to the emerging market literature by using primary data from Russia, which is one of the least studied countries among Brazil, Russia, India, and China (BRICs).

Our results show that vertical cooperation with domestic suppliers, clients, and intermediaries has a positive effect on new market expansion regardless of whether this expansion happens in physically and culturally nearby countries or in countries that are more distant. This implies that emerging market firms not only cooperate to explore new business possibilities in terms of upgrading internal capabilities or improving innovativeness but it is also about focusing scarce resources at hand and about protecting domestic market presence while trying to grow internationally. Then again, we also found that horizontal cooperation with R&D centers and universities has a significant effect on market expansion when firms are expanding to new international markets outside the CIS countries, as when both physical and cultural distance is greater. This again implies that while vertical cooperation might not be about capability building, horizontal cooperation is. Foreign markets are more demanding in many terms; the products that companies sell need to be more innovative, which in turn requires more basic research, and they have to possess better managerial skills (language know-how, marketing, manufacturing, processes, etc.). Research institutions and universities in Russia have traditionally held a significant role in providing these kinds of specialized talents and skills.

We found no support for horizontal cooperation within the exploitation context, which in itself highlights the important differences between exploration and exploitation activities and that finding a balance between the two is difficult but nevertheless crucial for the long-term survival of cooperative relationships as well as for the survival of the whole firm. As an example, coopetitive partners might be able to bring extra value in terms of new products; however, managing these types of cooperative relationships during international expansion can turn out to be resource consuming instead of pooling. Choosing the right time to include the right partners can lead to improved competitive advantage in both international as well as domestic markets, but choosing the wrong partners at the wrong time can have negative effects on competitive advantage. So by no means are cooperative relationships an easy answer for the catch-up dilemma of emerging market firms. Finally, our results show that whereas previous international experience has a positive effect on the international expansion of Russian firms
and so also enforces the effect of cooperation, the level of internal R&D has no similar effect.

We would like to conclude that when cooperative ties are studied in any country, their role and effects should not be taken as granted and that different partners can have different effects on different aspects of firms’ activities simultaneously. In order to catch this effect over a longer time span, as one of the future research suggestions, we would like to recommend collecting and using panel data, which would allow the evaluation of different cooperative relationships over different time periods. It would be interesting to see whether different cooperative partners are used in different stages of international expansion, as this is not caught by our study. Our paper is also limited by the sampling method due to which the generalizability of the results to other emerging markets or even to all Russian firms is limited. However, we do believe that our results hold in the regions where the data is collected from and so can be expanded to cover most Russian firms, and especially firms with international activities.

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The Will to Win - Antecedent to Successful Innovation Cooperation

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**Will to win - antecedent to successful innovation cooperation**

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Abstract: R&D cooperation has been under extensive academic scrutiny and various different relationships have been proposed and found to exist between cooperation and performance. However until now goal setting has not been addressed by scholars, even though goal setting theory explicitly states that they affect performance. We combine R&D cooperation literature with goal setting theory and study how the two moderate innovation and firm performance. Based on empirical data from 206 Russian manufacturing firms we find that goal setting moderates the role of R&D cooperation over different performance domains. Based on the results we are able to identify risks, possibilities and ways to manage both of them within the cooperation process. The paper has thus important implications for both researchers and managers.

Keywords: R&D cooperation; goal setting; innovation; strategy

1 Introduction

"...this nation should commit itself to achieving the goal, before the decade is out, of landing a man on the moon and returning him safely to earth... [this decision] means a degree of dedication, organization and discipline which have not always characterized our research and development efforts" (John F. Kennedy, Special Message to Congress on Urgent National Needs, 25 May 1961, )
In 1961 President Kennedy set a goal for a nation that at the time seemed almost impossible to achieve. Putting a man on the moon was not only technologically extremely challenging, but the mental hurdle that needed to be crossed was gigantic. However, as we all know, on July 21st 1969 that goal was reached. It is generally believed that the speech given by President Kennedy and the “impossible goal” that he set was in a vital role in making the moon landing happen. The success of the US space program in the 1960s is by so a great example of goal setting within the innovation process. Countries, organizations and firms alike can possess the necessary technologies, resources and skills in order to achieve breakthrough innovations such as space shuttles, but in the end without specific goals it is very hard to channel those assets into their proper use. If we look at the phrases that President Kennedy used and which were the building blocks for his goal they were commitment, dedication, organization and discipline. In his innovation strategy he thus insisted that these intangible concepts needed to be aligned with tangible R&D efforts.

Jumping from the 1960s to the 21st century the world has become increasingly complex in terms of technologies and products and the importance of continuous innovation has nothing but risen. Achieving new technological innovations requires increasing amounts of knowledge, skills and resources. For companies it has become hard, if not impossible, to completely rely on internal R&D activities. Many scholars have come to claim that today companies need to be open to their external environment and to cooperate with other organizations, companies and stakeholders. By cooperating firms gain many advantages such as access to new knowledge, share costs, access complementary resources, pool risks and co-opt competition (Hagedoorn, Link and Vonortas, 2000; Rese and Baier, 2011; Tether, 2002; Becker and Dietz, 2004). However the empirical studies done on cooperation and its effect on the focal firm has provided numerous contradictory results. Even though cooperation is generally perceived to have a positive effect on the focal firm, contradictory implications have also been found. Moreover, studies have shown that interfirm innovation partnerships in general are short lived and that they often result in failures (Das and Teng, 2000, Tether 2002). Even though there have been attempts to explain the high failure rates and negative outcomes of cooperative relationships, role of goal setting has largely been overlooked within the innovation cooperation context. It almost seems that cooperation is perceived as an absolute value, the possible negative effects are credited to context specific moderating factors, and that the positive effect assumption thus goes mostly unquestioned. We argue that just as goal setting had an important role in achieving success in the US space program in the 1960s, it is an important factor in 21st century companies and in achieving the multiple benefits that innovation cooperation is claimed to have. In addition we also argue that where as cooperation is not mandatory for firms in order to succeed in innovation, goals are precisely that.

From an academic standpoint the importance of goal setting has been studied in the context of individual personal performance (Medlin and Green, 2009), team performance (Wong, Tvosjold and Liu, 2009; Kleingeld, Mierlo and Arends, 2011) and general firm performance (Locke and Latham, 1984) and it is currently a well established theory in organizational psychology (Locke and Latham, 1990). Just as in President Kennedy’s speech, goal setting works as a premise for concrete actions and assumes that only these actions enable goals to be achieved (Ryan, 1970). Moreover, the more specific and difficult a goal is, the more dedicated action it provokes (Locke, 1981). By setting the bar high, not only in landing a man on the moon but on bringing him back afterwards,
Kennedy made sure of the commitment of people working in the space program, and by so also assuring constant concrete actions to take place.

Within the innovation cooperation context some studies have dealt with goals. For example Santamaria and Stroccca (2011) studied the relationship of the goals that firms set for individual partnerships and the impact of those partners on the focal firm. However our paper is to the best of our knowledge the first one to deal with goal setting in a wider firm context as it looks at the number of specific innovation goals on corporate level, their importance to the focal firm, and interfirm cooperation as an enabler in the goal-performance relationship. In other words we ask how does internal innovation goal setting moderate innovation and firm performance, and in particular what is the effect of R&D cooperation on innovation and firm performance?

To study the phenomenon we use empirical survey data from 206 manufacturing firms in Russia. Based on previous research on R&D cooperation and goal setting we identify four distinctive goal-cooperation strategies. Using hierarchical regression model we are able to show that goal setting plays a role in innovation and firm performance and that R&D cooperation can be used to further improve innovation performance, market performance as well as company performance. Our analysis also reveals that without goal setting R&D cooperation is more likely to have a negative effect on firm performance.

The paper is structured so that section two is a literature review of R&D cooperation and goal setting literature. In section three we developed hypotheses for different goal-cooperation strategies. Section four presents our empirical data, employed variables as well as methodological approach. In section five we present the results of the analysis. The paper ends with conclusions in section six.

2 Innovation, cooperation and goal setting

Technological innovations are at the core of both firm growth as well as economic growth (Schumpeter, 1943; Penrose, 1956; Teece, 1982; Prahalad and Hamel, 1990). In order for firms to survive in the ever changing market environment they need to be able to respond to new competitive threats such as disruptive products and technologies (Teece, Pisano and Shuen, 1997; Hitt, Keats and DeMarrie, 1998; Christensen, 1997). Examples of companies who failed to do this are plenty. Kodak was the leading player in the photography industry in the 1980s and 1990s through its innovative products but got downtrodden by the revolution of digital photography. Nokia was the leading mobile phone manufacturer in early 2000 but was overrun by Apple and Samsung later in the decade. From a resource point of view it is hard to justify the downfall of these types of firms. Both Nokia and Kodak were actively engaging in R&D and both of them had the skills needed to succeed in technology development. Hence the reason for their downfall was somewhere else.

The innovators dilemma states, "when times are good and the core businesses are growing robustly, starting new generations of growth ventures seems unnecessary" and on the other hand "when times are bad and mature businesses are under attack, investments to create new growth business can’t send enough profit to the bottom line quickly enough to satisfy investor pressure for a fast turnaround" (Christensen et al. 2002 p.22). The innovators dilemma by so explains partly why large successful companies...
often fail. What the innovators dilemma highlights is the role of growth as the goal. The more rapid it is the better. However there is a difference between rapid growth and long term growth. Long term sustainable growth can only be achieved through subsequent activities which link up within the organization and these do not only include the improvement of organizational cost efficiency but also constant incremental and radical innovations (D’Aveni, Dagnino and Smith, 2010). Taking again the simple example of the US Space Program in the 1960s the explicit goal was not to grow the dominance of US over Russia in space, but build and launch a ship into the moon and which could return back. Achieving this goal in turn was what led to the dominance of USA in space. Empirical studies have consistently shown that achieving innovations leads to positive long term performance (Colombelli, Haned and Le Bas, 2013; Cefis and Marsili, 2005; 2006) and hence the ultimate goal of the firm should not be growth per se but instead innovation.

Achieving innovations however is in many ways becoming harder and harder. As the technological life cycles of products are becoming increasingly shorter it means that companies need to innovate more and more rapidly (Reese and Baier, 2011). This again means they have to increase their both their exploration as well as exploitation activities (March, 1991; Benner and Tushman, 2003; Lavie and Rosenkopf, 2006). Moreover innovations are becoming more complex by nature and combined these contribute to both rising costs as to rising risks within the innovation process. And cost and risks again push companies to put their emphasis again on short term growth goals instead of long term innovation goals. In order to cope with the increasingly competitive business environment scholars have come to suggest that firms should open up their business processes, utilize external channels in their innovation activities and to cooperate more extensively (Chesbrough, 2003; Chesbrough, Vanhaverbeke and West, 2007; Kock and Torkkeli, 2008). Interfirm cooperation allows companies to access complementarities and new knowledge, internalize core competencies, lower costs and pool risks among other things (Hagedoorn et al. 2000). Many scholars have found a positive relationship between interfirm R&D cooperation and firms innovation performance (Okamuro, 2007; Chiu, 2009; Miotti and Sachwald, 2003; Nieto and Santamari, 2007). An argument could be made that those companies who actively engage in cooperative R&D would also set goals for their innovation activities, as it would make little sense to cooperate just for the sake of cooperating. However, positive outcomes are surprisingly relatively seldom. Research partnerships in general seem to be volatile and often result in failures (Das and Teng, 2000, Bönte and Keilbach, 2005) and one of the reasons behind failures is poor coordination and lack of clear goals.

Both innovation and cooperation have received wide attention by management scholars, and goal setting is a well-established stream of literature in organizational psychology (Locke and Latham, 1990), but there has been relatively little research done on the interplay between goal setting, innovation cooperation and firm performance regardless of their evident linkages. As an exception Santamaria and Surrocca (2011) studied technological goals and how they affect partner choices and again respective innovation performance. However their approach to goals was much too general in order to fully understand the impact of goal setting on corporate level. Goal setting works as a premise for any kind of action to exist (Ryan, 1970). Athletes need to set goals in order to improve their performance, teams need to set common goals to create team spirit, employees need to set goals in order to stay motivated, companies need to set goals in order to manage their businesses profitably, and governments need to set goals in order to
put a man on the moon (Locke and Latham, 1990). The importance of goal setting has been studied for example in the context of individuals (Medlin and Green, 2009), teams (Wong et al. 2009; Kleingeld et al. 2011) and organizations (Locke & Latham, 1984).

In the business context goals have been found to help focus attention towards relevant activities, act as energizers, affect persistence, and activate cognitive knowledge and strategies (Locke and Latham, 2002; Locke and Latham, 2006). Goal setting has also been found to help firms to overcome uncertainties in new product development (Hong et al. 2004), to be important for linking creativity with productiveness (Madjar, and Shalley, 2008; Shalley, 1995), and to contribute to redesigning exploration activities inside companies (Cesaroni, Di Minin and Piccluga, 2004).

The more specific the goals are the stronger is their effect on performance (Locke, 1981). In other words each goal has to be clear, understood well in all levels of the organization and accepted by employees. The goal that President Kennedy set in 1961 for the space program was regardless of its difficulty a specific target which was well taken and understood by the nation, people and most importantly engineers who worked with the program. However similarly as rockets are not build based on one general goal, overall performance is linked to a bundle of goals which link together. In the US space program engineers needed to be built on many detailed innovations, which required many detailed goals, and which all contributed to the goal of putting a man on the moon. This multiplicity in goal setting helps to understand the range of all required tasks.

Cascading goals to lower levels within the organization is still very often difficult and requires good management skills (Ittnner and Larcker 1998; Samsonowa, 2012). That is why most of the studies done on goal setting are focused on individuals and managers. In companies managers are typically the ones who are responsible for determining strategies and that is why it is important to understand the factors that motive their decisions related to applying those strategies in practice (Knight et al. 2001). This is especially relevant in the innovation context. Conscious decisions to cooperate and to innovate are done by senior managers and by so in most cases innovation and cooperation goal setting goes hand in hand. As evidence for this for example Baum and Locke (2004) were able to accurately predict future firm growth by using management goal setting as an indicator. Understanding the importance of goal setting for example Samsonowa (2012) has aimed to develop a classification of R&D-related goals, reflecting various aspects of innovation activities of a firm. According to classification of innovation activities, it also deals with cooperation dimensions, including partnerships with academia and other partners. Still, it seems there is a strong demand especially for empirical research related to goal setting, firm performance and cooperative innovation activities.

3 Hypothesis

Theoretically there is neither limit to the number of cooperative relationships a firm can have nor on the number of goals it can set. In other words firms have possibilities to cooperate with a multitude of different types of partners, such as clients, suppliers and universities. Firms also have the possibility to pursue numerous goals while innovating, such as cost reduction, improved new product performance or customer satisfaction.
In the context of this paper these two concepts, the *extent of cooperation network* and the *number of innovation goals* form the conceptual and empirical framework. The extent of partner network has been found to have a positive effect on firm and innovation performance (Becker and Dietz, 2004; Laursen and Salters, 2006). The more diverse the firm’s cooperation network is, the more likely the firm is able to access new knowledge and complementary resources (Nieto and Santamaria, 2007). For example the evolutionary theory suggests that diverse sources of knowledge provide opportunities for the firms to choose different technological paths while innovating (Nelson and Winter, 1982). Then again the higher the number of cooperative partners is, the greater the risk of opportunistic behavior is as well (Nieto and Santamaria, 2007). Thus the first balancing between few cooperation partners and multiple cooperation partners is an essential factor in cooperative innovation activities.

Goals on the other hand act as the motivational force that directs attention and mobilizes efforts (Locke, Shaw, Saari, and Latham, 1981). In connection to R&D cooperation and innovation they provide incentives to make the best possible use of cooperative networks. Performance improvements are the greatest when each specific task has its individual goal set (Madjar and Shalley, 2008). As companies typically have multiple tasks they need to set multiple goals that interlink with one another. Still at the same time some goals are more important than others. In addition Locke and Latham (1990) showed that groups perform better when they have specific and challenging goals when compared to having vague and easy goals. Thus the second balancing act is between the importance and number of goals the company sets.

Using cooperation networks approach and goal setting theory we can divide firms into four separate groups (figure 1). First group is companies that have no or only very few important innovation goals, and who also do not cooperate over R&D. These companies could be technological laggards or firms which leverage very specific assets in niche markets. They might have few competitors and thus are not pressured to innovate. They might also consider cooperation risky or then they do not see how it might benefit them. As these companies have no important innovation goals and do not access complementary assets they are likely to perform below expectations.

**Hypothesis 1:** Having little to no important innovation goals and little to no R&D cooperation strategy has a negative effect on performance.

The opposite group is firms which have both multiple important innovation goals and they make extensive use of interfirm R&D cooperation. These types of firms could be companies which operate on the forefront to technological innovation, in multiple markets, and possibly compete against number of local or international players. They need to be able to simultaneously improve organizational performance as well as innovation performance and they see R&D cooperation as an integral part of corporate strategy. These firms are by so more likely to exceed performance expectations.

**Hypothesis 2:** Having multiple important innovation goals and extensive R&D cooperation strategy has a positive effect on performance.

Between these two extremes are companies with either no or only very few important innovation goals, but who still cooperate extensively, and companies with multiple important innovation goals but who do not cooperate over R&D. Companies that have
little to no innovation goals but still cooperate are the most challenging companies to classify and describe. However they could be companies that consider themselves doing relative well in their current markets and thus do not feel a direct pressure to innovate. At the same time they acknowledge that cooperation might bring extra value, but that value is not clearly defined. In other words they might be cooperating for the sake of cooperating. In this type of a situation companies still have to commit resources to managing these potentially risky relationships. With low goal setting the firms at the same time are less likely to mobilize effort to benefit from the relationship and thus they are likely to perform much worse than they expect.

**Hypothesis 3:** Having little to no important innovation goals and extensive R&D cooperation strategy has a negative effect on performance.

Finally companies with multiple innovation goals but with little to no cooperation represent perhaps the most traditional type of companies. They might operate in well-established industries and/or have strong internal R&D capabilities. These types of firms are likely to be able coordinate and execute activities according to their plans and goals, and thus are likely to perform in line with their performance expectations.

**Hypothesis 4:** Having multiple important innovation goals and little to no R&D cooperation strategy has no significant impact on firm performance.

![Figure 1. Four goal setting-cooperation strategies and performance](image-url)

**4 Data and method**

In order to study the role of cooperation and goal setting in innovation context we employed a survey of manufacturing companies collected in 2009-2010. The data originates from Russia which is the largest country of the world according to land area. We collected our dataset from nine different regions that are considered the innovative regions of Russia (see Hollanders and van Cruysen, 2008). They included Saint Petersburg, Nizhny Novgorod, Rostov-on-Don, Saratov, Samara, Perm, Ekaterinburg,
Novosibirsk and Krasnoyarsk. 1000 manufacturing firms were randomly selected as potential respondents using SPARK Business Database, which is Russia’s largest company database.

Collecting survey data is a challenge in any emerging country and likewise in Russia. We wanted to maximize the reliability of the responses and for that reason we chose structured interviews as a method. However, due to the lack of resources we were not able to survey all of the preselected companies. Thus we employed stratified sampling method. Stratified sampling is a recommended method in populations which tend to vary considerably (Sudman, 1976). We used regional GDP as the stratification criteria to ensure that all the nine regions would be included in the sample and set the minimum response limit to 20%. The criteria was met with 206 random respondents from the original 1000. Similar approach to data collections has been used for example by the World Bank and European Bank for Reconstruction and Development while conducting the Business Environment and Enterprise Performance Survey (BEEPS) and the Management, Organization and Innovation Survey (MOI).

In the data collection phase itself we employed a questionnaire that was based on OECD recommendations for conducting innovation surveys (Oslo Manual, 2007). As said the actual answers were received through structured interviews by using the developed questionnaire. In the Saint Petersburg area the data was collected by the research team, and in other regions the data collection was outsourced to a third party. Because of this, all the interviews were also sound recorded and transcribed in order to maximize the reliability of answers. Robustness tests were also conducted between the regions and no significant differences were observed in responses. The questions themselves were generally related to the previous three years of business activities, so to 2008-2010. The respondents were positioned high in the company and included mainly job titles such as the CEO, Executive Director, Head of Innovation, Technical Director, and Head of Sales.

The companies in our sample are from various industries as follows; 27.2% represented production and construction, 17.5% metallurgy, 10.2% chemical industry, 13.6% machinery, 5.3% information technology, 4.9% telecommunications, 5.3% oil industry and rest 16% other industries. The range of companies by age varied from 4 years up to almost 300 years providing us with a large variation according to their historical background. This is especially important in the context of Russia as any company that was set up before 1991 was at some point a governmentally owned. Even if later privatized these state owned or formerly stated owned firms have been found to perform lower in terms of innovations (Desaj and Goldberg, 2008; European Bank of Reconstruction and Development, 2012).

**Variables**

*R&D Cooperation.* R&D Cooperation was measured as a yes/no questions on whether a particular type of partner is involved as an interfirm R&D partner. We focused on 12 different types of cooperation partners which were domestic clients, international clients, domestic suppliers, international suppliers, domestic intermediaries, international intermediaries, domestic competitors, international competitors, external commercial research centers, state research centers, and universities. Using these variables we computed an indicator for the breadth of the cooperation network, in other words the number of cooperation partners the focal firm uses. As each partner type was coded as a 0
if it was not employed as a partner and as a 1 if it was used as a partner, we simply added the variables together. Similar approach has been previously used for example by Laursen and Salter (2006) and Tomlinson (2010).

Goal setting. In our survey we asked respondents to evaluate the importance of 21 individual goals while innovating on a Likert scale of 1 (not important) to 5 (very important). These 21 items included items such as “decrease unit labor costs”, “increase safety of goods and services”, “develop radically new innovation goods and services”, and “sustain the current market share”. As many of the variables collated with each other by using factor analysis we were able to group the 21 items into 7 separate factors which were named as (1) environmental and social sustainability, (2) internal and external knowledge flows, (3) cost and processes, (4) product and service development, (5) product and service quality, (6) market performance, and (7) internationalization. These seven factors thus represent seven different general goals that firms pursue when they are innovating. Even though it is not a complete list of all possible goals a particular firm can have, it can be considered as an extensive one.

As important goals are the ones that matter the most (Locke and Latham, 1984; Locke and Latham 1990, Knight et al. 2001) we focused on most important goals of firms. We created a dummy variable for each of the seven factors to estimate how many firms treated that goal as very important. This was done so that firms that responded a 4.5 or higher on a likert scale of 1 to 5 were treated as perceiving that goal as very important. For example if a firm had a score of 5 on environmental and social sustainability it was coded with a 1, and if it had a score of 3 it was coded with a 0. Using the dummies we computed a similar indicator for goal setting as we did for the breadth of cooperation network. This gave us proxies of how goal oriented firms were in terms of their innovation strategy and ambidexterity. For example some firms treated all 7 goals as very important whereas some considered not having any important goals while innovating.

Performance and performance expectations. Performance in the survey was measured by using the respondent’s perception of performance against the performance objectives that had been set for the firm for the past three years. This naturally subjects the performance variable to respondent biases. However, it also allows us to compare whether the firm was able to improve its performance when taking into consideration its long term strategy and general expectations for improvement. Moreover, in the cooperation-goal context using the perception of performance over objectives we are able to more easily distinguish whether cooperation and goal setting can help firms to exceed their performance objectives and by so ask the critical question “is there any extra value in cooperation?”

Performance was measured on a Likert scale of -2 (significantly worse) to 2 (significantly improved) over three different domains which were; firm performance (construct of variables market share, sales growth, business profitability, ROI and sales profitability), end market performance (construct of variables customer satisfaction, creation of customer value and creation of customer loyalty), and innovation performance (construct of variables number of successful new products and services, launching new products to the markets, and time needed for launching new products).

Control variables. In our analysis we employed a number of control variables that have been found to explain firm performance and innovativeness. These included firm size (as
in number of employees), firm age (as in years from foundation), level of internal R&D (as in percentage of R&D expenditure from sales) and internationalization (as in international activities dummy).

**Method.** We used linear hierarchical regressing to test the hypothesized relationships, constructing separate analysis for each type of strategy and performance combination. The distributions of the dependent variables were checked visually and were found to be in line with the assumptions of linear models. Regarding the individual predictive power of the success factors on performance, the variables were tested for multicollinearity. The correlations were below the suggested multicollinearity threshold of 0.6 at which it is considered to be a problem (Grewal et al., 2004). Variance inflation factors were also well below the suggested limit of seven to ten (Belsley, 1991). Descriptive statistics, ANOVA and post hoc tests were also used to analyze and perceive performance differences between different goal-cooperation strategies.

**5 Results**

After cleaning the data from missing responses we had 55 companies with few innovation goals and no or only few R&D partners, 56 companies with few innovation goals but use multiple R&D partners, 33 companies with multiple innovation goals, but no or only a few R&D partners and 44 companies with multiple innovation goals and use multiple R&D partners. Thus the total number of firms for the analyses was 188. Table 1 presents the correlations between variables.

The summary results of regressions are presented in Table 2. Regarding the control variables and base models we found a positive significant relationship between the level of internal R&D and all three performance indicators. Company size had a positive significant effect on firm performance and innovation performance but no significant effect on end market performance. Company age had a negative significant effect on all three performance indicators. Internationalization on the contrary had no significant effect on any of the performance indicators. In general it can be said that all control variables between the different performance indicators are in line with each other’s as well as previous studies (Lausen and Salters, 2006; Nieto and Santamaria, 2007; Rese and Baier, 2011).

For little to no important innovation goals and little to no R&D cooperation strategy we found a negative significant relationship for end market performance and innovation performance. For firm performance we found likewise a negative but a non-significant relationship. This partially supports your first hypothesis however we cannot fully confirm it. For multiple important innovation goals and extensive R&D cooperation strategy we find a strong positive significant relationship for all three performance measurements, which again supports our second hypothesis.

For little to no important innovation goals and extensive R&D cooperation strategy we find a strong negative significant relationship for all three performance measurements. This provides support for our third hypothesis. For multiple important innovation goals and little to no R&D cooperation strategy we find a positive but a non-significant relationship with firm performance and innovation performance, and a negative non-significant relationship with end market performance.
All the models were found significant with $p<0.05$ and for all the models the adjusted $R^2$ was acceptable. Based on the results we are able to confirm three out of four hypotheses and also find partial support for hypothesis one. Thus based it seems that goal setting and cooperation have an influence on the performance of firm confirming our logical model.

Figure 2 presents the variations in performance averages across the four goal-cooperation strategies. In general firms which have little to no important innovation goals are the weakest performing firms regardless of whether they cooperate over R&D or not. However firms having no cooperation seem to be performing slightly better than firms with extensive cooperation. In general goal setting results in better average performance. Furthermore firms which combine goal setting with extensive cooperation are the best performing ones on average. ANOVA confirms that the performance differences between high goals-extensive cooperation and both little to no goals strategies are significant over all three performance indicators (Table 3). Post hoc tests using Tukey HSD confirmed that the differences exist between previously mentioned goal-cooperation strategies ($p<0.05$).
Table 1. Correlations (2-tailed)

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Little to no goals – little to no cooperation</td>
<td>1</td>
<td>-0.404</td>
<td>-0.297</td>
<td>-0.355</td>
<td>-0.129</td>
<td>-0.135</td>
<td>-0.088</td>
<td>-0.154</td>
<td>-0.138</td>
<td>-0.044</td>
<td>-0.113</td>
</tr>
<tr>
<td>2 Little to no goals – extensive cooperation</td>
<td>-0.301</td>
<td>-0.360</td>
<td>-0.154</td>
<td>-0.141</td>
<td>-0.136</td>
<td>0.115</td>
<td>0.031</td>
<td>0.195</td>
<td>0.120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 High goals – little to no cooperation</td>
<td>-0.235</td>
<td>0.050</td>
<td>-0.006</td>
<td>0.008</td>
<td>-0.028</td>
<td>-0.064</td>
<td>-0.063</td>
<td>-0.020</td>
<td></td>
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</tr>
<tr>
<td>4 High goals – extensive cooperation</td>
<td>0.274</td>
<td>0.312</td>
<td>0.238</td>
<td>0.081</td>
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<td>5 Firm Performance</td>
<td>0.757</td>
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<td>-0.016</td>
<td>0.298</td>
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<td>0.102</td>
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<td>6 End market performance</td>
<td>0.694</td>
<td>-0.051</td>
<td>0.099</td>
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<td>7 Innovation performance</td>
<td>-0.022</td>
<td>0.193</td>
<td>-0.162</td>
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<td>8 Internationalization</td>
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<td>9 Internal R&amp;D</td>
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Table 2. Regression results

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<td>-0.265</td>
<td>-0.365</td>
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<tr>
<td>- little to no cooperation</td>
<td>(0.165)</td>
<td>(0.146)</td>
<td>(0.134)</td>
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<td>H2 Multiple goals – extensive cooperation</td>
<td>0.600*</td>
<td>0.725*</td>
<td>0.481*</td>
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<tr>
<td>(0.170)</td>
<td>(0.149)</td>
<td>(0.147)</td>
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<td>H3 Little to no goals – extensive cooperation</td>
<td>-0.365*</td>
<td>-0.243**</td>
<td>-0.240**</td>
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<tr>
<td>(0.162)</td>
<td>(0.146)</td>
<td>(0.139)</td>
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<tr>
<td>H4 Multiple goals – little to no cooperation</td>
<td>0.234</td>
<td>-0.017</td>
<td>0.096</td>
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<tr>
<td>(0.046)</td>
<td>(0.179)</td>
<td>(0.166)</td>
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<td>Controls</td>
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<tr>
<td>Race</td>
<td>-0.137</td>
<td>-0.073</td>
<td>-0.062</td>
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<td>Internationalization</td>
<td>(-0.15)</td>
<td>(0.134)</td>
<td>(0.128)</td>
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<td>Internal R&amp;D</td>
<td>0.455*</td>
<td>0.156</td>
<td>0.264</td>
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<tr>
<td>(0.097)</td>
<td>(0.087)</td>
<td>(0.084)</td>
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<tr>
<td>Age</td>
<td>-0.005*</td>
<td>-0.004</td>
<td>-0.005</td>
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<td>(0.002)</td>
<td>(0.001)</td>
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<td>Size</td>
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<td>0.52</td>
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<td>(0.046)</td>
<td>(0.042)</td>
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<td>Constant</td>
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<td>0.322</td>
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<td>(0.328)</td>
<td>(0.296)</td>
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<td>Adjusted R²</td>
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<td>0.177</td>
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*p<0.01, **p<0.05, †p<0.10, standard errors in parenthesis
Figure 2. Firm performance averages over three performance domains (scale -2 to 2, 0=expected performance)

Table 3. Results for ANOVA

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<td>5.013</td>
<td>3</td>
<td>153</td>
<td>3.988</td>
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<td>End Market performance</td>
<td>6.334</td>
<td>3</td>
<td>163</td>
<td>3.874</td>
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<td>Innovation performance</td>
<td>4.052</td>
<td>3</td>
<td>165</td>
<td>2.432</td>
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6 Conclusions

The existing management literature stresses the importance of different R&D cooperation partners within the innovation process. One could even argue that there is an overemphasis, a push towards being more active when it comes to interfirm cooperation and that interfirm cooperation is often seen as a fix for competitiveness, innovation and creativity problems. However studies done on the effect of different R&D partners has left us puzzled. In some situations particular partners have a positive effect, and in other situations a negative effect. Instead of external factors in this paper we studied the internal moderating conditions which allow firms to benefit from R&D cooperation. In more detail we analyzed the role of goal setting over three different performance indicators.

Our findings show that goal setting plays a crucial role in firms and moderates the effect of R&D cooperation on firm performance over various domains. Companies that cooperate without meaning or purpose, or who have low goal setting capabilities perform worse than companies with extensive goals setting. We studied four different goal cooperation strategies and found that two of them had a negative effect on firm performance and one had no significant effect on firm performance. Thus our results
imply that R&D cooperation is indeed risky and it should be approached accordingly. However as a positive note we would highlight that the fourth strategy which consist of firms having both multiple important innovation goals as well as extensive network of R&D cooperation partners. This results in significant improvements in innovation performance, end market performance, as well as firm performance.

This paper is limited by the usual problems of survival bias, key informant bias and retrospective bias. As the dependent variables are perceptions of success there is an issue of self-fulfilling prophecy. However the sheer logic of the responses would suggest that this is not the case. Future studies should still focus on verifying the findings using primary performance indicators. All in all we believe that our paper has yielded valid and interesting results and makes significant contributions both to the existing management literature as well as has important implications for managers.

References


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