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New Trends in Russian Innovations: The Ownership Effect on the Adoption of Open Innovation Practices

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Open innovation paradigm has emerged into an integral element of enterprise innovation strategies. The evidence on the adoption of open innovation in transition economies is rather scarce. A distinctive feature of transition economies is the structure of company ownership and the outbalanced share of state in it. This article studies the effect of ownership in the enterprises' adoption of open innovation practices in Russia's transition economy. The study is based on the survey of 206 Russian R&D-oriented enterprises. The enterprises are classified by their ownership type. The ownership structure is divided into four value categories: state-owned, privatized, de-novo, and foreign-owned.

KEYWORDS *open innovation, ownership, Russia, transition economy*

INTRODUCTION

Emerging economy in Russia has set a goal to modernize industries and to transform into knowledge-based economy. After the collapse of the Soviet Union, Russia has suffered from the paradox when relatively high R&D spending (1.3% of gross domestic product) in the emerging market context produces very weak innovation output for the economy. This low

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productivity of R&D is often linked to significant state involvement and ownership.

The majority of empirical studies on transitional economies show that ownership has a significant impact on enterprise performance (Megginson and Netter 2001; Väättänen 2008) and support the assumption that privatized enterprises outperform state enterprises. Especially the positive effects of foreign ownership on enterprise performance have been captured in many studies in Central and Eastern European countries (Konings 2001). The foreign ownership often leads to better performance—higher profitability, better new product development, more product and process innovations, and higher number of patents (Podmetina et al. 2009; Väättänen, Podmetina, and Pillania 2009). Furthermore, foreign-owned enterprises manage to develop their competitive advantages to a new level, which often involves radical changes in their business models, such as increased openness, value creation, and value capture (Podmetina et al. 2011).

Experience from the transitional economies has shown that competitive pressures force enterprises to develop their competences (Yudaeva et al. 2003). However, Frydman and Rapaczynski (1993) argue that competition cannot substitute for the effects of ownership. This leads to the assumption that ownership is a determinant factor of enterprise performance in transitional economies.

Traditionally, the mainstream of Russian innovation research is focused on the policy level and the national and regional innovation systems because of the governmental policies aims to improve innovation output on the governmental and company level. The traditional closed innovation approach relies on mobilizing company's internal resources to achieve better R&D and innovation output. However, the open innovation framework (Chesbrough 2003) proposes to cooperate, to use external sources of innovations and external channels for commercializing the surplus of innovations produced by the firm. The attractiveness of the open innovation concept in innovation studies is explained by its potential benefits for companies' innovativeness, competitiveness, and effectiveness (Gassman and Enkel 2004; Lichtenthaler 2009).

This article studies the effect of ownership in the enterprises adoption of open innovation practices in Russia's transition economy. The authors aim to contribute to understanding the relationship between innovation strategies and the ownership structures of Russian companies. Earlier studies have shown that the significant involvement in internal R&D correlates positively with adoption of the open innovation strategies (Podmetina et al. 2011).

The study consists of five sections including this introduction. The next section undertakes a review of the literature on the topic. The third section defines the research problem, elaborates research methodology and data collection, and enlists the limitations of the study. The fourth section presents

the result and discussion. The last part concludes the research: enlists implications of the study; and suggests possible research directions.

OPEN INNOVATION FRAMEWORK AND HYPOTHESES

The linkage between ownership and innovation performance in developed economies has been studied quite widely in the literature. The main focus of earlier research has been on differences in innovation performance between foreign and domestic-owned enterprises (Balcer and Evangelista 2005; Sadowski and Sadowski-Rasters 2006). The studies show that there are significant differences in innovation performance between foreign and domestic-owned enterprises.

The research on the linkages between ownership and innovation strategies in emerging markets is just emerging. Earlier studies aimed to reveal the long-term impact of privatization on enterprise performance by basic indicators such as growth and profitability. The enterprise ownership types in transition economies have been classified traditionally into four categories: state-owned, private, de-novo, and foreign-owned (Megginson and Netter 2001). The studies on effect of ownership types has led to the conclusion that foreign owners or outsider owners have the highest impact on enterprise performance, and new enterprise structures tend to be more effective than old enterprise structures. On the basis of a large cross-country study, Carlin and others (2001) support the view that new enterprise structures are most efficient. The performance gaps between foreign and domestic enterprises have been studied to some extent in transition economies other than Russia (Kostyuk 2005; Brown et al. 2010).

Studies on open innovation show that traditional, centralized, and tightly closed approaches to innovation do not fit in with today's fast-changing competitive environment (Enkel, Gassmann, and Chesbrough 2010). In a closed innovation approach, companies aim to control all stages of the innovation process, and R&D is relying on internal resources (Wheelwright and Clark 1992). This approach was challenged by the business turbulence and increased global competition. These fundamental changes provided for companies an opportunity to learn and to develop new strategies both for inter-functional coordination and for interacting with other organizations on the new level (Kotler and Caslione 2009).

Chesbrough (2003) introduces three fundamental factors that have had an impact on the beginning of the open innovation era. First, the access to the best available knowledge sources has improved, because of the increase in educated labor force availability. Second is the increase in the number of financing sources for R&D projects. Third, companies have started to cooperate more and search for ideas and technology outside, and—more important— started to incorporate them into innovation policy. Several

studies have suggested new approaches to business already in 1990s (Watkins 2003) but not until Chesbrough launched the term *open innovation* combining these various ideas of openness under one term.

The attractiveness of the open innovation concept is in its potential benefits for companies' innovativeness, competitiveness, and effectiveness (Lichtenthaler 2009). In their study, Gassman and Enkel (2004) define three core processes of open innovation framework: the outside-in process—searching for and incorporating the external knowledge of suppliers, customers, competitors, universities, and research organizations; the inside-out process—transfer of the ideas, technologies, and intellectual property to the market; and the combination of outside-in and inside-out processes. The organized search for new ideas is important for open innovation framework development (Laursen and Salter 2006). The capability to utilize external knowledge is a significant factor of innovation performance (Cohen and Levinthal 1990).

Studies on innovation performance have shown that external linkages and cooperation increase a company's innovation capability and have a positive effect on innovation output (Bayona, Garcia-Marco, and Huerta 2001; Kaufmann and Tödting 2001; Klomp and van Leeuwen 2001; Hagedoorn 2002; Romijn and Albaladejo 2002; Belderbos, Caree, and Lokshin 2004).

There have been only few studies on open innovation in Russian companies yet (Savitskaya and Torkkeli 2011; Podmetina et al. 2011). Russia as a transition economy is a very interesting research target with its diversified ownership structures and institutional settings. On the basis of a large cross-country study of 25 transition economies, including Russia, Carlin and others (2001) found out that privatized or new enterprise structures are more efficient than old enterprise structures. This view has also been supported by other studies (Väättänen 2008). Especially, the state ownership has been criticized as ineffective (Boardman and Vining 1989; Vickers and Yarrow 1991; Shleifer 1998). We assume that these performance differences between new (de-novo), old enterprise (state-owned and privatized) and foreign-owned enterprises exist also in the adoption of open innovation framework. We set our hypotheses as follows:

- H1: Private enterprises have a higher rate of open innovation adoption than state-owned firms.
- H2: Foreign-owned enterprises have a higher rate of open innovation adoption than domestic enterprises.
- H3: New (de-novo) enterprises have the highest rate of open innovation adoption.

The proposed hypotheses here are tested with descriptive analysis and statistical methods. The innovation performance differences between ownership types are also analyzed. Various proxies are applied to measure innovation

performance on firm level for input measures such as R&D intensity (Cohen and Levinthal 1990) or, for output measures such as new products, patents (Penner-Hahn and Shaver 2005).

RESEARCH DATA AND METHODOLOGY

We test validity of our hypotheses with data from the recent survey of 206 Russian R&D-oriented manufacturing enterprises. The data were collected through structured interviews in the end of 2009 to beginning 2010; no specific emphasis was done on technological intensity of the enterprises-respondents; hence all industries from high-tech to low-tech were included. The key respondents were top managers of the firm or people specifically responsible for innovation processes and/or management. The enterprises were approached following such selection criteria as region, industry, and annual revenue of the enterprise. The sampling method was based on the stratified sample approach, which means not a representative but a meaningful structure of the sample.

The sample consists mainly of the medium (100–250 employees), 27.3%; large (250–1,000 employees), 32.7%; and very large enterprises (more than 1,000 employees), 23.4%. There are 102 (49.5%) de-novo enterprises in the sample. De-novo firms are defined to be established after the dissolution of the Soviet Union in 1991 and are privately owned from the year of establishment. The other significant group of enterprises (39.3%) is privatized enterprises ($N=81$); these are former state-owned enterprises that existed in the Soviet Union and were privatized after 1991. About 6% of enterprises in the sample are partly owned by government (the state share in ownership is more than 50%), and 5.3% of enterprises have foreign capital involved (share of foreign capital at more than 10%).

Regarding R&D, 42.7% of the analyzed enterprises conduct in-house R&D systematically and 35.9% on a more random basis (e.g., all information technology (IT) enterprises in the sample have in-house R&D activities), with the proportion being high for other industries as well (93.3% for electrical machinery firms, 91.3% in the electrical and optic industry, 87.5% in the rubber and plastic industry, 86.1% in metallurgy, 75% both in aircraft and machinery and equipment, and 72.7% in the oil refinery industry). The R&D intensity (R&D expenditure /sales) is more than 3.0% for 39.7% of enterprises. The equivalent share of sample—38.6%—have R&D intensity between 1.5 and 3%, and only 21.6% have less than 1.5%.

The enterprise data are classified on the basis of independent variable—the ownership structure. The ownership structure is divided into four value categories: state-owned, privatized, de-novo, and foreign-owned enterprise. The enterprise ownership types are defined as follows. State owned enterprises are partly owned by government (the state share in ownership is more

than 50%). Privatized enterprises existed in the Soviet Union and were privatized later on during the privatization. New enterprises were established after the dissolution of the Soviet Union in 1991, and they are privately owned from the year of establishment. Foreign-owned enterprises have foreign capital involved (share of foreign capital, more than 10%).

The adoption of an open innovation concept is compared between ownership structures. The innovation drivers are analyzed, and innovation performance differences (R&D intensity, new product development, and patents) are measured between ownership structures. Companies' self-evaluation of open innovation adoption allows verifying the results. The innovation drivers and self-evaluation are constructed on a 5-point Likert scale ranging from 1 (*no influence*) to 5 (*strong influence*).

RESULTS AND DISCUSSION

The results on the adoption of open innovation practices between ownership types are presented in table 1. The R&D intensity was measured by R&D expenditure /sales. The new enterprises have the highest R&D expenditure of 3.8%, followed by foreign-owned and privatized enterprises. The openness of enterprise is indicated by the share of technology acquisition (In OI) and technology commercialization (Out OI).¹ Foreign-owned enterprises demonstrate the highest level of openness and thus the most open business models both for external technology acquisition (In OI) and technology commercialization (Out OI). As a whole, 34.7% of surveyed companies combine internal R&D and acquisition of external R&D (In OI). They also indicated increase in the innovation output. The combination of internal R&D and technology commercialization (Out OI) was reported by 15.1% of companies.

To map out the motivation for innovation activities, enterprises were asked about their innovation drivers. The main factors influencing motivation for innovation activities were rated on a 5-point Likert scale ranging from 1 (*no influence*) to 5 (*strong influence*). To analyze innovation drivers in more detail, a cross-tabulation based on ownership types was calculated. The main innovation drivers for privatized and new enterprises are pressure from domestic competitors, pressure from domestic consumers, and aim for higher quality. For state-owned enterprises, government policy had a high importance, higher than consumer influence. Foreign-owned enterprises were mainly influenced by international competition. The results are presented in table 2.

The comparison of innovation performance between foreign-owned and domestic enterprises is presented in table 3. A larger share of foreign-owned enterprises has internal R&D than domestic enterprises. However, there are no differences between R&D intensity and new product

TABLE 1 R&D Expenditure/Sales by Ownership Type

	R&D intensity (%)	In OI (%)	Out OI (%)
New	3.8	31.4	11.8
Foreign	3.6	45.5	18.2
Privatized	3.6	28.4	13.6
State	3.1	33.3	16.7
Total average	3.6	34.7	15.1

Note. In OI = technology acquisition; Out OI = external technology commercialization.

development. When comparing innovation performance, foreign enterprises have significantly higher share of technology innovations and patents than domestic enterprises. Similarly, foreign enterprises are more open in their innovation activities and seem to apply more open business models both for external technology acquisition and technology commercialization.

In the comparison between private and state-owned enterprises' innovation performance, enterprises with private ownership do have a higher innovation performance than state-owned enterprises. They outperform state-owned enterprises by research intensity, technology innovations, and share of patents. The results are presented in table 4.

However, there are no innovation performance differences between private domestic (new and privatized) enterprises. The comparison of innovation performance between new and other types of domestic enterprises is presented in table 5. New enterprises do not perform better by any indicator than other domestic firms except even that they have higher R&D intensity.

To differentiate innovation performance on new product development between ownership types, respondents were asked to indicate the novelty of new products. Results show that different innovation strategies are applied. Foreign-owned enterprises focus on modifications of existing products as their main innovation strategy. Contrary to that, private domestic enterprises' main innovation strategy is to develop new products on enterprise level, country level (Russia), and even to international markets. However, state-owned enterprises' innovation strategies focus mainly to the domestic markets. The innovation strategies by ownership types are presented in table 6.

When measuring innovation performance by patenting activity, the foreign-owned (45.5% have patents) and privatized enterprises (53.1%) were the most active. State-owned enterprises lagged significantly behind in patenting activity (16.7%). The underperformance of state-owned enterprises was statistically significant (.000) at 95% confidence level.

To validate the innovation performance results, enterprises were asked to provide self-evaluation of their innovation performance. Enterprises rated their innovation performance on a 5-point Likert scale ranging from 1 (*weak result*) to 5 (*strong result*). The results are shown table 7. In general domestic firms (privatized, new, and state-owned) do have higher satisfaction with

TABLE 2 Innovation Drivers

	Privatized		New		State		Foreign	
	<i>n</i>	Mean	<i>n</i>	Mean	<i>n</i>	Mean	<i>n</i>	Mean
Pressure from Russian competitors	81	3.52	98	3.81	12	3.17	11	2.64
Pressure from foreign competitors in Russia	81	2.67	97	3.14	12	2.08	11	2.91
Pressure from competitors on international market	81	2.64	95	2.57	12	2.50	11	2.91
Pressure from Russian consumers	80	3.41	97	3.70	12	2.92	11	3.18
Pressure from foreign consumers	81	2.57	97	2.41	12	2.25	11	2.36
Pressure from Russian suppliers	81	2.44	97	2.59	12	2.42	10	1.70
Pressure from foreign suppliers	81	2.33	97	2.27	12	2.00	11	1.64
Governmental policy on innovations	80	2.69	95	2.82	12	3.08	11	2.27
Better control for quality of the goods	80	3.07	97	3.20	12	3.67	11	2.82

TABLE 3 Innovation Performance: Foreign versus Domestic Enterprises

	Foreign (%)	Domestic (%)
Share of enterprises with internal R&D	81.8	75.1
R&D Intensity	3.6	3.5
Share of companies with NPD	90.9	89.9
Share of companies with technology innovation	100.0	81.1
Patents (%)	45.5	31.1
Share of companies with Inbound OI	45.5	31.0
Share of companies with Outbound OI	18.2	14.0

their innovation performance than foreign-owned enterprises. These results could be explained by the higher starting level of innovation performance of foreign-owned enterprises.

CONCLUSIONS

This article studied the effect of ownership on the enterprises' adoption of open innovation practices in Russia's transition economy. The authors aimed to contribute to understanding the relationship between innovation strategies and the ownership structures of Russian companies. Earlier studies have

TABLE 4 Innovation Performance: Private versus State Enterprises

	Privatized (%)	State-owned (%)
Share of companies with internal R&D	80.2	66.7
R&D Intensity	3.6	3.1
Share of companies with NPD	87.7	91.7
Share of companies with technology innovation	85.2	81.8
Patents (%)	53.1	16.7
Share of companies with Inbound OI	28.4	33.3
Share of companies with Outbound OI	13.6	16.7

TABLE 5 Innovation Performance: New versus Other Domestic Enterprises

	New (%)	Other domestic (%)
Share of companies with internal R&D	78.4	75.1
R&D Intensity	3.8	3.5
Share of companies with NPD	90.2	89.9
Share of companies with technology innovation	76.2	81.1
Patents, %	23.5	31.1
Share of companies with Inbound OI	31.4	31.0
Share of companies with Outbound OI	11.8	14.0

TABLE 6 Novelty of New Products

	Privatized (%)	New (%)	State (%)	Foreign (%)
Products developed were completely new for our company	63.4	61.4	54.5	30.0
Products or services were completely new for Russian market	11.3	12.5	18.2	20.0
Products or services were completely new for the world	8.5	1.1	0.0	0.0
Products or services were a modification of existing products or services	16.9	25.0	27.3	50.0

shown that the significant involvement in internal R&D correlates positively with adoption of the open innovation strategies (Podmetina et al. 2011).

The results of this study show that ownership structure has an effect on Russian enterprises' adoption of open innovation practices. The largest differences in the adoption of open innovation are found between

TABLE 7 Self-Evaluation of Innovation Performance

	Privatized		New		State		Foreign	
	<i>n</i>	Mean	<i>n</i>	Mean	<i>n</i>	Mean	<i>n</i>	Mean
The product and service portfolio expanded	78	3.91	95	3.91	11	3.27	11	3.45
The quality of products and services improved	79	3.92	95	4.05	11	3.91	11	3.73
The production flexibility improved	78	3.79	93	3.59	11	3.64	11	3.73
Company entered new markets—in Russia	77	3.65	92	3.51	10	3.30	11	3.36
CIS (Commonwealth of independent states)	75	3.03	79	2.47	8	2.25	10	2.70
International (in other countries)	77	2.48	71	2.07	8	1.38	9	2.67
Unit labor costs decreased	78	3.17	94	3.33	11	3.45	11	3.45
Production capacity increased	78	3.53	92	3.48	10	3.70	11	3.64
Material costs per unit decreased	78	3.54	92	3.38	11	3.36	11	3.18
Energy costs per unit decreased	78	3.53	92	3.27	11	3.18	11	3.18
The environment and health risks decreased	79	3.61	91	3.34	11	3.18	11	3.45
The fulfilling of governmental standards and regulations improved	79	3.86	91	3.35	10	3.70	11	3.36
Image of the company improved	79	3.86	91	3.82	11	3.91	11	3.55
Cooperation with external partners improved	79	3.76	90	3.79	11	3.64	11	3.55

foreign-owned and domestic enterprises. Foreign-owned enterprises are more open in their R&D activities. In the group of domestic enterprises, new enterprises have the highest and state-owned enterprises have the lowest research intensity of all ownership types. State-owned enterprises also differ by innovation drivers: Their innovation activities are affected by government innovation policies.

State-owned enterprises self-reported the highest level of openness in their innovation activities inside the group of domestic enterprises. However, the study results showed the low innovation performance of state-owned enterprises and high innovation performance of private domestic enterprises. The results are confusing as state-owned enterprises seem not able to capture benefits of being open in their innovation activities. Thus Hypothesis 1 of private enterprises' higher rate of open innovation adoption was not supported by the results.

Results showed that foreign-owned enterprises are the most open both in inbound OI and outbound OI. Foreign-owned enterprises' R&D aims for incremental innovations, when domestic enterprises aim for more for radical innovations. Foreign enterprises had the highest innovation performance when measured by new product introduction and number of patents. Thus, Hypothesis 2 was supported by the results.

New enterprises have a higher rate of adopting inbound OI when other enterprises show higher rate in adopting outbound OI approach. This can be explained by the nature of these companies. New firms are open to capture new knowledge and technologies. Privatized companies tend to demonstrate more open access to their scientific results base, which may be different from new enterprises innovation strategies, focused rather on policies than profit maximization.

The innovation performance in emerging economies such as Russia is the most important factor in transition to the knowledge-based economy. Study results show that private domestic enterprises and foreign-owned enterprises are leading this development trend such as adoption of open innovation practices. The state-owned enterprises are lagging behind in innovation performance despite their self-reported openness. The recommendation, based on this study of Russia, is to decrease the government's high involvement in R&D and to encourage foreign participation in Russian R&D and—more important—to promote openness in innovation and R&D processes.

Certain limitations of the study should be emphasized. The study is based on analysis of a cross-sectional sample in Russia and is not representative of all regions. As such, the study creates a firm base for further analysis but presents only descriptive results on the adoption of open innovation practices in Russian enterprises at this stage. Nevertheless, these results allow for an insight into the current innovation strategies of Russian enterprises divided by ownership structures and emphasize that large differences in innovation performance do exist.

NOTE

1. In OI is the variable standing for Outside-in open innovation process. Out OI is the variable standing for Inside-out open innovation process.

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