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Drivers for Innovation in KIBS: Evidence from Russia

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Abstract. Knowledge-intensive business services (KIBS) significantly contribute to the economic growth and competitive advantage of emerging markets, including Silk Road countries. KIBS are not only intermediaries that transfer knowledge through the economy, but are also innovators themselves. This paper aims to explore how major innovation drivers influence the implementation of innovation in KIBS. Using a sample of 519 KIBS enterprises from Russia, the results show that human capital increases the implementation of technological innovation, while the link between standardisation and technological innovations is non-linear (an inverted U-shaped). In addition, the multiregional branch network promotes the implementation of all types of innovation, while advertising investments enhance the implementation of technological and marketing ones. These results help to provide some practical suggestions for both innovation managers and policy-makers.

Keywords: service industries, knowledge-intensive business services, KIBS, innovation, Silk Road.

Introduction

Almost 25 years ago, Ian Miles and colleagues underlined that some service companies appreciated as high technological and very innovative ones made up a special group of industries called ‘knowledge intensive business services’ or KIBS (Miles et al., 1995). Since then KIBS have attracted a lot of attention from scholars in different areas of research. For example, recent bibliometric research by Scarso showed that the most emerging topics in KIBS field of studies were innovation, knowledge, space and management (Scarso, 2015). KIBS also play an important role in innovation systems because they often act as intermediaries who support innovation in client firms by facilitating and initiating their innovation process, transferring innovative solutions within and between industries or even co-produce innovation with their clients (Den Hertog, 2000).

By doing so, KIBS became crucial drivers for the economic development because innovations are considered as one of the most contributing factor for the long-term sustainable economic growth (Sargon & Katircioglu, 2018). Innovation development is particularly important for many developing and emerging countries that are facing with strong global challenges in the rapidly changing world (Kuryanov, 2008, Kuchukova, Sadvokasova, Salykov & Muniyaeva, 2016). These countries are now transforming into knowledge economies and gain benefits by developing KIBS who support business processes in other industries by ensuring knowledge provision, exchange and transfer (Miles, 2005).

Recently, Shearmur and Doloreux (2018) have developed a conceptualize view that connect the traditional ‘intermediary’ view of KIBS with the view of KIBS as innovators in their own right. However, in most cases researchers explored the impact caused by KIBS on their clients and innovation systems, while drivers and barriers of their own innovation activity are much less examined (Janssen, Castaldi & Alexiev, 2018). In addition, most studies on knowledge-intensive business services usually focused only on developed markets,

although emerging ones including those across Silk Road are increasing their competitiveness at global KIBS market (Wyszkowska-Kuna, 2016).

In this paper, we try to fill these gaps by focusing on drivers for innovation in KIBS in Russia, which is the 3rd Silk Road country in terms of GDP. If in the beginning of the century compound annual growth rate of value-added created in Russian KIBS was among the highest (for example, it was twice more than in China and in the EU, and about four times more than in the USA), but it became lower in 2006-2011. Moreover, since 2013 the total amount of value-added in Russian KIBS has been decreasing from 97.8 billion of current dollars to 59.8 billion of current dollars in 2015 (National Science Board, 2018). This is in line with the overall stagnation – in some cases even a regress - of the whole Russian national innovation system, where a substantial gap has been diagnosed between the accumulated innovation potential and the outcomes of innovation activities (Gokhberg & Roud, 2016).

In addition, just less than 10% of manufacturing companies undertake technological innovations (Gokhberg & Roud, 2016) while most of such enterprises did not want to be engaged in complex innovation strategies (Roud, 2018). The share of innovative enterprises in Russia (9.1%) is slightly above than in Kazakstan (7.6%), another Silk Road country, and is much lower than in developed economies (50-80%) (Kuchukova et al., 2016). Nowadays, the majority of financial resources are concentrated in energy and manufacturing industries that are considered to be main drivers of the economic development. But KIBS and creative industries could be an alternative source of economic growth (Gershman, Gokhberg, Kuznetsova & Roud, 2018). Moreover, business services can contribute significantly to the promotion of Russian economic growth not only by introducing innovative solutions and by becoming the sources of export, but also by ensuring the modernisation of other industries and by facilitating the cooperation between the public (including research universities and centres) and the private sectors (Rodriguez & Melikhova, 2015).

Using a survey-based data about innovation development in 519 KIBS enterprises in Russia, we find that the level of the human capital measured by the share of human resource development expenditures positively influences the implementation of technological innovations while the level of standardization have a non-linear (inverted U-shaped) impact on this particular type of innovation. The share of advertising expenditures has a strong impact on the implementation of both technological and marketing innovations. Finally, if KIBS enterprises have a multiregional branch network, it significantly increases the introduction of all types of innovation.

The paper is structured as follows. Section 2 briefly discusses the state of KIBS in Silk Road countries and in Russia in particular. Section 3 presents the theoretical framework of our empirical study, and it states our research hypotheses. In Section 4 the data and methodology are described, followed by discussing our results. The final section concludes and suggests some policy implications and directions for future research.

KIBS in Silk Road countries

KIBS are often considered to be a set of industries which have grown rapidly for the last 40 years in developed economies (Wei & Zhou, 2016). According to the European Commission (2011), KIBS contribution to the total value-added and employment in the USA and the EU-15 countries, sharply increased over recent decades, and Miles, Belousova and Chichkanov (2018) demonstrated that KIBS share in value-added and employment in these countries was still growing. While KIBS are often defined as main drivers of modern service-dominated economies (Wei, Yan & Jiangqi, 2008), these service industries have also become extremely important for developing and emerging economies aiming to become more competitive in global markets (Osloob & Foumani, 2017).

Much of the attention given to KIBS in emerging economies relates to the outsourcing of operations in global value chains. Lower labor costs are a major factor here, with Javalgi, Gross, Benoy Joseph and Granot (2011) identifying important factors behind KIBS outsourcing to such emerging markets as China and India as including: more open markets and greater political stability, increasing access to competences and skills, advanced information and communication technologies allowing for coordination of work conducted in multiple locations, and agreements concerning intellectual property protection rights. In addition, the cross-border transfer of many such services does not require a huge amount of effort (Klimek, 2017).

Silk Road countries are often engaged in such KIBS outsourcing. According to Wyszowska-Kuna (2016), the average annual growth rates of KIBS exports in 2000-2013 was the highest in developing economies in Asia¹ (13.4%) and in transition economies² (18.7%) compared to other groups of countries. The fastest growing export category is computer and information services (with an annual growth of 22.9% in Asian developing economies and 35.1% in transition economies). All other KIBS categories featured annual average growth rates greater than 10%. Despite very high export growth rates, both country groups contributed less than a quarter of the total world KIBS export; about 75% of exports stemmed from developed economies. Moreover, Miles et al. (2018) reported that developed and developing countries display different export structures: the share of KIBS in total exports from BRICS³ was just 5.5% in 2015 (as compared to 6.8% in the USA and 10% in the EU-15).

KIBS play other roles than their contribution to exports. They pursue the economic development of emerging countries through being drivers of national innovation systems

¹ Including Silk Road countries (China, India, Iran and Turkey).

² Including Silk Road countries (Kazakhstan, Kyrgyzstan, Russia and Uzbekistan).

³ Including three major Silk Road countries in terms of GDP (Russia, India, China).

(Muller & Zenker, 2001). Acting in regional innovation systems as knowledge intermediaries, KIBS ensure knowledge flows and exchange of best practices among different companies and industries (Doloreux & Gomez, 2017). For instance, Ciriaci, Montresor and Palma (2015) showed that manufacturers' knowledge acquisition from KIBS in large European countries lead to increased innovation performance of these manufacturing enterprises. This effect has also been demonstrated in Silk Road countries. Zhou, Kautonen and Wei (2015) reported that innovation activity in Chinese manufacturing firms became more intensive when they simultaneously used services from KIBS companies specialised in R&D, IT, marketing and management consultancy. Similarly, Wei and Zhou (2016) and Fang, Zhao and Zhang (2016) reported that KIBS inputs enhanced innovation activity in Chinese manufacturing. Moreover, this effect also occurs if one restricts the analysis to the sample of small and medium-sized manufacturing enterprises (Zhou, Kautonen, Wang & Wang, 2017).

Due to the role of KIBS in economic development as well as in offshoring, these companies significantly contribute to the growth of value-added in the respective industries for emerging markets within the Silk Road, as shown, for example, by figure 1 for the period 2001–2016. Nevertheless, as noted above, the share of these services in global output is still quite low compared to that in the European Union or United States (it currently stands at around $\frac{1}{4}$ of the global value-added for the EU and US, China accounts for the greatest share of this by far).

Figure 1. Value added in knowledge-intensive business services⁴ in Silk Road⁵ (left axis) and US and EU (right axis) in 2001-2016 (billions of current dollars)

Source: Authors' calculations based on National Science Board (2018, Appendix Tables 6-10 and 6-12)

Table 1 displays growth rate data demonstrating that the value-added of KIBS in emerging markets has grown faster within the Silk Road than in developed economies. From 2001 to 2016, value-added in KIBS in Russia and Iran grew at more than twice of the rate displayed by the US, EU and the rest of the world. India and China had even higher growth rates. While growth seems to have slowed down in the latest 5 years, these two countries continue to display the most rapid growth in KIBS value-added. This is striking given that studies on KIBS usually focus on developed markets. Few studies examine emerging markets, though there are a few Chinese (and Taiwanese), Korean, and Russian investigations (and, well beyond the Silk Road, some Latin American studies).

⁴ Including advertising; architectural, engineering and other technical activities; building maintenance and support; data processing; leasing; legal, accounting and auditing activities; market research and public opinion polling; R&D services, computer programming and related services.

⁵ China, India, Iran, Turkey and Russia.

Table 1. CAGR of total value added in KIBS

	2001-2016	2001-2006	2006-2011	2011-2016
China	16.62	11.51	24.49	14.24
India	15.68	18.15	20.46	8.78
Russia	10.12	23.08	14.89	-5.56
Turkey	13.50	27.30	11.68	2.85
Iran	10.27	22.56	18.99	-8.05
United States	4.72	6.06	2.92	5.21
EU	4.45	11.54	3.38	-1.19
Other	4.50	6.59	10.23	-2.88

Source: Authors' calculations based on National Science Board (2018, Appendix Tables 6-10 and 6-12)

During the Soviet period, services as a whole were not considered to be crucial for economic development in Russia. Many business services did not exist until the beginning of the market reforms in the late 1980s, after which an explosive growth of demand during 1990s and 2000s led to the growth of KIBS industries (Doroshenko, Miles & Vinogradov, 2014). Even in the economic difficulties of 2005-2008, the whole industry still grew at rates higher than that of total GDP (Berezin & Doroshenko, 2015).

One of the first empirical study of KIBS in Russia showed that, about 40% of these enterprises in 2007 planned to introduce new innovative services in two years (Doroshenko, 2007). Since the relative size of this sector was quite small, there appeared to be many opportunities for expansion. However, Russian KIBS enterprises faced strong negative pressures in 2008-2009, caused by global financial crisis and economic recession; some KIBS industries shrunk considerably (Berezin & Doroshenko, 2015).

During the 2008-2009 crisis, Russian KIBS did not receive any type of support from the government, although such support was provided to banking⁶ (Doroshenko, 2011). According to Doroshenko (2010), about 20% of executives planned to sell out or liquidate their companies during this period while 25% of companies decided to decrease the amount of services being developed. Moreover, about 20% of KIBS shifted to the production of standard services, requiring less expert knowledge-intensive work to produce (Doroshenko, 2010). However, the innovativeness of KIBS companies may have benefitted ultimately because those clients who survived the crisis may have been more sophisticated users of KIBS, who demanded more highly customized services (Doroshenko, 2011). Doroshenko reported that the share of innovation-active KIBS even increased as compared to the pre-crisis period (Doroshenko, 2010).

In contrast with Western economies, the recovery of the sector in 2010-2012 was slower than that of the whole economy, so the share of KIBS in GDP slowly decreased (Berezin & Doroshenko, 2015). Nevertheless, Berezin (2016) argued that most Russian KIBS industries in 2013 achieved their highest ever levels of total revenues. In 2013, the relative size of Russian KIBS sector (in terms of the share of total employment) was close to Central and Eastern European countries (Doroshenko et al., 2014). The share of leading Russian KIBS introduced technological and marketing innovations was close to those observed for KIBS sectors in such European countries as the UK or Denmark (Miles, Belousova & Chichkanov, 2017). However, there was a large gap between Russian and European KIBS in terms of organizational innovation activity.

Later, in 2015, economic and political instability led to a sharp decrease of the whole KIBS industry. (Berezin & Doroshenko, 2015). The share of KIBS firms with a significantly

⁶ Though banking does supply services to business, and is quite knowledge-intensive, it is also an industry with much use by consumers. Schnabl & Zenker (2013) suggested that knowledge-intensity alone does not mean that financial services should not be included in the KIBS sector; Pina (2015) argued that merchant or investment banking are KIBS – though in practice it can be difficult to split these functions from retail banks empirically.

decreased turnover (10% or more) doubled compared to 2014 (38% and 18% respectively) (Belousova & Chichkanov, 2016). Many small companies were closed or acquired by larger ones, while few new establishments entered the market. On the demand side, many customers cut their budgets for KIBS purchases significantly, although the demand for KIBS was leveraged by import substitution policy and the impact caused by large sport events (Sochi Olympics). Industry experts expected this effect to be continuing during the 2018 FIFA World Cup (Belousova & Chichkanov, 2016).

Drivers of innovation activity in KIBS

Historically, the application of similar productivity measures to both manufacturing and services indicated service industries as displaying low productivity growth (Biege, Lay, Zanker & Schmall, 2013). Moreover, until the early 2000s, services were typically considered as non-innovative industries compared to manufacturing, which has been seen as the source of almost all innovations (Miles, 2011). KIBS have been portrayed as contributors to, or facilitators of, innovation activities undertaken by manufacturing enterprises (Muller & Doloreux, 2009), so even if they were not themselves innovative, they might play important roles in innovation systems. However, den Hertog (2000) stressed that some KIBS act as coproducers of innovation, and, as European survey data became available, many researchers conceded that KIBS are often themselves innovators.

For example, Gotsch, Hipp, Gallego and Rubalcaba (2011) found that a higher share of European KIBS enterprises report undertaking any type of innovation activity than do their manufacturing counterparts (the gap was 24 percentage points), and that the difference is even more marked when comparing the share of innovative companies among KIBS to that within the whole economy (33 percentage points). Other studies may not agree precisely with this result. For example, Hipp, Gallego and Rubalcaba (2015) did not find striking differences

between the share of innovative companies in European KIBS and in manufacturing; Behrens et al. (2017) demonstrated that the share of innovative enterprises was the highest in some particular manufacturing industries like the production of chemicals and pharmaceuticals, in Germany, though KIBS were more innovative than traditional manufacturing industries and other services. High levels of innovativeness in KIBS have also been reported in less developed countries like Mexico (De Fuentes, Dutrenit, Santiago & Gras, 2015) or Chile (Álvarez, Zahler & Bravo-Ortega, 2013).

But in KIBS, as in practically all sectors, some firms do not innovate at all, others innovate to modest extents and/or infrequently, and often there are exceptions who do not adopt a particular type of innovation that is common in their industry (Bozic & Raikh, 2016). In general, innovation processes are extremely complicated due to the high level of uncertainty (Hachicha, 2008). In that case, innovation process requires a very precise coordination of company's organisational knowledge and skills (Osloob & Foumani, 2017). During this process, firms are coping with such challenges as searching for financial resources, exploring market needs and potential, developing partnerships with competitors, suppliers and customers, recruiting qualified personnel with a required level of skills and competences (D'Este, Iammarino, Savona & von Tunzelmann, 2012).

In contrast to manufacturing companies, where innovation process is technology-oriented for a large extent, human factor is the most crucial in KIBS companies (Schrike, Zenker & Stahlecker, 2012). KIBS dependence on professional knowledge is often highlighted as one of their main feature (Miles et al., 1995; Muller & Doloreux, 2009). Moreover, the knowledge of KIBS' employees is one of the most common ways for such companies to gain a competitive advantage (Ferriera & Fernandes, 2012). However, the creation of new knowledge in KIBS is project-based and ad hoc for a large extent (Strambach, 2008). Innovations in such enterprises may also be of the ad hoc nature, developed in a highly

interactive manner (Gallouj, 2002). Gotsch et al. (2011) reported that KIBS less often acquire machinery and equipment than manufacturing and other services enterprises, but invest more in training of their personnel than their counterparts in other industries. In that case, the usage of traditional R&D approach may lead to the large underestimation of such activities in KIBS (Djellal, Francoz, Gallouj, Gallouj & Jacquin, 2003).

In KIBS, skills and competences of core employees are highly important because their knowledge in the main production factor (Miles, 2005; Strambach, 2008) and most of business processes are those of a human nature. For instance, Belousova and Chichkanov (2016) showed that in Russian KIBS personnel costs⁷ accounted for a half of total costs in almost all KIBS industries. According to Consoli, Elche and Rulani (2015), the share of high-skilled employees in KIBS (except legal services) is higher than the shares of medium-skilled or low-skilled staff. KIBS are also highly graduate-intensive because their workers very often have to develop creative frameworks that help them to combine their own professional knowledge with specific information provided by clients to develop innovative solution (Miles, 2008; Miles et al., 2018).

In that case, if KIBS so heavily depend on tacit knowledge, which is possessed by their staff, the access to the high qualified labor force is an important contributing factor to the innovation activities in KIBS. If the company has a workforce with a high level of competences, it would also be able to cope with deterring innovation barriers that might prevent companies to be engaged in innovation activities (D'Este, Rentocchini & Vega-Jurado, 2014).

However, in Silk Road countries and particularly in Russia, it might be difficult for KIBS companies to get the access to the highly-qualified labor force. For instance, in Russia, 15-year-old students are less able to participate in collaborative problem solving processes

⁷ In this case, personnel costs include also direct expenditures like wages, salaries, bonuses, etc., but does not cover expenses on human resource development, that were included into a separate category.

(the core activities in KIBS enterprises) than in many other countries. The average collaborative problem solving score in Russia in 2015 was only 473 of 1000, while it equals 500 in OECD countries (PISA, 2018). Moreover, due to the uneven distribution of R&D personnel during the soviet period, those Russian regions being with a higher level of such specialists in early 1990s, are still more successful in terms of technological development in KIBS like informational technology, architecture and engineering (Ivanov, 2016).

Thus, we hypothesize that Russian KIBS companies may spend more in selecting highly qualified staff or invest more in their already hired employees to overcome the lack of qualified labor force at the market:

Hypothesis 1: KIBS companies with a higher level of human resource development expenditures focus more on the implementation of innovations of different types.

One of the main features of ad hoc innovations in KIBS is that these innovations are developed during coproduction with a particular client and are not necessary to be applicable to solve problems of other clients (Gallowj, 2002). Actually, KIBS output is often described as intangible and highly customised (Jia & Li, 2018). In that case, standardised solutions seem to be less widespread in KIBS industries (Bettiol, Di Maria & Grandinetti, 2015). Moreover, customisation is usually considered as an important source of competitive advantage for KIBS (Campagnolo & Cabigiosu, 2015).

On the contrary, a well-known paper by Baldwin & Clark (1997) underlined that services might also be modularised as products. Tether, Hipp and Miles (2001) showed that the share of German service companies focused on customised and bespoke services was 26% and 7% respectively. In opposite, the share of service enterprises with fully and largely standardised solutions was 24% and 42%, respectively. Moreover, modularisation is also used as a tool that helps companies combine the existing services in a new way leading to the spinning off a new innovative solution (Brax & Toivonen, 2007).

Bettiol et al. (2015) suggested a new classification of KIBS that included not just industrialised KIBS (those focused on standard services) and bespoke KIBS (focused on customised services), but also combinatory KIBS, that managed both types of services. The researchers also showed that combinatory KIBS achieved higher results in terms of revenues, number of employees, increasing market share and amount of served industries and internationalisation than their peers focused only on a particular type of services. In addition, this gaps (except those for increasing market share) were statistically significant at least either for industrialised or bespoke KIBS.

Therefore, the link between innovation and standardisation in KIBS is not clear. On the one hand, customised solutions are usually developed during co-production with a client that leads to a greater possibility that this innovative solution would be successful (Cabigiosu & Campagnolo, 2018). However, these specific solutions may have a very limited market potential. On the contrary, standardisation ensures the replication of the innovative solutions (Campagnolo & Cabigiosu, 2015).

In addition, the nonlinear relationship between standardization and innovation in Russian KIBS is even more possible to exist. On the one hand, Doroshenko (2010) showed that under the pressure caused by economic turbulence those companies that were focused only on the development of standard services were motivated by cost reduction domain and did not intend to implement any innovations. On the other hand, when the economic situations became better, the demand for KIBS also increased, but mostly by inexperienced customers, who considered KIBS inputs as unnecessary luxury items (Doroshenko, 2011) that should be the first to be reduced in the case of economic downturn or decrease of profit (Belousova & Chichkanov, 2016). This may cause a 'turbid glass' effect, which means that the share of services considered by such customers as standard ones exceeds the share of services considered as standard by KIBS producers (Doroshenko, Miles & Vinogradov, 2013). In that

case, the delivering of both standard and customized services may help KIBS enterprises set apart some additional resources for innovation process. Thus, our hypothesis is stated as follows:

Hypothesis 2: The link between standardization and innovation in KIBS is characterized by an inverted U-shape curve.

Another possible challenge, that may undermine innovation activity, is the lack of demand for such services. For instance, Pellegrino & Savona (2017) reported that the ‘sluggish demand’ for innovative services might seriously undermine the innovation activity of the company. Moreover, this negative impact is close to those caused by financial constraints that are usually reported as main innovation obstacles. This effect is in line with a “Schmooklerian” framework of a ‘demand-led’ innovation (D’Este et al., 2012).

Actually, Filippetti and Archibugi (2011) argued that since this sort of relationships between the demand and the innovation activity on the firm level has been suggested by Schmookler (1966), it has received a lot of attention from various scholars, who found an empirical support for this demand-pull view of innovation. Moreover, the authors also showed that the decision whether to innovate or not in knowledge intensive sector was extremely dependent on the domestic demand.

Rodrigues and Camacho (2010) found that those companies, that focused on non-technological or soft innovations (which is usually reported as one of the distinctive feature of both KIBS and other services⁸), were concentrated in a cluster with high level of marketing expenditures. Asikainen (2015) reported that in KIBS and financial services expenditures on R&D marketing were one the most common innovation investments. In addition, the results

⁸ For example, Howells et al. (2004) reported that only 8% of manufacturing firms focused on organisational innovations, while in services 37% of enterprises were concentrated only on the organisational changes. Later, Gotsch et al. (2011) found that in the mid-2000s the gap between the share of European KIBS implemented organisational innovations and their manufacturing counterparts was more than 20 percentage points. Behrens et al. (2017) demonstrated knowledge-intensive services (including KIBS) to be more disposed to introduce organisational innovations than other services as well as mining, energy and non R&D intensive manufacturing.

of one of the early studies on service innovation showed that service companies considered marketing and advertising at least as efficient as patents and trademarks for protecting their intellectual rights. (Djellal & Gallouj, 2001). In addition, the authors found brand image to be recognized by service companies as the most efficient means of protecting innovation.

However, brand image has a significant indirect effect on brand loyalty (Ha, John, Janda, Muthaly, 2011). Moreover, Askenazy, Breda and Irac (2016) argued that “technological leaders spend more on advertising as they enjoy higher advertising returns by capturing the segment of neutral consumers and those who ex ante prefer the follower product” (p. 48). This may be a case of emerging markets, which are usually immature and highly uncertain. For example, Lingyun, Muhos and Kess (2011) reported that potential clients of Chinese KIBS often considered consulting services as just an advice that they are not ready to pay for. In Russia in 2014-2015 the number of clients decreased (Belousova & Chichkanov, 2016), so KIBS companies focused on innovation also need to spend more on advertising to attract potential customers. In addition, they need to compete with well-known international KIBS producers with highly recognizable brands. Thus, we hypothesize that:

Hypothesis 3: More advertising expenditures in KIBS lead to the higher probability of the implementation of any type of innovation.

Due to the KIBS dependence on the specific knowledge generated by their clients these clients are crucial innovation collaborators for KIBS (Miozzo, Desyllas, Lee & Miles, 2016). The exchange of knowledge, especially tacit one, between KIBS and their clients is enhanced by the cognitive proximity between them developed during both formal and informal meetings (Landry, Amara & Doloreux, 2012). Trust is strongly required for such collaborations (Scarso & Bolisani, 2012), and it is much easier to develop such relationships during face-to-face contacts (Gotsch et al., 2011).

According to Miles (2003), the ideas, which imply the strength of weak ties (Granovetter, 1973), are also relevant for the relations between KIBS and SMEs. While large companies have opportunities to look for any inputs, that they need, without taking into consideration the location of their supplier, SMEs usually search such inputs using their personal contacts, that are local. KIBS, especially young ones, gain extra benefits related to the tacit knowledge flows due to the proximity to their clients (Koch & Stahlecker, 2006). Moreover, proximity is extremely important during the initial stages of collaborative projects (Gotsch et al., 2011).

In addition, for those clients, who use KIBS close contacts with the provider of such services via branches, also increase the benefits of KIBS usage (Miles et al., 2018). These close contacts and strong ties are facilitated by geographic proximity (Huggins, 2011). According to Aslesen and Jakobsen (2007), spatial proximity also increased social and cognitive proximity between KIBS and their clients. Shearmur and Doloreux (2018) also argued that many researchers connected such proximity not only with close interactions, but also with a high quality contacts.

Although modern communication technologies allow KIBS producers to deliver some services remotely (Gallouj, Weber, Stare & Rubalcaba, 2015), these companies remain local in general (Gotsch et al., 2011). However, the more diversified knowledge base may significantly contribute to the innovation development of KIBS. They may benefit from extending their best practices, combining experiences of other regions and build strong competitive advantage by providing such strategic knowledge to their clients in the form of the innovative solutions (Miles, 2003). We hypothesize that KIBS with a branch network will be more innovative than their locally-oriented counterparts:

Hypothesis 4: KIBS with a larger branch network are more oriented towards introduction of innovations of any type.

We also include a set of control variables like proxies for management practices, institutional conditions, industry, size and age (Amara, D'Este, Landry & Doloreux, 2016). Management practices measured by the existence a formal strategy in KIBS company reflect a more foresight-oriented innovation development of the company. Institutional conditions are very important for the emerging market, as Russian cities are highly heterogeneous in terms of the business environment (Plekhanov & Isakova, 2011). Differences among three main KIBS categories (technological, professional or creative KIBS, respectively) are also widely discussed in the KIBS literature. Finally, small and young companies are usually considered as either more innovative (due to the absence of organizational routines) or less innovative (due to the lack of financial and other resources) than large and old ones.

Data & Methodology

One of the most well-known sources for innovation studies is Community Innovation Survey (CIS) data that covers different European countries. Usually, KIBS studies use either CIS data or other innovation surveys targeted to evidence-based STI policy with a consistent methodology. However, KIBS are very poorly represented in official statistics in Russia (Doroshenko et al., 2014) and existing version of the CIS-type study does not cover most of KIBS industries. The only existing data source that deals with different KIBS sectors is 'Monitoring of Knowledge-Intensive Business Services in Russia', conducted by HSE ISSEK since 2007. The last available data was collected in 2015 and covered 10 KIBS industries⁹.

This database contains the survey results run among KIBS producers in 14 major Russian cities. The sample was developed by implementing a two-stage selection process. During the first stage, quotas for company location were set. 14 regions were selected by

⁹ Advertising, audit and accountancy, development and real estate services, engineering, b2b financial intermediation (trust management, financial consulting, investment attraction, brokerage and trading services, leasing and factoring), human resources consulting, informational communication consulting, information technology, legal services, web and digital services.

taking into account the level of their economic development. According to the latest available data at the time, when the sample was developed, all of the selected regions were among the most economically prospering regions in terms of regional GDP (Rosstat, 2018). These regions were also characterised by the high level of total net profit of all the enterprises registered in the region (Minfin, 2018). Finally, according to Russian Regional Innovation Ranking, the selected regions are among the most innovative (RRII, 2017). This procedure is in line with European Cluster Observatory, that showed KIBS to be highly concentrated in the most developed and innovative (in terms of patents) regions. Moreover, “with no other factors taken into account, regional KIBS specialisation explains 59% of variance in GDP per capita” (European Cluster Observatory, 2009, p. 2).

The report of European Cluster Observatory also suggested that KIBS were concentrated in urban areas. Many other studies also supported this result and showed that metropolitan areas and especially capital cities were centres where most of KIBS were located (Deza & Lopez, 2014). It allows KIBS enterprises to be close to public authorities (Corrocher & Cusmano, 2014) and to KIBS producers’ main clients whose head offices are also usually located in capital cities (Wang, Zhang, Yeh, 2016). In addition, large cities have a developed infrastructure, many research centers and universities and attract highly qualified workforce (Doloreux & Shearmur, 2012). Rodriguez and Melikhova (2016) reported that this trend was also relevant for Russia, where KIBS tended to concentrate in “densely populated cities with high market-growth potential” (p.674). Therefore, each of the selected region was represented by the respective capital city (Chelyabinsk, Kazan, Krasnodar, Krasnoyarsk, Moscow, Nizhny Novgorod, Novosibirsk, Perm, Rostov-on-Don, Samara, St. Petersburg, Tyumen, Ufa, Yekaterinburg, respectively).

At the second stage of the sampling procedure, additional quotas for company size were established with respect to the level of each KIBS industry development in each

particular selected city. This two-stage sampling procedure provides an opportunity to analyse KIBS across various regions, industries and companies. The initial database that covers 656 KIBS enterprises in this study is restricted to 519 cases after excluding those with such missing data as the implementation of innovation, share of HR development expenditures, branch network, etc. Each company is represented by the structured interview with its owner or with a key position employee (CEO, company head, etc.).

In addition, we also use data from other sources to measure three institutional characteristics. The first one, the number of companies officially registered in a city, is collected from Federal State Statistics Service (Rosstat), Russian governmental statistics agency (Rosstat, 2018). The second one, gross city product, is collected from a research project ‘Economies of Russian Cities and Metropolitan Areas’ organised by the Institute for Urban Economics (IUE). For each capital city, this indicator was calculated by the IUE based on Rosstat and state extra-budgetary funds data (Institute for Urban Economics, 2018). The third one, labour attractiveness, reflects the position of the city in labour attractiveness rating developed by a leading Russian HR-platform Superjob.ru (Superjob.ru, 2018). We transform the original rating scale, which varies from C- to A+, to the numeric one being in a range from 1 to 9.

Table 2 presents the short definition of each variable as well as descriptive statistics, respectively. In addition, correlation matrix is included in Appendix 1.

Table 2. Descriptive statistics and definitions of used variables

	Description	N	Min	Max	Mean	St.dev
Innovation types						
Innovation	1 if company implemented any type of innovation in the 1 st half of 2015, 0 otherwise	519	0	1	0.71	0.45
Technological Innovation	1 if company implemented technological innovation (including innovative products and services) in the 1 st half of 2015, 0 otherwise	519	0	1	0.64	0.48
Marketing innovation	1 if company implemented marketing innovation in the 1 st half of 2015, 0 otherwise	519	0	1	0.25	0.44
Organisational innovation	1 if company implemented organisational innovation in the 1 st half of 2015, 0 otherwise	519	0	1	0.26	0.49
Innovation drivers						

Share of HR development expenditures	Share of expenditures on recruiting and training in total expenditures of the company in the 1 st half of 2015	519	0	25	5.10	5.71
Share of well-educated staff	Share of employment with two diploma or scientific degree or MBA	519	0	80	7.92	14.19
Standardisation	7 categories from 1 means that the share of standardised services in the total amount of orders in 2014 was less than 10% to 7 means that the share of standardised services in the total amount of orders in 2014 was higher than 90%	519	1	7	5.39	1.52
Standardisation square	Square of standardisation variable	519	1	49	31.33	14.66
Branches	1 if company had branches or representative offices in other cities, 0 otherwise	519	0	1	0.29	0.45
Share of advertising expenditures	Share of expenditures on advertising in total expenditures of the company in the 1 st half of 2015	519	0	40	7.15	6.03
Control variables						
Strategy	1 if in the 1 st half of 2015 the company continued the strategy had developed in 2012-2014 with minor changes or already introduced a new strategy for 2015, 0 otherwise	519	0	1	0.45	0.50
Companies registered in a city	Natural logarithm of the number (in thousands) of companies registered in the city in 2014 (Collected from Rosstat)	519	3.61	7.04	5.18	1.34
Labour attractiveness	9 categories from 1 means that the city is less attractive for qualified personnel due to low wages, structural imbalances, etc. to 9 means that the city is highly attractive for qualified personnel due to high wages, high demand, etc. (Based on the rating developed by research centre of HR platform Superjob.ru for major Russian cities in 2015)	519	1	9	6.77	2.32
Gross city product	Natural logarithm of the gross city product (in bln rubles) in 2015 (Collected from Institute for Urban Economics)	519	6.08	9.54	7.50	1.45
T-KIBS	1 if the company operates in information technology or engineering industries, 0 otherwise	519	0	1	0.20	0.40
C-KIBS	1 if the company operates in advertising, information-communication consulting or web, design and digital services industries, 0 otherwise	519	0	1	0.31	0.46
Size	3 categories where 1 for small enterprises (from 7 to 50 employees in the 1 st half of 2015), 2 for medium-sized enterprises (from 51 to 250 employees in the 1 st half of 2015) and 3 for large enterprises (more than 250 employees in the 1 st half of 2015) ¹⁰	519	1	3	1.38	0.58
Size perception	1 if the company perceive itself as small, 2 if the company perceive itself as medium-sized, 3 if company perceive itself as s large enterprises relatively to its industry	519	1	3	1.82	0.73
Age	Natural logarithm of age of the company in the 1 st half of 2015	519	0	4.17	2.13	0.69

¹⁰ This classification is close to those used by OECD/Eurostat for small (from 10 to 49 employees), medium (from 50 to 249 employees) and large (more than 250 employees) enterprises. In addition, for robustness check we also include the variable that reflects how the company perceive its' relative size itself.

To explore the impact of different drivers on the implementation of innovation in KIBS, we develop the following logit models:

$$\log\left(\frac{P_i}{(1-P_i)}\right) = \alpha + (\beta_1 \dots \beta_5) * Drivers + (\lambda_1 \dots \lambda_6) * Controls + \varepsilon_i \quad (1)$$

where $\log(\frac{P_i}{(1-P_i)})$ is the logarithm of the ratio of the probability, that KIBS firm implements an innovation, to the probability, that it does not; α is a constant; *Drivers* is a vector of drivers for innovations, *Controls* is a vector of control variables; β, λ are regression coefficients; ε is an error term. All estimations are made by using STATA software.

Results and Discussion

The results of the baseline models are presented in columns 1,4,7,10 of Table 3 for innovation in general, technological¹¹, marketing and organizational ones, respectively. The explanatory power of these models is high as the share of correct predictions varies from 72.8% to 76.1%. The goodness of fit is also in line with recommended one, as Hosmer-Lemeshow statistics are insignificant. Values of Nagelkerke R² are quite low (the highest one equals 0.323), but they are acceptable in a case of qualitative dependent variables (Amara et al., 2016).

¹¹ In services, it may be difficult to differentiate between product and process innovation because the service is usually produced and consumed simultaneously. Based on Gonzalez-Blanco, Coca-Perez. Guisado-Gonzalez (2019), we consider both product and process innovations as parts of a single group of technological innovations.

Table 3. The results of logit regressions (marginal effects)

	Innovation			Technological innovation			Marketing innovation			Organisational innovation		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Innovation drivers												
Share of HR development expenditures	0.015*** (0.004)			0.019*** (0.004)			-0.001 (0.003)			0.004 (0.003)		
Share of well-educated staff		0.003 (0.002)	0.003 (0.002)		0.005** (0.002)	0.005** (0.002)		0.000 (0.001)	-4.43e-05 (0.001)		0.001 (0.001)	0.002 (0.001)
Standardization	0.078 (0.061)	0.082 (0.063)	0.076 (0.063)	0.141** (0.061)	0.149** (0.063)	0.134** (0.063)	0.092 (0.063)	0.089 (0.063)	0.077 (0.062)	-0.010 (0.066)	-0.009 (0.066)	-0.012 (0.066)
Standardization square	-0.013** (0.006)	-0.013* (0.007)	-0.012* (0.006)	-0.020*** (0.006)	-0.020*** (0.007)	-0.019*** (0.007)	-0.012* (0.007)	-0.012* (0.007)	-0.0110* (0.007)	-0.001 (0.007)	-0.001 (0.007)	-0.000 (0.007)
Branches	0.278*** (0.055)	0.248*** (0.056)	0.252*** (0.056)	0.263*** (0.051)	0.253*** (0.052)	0.256*** (0.052)	0.102** (0.042)	0.051 (0.043)	0.052 (0.044)	0.130*** (0.044)	0.106** (0.046)	0.116** (0.046)
Share of advertising expenditures	0.011*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.010*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.003)	0.013*** (0.003)	0.014*** (0.003)	0.003 (0.003)	0.003 (0.003)	0.003 (0.003)
Control variables												
Strategy	0.029 (0.037)	0.022 (0.037)	0.022 (0.037)	0.012 (0.038)	0.007 (0.039)	0.013 (0.038)	0.052 (0.036)	0.041 (0.036)	0.054 (0.036)	0.021 (0.038)	0.022 (0.038)	0.011 (0.038)
Companies registered in a city	0.005 (0.014)			-0.018 (0.014)			-0.035** (0.015)			0.035** (0.015)		
Labor attractiveness			0.005 (0.008)			-0.007 (0.009)			-0.019** (0.008)			0.024** (0.009)
Gross city product		0.002 (0.013)			-0.021 (0.013)			-0.041*** (0.014)			0.031** (0.014)	
T-KIBS	0.115** (0.050)	0.107** (0.050)	0.107** (0.050)	0.179*** (0.050)	0.165*** (0.051)	0.164*** (0.051)	-0.148*** (0.054)	-0.139*** (0.053)	-0.136** (0.054)	-0.135*** (0.053)	-0.128** (0.052)	-0.130** (0.052)

Continue of Table 3

C-KIBS	0.094** (0.042)	0.081* (0.043)	0.081* (0.043)	0.111*** (0.043)	0.098** (0.044)	0.096** (0.044)	0.030 (0.041)	0.033 (0.040)	0.028 (0.040)	-0.093** (0.044)	-0.095** (0.044)	-0.093** (0.044)
Size	-0.037 (0.039)			-0.021 (0.039)			-0.011 (0.034)			0.038 (0.035)		
Size perception		0.052* (0.028)	0.052* (0.028)		0.023 (0.029)	0.023 (0.029)		0.067** (0.026)	0.067** (0.026)		0.080*** (0.027)	0.079*** (0.027)
Age	-0.002 (0.028)	-0.018 (0.028)	-0.019 (0.027)	-0.022 (0.029)	-0.027 (0.029)	-0.033 (0.028)	0.011 (0.028)	-0.004 (0.028)	-0.014 (0.028)	-0.039 (0.030)	-0.052* (0.030)	-0.050* (0.029)
Const												
R-square Nagelkerke	0.283	0.262	0.263	0.323	0.293	0.290	0.178	0.202	0.192	0.093	0.106	0.110
Hosmer-Lemeshow statistic significance	0.830	0.636	0.637	0.802	0.293	0.171	0.709	0.585	0.420	0.775	0.839	0.996
Share of correct predictions	75.3	72.8	72.8	72.8	71.1	69.7	76.1	76.7	76.5	75.0	75.0	74.8
Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1												

The results confirm that the share of HR development expenditures is important for implementing any type of innovation and for technological one in particular. Similar results were obtained by Corrocher, Cusmano and Morrison (2009) and Asikainen (2015), who found that KIBS invested more in human development and R&D trainings for employees by aiming at introducing product and process innovations. However, we did not find significant relationships between the share of HR expenditures in KIBS and the implementation of non-technological (both marketing and organisational) innovations. It may reflect the different knowledge base of technological and non-technological innovation. If the former requires technological knowledge, that is codified and transferable within the organisation and outside, the latter is related to tacit knowledge, that is accumulated by professional experience (Rodríguez, Nieto & Santamaría, 2018). Shearmur and Doloreux (2018) also showed that internal management and marketing KIBS inputs (that may be considered as a proxy for outsourcing non-technological innovations) are used by other KIBS more frequently than KIBS inputs related to concept validation (that seems to be a part of the technological innovations).

As we have anticipated, standardization has an inverted U-shaped impact on technological innovations, which is in line with Cabigiosu and Campagnolo (2018) who proposed that KIBS growth being caused by the implementation of highly innovative products was significantly undermined by the high level of customization. In that case, innovative strategies, which focus on technological innovations, should include both customization (that may enhance the availability of specific client knowledge) and standardization (that may help KIBS companies replicate innovative solution). However, we do not find the similar effect for marketing or organizational innovations that seems to have no relations to the customization-standardization nexus.

About two-thirds of most dynamically developing Russian KIBS delivered their services to clients from other regions and even countries (Chichkanov & Yakovleva, 2017). These KIBS did not consider spatial remoteness as a crucial obstacle for the delivering of their services and most of them did not open branches in other regions. At the same time, the results of our baseline models show that KIBS companies with a multiregional branch network are more innovative than their local counterparts, being in line with Howells et al. (2004) who found locally-focused KIBS to be less likely engaged in technological and non-technological innovations. These findings may contribute to the discussion of the impact caused by advanced communications on the geographical distribution of KIBS. Although KIBS did not see any difficulties to deliver their services to the clients located far away from them, those companies, who established branches in the regions served, become more innovative. This means that despite the development of modern technologies face-to-face contact with clients are still being crucial for KIBS at least under emerging market conditions.

Our results also support the hypothesis about the impact of advertising expenditures on the innovation activity in KIBS. The more the share of advertising expenditures is, the more likely KIBS implement technological and marketing innovations. Advertising expenditure help companies to develop appropriate communications with existing and potential clients (Berezin & Doroshenko, 2015). Extra spending on advertising may be done by the company to promote innovative services or enhance sales of services developed by introducing new production processes. In opposite, organizational innovations are not connected to the advertising expenditures.

Among control variables, we find that the number of companies registered in a city significantly reduces the implementation of marketing innovations. Doloreux and Shearmur (2012) also showed that the possibility to implement radical marketing and management innovations increased in Canadian KIBS by moving away from the large cities. In contrast,

we find an opposite effect caused by the city size on the organizational innovations in KIBS. In larger cities with a higher demand, KIBS may serve the particular niches that prevent them from implementing marketing innovations.

The more anticipated results are that the positive relationship exists between being a technological-KIBS (T-KIBS) enterprise and the implementing of technological innovation and the negative relationship occurs between being a T-KIBS firm and implementing of non-technological (marketing and organizational) ones. These results are driven by the nature of T-KIBS, who are not only intensive users and distributors of advanced technologies, but also often developed their own technological solutions (Miles, 2012). Being a creative KIBS (C-KIBS) firm also increases the probability to implement technological innovation. This result is also quite anticipated as in recent years some sub-industries among C-KIBS like web-design or digital marketing have become heavily users of new technologies (Berezin, 2016).

To check the robustness of our results, we use some alternative measures for the respective variables. First, we replace the share of HR development expenditures by the share of well-educated staff. If our initial variable reflects companies' investments in their human capital, the new measure concentrates on skilled people who are already employed. Secondly, we use two alternative measures for the institutional conditions, by replacing the number of companies registered in a city either by gross city product and by the labor attractiveness of the city. Finally, we replace size measured by the number of employees by the size which is perceived by KIBS producers themselves. The robustness check results are presented in columns 2-3, 5-6, 8-9 and 11-12 of Table 3 for innovation in general, technological, marketing and organizational innovations in particular.

All the results obtained via baseline models seem to be robust. However, we found an additional effect caused by the size perception on the implementation of non-technological (both marketing and organizational) innovation. The bigger the company perceives itself, the

more likely it focuses on non-technological innovation. The possible explanation of this result is that KIBS industries tend to consist of relatively small enterprises (Miles et al, 2018). In that case, even those companies that are not so large in terms of the number of employees, may consider themselves as big while compared to their peers in relevant industry.

Conclusion

KIBS are not only innovation intermediaries that support business processes in other enterprises, but are also active innovators in their own. In this paper, we focus on the drivers for innovation in KIBS at emerging market. Based on a sample of 519 KIBS enterprises from Russia, we explore how four key drivers (human capital, standardization, advertising activities and an access to the wider knowledge base through the multiregional branch network) influence the implementation of innovations in general as well the introduction of three particular types of innovation (technological, marketing and organizational).

Our results confirm the positive effect caused by all of the considered drivers on innovation, but this effect differs among particular types of innovation. The most significant driver that has an impact on all types of innovation as well as on the implementation of any type of them is a multiregional branch network. As for human capital, it is found to be relevant only for technological innovation and cause no significant effect of non-technological (both marketing and organizational) ones. In addition, technological innovations are influenced by the standardization in an inverted U-shape direction. Finally, advertising expenditures enhanced technological and marketing innovations.

These results help us provide some important implications for both innovation managers and policy-makers. Those companies, that focus on technological innovation, should apply some selective tools to choose only core customers to cooperate with and to develop customized solutions, while suggest more standard services for the others. In

addition, managers at emerging markets should not avoid investing in advertising and promoting their innovative solutions as it helps them enhance the demand for these solutions and increase the probability of the implementation of innovative solutions. Policy-makers aiming at increasing the implementation of technological innovations in the emerging economy like Russia may provide some educational programs or tax incentives to incite companies to invest in the development of their employees. In addition, some state support may be provided for those companies that try to entry new regions as the diversified multiregional branch network increases the implementation of all types of innovation.

The further promising line of the future research would be to address some of the limitation of the current study. Firstly, the lack of information about failed innovators did not allow us to compare the innovation behavior of innovators and non-innovators in detail. In addition, the identification of potential innovators from those firms who did not want to undertake any innovation activity may also provide an opportunity to explore not only innovation drivers, but innovation barriers as well. Secondly, some external factors like the access to external finance may also contribute to the innovation activity of KIBS. Future studies would also benefit by comparing the results among different emerging markets and by using the longitudinal data.

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References

- Alvarez, R., Bravo-Ortega, C., & Zahler, A. (2015). Innovation and productivity in services: evidence from Chile. *Emerging Markets Finance and Trade*, 51(3), 593-611.
- Amara, N., D'Este, P., Landry, R., & Doloreux, D. (2016). Impacts of obstacles on innovation patterns in KIBS firms. *Journal of Business Research*, 69(10), 4065–4073.
- Asikainen, A. (2015). Innovation modes and strategies in knowledge intensive business services. *Service Business*, 9(1), 77–95.
- Askenazy, P., Breda, T., & Irac, D. (2016). Advertising and R&D: theory and evidence from France. *Economics of Innovation and New Technology*, 25(1), 33-56.
- Aslesen, H.W. & Jakobsen, S.-E. (2007). The role of proximity and knowledge interaction between head offices and KIBS. *Tijdschrift voor Economische en Sociale Geografie*, 98(2), 188 – 201.
- Baldwin, C.Y. & Clark, K.B. (1997). Managing in an Age of Modularity. *Harvard Business Review*, 75(5), 84–93.
- Behrens, V., Berger, M., Hud, M., Hünermund, P., Iferd, Y., Peters, B., ... Schubert, T. (2017). *Innovation Activities of Firms in Germany – Results of the German CIS 2012 and 2014* (ZEW Documentation, No. 17-04). Mannheim: ZEW.
- Belousova, V., Chichkanov, N. (2016). Knowledge-Intensive Business Services in Russia: 2014–2015 Crisis Aftermath. *Foresight and STI Governance*, 10(4), 46–58.
- Berezin, I. & Doroshenko, M. (2015). Количественные и качественные изменения на рынке интеллектуальных услуг в России в 2005-2013 [Quantitative and qualitative changes on the market on intellectual services in Russia in 2005–2013]. In I.S. Berezin (Ed.) *Marketing в России 2015 [Marketing in Russia 2015]* (pp. 85-128). Moscow: Marketers Guild.

- Berezin, I. (2016) Экспертные оценки объема и динамики рынков интеллектуальных услуг в России в 2005-2015 2013 [Experts' estimations on the market value and dynamics of intellectual services in Russia in 2005–2013]. In I.S. Berezin (Ed.) *Marketing v Rossii 2016 [Marketing in Russia 2016]* (pp. 33-69). Moscow: Marketers Guild.
- Bettiol, M., Di Maria, E. & Grandinetti, R. (2015). Service customisation and standardisation in combinatory knowledge-intensive business services. *International Journal of Knowledge-Based Development*, 6(3), 241–260.
- Biege, S., Lay, G., Zanker, C. & Schmall, T. (2013). Challenges of measuring service productivity in innovative, knowledge-intensive business services. *The Service Industries Journal*, 33(3-4), 378-391.
- Božić, L. & Rajh, E. (2016). The factors constraining innovation performance of SMEs in Croatia. *Economic Research-Ekonomska Istraživanja*, 29(1), 314-324.
- Brax, S.A. & Toivonen, M. (2007). Modularization in business service innovations. In *The 2007 ISPIM Conference 'Innovation for Growth: The Challenges for East & West'*, Warsaw, Poland, 17-20 June 2007.
- Cabigiosu, A., & Campagnolo, D. (2018). Innovation and growth in KIBS: the role of clients' collaboration and service customisation. *Industry and Innovation*, 1-27.
- Campagnolo, D. & Cabigiosu, A. (2015). Innovation, Service Types, and Performance in Knowledge Intensive Business Services. In R. Agarwal, W. Selen, G. Roos & R. Green (Eds.), *The Handbook of Service Innovation* (pp. 109-121). London: Springer.
- Chichkanov, N., Yakovleva, D. (2017). Razvitie rinka intellektualnikh uslug v regionah [KIBS development in Russian regions]. Retrieved from https://issek.hse.ru/data/2017/05/03/1171421656/NTI_N_51_03052017.pdf (date accessed: 15.12.2018). [in Russian].

- Ciriaci, D., Montresor, S., & Palma, D. (2015). Do KIBS make manufacturing more innovative? An empirical investigation of four European countries. *Technological Forecasting and Social Change*, 95, 135-151.
- Consoli, D., Elche, D. and Rullani, F. (2015). Employment and Skill Configurations in KIBS Sectors: A Longitudinal Analysis”, in *The Handbook of Service Innovation*. Agarwal, R., Roos, G., Selen, W. and Green, R. (Eds.), Springer-Verlag, London, pp. 213–235.
- Corrocher, N., & Cusmano, L. (2014). The ‘KIBS engine’ of regional innovation systems: Empirical evidence from European regions. *Regional Studies*, 48(7), 1212-1226.
- Corrocher, N., Cusmano, L. & Morrison, A. (2009). Modes of innovation in knowledge-intensive business services evidence from Lombardy. *Journal of Evolutionary Economics*, 19(2), 173–196.
- D’Este, P., Iammarino, S., Savona, M., & von Tunzelmann, N. (2012). What hampers innovation? Revealed barriers versus deterring barriers. *Research Policy*, 41(2), 482–488.
- D’Este, P., Rentocchini, F., & Vega-Jurado, J. (2014). The role of human capital in lowering the barriers to engaging in innovation: evidence from the Spanish innovation survey. *Industry and Innovation*, 21(1), 1–19.
- De Fuentes, C., Dutrenit, G., Santiago, F., & Gras, N. (2015). Determinants of Innovation and Productivity in the Service Sector in Mexico. *Emerging Markets Finance and Trade*, 51(3), 578–592.
- den Hertog, P. (2000). Knowledge-intensive Business Services as Co-producers of Innovation. *International Journal of Innovation Management*, 4(4) 491–528.
- Deza, X.V. & López, M.G. (2014). Regional concentration of knowledge-intensive business services in Europe. *Environment and Planning C: Government and Policy*, 32, 1036 – 1058.

- Djellal, F., Francoz, D., Gallouj, C., Gallouj, F., Jacquin, Y. (2003). Revising the definition of research and development in the light of the specificities of services. *Science and Public Policy*, 30(6), 415–429.
- Djellal, F., Gallouj, F. (2001). Patterns of innovation organisation in service firms: postal survey results and theoretical models. *Science and Public Policy*, 28(1), 57–67.
- Doloreux, D. & Shearmur, R. (2012). Collaboration, information and the geography of innovation in knowledge intensive business services. *Journal of Economic Geography*, 12(1), 79–105.
- Doloreux, D., & Gomez, I. (2017). A review of (almost) 20 years of regional innovation systems research. *European Planning Studies*, 25(3), 371-387.
- Doroshenko, M. (2007). Intellektual'nye uslugi segodnya i zavtra [Knowledge-based services: today and tomorrow]. *Foresight-Russia*, 1(2), 37-45 (in Russian).
- Doroshenko M. (2010). Krizisnye strategii v sektore intellektual'nykh uslug [Crisis Strategies in the Sector of Knowledge-Intensive Services]. *Foresight-Russia*, 4(1), 64-73 (in Russian).
- Doroshenko, M. (2011). Innovatsionnyy potentsial sektora intellektual'nykh uslug v Rossii [Innovative Potential of the Knowledge-Intensive Services Sector in Russia]. *Foresight-Russia*, 5(4), 50-65 (in Russian).
- Doroshenko, M. Miles, I. & Vinogradov, D. (2014). Knowledge Intensive Business Services: the Russian Experience. *Foresight and STI Governance*, 8(4), 24-39.
- Doroshenko, M., Miles, I., Vinogradov, D. (2013). *Knowledge intensive business services as generators of innovations* (HSE WP BRP Science, Technology and Innovation no 12). Moscow: NRU Higher School of Economics.
- European Commission (2011). European Competitiveness Report 2011, European Commission, Luxembourg.

- European Cluster Observatory (2009). Knowledge Intensive Business Services. Priority Sector Report.
- Fang, H., Zhao, T., Zhang, Y.Q. (2016). Research on the Interaction of China's Knowledge-Intensive Business Services and Manufacturing Upgrading. In *Proceedings of Joint International Conference on Economics and Management Engineering (ICEME 2016) and International Conference on Economics and Business Management (EBM 2016)*. Retrieved from: <http://goo.gl/6oGc3r>. (date accessed: 15.12.2018)
- Ferreira, J. J., & Fernandes, C. I. (2012). Is Human Capital the Key Factor in Explaining Business Location Differences? Knowledge Intensive Business Services in Portugal. In *Soft Computing in Management and Business Economics* (pp. 19-30). Springer, Berlin, Heidelberg.
- Filippetti, A., Archibugia, D. (2011). Innovation in times of crisis: National Systems of Innovation, structure, and demand. *Research Policy* , 40, 179–192.
- Gallouj, F. (2002). Knowledge-intensive Business Services: Processing Knowledge and Producing Innovation. In *Productivity, Innovation and Knowledge in Services*, ed. by Gadrey J., Gallouj, F. Edward Elgar, 256 – 284.
- Gallouj, F., Weber, K.M., Stare, M. & Rubalcaba, L. (2015). The futures of the service economy in Europe: A foresight analysis. *Technological Forecasting and Social Change*, 94, 80–96.
- Gershman, M., Gokhberg, L., Kuznetsova, T. & Roud, V. (2018). Bridging S&T and innovation in Russia: A historical perspective. *Technological Forecasting and Social Change*, 133, 132-140.
- Gokhberg, L., & Roud, V. (2016). How to Design a National Innovation System in a Time of Global Innovation Networks: A Russian Perspective. In S. Dutta, B. Lanvin, S. Wunsch-Vincent (Eds.), *The Global Innovation Index 2016. Winning with Global*

- Innovation* (pp. 159-166). Geneva, Fontainebleau, Ithaca, NY: Cornell University, INSEAD, WIPO.
- González-Blanco, J., Coca-Pérez, J.L., Guisado-González, M. (2019). Relations between technological and non-technological innovations in the service sector. *The Service Industries Journal*, 39(2), 134-153.
- Gotsch, M., Hipp, C., Gallego, J., & Rubalcaba, L. (2011). Sectoral Innovation Watch: Knowledge Intensive Services Sector. *Europe INNOVA Sectoral Innovation Watch, for DG Enterprise and Industry, European Commission*.
- Granovetter, M. S., (1973). The strength of weak ties. *American Journal of Sociology*, 78, 1360–1380.
- Ha, H.-H., John, J., Janda, S., Muthaly, S. (2011). The effects of advertising spending on brand loyalty in services. *European Journal of Marketing*, 45(4), 673-691.
- Hachicha, A. (2008). Does Financial Innovation of Credit Derivatives Make Bank Riskier?, *International Journal of Economic Perspectives*, 2(1), 1-4.
- Hipp, C., Gallego, J., & Rubalcaba, L. (2015). Shaping innovation in European knowledge-intensive business services. *Service Business*, 9(1), 41-55.
- Howells, J., Tether, B., Gallouj, F., Djellal, F., Gallouj, C., Blind, K. ... Banach, D. (2004). Innovation in Services: Issues at Stake and Trends. European Commission, Final Report.
- Huggins, R. (2011). The Growth of Knowledge-Intensive Business Services: Innovation, Markets and Networks. *European Planning Studies*, 19(8), 1459-1480.
- Ivanov, D. (2016). Human Capital and Knowledge-Intensive Industries Location: Evidence from Soviet Legacy in Russia. *Journal of Economic History*. 76(3), 736-768.

- Janssen, M.J., Castaldi, C., Alexiev, A.S. (2018). In the vanguard of openness: which dynamic capabilities are essential for innovative KIBS firms to develop? *Industry and Innovation*, 25(4), 432-457.
- Javalgi, R.R.G., Gross, A.C., Benoy Joseph, W., Granot, E. (2011). Assessing competitive advantage of emerging markets in knowledge intensive business services. *Journal of Business & Industrial Marketing*, 26(3), 171 -180.
- Jia, S.S. & Li, F. (2018). Customer Value Co-Creation in KIBS Firms' New Service Development: Patterns and Antecedents. *International Journal of Business and Social Research*, 08(01), 19–29.
- Klimek, A. (2017). Advanced Business Services in Emerging Asian Economies. *Research Papers of Wroclaw University of Economics*, 486, 61-70.
- Koch, A. & Stahlecker, T. (2006). Regional innovation systems and the foundation of knowledge intensive business services. A comparative study in Bremen, Munich, and Stuttgart, Germany. *European Planning Studies*, 14(2), 123-146.
- Kuchukova, N., Sadvokasova, K., Salykov, O., & Muhiyaeva, D. (2016). The Improvement of the Innovation Development Funding in the Republic of Kazakhstan with Regard to International Experience. *International Journal of Economic Perspectives*, 10(4), 244-255.
- Kuryanov, A. (2008). Monetary Policy and Innovation Economy in Russia, *International Journal of Economic Perspectives*, 2(3), 168-174.
- Landry, R., Amara, N. & Doloreux, D. (2012). Knowledge-exchange strategies between KIBS firms and their clients. *Service Industries Journal*, 32(2), 291–320.
- Lingyun, W., Muhos, M., & Kess, P. (2011). Motivations, Modes and Challenges of KIBS in the Internationalisation to China. *Journal of modern accounting and auditing*, 7(6), 588.

- Miles, I. (2003). Knowledge-Intensive Services' Suppliers and Clients. Helsinki. Ministry of Trade and Industry Finland Studies and Reports 15/2003. 81 p.
- Miles, I. (2005). Knowledge intensive business services: prospects and policies. *Foresight*, 7(6), 39–63.
- Miles I. (2011) Servisnye innovatsii v XXI veke [Service Innovation in the Twenty First Century]. *Foresight-Russia*, 5(2), 4-15 (in Russian).
- Miles, I. (2008). Patterns of innovation in service industries. *IBM Systems Journal*, 47(1), 115–128.
- Miles, I. (2012). KIBS and Knowledge Dynamics in Client-Supplier Interaction. In: E. Di Maria (Ed.), *Exploring Knowledge-Intensive Business Services: Knowledge Management Strategies* (pp. 13–34). London: Palgrave Macmillan.
- Miles, I. D., Belousova V. & Chichkanov N. (2017). Innovation Configurations in Knowledge-Intensive Business Services. *Foresight and STI Governance*, 11(3), 94-102.
- Miles, I., Belousova, V., Chichkanov, N. (2018). Knowledge intensive business services: ambiguities and continuities, *Foresight*, 20(1), 1-26.
- Miles, I., Kastrinos, N., Flanagan, K., Bilderbeek, R., den Hertog, P., Huitink, R., & Bouman, M. (1995). *Knowledge-Intensive Business Services: Users, Carriers and Sources of Innovation*. European Innovation Monitoring Service, Publication no. 15. Luxembourg.
- Minfin (2018). The archive of the Russian Ministry of Finance website on 01/01/2015. Retrieved from: <http://info.minfin.ru/monitoring.php> (date accessed: 15/12/2018).
- Miozzo, M., Desyllas, P., Lee, H. and Miles, I. (2016). Innovation collaboration and appropriability by knowledge-intensive business services firms. *Research Policy*, 45(7), 1337–1351.

- Muller, E., & Doloreux, D. (2009). What we should know about knowledge-intensive business services. *Technology in Society*, 31(1), 64–72.
- Muller, E., & Zenker, A. (2001). Business services as actors of knowledge transformation: the role of KIBS in regional and national innovation systems. *Research Policy*, 30(9), 1501–1516.
- National Science Board (2018). Science & Engineering Indicators 2018. NSB-2018-1. Alexandria, VA: National Science Foundation. Retrieved from <https://www.nsf.gov/statistics/indicators/>. (date accessed: 15.12.2018).
- Osloob, M. & Foumani, A. F. (2017). The Relationship between Market Orientation and Innovation Performance: Testing the Moderating Role of Ownership Structure. *International Journal of Economic Perspectives*, 11(1), 1100-1108.
- Pellegrino G., & Savona M. 2017. No money, no honey? Financial versus knowledge and demand constraints on innovation. *Research Policy*, 46, 510-521.
- Pina, K.O. (2015). Into the Black Box of Knowledge Intensive Business Services: Understanding the Knowledge Bases, Innovation and Competitiveness of KIBS (Doctoral dissertation). Retrieved from <https://www.escholar.manchester.ac.uk/api/datastream?publicationPid=uk-ac-man-scw:294492&datastreamId=FULL-TEXT.PDF> (date accessed: 15.12.2018).
- PISA. (2018). Programme for International Student Assessment Data. Retrieved from <http://www.oecd.org/pisa/data/>. (date accessed: 15.12.2018).
- Plekhanov, A., Isakova, A. (2011). Region-specific constraints to doing business: evidence from Russia. EBRD Working Paper No. 125.
- Rodríguez, A., Nieto, M.J. & Santamaría, L. (2018). International collaboration and innovation in professional and technological knowledge-intensive services. *Industry and Innovation*, 25(4), 408–431.

- Rodríguez, M. & Melikhova, Y. (2015). Services in Russia: past, present, and future, *Eurasian Geography and Economics*, 56(6), 656-678.
- Rodriguez, M., & Camacho, J.A. (2010). Are knowledge-intensive business services so hard innovators? Some insights using Spanish microdata. *Journal of Innovation Economics & Management*, 1(5), 41-65.
- Rosstat. (2018). Регионы России: Социально-экономические показатели [Russian regions: socio-economic indicators]. Retrieved from http://www.gks.ru/wps/wcm/connect/rosstat_main/rosstat/ru/statistics/publications/catalog/doc_1138623506156. (date accessed: 15.12.2018).
- Roud, V. (2018). Understanding the heterogeneity of innovation modes: Performance effects, barriers, and demand for state support. *Technological Forecasting and Social Change*, 133, 238-253.
- RRП (2017). Рейтинг инновационного развития субъектов Российской Федерации [The Russian Regional Innovation Index]. Retrieved from <https://issek.hse.ru/data/2017/06/09/1170533818/RIR2017.pdf>. (data accessed: 15.12.2018).
- Sargon, B. & Katircioglu, S. (2018). The Role of Innovation in Venture Capital: Empirical Evidence from European Union and EFTA Countries, *Applied Economics Letters*, 26(4), 335-340.
- Scarso, E. & Bolisani, E. (2012). Trust in knowledge exchanges between service providers and clients: A multiple case study of KIBS. *Knowledge Management Research and Practice*, 10(1), 16–26.
- Scarso, E. (2015). What do we know about KIBS? Results of a systematic literature review. In Proceedings of IFKAD 2015, edited by Spender J., Schiuma G., Albino V. pp. 1159-1172.

- Schnabl, E., Zenker, A. (2013). Statistical Classification of Knowledge-Intensive Business Services (KIBS) with NACE Rev. 2 Karlsruhe: Fraunhofer Institute for Systems and Innovation Research ISI, evoREG Research Note 25.
- Schricke, E., Zenker, A. & Stahlecker, T. (2012). Knowledge-Intensive (Business) Services in Europe, Luxembourg: Publications Office of the European Union.
- Shearmur, R., Doloreux, D. (2018). KIBS as both innovators and knowledge intermediaries in the innovation process: Intermediation as a contingent role. *Papers in Regional Science*, 1-19.
- Strambach, S. (2008). Knowledge-Intensive Business Services (KIBS) as drivers of multilevel knowledge dynamics. *International Journal of Services Technology and Management*, 10(2/3/4), 157–180.
- Superjob.ru (2018) Рейтинг трудовой привлекательности крупнейших городов России в 2015 году [Rating of Labor Attractiveness of Russian Cities in 2015]. Retrieved from <https://www.superjob.ru/research/articles/111863/rejting-trudovoj-privlekatelnosti-krupnejshih-gorodov-rossii-v-2015-godu/> (date accessed: 15.12.2018).
- Tether, B., Hipp, C., Miles, I. (2001). Standardisation and particularisation in services: evidence from Germany. *Research Policy*, 30, 1115–1138.
- The Institute of Urban Economics. (2018). Reiting Stolichnih gorodov Rossii [Rating of major Russian capital cities]. Retrieved from <http://www.urbaneconomics.ru/centr-obshchestvennyh-svyazey/news/rejting-stolichnyh-gorodov-rossii-ot-fonda-institut-ekonomiki> (date accessed: 15.12.2018). [in Russian].
- Wang, J., Zhang, X., Yeh, A. (2016). Spatial proximity and location dynamics of knowledge-intensive business service in the Pearl River Delta, China. *Habitat International*, 53, 390-402.

- Wei, J. & Zhou, D. (2016). The Role of Knowledge-Intensive Business Services in Innovation System: The Case of China. In M. Toivonen (Ed.), *Service Innovation: Novel Ways of Creating Value in Actor Systems* (pp. 251-268). Tokyo: Springer.
- Wei, J., Yan, T., & Jiangqi, Z. (2008, September). Barriers to service innovation: Empirical study on chinese KIBS from yangtze delta. In *Proceedings of the 4th IEEE International Conference on Management of Innovation and Technology* (pp. 1506–1510). IEEE.
- Wyszkowska-Kuna, J. (2016). The Growing Importance of Knowledge-Intensive Business Services in International Trade. *Studia Ekonomiczne. Zeszyty Naukowe*, 266, 249–260.
- Zhou, D., Kautonen, M., & Wei, J. (2015). The effect of external KISA on innovation in manufacturing firms. *Innovation: Management, Policy & Practice*, 17(4), 508-523.
- Zhou, D., Kautonen, M., Wang, H. & Wang, L. (2017). How to interact with knowledge-intensive business services: A multiple case study of small and medium manufacturing enterprises in China. *Journal of Management & Organization*, 23(2), 297–318.

Appendix 1. Correlation Matrix

	Share of HR development expenditures	Share of well-educated staff	Standardization	Standardization square	Branches	Share of advertising expenditures	Strategy	Companies registered in a city	Labor attractiveness	Gross city product	T-KIBS	C-KIBS	Size	Size perception	Age
Share of HR development expenditures	1														
Share of well-educated staff	0.455	1													
Standardization	-0.053	-0.176	1												
Standardization square	-0.086	-0.217	0.981	1											
Branches	0.322	0.408	-0.109	-0.131	1										
Share of advertising expenditures	0.216	0.192	-0.104	-0.126	0.139	1									
Strategy	0.070	0.117	-0.050	-0.049	0.140	-0.042	1								
Companies registered in a city	-0.073	-0.108	0.044	0.005	-0.159	-0.046	-0.095	1							
Labor attractiveness	-0.097	-0.230	0.018	-0.009	-0.270	0.013	-0.032	0.770	1						
Gross city product	-0.087	-0.126	0.058	0.021	-0.191	-0.041	-0.121	0.988	0.760	1					
T-KIBS	-0.027	0.009	-0.059	-0.058	0.027	-0.003	-0.019	0.008	0.015	0.003	1				
C-KIBS	-0.132	-0.092	-0.120	-0.128	-0.009	-0.014	-0.023	0.007	0.004	0.015	-0.329	1			
Size	0.257	0.146	0.017	0.006	0.368	0.044	0.128	0.073	0.028	0.069	-0.009	-0.107	1		
Size perception	0.221	0.113	0.019	0.009	0.350	-0.001	0.094	-0.022	-0.055	-0.024	-0.048	-0.056	0.627	1	
Age	0.105	0.134	0.057	0.060	0.119	-0.076	0.016	0.163	0.084	0.166	0.023	-0.151	0.326	0.282	1