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The development of service industries in emerging economies has been attracting more attention in recent years, but to date there have been few studies of knowledge-intensive business services (KIBS) in these countries. (The main exception is the case of a specific sector – software and related Information Technology services, with most focus here being on India. KIBS as a whole have received little examination.) This paper aims to study how conditions for innovation influence innovation activities in KIBS in one of the largest emerging countries, Russia. The study draws on survey data from firms belonging to ten KIBS subsectors, based in major Russian cities in 2015. The results contrast with those generally reported in Western developed economies. In this particular emerging economy, firms experiencing negative market and knowledge conditions are actually more liable to undertake nontechnological innovations. We consider various explanations for this apparent anomaly. The institutional framework appears to be less essential for KIBS than has been earlier documented for manufacturing enterprises in Russia. Implications for innovation management and policy are outlined: both government and corporate, strategies here would benefit from more attention to these sectors.

Keywords: KIBS, conditions for innovation, emerging economies.

JEL Codes: O30, O31.

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Introduction

In recent decades, the structure of many economies has significantly transformed. Manufacturing has been replaced by service industries as the largest economic sector, both in terms of value added and employment, in developed and in many developing countries (De Fuentes et al., 2015). While some services are fairly traditional low-skilled industries, others are characterised by a highly qualified workforce, performing complex intellectual operations. This applies to public services such as education and health; and to knowledge-intensive business services (KIBS). The latter have become one of the most important sectors within Western economies (Miles et al., 2018).

The importance of KIBS is more than just a matter of their size and growth. Several studies indicate that KIBS play an important role in regional and national innovation systems (e.g. the conclusions of the extensive literature review of Doloreux & Gomez, 2017; and those that Brenner et al., (2018) draw from their analysis of labour market data). Some KIBS generate new knowledge, and others combine knowledge from diverse sources and diffuse this to clients; by doing so, they promote knowledge development in the whole economy. In emerging countries, KIBS input has been shown to be positively related to innovation, for instance in Chinese manufacturing (Fang et al., 2016; Wei & Zhou, 2016). KIBS are also innovators in their own right (Rodriguez & Camacho, 2008): indeed, they are often considered as one of the most innovative subsectors, and could be seen as a driver of the national economy (Wei et al., 2008).

The internationalisation of KIBS industries is also a significant trend in the general process of globalisation (Miles & Miozzo, 2015). Globalisation trends are the source of some political contention, with concerns in several Western countries about the shift of economic power to emerging economies, and their own “deindustrialisation”. But even if links to some Western economies become more challenging, emerging economies may have great opportunities as suppliers of those elements of KIBS that can be offshored, with other emerging economies themselves providing market opportunities. Their circumstances (not least relatively high-skill but low-wage workforces) mean that they could continue to ‘enjoy significant competitive advantage’ (Javalgi et al., 2011, p. 172). As well as export opportunities, KIBS may well contribute to national economic development in these economies. However, KIBS research usually focuses on developed markets while emerging economies are underexplored within this framework. Moreover, most existing studies dealing with KIBS-type services relate to the IT industry (notably software services in India), while other types of KIBS are not usually covered, though there is a gradual growth in the small base of Chinese (and Taiwanese), Korean, Russian and Latin American (mainly Brazilian) studies.

This study examines data from Russia, one of the largest emerging economies in terms of GDP. Russia has a huge economic potential in terms of human capital, but its national innovation system has been suffering from stagnation and inertia (Gokhberg & Roud, 2016), in notable contrast to China. Rodriguez & Melikhova (2015) argued that in Russia it has been “traditional” to neglect business services, because non-technological innovations are not considered as crucial as technological ones for fostering economic development. But manufacturing companies rarely adopt complex innovation strategies under the existing conditions (Roud, 2018), and only 10% of industrial enterprises are involved in technological innovation (Gokhberg & Roud, 2016). KIBS could play an important role in rendering the economy more innovative (Doroshenko, 2011); some researchers argue that some of the attention given to sectors like energy and traditional manufacturing should be devoted to KIBS like IT or design services (Gershman et al., 2018).

This Working Paper contributes, then, to examining KIBS in an emerging economy. But it also addresses a gap in the literature concerning the conditions that both foster and impede innovation in KIBS. While there is ample documentation of KIBS’ innovativeness, Amara et al. (2016) noting that obstacles that hamper KIBS’ innovation activity ‘are not documented at all’ (p. 4065), undertook such a study based on Canadian survey data. They found financial obstacles to be crucial barriers for technological innovations, while knowledge obstacles were important for nontechnological ones. (We discuss the meaning of these terms later.) Recently, de Moraes Silva et al. (2018) presented an empirical exploration of a sample of Brazilian KIBS SMEs, examining the impact of various obstacles to innovation on the companies’ propensity to cooperate for innovation with universities and research institutes. They found financial obstacles to be a strong impetus for such cooperation.

However, in general, innovation conditions that promote or restrain innovation activity in KIBS are underexamined. But, since KIBS’ innovation may be important both for their competitiveness and for their supporting other industries, more work is needed in this area. This study will examine the role of such innovation conditions in Russian KIBS - sectors that are changing rapidly, such as web and digital services (Berezin, 2016), and that are poorly covered in official STI statistics (Gershman et al., 2017).

In this paper, we empirically explore the impact of financial, knowledge, market, and institutional conditions, along with features of the client base, on the introduction of technological, marketing and organisational innovations in Russian KIBS. Our results show that the relationships between conditions for innovation and innovation activity in Russian KIBS differ in some respects from those reported for well developed markets. The most important

indication of this is that companies experiencing negative market and knowledge conditions are more liable to develop nontechnological innovations. This surprising finding may reflect the firms making efforts to overcome such barriers through innovative strategies.

The paper is organised as follows. In the next section, we briefly discuss the nature and innovation activity of KIBS, and review the empirical literature on conditions for innovation. The sample and survey & methodology sections describe the sample and set of variables employed, and then we present and discuss the results, and the conclusions drawn from them.

KIBS and their innovation activity

The term ‘Knowledge Intensive Business Services’ was introduced in the mid-1990s, to describe those services that ‘rely heavily upon professional knowledge, either supply products which are themselves primarily sources of information and knowledge ... or use their knowledge to produce ... intermediate inputs to their clients’ own knowledge generating...activities ... [and] have as their main clients other businesses’ (Miles et al., 1995, p. 28). This sector was described as consisting of firms that specifically provide solutions to problems of other organisations, solutions which require knowledge and experience from external sources (Miles et al., 2018). As private firms, KIBS differ from Public Research Institutions (PRIs), which are more often run and largely funded by governments. There can be overlap between their activities; both PRIs and KIBS may provide such services as applied R&D, technology transfer, and training.⁵ KIBS may support public sector organisations as clients, as well as providing services to other businesses: many consultancies, for instance, work both for private clients and for government departments.

KIBS rely on high levels of intellectual capital: large shares of the workforce are university graduates, for example. These firms are associated with a more or less specialised area of knowledge, which they use to develop solutions for their clients (Muller & Doloreux, 2009). Sometimes sets of KIBS will work together (orchestrated by a project leader) when they are assisting with a particularly complex problem, for example a major infrastructural project like an airport, transport system, or even the construction of a whole new city, where many specialised sorts of knowledge are required (architecture, engineering services, legal services, management services, and so on). KIBS provide knowledge intensive inputs to other organisations (Figueiredo et al., 2015), becoming members of production chains for companies from other industries; they can significantly contribute to the growth and development of the sectors they service, and thus to the whole economy (Morrar & Abdelkhadi, 2016). KIBS use is associated with innovation. For instance, Doloreux & Shearmur (2013) found that the purchase of KIBS had a positive impact on the innovation activities carried by industrial companies. Moreover, the probability that a manufacturing firm will implement product, process or management innovation grows monotonically with the number of types of KIBS purchased by this manufacturing firm. (Shearmur & Doloreux, 2013).

⁵ While it is usually possible to demarcate KIBS from PRIs, there are some industrial statistics in which this is more of a problem. In particular, the R&D services industry as captured in NACE classifications (as division 72) includes both the PRIs dominant in countries such as Germany, and the private service firms more active in countries such as the UK.

KIBS are not only contributors to other industries' innovation activities, but also are innovators themselves (Muller & Doloreux, 2009). Several studies indicate that KIBS tend to be more innovative than most manufacturing companies. For instance, Gotsch et al. (2011), drawing on Community Innovation Survey (CIS) data, concluded that in Europe the average share of innovative enterprises in KIBS was about 24 percentage points higher than in manufacturing. A recent analysis of German CIS results found KIBS tend to be more innovative than other market services and more so than many manufacturing sectors,⁶ in terms of such indicators as share of innovation-active firms, share of firms with continuous R&D activities, innovation expenditures, and so on. (Behrens et al., 2017).

Moreover, as Miles et al. (2017) demonstrate, Russian KIBS do not only develop technological innovations, but also feature such non-technological innovations as marketing and organisational innovations. Actually, comparative study shows that the share of KIBS developing technological and marketing innovations in the leading Russian cities, at least,⁷ is well within the range for KIBS in EU countries, and quite similar to those for the UK and Denmark (Chichkanov & Belousova, 2017). However, in European countries KIBS appear to be much more active in terms of organisational innovation than these Russian counterparts.

Despite the sector's generally high level of innovation, some firms do not adopt any form of innovation. While some of these firms may have little incentive to innovate – they may be in comfortable niches with little competition, for example – others report difficulties and frustrations during the innovation process (De Fuentes et al. 2015). These difficulties can be seen in terms of “obstacles” (e.g. regulations that restrict new initiatives), and/or in terms of limited capabilities. For example, D'Este et al. (2012) conclude that the success of innovation efforts depends on a firm's ability to combine capabilities such as finance, recruitment of high-skilled staff, effective interactions, and understanding of market needs, among other factors. Whether obstacles or capabilities, the characteristics and operating conditions of companies affect their decisions as to whether to proceed with innovation activities, and which activities to undertake.

⁶ However, the most innovative sectors were some R&D-intensive manufacturing industries, like chemicals or pharmaceuticals.

⁷ As described below, Russia was represented only by KIBS in large major cities; this makes it likely that the sample to include more leading (and innovative) companies, while CIS studies in Europe also cover KIBS firms from minor cities and more peripheral areas.

Conditions for Innovations

The literature on innovation in KIBS has emphasised those factors that have a positive impact on companies' propensity to undertake innovations. The most well-known group of such factors involves innovation efforts; not surprisingly, activity intended to promote innovation is highly associated with actually innovating! The main focus of research on such activity has been on internal or external R&D expenditures (Rodriguez & Camacho, 2010; Asikainen, 2015). Although in general KIBS are not highly R&D-intensive (exceptions include engineering, computer, and, unsurprisingly, R&D services) several scholars report such expenditures to be important for both innovativeness (Teixeira & Bezerra, 2016) and profitability (Nunes & Serrasqueiro, 2015) among KIBS.

Innovation efforts require specific expenditures, some of which can be very costly for the company. It may be difficult to find such financial resources for innovation, due to lack of funds within the enterprise and limited access to funding from outside sources like venture capital and public funding. (These latter factors are often those emphasised in policy research). Finally, innovations are usually connected with uncertainty; innovation expenditures may be extremely risky, especially where major new products are involved, many projects fail to achieve the market success hoped for. Financing and riskiness are described as cost factors in the Oslo Manual (OECD, 2005), and are found to be the barriers for innovation most often reported by companies in many sectors, including KIBS (Segarra-Blasco et al., 2008; Kuhl & da Cunha, 2013).

Cost factors are also liable to be highly important in emerging economies, where innovators among KIBS may face strong challenges. KIBS firms require more highly qualified employees, who can command relatively high wages. Recruitment of new technical expertise in the course of innovation can be expensive; KIBS firms from emerging economies may find it hard to compensate for labour costs by price increases, because their clients (especially foreign enterprises) often view emerging economies as low-cost locations for outsourcing services (Bello et al., 2016).

Access to knowledge and skills is another factor shaping innovation activities and outcomes. Investments in human capital, including expenditures on external and internal training for employees, are one aspect of this. KIBS by their nature are highly dependent on expertise and skills (Teixeira & Bezerra, 2016), and He & Wong (2009) noted that KIBS with a higher level of well-educated employees tend to be more innovative, especially in terms of product innovations. D'Este et al. (2014) reported that human capital also enables firms to overcome obstacles to innovations '...represented by knowledge shortages and market uncertainties...' (p.1).

Conversely, when the company does not have an opportunity to invest a lot in employees, it may face what Oslo Manual (OECD, 2005) classifies as knowledge barriers to innovation. Lack of qualified staff was reported as a factor hampering innovation by Wziątec-Kubiak et al. (2011) and Hölzl & Janger (2014). Problems with the availability of high-skilled labour may be more severe in emerging countries. Even if there is a good supply of University graduates, skills for KIBS may be limited.

A third set of innovation activities involves marketing (Rodriguez & Camacho, 2010; Rodriguez et al., 2016), which can help firms to focus on the innovations with highest market potential and/or likelihood of successful commercialisation. It can help innovators determine how to design products with most appeal to potential users. Marketing and advertising may also attract new customers and help establish demand for new services. KIBS' innovation may be hampered by uncertain demand for new or improved services (D'Este et al., 2014; OECD, 2005). Thus, Lingyun et al. (2011) characterised the Chinese market for KIBS as being immature and uncertain: potential clients preferred to develop all the services internally, '...were not ready to pay for advice...' (p. 594) and generally avoid consuming consulting services from KIBS. Similar results were obtained in Russia, where KIBS services are still considered as unnecessary 'luxury items' (Doroshenko, 2011).

Clients are also often identified as important sources of information for innovation activity in KIBS (Amara et al., 2016). The complex problem-solving involved in the service requires close interactions between service supplier and client. The KIBS firm may be a specialist, but often needs to learn more 'local' knowledge from the client about the nature of the problem. It might be that a diversity of clients will provide the KIBS with a broader knowledge base. Bolisani et al. (2014) showed that less standardized service offerings require a wider knowledge base and make their producers more dependent on external relations. However, some clients may have a low motivation to cooperate with KIBS producers due to the lack of clarity about their role, or to lack of qualified staff and limited technical capabilities in the area of KIBS expertise (Santos & Spring, 2015). Doroshenko et al., (2014) reported that Russian KIBS' clients typically have lower expectations about the extent of coproduction of services than did the service suppliers themselves.

Finally, broader features of local environments may also either favour or impede innovations in KIBS. For example, the Oslo Manual (OECD, 2005) pointed out that negative conditions include lack of infrastructure, weak property rights protection, and cumbersome regulations, standards, and tax arrangements. In Russia, the innovative potential is widely reported to be significantly reduced by institutional factors including quality of regulation and

rule of law (Gokhberg & Roud, 2016). Looking at the Finnish case, Viljamaa et al. (2010) pointed out that policy decisions might simultaneously perform as both contributing and hampering factors for innovation activities in KIBS. Individual policies might trigger some sorts of innovation. (For example, adopting new and improved software engineering standards, or environmental protections, mandated by government procurement rules, as has been the case in some Western countries, has led suppliers to adopt new production processes.) But individual policies might suppress some sorts of innovation, too. (For example, specifications that particular technological solutions should be adopted may impede efforts to develop novel solutions resting on other technologies – this is reportedly an issue in areas as diverse as testing and producing vaccines, purifying water for drinking purposes, and reducing emissions from automobile exhausts.) Individual policies are typically part of a policy mix in which different actions are implemented; elements of the policy mix are often intended to serve several ultimate objectives; the individual policies may have conflicting impacts, rather than the complementary ones that are envisaged.

Returning to our focus on KIBS in Russia, it should be noted that most KIBS arose only with the beginning of market reforms. The share of employees working in KIBS in the total labour force was almost zero until the late 1980s; but since then it has grown constantly, and in 2013 it was comparable with Central and Eastern Europe (Doroshenko et al., 2014). By 2014-2015 leading Russian KIBS were highly engaged in technological and marketing innovation activities, even comparable with developed European countries, although the level of organisational innovation was still substantially lower (Miles et al., 2017). At this point we should note that the CIS, following the Oslo Manual (OECD, 2005), identifies in its survey questions four main types of innovation (product, process, organisational and marketing). However, in services, and particularly in KIBS, the service is often, at least in part, simultaneously produced and consumed. Some researchers thus suggest avoiding making a strong distinction between product and process innovations in service industries (Sirilli & Evangelista, 1998; Morrar, 2014). As also undertaken by Gonzalez-Blanco et al. (2019), the survey whose data we draw on does not distinguish product and process innovations: instead it treats these together as a group of technological innovations. In addition, the survey we use does include data about 2 types of non-technological innovations – marketing and organisational ones. Our research opportunity, then, is to explore which conditions for innovation influence the implementation of these 3 types of innovation in Russian KIBS.

The Sample

It would be ideal, for comparative purposes, to use data conforming to the CIS survey used across European countries. Unfortunately, while there is an annual Russian version of this survey, it does not cover KIBS. Indeed the representation of KIBS in Russian statistics is very limited (Doroshenko et al., 2014). However, we are able to draw on data from the survey ‘Monitoring of Knowledge-Intensive Business Services in Russia’, conducted by HSE ISSEK in 2015⁸. The initial data set includes 656 enterprises from 10 KIBS industries (advertising, informational communication consulting, audit (and accountancy), information technology, human resources consulting, engineering, financial intermediation⁹, legal services, development and real estate services, web and digital services).

This database was developed using a two-stage quota sampling method. In the first stage, the companies were chosen based on quotas for their location. Our sample covers the top 15 regions in terms of number of operating enterprises in 2013¹⁰ (Rosstat, 2018). Since KIBS operate to serve other enterprises rather than individual households, this criterion is crucial for them. In addition, all of the selected regions in 2013 were in the top 30 regions in terms of all enterprises’ total net profit (Minfin, 2018). Each region is represented by its capital city where KIBS are usually concentrated (Moscow, St. Petersburg, Tyumen, Krasnodar, Yekaterinburg, Kazan, Ufa, Krasnoyarsk, Samara, Nizhny Novgorod, Rostov-on-Don, Perm, Chelyabinsk, Novosibirsk are the cases). In the second stage, on the basis of the level of the industry development in a particular city and of in-depth interviews with 24 leading experts (occupants of senior positions in industry associations and major self-regulation organisations), quotas were established for company size and industry in each city. This procedure was intended to ensure that the sample reflects the entire population of particular KIBS industries, both in terms of regional coverage and company size within each city. Our sample thus focuses on KIBS in the

⁸ In addition, the data for the variable “the number of companies registered in a city” was collected from Federal State Statistics Service (Rosstat).

⁹ This includes such financial services as trust management, financial consulting, investment attraction, brokerage and trading services; leasing; and factoring. Such financial intermediation has most of the features of a KIBS sector, in fact. However, it is not always included among the KIBS analysed by research studies; a major reason for which is simply one of statistical convenience. These financial intermediation services are often put together with banking and insurance activities in statistical aggregations. This creates difficulty for analysis via official data. Another source of difficulty in examining these activities is that they are often involved in processing high volumes of money; this causes difficulties in interpreting conventional statistical categories such as productivity and turnover; the very high rewards accruing to senior staff may also be problematic in terms of sectoral analysis.

¹⁰ The latest information available at the time the data was collected.

most dynamic regions of a very large country. It is likely to be more innovative than would be one that covered the whole country, because less advanced regions will also feature some KIBS. However, the firms in our sample are liable to be representative of those making the more significant contributions to the economy and innovation system.¹¹

Finally, we exclude those cases where data was missing about their innovation propensity or conditions for innovation: our final sample then consists of 449 enterprises.

The Survey & Data Analysis Methodology

Following Santos-Vijande et al. (2012), the survey did not differentiate between product and process innovations, simply asking about “technological” innovations. This limitation may be justified given the difficulties reported in distinguishing service product from service process innovation, mentioned earlier. Questions are also asked about organisational and marketing innovations.

Respondents were asked about innovations undertaken in the last 6 months; this reduces the comparability with CIS data (the CIS questionnaire asks about the last 3 years). The indicators are dichotomous – either the enterprise did or did not introduce such an innovation in the last 6 months. If the company implemented at least one type of innovation, this company is considered as innovative (variable ‘Innovation’ equals 1). However, each company might introduce different types of innovation simultaneously, so the sum of the number of companies introducing technological, marketing or organisations innovations exceeds the number of innovative companies.

The literature dealing with conditions for innovation points to five main conditions (financial, market, knowledge, institutional conditions and the state of the client base) that may impact KIBS’ innovation activity (cf. D’Este et al., 2014; Amara et al., 2016). The survey provides data that can be brought to bear on each of these.

For *financial conditions* we used, first, the trend (decrease/ increase) in company turnover. Changes in turnover or in sales revenue is a well-known metric that is used to indicate the financial health of the company and predict the probability of bankruptcy: this indicator is believed to show how well management deals with a competitive environment (Altman, 1968). A second proxy is advertising expenditure: Russian companies from different sectors report that

¹¹ Economic geographers have often considered absence of access business services to be a source of disadvantage to businesses in more peripheral areas: research into the extent to which this problem is confronted in emerging economies, and how far it might be partially offset through use of new communications technologies, would be valuable.

they reduce this expenditure when their economic situation worsens (Belousova & Chichkanov, 2016), so it appears to be a measure of good financial health of the firm. But there is a complication when it comes to analysing innovations: firms that spend a lot on advertising may well be motivated to reduce the costs or increase the effectiveness of advertising, by pursuing marketing innovations.

Knowledge conditions are measured by two variables: first, the share of HR development (recruitment and training) expenditures in the company's total expenditure; this is relevant since KIBS' main resources are 'the knowledge and experience embodied in human capital' (D'Antone & Santos, 2016, p. 172). Second, the perceived lack of qualified personnel, which is a type of knowledge obstacle often reported to be a serious barrier to innovation activity (Coad et al., 2016). This survey question concerns respondents' perceptions (Hall et al., 2016; Božić & Rajh, 2016), which is also the case for some of the remaining three conditions.

For *market conditions*, we again use two indicators. The first is a binary variable indicating whether the company reports lack of, and/or uncertain, demand as a barrier to the development of the whole KIBS sector in their region. Such a measure is often used as a proxy for market obstacles (e.g. Santiago et al., 2017). Second, we use Rosstat data about the number of the companies in a city-region¹². While this measure does not allow us to identify the particular target group of customer for each company, it might reflect the availability of potential clients in general. As Deza & Lopez (2014) argued, KIBS firms exist only once potential demand for their services has reached a critical level. KIBS firms also tend to emerge and locate themselves in more developed regions, where many KIBS establishments as well as potential clients already exist (Wang et al, 2016).

The *client base* conditions are addressed in the survey, in part, through questions about the existence of branches in other regions. We hypothesise that companies with branches in other regions are liable to be more innovative because they have access to a wider knowledge base. (On a similar point, Wang et al. (2016) showed that new KIBS enterprises tend to develop near foreign companies or transnational corporations, in order to engage with global networks and absorb more knowledge.) We also employ perceptions of the quality of existing clients. The survey asked respondents whether their clients lack of competencies and facilities for being, or do not want to be, involved in coproduction. Coproduction - the process during which the customer creates the solution jointly with a KIBS producer by sharing knowledge, providing production inputs and providing feedback at different project stages - is important to value

¹² This proxy is also highly correlated with the regional GDP (more than 0.7)

cocreation in KIBS, and client cooperation is essential for this (Bettencourt et al., 2002; Aarikka-Stenroos & Jaakkola, 2012).

Institutional conditions are less directly addressed in the survey. One question dealt with perceptions of government support. We employ here a binary variable that equals 1 if the respondent specified the lack of government support, restraining regional policy and/or lack of infrastructure as a barrier for the development of the KIBS sector in their region. This is justified by a number of studies indicating that such support is seen as important by companies. Thus, Medvedev (2016) argued that in the mid-term the Russian government needs to tackle the issues of institutional nature including more focused government support, developing long-term regulatory models as well as the development of efficient transportation and logistical connections. Davidson et al. (2018) showed that the most important external factors that determine the innovation activity of Russian companies are government support and “other institutional factors”. More generally, Gurvich (2016) showed that weak institutional framework significantly reduces the growth potential of the Russian economy, while foreign companies report difficulties with law and regulation as well as the lack of infrastructure in many regions as important barriers to their operations in Russia (Ershova, 2017). Roud (2018) discussed different types of innovating manufacturers in Russia and reports that they believe that the institutional framework is a strong obstacle to innovation activity.

We also include a set of control variables from the survey, taking into account factors that other studies have related to innovation (cf. Pellegrino & Savona, 2017; Rodriguez et al., 2018). These include management practices of the company, size, age, and industry. Data on management practices is provided by questions about the development of formal strategy and about company orientation, specifically about the level of standardisation, of their service activities. Suspecting that the effect of standardisation could have a non-linear effect (too little and too much customisation both diminishing innovative potential), we add the squared term of this variable into the analysis (Cabigiosu & Campagnolo, 2018).

Industrial differences were measured by using dummies for different types of KIBS. KIBS companies innovate in various ways and the sector displays high heterogeneity, but previous studies suggest that the groups of P-, T- and C-KIBS are useful for analysis. Traditional professional services (P-KIBS) that are based on specialised knowledge of administrative systems and the like include audit, human resources consulting, financial intermediation, legal services, development and real estate services; T-KIBS, including enterprises operating in information technology or engineering services support the effective use of new technologies across the economy (Miles et al., 1995; Miles, 2005); while C-KIBS include those sectors that

are highly dependent on cultural knowledge (Miles & Green, 2010). In our sample, three industries were classified as C-KIBS: advertising, informational communication consulting, web and digital services.

Descriptive statistics and definitions of all variables are presented in Table 1.

Table 1. Descriptive statistics and definitions of variables employed

	Description	N	Min	Max	Share with value = 1	Mean	Standard deviation
Innovation types							
Innovation	1 if company implements any type of innovation in the 1 st half of 2015, 0 otherwise	449	0	1	72%	0.72	0.45
Technological Innovation	1 if company implements technological innovation (including innovative products and services) in the 1 st half of 2015, 0 otherwise	449	0	1	66%	0.66	0.47
Marketing innovation	1 if company implements any marketing innovation in the 1 st half of 2015, 0 otherwise	449	0	1	27%	0.27	0.44
Organisational innovation	1 if company implements organisational innovation in the 1 st half of 2015, 0 otherwise	449	0	1	28%	0.28	0.45
Financial conditions							
Turnover decrease	1 if company indicates the decrease in turnover in 2014 compared to 2013, 0 otherwise	449	0	1	36%	0.36	0.48
Share of advertising expenditures	Share of expenditures on advertising in total expenditures of the company in the 1 st half of 2015	449	0	40	n.a.	7.54	6.20
Knowledge conditions							
Lack of qualified personnel	1 if the company in the 1 st half of 2015 indicates the lack of qualified personnel as barriers for the development of sector in the city	449	0	1	18%	0.18	0.38
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	449	0	25	n.a.	5.37	5.73
Market conditions							
Lack of demand	1 if the company in the 1 st half of 2015 indicates the lack of demand and/or uncertain demand as barriers for the development of sector in the city	449	0	1	45%	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)	449	3.61	7.04	n.a.	5.25	1.34
Conditions of client base							
Low quality of client base	1 if the company in the 1 st half of 2015 indicates at least one of the following reasons as barriers for the development of sector in the city: low level or readiness of clients to coproduce; lack of competencies in client company or lack of facilities in client company	449	0	1	27%	0.27	0.45
Branch network	1 if in the 1 st half of 2015 the company have branches in other regions, 0 otherwise	449	0	1	30%	0.30	0.46

Table 1 (Continue)

Institutional conditions							
Institutional conditions	1 if the company in the 1 st half of 2015 indicates at least one of the following reasons as barriers for the development of sector in the city: lack of regional government support, restraining regional policy or lack of infrastructure	449	0	1	27%	0.27	0.45
Control variables							
Strategy	1 if in the 1 st half of 2015 the company continue the strategy developed in 2012-2014 with minor changes or already have a new strategy for 2015, 0 otherwise	449	0	1	44%	0.44	0.50
Standardisation	7 categories: 1 means that the share of standardised services in 2014 is less than 10%, 2 means that this share lies between 10 and 20%, 3 means between 21 and 40%, 4 means between 41 and 60%, 5 means 61 and 80%, 6 means between 81 and 90% and 7 means that the share of standardised services in 2014 is higher than 90%	449	1	7	n.a.	5.34	1.46
Standardisation square	Square of the standardisation variable (for testing for non-linearity)	449	1	49	n.a.	30.7	14.3
T-KIBS	1 if the company in the 1 st half of 2015 belong to information technology or engineering industries, 0 otherwise	449	0	1	18%	0.18	0.39
C-KIBS	1 if the company in the 1 st half of 2015 belong to advertising, information-communication consulting or web, design and digital services industries, 0 otherwise	449	0	1	32%	0.32	0.47
Size	3 categories from 1 for small enterprises (from 7 to 50 employees in the 1 st half of 2015), 2 for medium-sized enterprises (from 51 to 249 employees in the 1 st half of 2015) and 3 for large enterprises (more than 250 employees in the 1 st half of 2015) ¹³	449	1	3	n.a.	1.39	0.58
Age	Natural logarithm of age of the company in the 1 st half of 2015	449	0	4.17	n.a.	2.15	0.64

¹³ The classification used by OECD/Eurostat also includes three categories – small (from 10 to 49 employees), medium (from 50 to 249 employees) and large (more than 250 employees) enterprises. It could not be reproduced precisely for the present study due to data limitations, but the classification we employ is largely comparable.

To explore how different conditions for innovation influence the probability to innovate we use logit models as follows:

$$\log\left(\frac{P_i}{(1-P_i)}\right) = \alpha + (\beta_1, \beta_2) * FC + (\gamma_1, \gamma_2) * MC + (\delta_1, \delta_2) * KC + \zeta_1 IC + (\eta_1, \eta_2) * CCB + (\lambda_1 \dots \lambda_7) * Controls + \varepsilon_i \quad (1)$$

where $\log\left(\frac{P_i}{(1-P_i)}\right)$ is the logarithm of the ratio of the probability that a KIBS firm introduces an innovation of a particular type to the probability that it does not; α is a constant; FC is a vector of financial conditions; MC is a vector of market conditions; KC is a vector of knowledge conditions; IC is variable for institutional conditions; CCB is a vector of client base conditions, $Controls$ is a vector of control variables; $\beta, \gamma, \delta, \zeta, \eta, \lambda$ are regression coefficients; ε is an error term.

Results and Discussion

The results of the logit regression estimations are presented in Table 2, in terms of marginal effects for technological, marketing and organisational innovations, as well as for different types of implemented innovations. They were obtained using STATA software. The explanatory power of all models is quite high; the share of correct predictions (the number of correctly predicted observations divided by the total number of observations) varies from 73.9% to 78.4%. We also can rely on the goodness of fit, as the Hosmer-Lemeshow statistic is insignificant. Finally, Nagelkerke R^2 , though low (ranging from 0.137 to 0.357), is acceptable as our dependent variables are qualitative (Amara et al., 2016).

According to the results presented in Table 2, all of the conditions considered - except the institutional variable - are found to influence innovation activities in Russian KIBS. The direction and the significance of these effects differ between innovation types.

Financial conditions: we might expect negative financial conditions in terms of the decrease of turnover to impede all forms of innovation; thus Innobarometer (2016) reports that EU companies with decreasing turnover are less likely to introduce any type of innovation than are those with increasing turnover (60% vs. 75% are innovators). Our results only partly support this evidence: Russian KIBS companies with decreasing turnover tend significantly less frequently to introduce marketing innovation. In terms of the advertising expenditures indicator, which we consider a measure of a financial health of the company, results are more consistent. Companies with a high share of such expenditures are more likely to introduce innovations, especially technological and marketing ones. Some studies of innovation obstacles find that

financial difficulties were also important ones for KIBS (Alvarez & Crespi, 2015; Morrar & Abdelkhadi, 2016), though Amara et al. (2016) did not find any significant relationships between poor financial conditions and different types of organisational innovation (strategic and managerial) in Canadian KIBS.

Table 2. The results of logit regressions (marginal effects)

	Innovation	Technological innovation	Marketing innovation	Organisational innovation
Financial conditions				
Turnover decrease	-0.049 (0.040)	-0.058 (0.041)	-0.092** (0.044)	0.010 (0.044)
Share of advertising expenditures	0.010*** (0.004)	0.011*** (0.004)	0.009*** (0.003)	0.002 (0.003)
Knowledge conditions				
Lack of qualified personnel	0.059 (0.054)	-0.005 (0.055)	0.138*** (0.050)	0.138*** (0.052)
Share of HR development expenditures	0.012*** (0.004)	0.015*** (0.004)	-0.003 (0.004)	0.0053 (0.0037)
Market conditions				
Lack of demand	0.054 (0.040)	0.027 (0.041)	0.136*** (0.041)	0.080* (0.043)
Companies registered in a city	0.007 (0.015)	-0.006 (0.015)	-0.045*** (0.016)	0.030* (0.017)
Conditions of client base				
Low quality of client base	0.112** (0.046)	0.089** (0.045)	0.042 (0.043)	0.120*** (0.043)
Branch network	0.247*** (0.057)	0.247*** (0.053)	0.101** (0.046)	0.141*** (0.047)
Institutional conditions				
Institutional conditions	0.071 (0.046)	0.015 (0.046)	0.026 (0.046)	0.056 (0.047)
Control variables				
Strategy	0.006 (0.039)	0.047 (0.040)	0.029 (0.039)	0.019 (0.042)
Standardization	0.085 (0.068)	0.141** (0.067)	0.121 (0.074)	-0.082 (0.079)
Standardization square	-0.013* (0.007)	-0.020*** (0.007)	-0.016** (0.007)	0.008 (0.008)
T-KIBS	0.111** (0.055)	0.162*** (0.056)	-0.132** (0.059)	-0.127** (0.058)
C-KIBS	0.084* (0.044)	0.093** (0.044)	0.036 (0.044)	-0.075 (0.048)
Size	-0.041 (0.040)	-0.062 (0.041)	-0.005 (0.038)	0.039 (0.037)
Age	0.015 (0.031)	-0.004 (0.032)	0.001 (0.033)	-0.017 (0.036)
R-square Nagelkerke	0.309	0.357	0.219	0.137
Hosmer-Lemeshow statistic significance	0.124	0.162	0.765	0.632
Share of correct predictions	78.4	76.6	77.5	73.9
Standard errors in parentheses *** p<0.01, ** p<0.05, *p<0.1				

Knowledge conditions: investments in HR development were found to be important for technological innovations, while lack of qualified personnel was for non-technological innovations (both marketing and organisational). KIBS enterprises with higher share of expenditures on HR development are more technologically innovative – this is in line with Corrocher et al. (2009) who found that more (service) product oriented and technologically oriented KIBS also invest significantly more in human resources; and Asikainen (2015) reported that innovations aiming to improve the production process need to be supported by R&D training for employees. However, the lack of qualified personnel is positively related to both marketing and organisational innovations in our Russian KIBS: a similar effect was reported by Morrar & Abdelkhadi (2016) for KIBS in Pakistan. Their suggestion is that this may reflect an immature market where such innovations do not necessarily require much specific knowledge (especially in comparison with technological innovations). The idea is that non-technological innovations may be pursued as an alternative, when the firm could not implement technological ones due to lack of relevant knowledge/skills. In addition, we could suggest that negative knowledge conditions might actually be an incentive for organisational innovations. A lack of qualified personnel could lead firms to pay more attention to internal organisation, combining existing skills and competencies in more effective ways.

Market conditions: here a similar effect was found: a lack of demand is positively connected with organisational and marketing innovations. According to the Oslo Manual (OECD, 2005), ‘marketing innovations are aimed at better addressing customer needs, opening up new markets, or newly positioning a firm’s product on the market, with the objective of increasing the firm’s sales’ (p.49). The firms who reported a lack of demand could be trying to cope with this by focusing on marketing innovation, effectively attempting to increase demand (whether through better understanding customer needs, or through more effort at advertising the virtues of their services). As for the other indicator of market conditions, the number of companies registered in a city, this has a negative influence on marketing innovations. While we might expect demand to increase when there is a larger number of companies in the environment, we could also suspect that competitive KIBS are likely to be more prevalent. Amara et al. (2016) found intensity of competition to be negatively related to marketing innovations, which corresponds with this interpretation of the result, though further research is needed to explore this line of argument.

A further unexpected result concerned the client base. A low-quality client base – here understood as one where the clients do not want to coproduce and/or lack the requisite competencies and facilities - is positively related to innovation activity in general, as well as to

technological and organisational innovations. We might expect to find evidence that KIBS are learning from sophisticated clients, and innovating as a result: this is the general thrust of the literature. But instead, quite the reverse appears to be the case. What might be happening? One interpretation is that these KIBS are using technological innovation and new organisational approaches to employ the more limited client competences most effectively. In addition, Santos & Spring (2015) reported that KIBS effectiveness in a situation of low client participation may be overcome by preventive measures and problem management requiring effective use of frontline employees' experience of previous interactions with clients. We might, then, expect organisational innovation to be undertaken, to enable the KIBS firm to capture and employ information about clients, the problems encountered by clients of various types, the solutions that work for such clients, etc., from the KIBS' own employees. A related interpretation of the results is that, in circumstances where clients are not coproducing highly specialised solutions to their particular problems, KIBS are liable to move to supplying more standardised services. Organisational innovation may be required to support such standardised service delivery, involving staff undertaking new procedures, with new management processes being associated with these. Dealing with problems of low client participation may have been important for many firms at the time of this survey; over the period 2014-2015 the value of orders, and the conversion of requests into real orders, decreased significantly for Russian KIBS as economic conditions worsened (Belousova & Chichkanov, 2016)> This probably reduced the KIBS firms' ability to choose clients, leading to a lowering of the quality of client base; clients may themselves have been under more stress and unable to devote so much attention to KIBS inputs. (The economic conditions, too, may also have increased competition among KIBS firms.)

More along the lines anticipated, another factor that has a positive impact on innovation propensity in KIBS is the existence of branches in other regions. KIBS companies that operate only in local markets are likely to do so on the basis of local knowledge and connections, and possibly face a low level of competition (for example, being in relatively sheltered local niches, where they are known to customers). But when operating in more regions, the firm is forced to innovate in order to deal with different local conditions, or to compete with firms supplying competitive offerings (and possibly drawing on more local knowledge). Operating in more regions provides more innovation-relevant knowledge, then. We should consider, though, that there may be bidirectional causality: the most innovative and dynamic KIBS are likely to be more prone to expand across the regions. (These may be the ones to watch for in the event of future internationalisation of Russian KIBS.)

Finally, despite claims about institutional conditions in Russia, we do not find any significant relationship between institutional obstacles (measured by perceptions of the lack of government support, restrictive regional policy or lack of infrastructure) and the implementation of different types of innovation¹⁴. One possibility is that major regulatory problems are actually pervasive, and are not reflected in differing scores on our indicators. An analysis of more than 200 interviews with experts from the Russian KIBS sector suggested that there is a strong need for changes in public procurement procedures and standards - but this problem was related to all SMEs, not just KIBS (Berezin & Doroshenko, 2015). Santiago et al. (2017) actually found Mexican KIBS to be less likely than firms in other sectors to report regulation barriers as highly important. We can also speculate that the impact of regulation may vary across KIBS sectors: for instance, in Russia industries like audit or financial services are highly regulated by special standards, some others (e.g. legal services) are only partly regulated, and yet others (e.g. design) have no particular regulations in place.

Among control variables, we found, as anticipated, an inverted U-shaped influence of standardization on technological innovations. Standardisation helps companies increase the market size through replication, so may be a form of innovation, or a complementary strategy for innovation (Campagnolo & Cabigiosu, 2015). On the other hand, Tether et al. (2001) reported that specialisation in services tends to be associated with higher levels of innovation. Our interpretation is that a high level of standardisation may impede innovation activity by reducing client input; a high level of customisation may result in much effort spent on eliciting knowledge of very specific local circumstances, with less ability to acquire generic knowledge.

The heterogeneity of KIBS also influences different types of innovation. The Russian T-KIBS are more likely to report technological innovations, which we would anticipate: these sectors are notably heavy users of cutting-edge technologies, who often develop their own technologies (including intangible assets like computer software) (Miles, 2012). Less predictably, they are less likely than others to report marketing and organisational innovations. The indication is that Russian T-KIBS are more concentrated on technological rather than non-technological innovations (which also seems to be the case in the UK and Germany - cf Miles, 2012).

C-KIBS are also more innovative in terms of technological innovation. The possible explanation is that this sub-sector include new industries that are both creative and highly dependent on the technological content, like web design or digital marketing (Berezin, 2016). While some professional services (P-KIBS) do involve routine activity that can be automated

¹⁴ Few respondents also mentioned such institutional barriers as corruption, ineffective procurement and tax systems.

readily, many are dealing with complex administrative systems and organisational environments requiring face-to-face interaction; these offer less scope at present for application of technological solutions, though we are aware of much effort to apply Artificial Intelligence and data analytics to P-KIBS in Western contexts.

Conclusions

This paper has explored the conditions that influence innovation activity in KIBS. Our sample consists of KIBS enterprises from Russia, one of the largest emerging economies. We distinguish five main types of such factors specified in relevant literature: financial, knowledge, market, client base and institutional factors, and apply logit models to data from a survey of KIBS to estimate the relationships between conditions for innovation and three types of innovation (technological, marketing, and organisational).

Our analyses confirm that different types of innovation are differentially affected by various conditions. This demonstrates the importance of examining both positive and negative conditions in future studies. The precise results found for our sample of Russian KIBS may well not be replicated elsewhere due to national specificity. However, we suggest that differential relationships between types of conditions and forms of innovation are probable in most locations. (Indeed, results may vary within Russia; our sample is limited only to the most dynamic and developed regions, while KIBS in remote locations may show other patterns of behaviour.) In addition, there is as yet no Russian data on KIBS harmonised with CIS-type questionnaires, so comparisons with CIS-type results from other countries are problematic. Thus our results should be considered with some caution and further research could examine whether such matters as the classification of innovations, and the short time period which respondents report on, substantially affect the main patterns uncovered.

The striking result is that some conditions that are often seen as negative, as barriers, may perform as incentives to specific types of innovation. Negative financial conditions, in terms of decreasing turnover, have an impact on marketing innovations in the Russian case. Some of the results were rather inconsistent with the literature on innovation obstacles. Thus, negative knowledge conditions (measured as a lack of qualified personnel) significantly increase organisational innovation as well as marketing innovation. Similar effects are significant for negative market conditions (in terms of the lack of demand). It is interesting that these apparent anomalies apply to non-technological innovations may be that non-technological innovations are being promoted, as alternatives, when conditions for technological innovation are poor, but when

firms need to innovate in order to survive difficult circumstances. These results bear further investigation, to test how far these effects exist in other emerging countries (as appears to be the case for Pakistan, cf Morrar & Abdelhadi, 2016).

Less surprisingly, incurring some expenditures boosted some forms of innovation. The ability to spend more on advertising (which is generally taken to be a positive financial indicator) is associated with higher probability of technological and marketing innovations. Technological innovations are also more likely to occur in those KIBS who invest more in HR development. Finally, KIBS companies that operate in more regions tend also to introduce more innovations.

One further promising line of future research would be to examine which conditions were crucial for companies that decide not to take any innovation activity, and those whose innovation efforts fail or are impeded by obstacles encountered during their innovation process. It would be valuable to examine alternatives to self-reported perceptions of different conditions. “Objective” measures of the actual existence of such factors could be valuable – as would the insights from a comparison between these measures and the “subjective” perceptions of KIBS managers (The development of such alternative measures may decrease the common method bias involved when results are drawn from a single survey). Such work is needed to clarify the influence of conditions for innovation on innovation activity of KIBS companies from emerging economies.

Such clarification would help inform policy and strategy in emerging economies, so that they can become more actively involved in the internationalisation of KIBS and knowledge flows. Such a growth of competitive advantages of emerging economies will help them to be more resilient, promote their economic growth, and assist their movement towards knowledge economies.

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