NATIONAL RESEARCH UNIVERSITY
HIGHER SCHOOL OF ECONOMICS

Ivan Iudin, Liliya Kuzina

DETERMINANTS OF EMPLOYEES' INNOVATIVE BEHAVIOR IN RUSSIAN ORGANIZATIONS

BASIC RESEARCH PROGRAM

WORKING PAPERS

SERIES: SCIENCE, TECHNOLOGY AND INNOVATION

WP BRP 114/STI/2020

Ivan Iudin[1]*, Liliya Kuzina*[2]

DETERMINANTS OF EMPLOYEES' INNOVATIVE BEHAVIOR IN RUSSIAN ORGANIZATIONS

Long history of top-down interventions from the Russian state led to emergence of extractive institutional environment, in which innovative activity is expected to be low. However, like many other countries Russia is expected to shift towards innovation-based economic growth model. In this paper we investigate determinants of work-related innovative behavior in Russian organizations by implementing employee-driven innovation (EDI) approach. Our data suggests different determinants to be significant during idea generation and idea implementation stages of innovative process. The only two factors significant during both stages are job autonomy and innovative activity as a job requirement.

Keywords: innovation, innovative behavior, employee-driven innovations, innovative process, determinants of innovative behavior

JEL Classification: Z.

[1] Research Assistant, Laboratory for Economics of Innovation, Institute for Statistical Studies and Economics of Knowledge, National Research University Higher School of Economics, Russian Federation. Email: iyudin@hse.ru

[2] Research Assistant, Centre for Statistics and Monitoring of S&T and Innovation, Institute for Statistical Studies and Economics of Knowledge, National Research University Higher School of Economics, Russian Federation. Email: lkuzina@hse.ru

Introduction

During the recent decades natural resources and physical capital were increasingly complemented and partially replaced by information and knowledge as the basic resources for economic growth (Bubanja, & Madzar, 2019, p. 158). Further development of information and communication technologies (ICT) lead to the development of a human capital base which in turn makes transition towards knowledge-based economy possible (Kowal, & Paliwoda-Pękosz, 2017, p. 305). Consequently, ICT based and in a broader sense digital economy based innovation become a key driver in wealth creation (Bică et al., 2015) not only in terms of per capita economic growth (Agénor, & Neanidis, 2015; Maradana et al., 2017) but also related to sustainable development (Silvestre, & Ţîrcă, 2019).

Therefore, it should not come as a surprise that the contemporary economic competitiveness paradigm is based "on the ability of countries and their respective companies to innovate" (Feldmann et al., 2019, p. 196). In fact, more developing countries are shifting from technological catch-up to innovation-based economic growth. Consequently, attempts to reconceptualize global innovation system are undertaken (e.g. Binz, & Truffer, 2017; Lee et al., 2020). Even though the relationship between innovation and country global competitiveness is indirect (Feldmann et al., 2019, p. 205), it can still be argued that for a country to be competitive in the global market, transition towards innovation-based economic growth model is needed.

Russia's position in this regard, however, is unfortunate. Most importantly, Russia lags behind more developed countries in the level of ICT usage (Rodionova, 2013, p. 22). The creation of a strong national innovation system would help Russia to take a stronger position in the world economy (Rodionova et al., 2018, p. 411), as Russian people have an advantage in transition to knowledge-based economy due to higher levels of secondary and tertiary education (Rodionova, 2013, p. 23). Nevertheless, "Russia's long-term record of market-contrary governance" curbs its innovative potential and makes fulfillment of its post-Soviet ambition to implement radical "systemic change" unlikely (Hedlund, 2011, p. 5).

According to Hedlund (2011), institutional changes and reforms throughout Russian history were consistently initiated from the top (p. 171). He argues that institutions, which stifle private entrepreneurship and innovation from the bottom emerged during Muscovite era around the 14th century, and persist until today, hence strongly reducing the current "prospects for Russian industry to achieve the type of innovation and technological change that would be needed to ensure global competitiveness" (Ibid, p. 137). Even rapid economic growth achieved under "innovative" soviet economic system (Ibid, p. 82) did not last long. As soon as USSR started catching up with developed countries, growth started fading. Technological progress remained only in sectors, "where resources were being poured and where innovation was strongly rewarded because of its role in the competition

with the West". This proves nature of economic growth under extractive institutions to be different in nature, most importantly unsustainable (Acemoglu, & Robinson, 2013, p. 150).

In light of this, the Russian case appears intriguing, as the extractive institutional environment combined with long history top-down interventions from the state hinder innovative activity, yet no other option to ensure economic growth other than through innovation appears to be possible. Therefore, in this research we aim to determine what influences innovative activity in Russian organizations. Due to Russia being a post-Soviet transition economy, i.e. where "financial capital, innovation management experience and state-of-the-art technology" are lacking, yet where "high levels of human capital and a long-term practice in manufacturing activities" can foster innovative activity (Apanasovich et al., 2016, p. 32), an employee-driven innovation (EDI) approach (Kesting, & Parm Ulhøi, 2010) will be implemented. In particular, two groups of factors – ones that affect innovative behavior of employees and ones that influence implementation of employee suggested innovations – will be investigated.

The remainder of the paper will proceed in a following manner. In the first section the theoretical framework is outlined. In the second section methodological aspects of this study are described. The third section features models through which the relationship between possible determinants of employees' innovative behavior and the innovation outcome is investigated. The article concludes with a discussion of the obtained results; several practical policies for organizations will also be suggested based on given results.

1. Employees and innovations

1.1. Defining innovations

When analyzing innovations, researchers usually face the problem of multiple possible definitions as Baregheh et al. (2009) found more than 60 definitions of the term "innovation" in various academic fields. Based on these definitions the authors proposed an integrated one, where innovation is considered to be a "multi-stage process whereby organizations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace" (p. 1334).

In current research, we use innovation definition that was proposed by OECD and European Commission (2018). They defined not only innovation in general, but several other types as well, including business innovation, which appears to be most suitable for current research. It was defined as "a new or improved product or business process (or combination thereof) that differs significantly from the firm's previous products or business processes and that has been introduced on the market or brought into use by the firm" (p. 20).

The chosen definition implicitly allows us to view innovation as a multi-stage process (Kotsemir, & Meissner, 2013), therefore we need to outline the stages. There is no commonly accepted number of innovation process stages: some researchers suggest there to be three stages,

e.g. idea generation, incubation and scaling (O'Reilly, & Binns. 2019), some suggest five, e.g. creation, generation, implementation, development and adoption (Baregheh et al., 2009), while others suggest innovation process to be nonlinear (e.g. Tohidi, & Jabbari, 2012). As for current research, we view innovation process as consisting of two stages – idea generation and idea implementation (Anderson et al., 2014). This approach appears to be parsimonious, yet in line with OECD and European Commission (2018) approach that differentiates innovation from resembling concepts, like invention, by making implementation a requirement for innovation.

1.2. Employees and employee-driven innovations

According to Kesting and Parm Ulhøi (2010) the employee-driven innovation (EDI) approach aims to demonstrate that generation and implementation of new ideas, products and processes can originate from ordinary employees, who are not assigned to such tasks. Following this approach, innovations are viewed as a result of creative behavior and consequent realization of the novel and useful ideas (Kurz et al., 2018, pp. 399-400).

Echebiri (2020) outlined three main premises of EDI approach that provide us with a more comprehensive image of an employee involved in EDI process. Firstly, innovations can emerge from employees outside of a selected group of employees with innovation related obligations. Secondly, employees who engage in EDI adopt extra-role behaviors as they engage in duties, that are not formally assigned to them. Thirdly, employees who are involved mostly in the execution of ideas can also generate and select novel ideas.

Overall, as argued by Høyrup (2010) EDI takes the form of a bottom-up process that can emerge spontaneously and informally, as well as it can be supported, recognized and organized via various organizational and managerial means. Furthermore, EDI does not refer to any particular kind of innovation – "all kinds of innovations: products, processes, organization, markets, at any level of intensity – incremental or radical, are the concern of EDI" (p. 149).

1.3. Determinants of innovative behavior

Hammond et al. (2011) meta analysis revealed three groups of antecedents of individual innovative performance: (1) *individual factors* that include personality traits and demographic characteristics; (2) *job factors* like job complexity, autonomy and role obligations/expectations; (3) *contextual factors*, i.e. organizational climate, organizational resources, perceived supervisory support and leadership type. Let's look deeper into each of these groups of factors, especially into individual factors as in the EDI approach they appear to be "essential in predicting organizational performance" (Echebiri, 2020, p. 43).

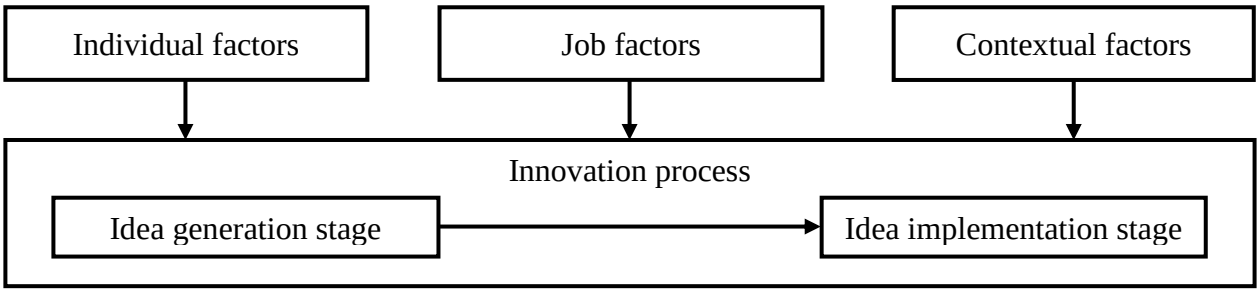

Figure 1. Model of the antecedents of individual innovation (based on Hammond et al., 2011)

Individual factors. Starting off with psychological traits, researchers often focus on the big five personality traits, intrapreneurial (and entrepreneurial) behavior (Abdullah et al., 2016, p. 180). In regard to personality traits, Nov and Ye (2008) showed resistance to change to have negative effect on personal innovativeness in IT, while openness was found to have positive effect. Later study by Yesil and Sozbilir (2013) also showed openness to have a positive effect on individual innovation behavior. Thus, we expect this trait to positively affect innovative behavior (*Hypothesis 1*). As for the intrapreneurial behavior, Åmo and Kolvereid (2005) found intrapreneurs, i.e. people who act as entrepreneurs, while working in an organization, to be more innovative. In Russian institutional context, however, we can not be sure that intrapreneurial or entrepreneurial types of behavior will affect innovative behavior (*Hypothesis 2*).

Less often focus is made consumer's innovative buying behavior, yet it also can yield valuable results. For instance, Alpert (1994) argued that during the introductory stage of a certain novel product to be "virtually the only customers there" (p. 60). Therefore, it can be argued that early adopters are also more likely to be innovative compared to later majority (*Hypothesis 3*).

Another personality trait that should not be overlooked is one's tendency to trust others. Both generalized, i.e. towards other people, and institutional, i.e. towards institutions or organizations, types of trust were shown to be drivers of innovation (Dakhli, & De Clercq, 2004, p. 123). Further studies also showed these types of trust to be core components of social capital that in turn was found to have positive effect on overall innovation (Doh, & Acs, 2010, p. 257). In line with these findings, we can expect higher levels of all types of trust to be positively associated with innovative behavior of Russian organizations' employees (*Hypothesis 4*).

Moving on to demographic factors, studies demonstrated innovation to be "both a source and a consequence of gender relations" (Agnete Alsos et al., 2013, p. 247). In particular, Luksyte and colleagues' (2017) study suggested innovative work behavior to be stereotypically ascribed more to men than to women. Furthermore, their results show that men experienced greater returns with respect to performance appraisals for engaging in such behavior compared to women. Previous studies also suggested that, for example, male managers are generally perceived as more innovative, while women managers as more adaptive (Skinner, 1989, p. 52-53), yet both genders are believed to be equally likely to be innovative (Millward, & Freeman, 2002, p. 107).

Furthermore, Mendonça and Reis (2020) showed that despite men being more likely to develop their own products and services, no clear differences between innovative behavior and characteristics of innovations by men and women were found (p. 11). Following these studies, we hypothesize that during idea generation stage of innovative process gender will not affect innovative behavior as both genders are similarly innovative, yet during idea implementation stage male generated ideas will be favored (*Hypothesis 5*).

In regard to age, however, the relationship with innovative behavior is not that straightforward. The relationship between age and innovative behavior is likely to be curvilinear, rather than simply negative linear, yet if interdepartmental collaboration is taken into account, older employees are likely to be viewed as innovative as young ones (Guillén, & Kunze, 2019). Gong and colleagues' (2010) study showed there to be no direct correlation between age and innovative behavior. They also found age stereotypes to be a moderator in this relationship. In other words, presence of age stereotypes can negatively affect older workers' image in regard to their innovative behavior. Therefore, we assume that age will not significantly affect employees' innovative behavior in Russian organizations (*Hypothesis 6*).

However, in some cases age can have a pronounced negative effect on innovative behavior. For example, Camelo-Ordaz and colleagues' (2012) showed intrapreneurs' age to be negatively related to both entrepreneurial values and innovation performance. They concluded that with age "flexibility decreases, resistance to change rises and values such as security become more relevant" making intrapreneur more prone to adoption of conservative strategies, which in turn decrease innovation performance (p. 525).

Next demographic characteristic that needs to be mentioned is education. According to Hammond and colleagues' (2011) meta study, in theory educational level was expected to be positively correlated with innovative performance, yet in practice this relationship turned out to be insignificant. Thus, we can hypothesize formal education level to be of no significance in relation to employees' innovative behavior (*Hypothesis 7*).

Nevertheless, we should not overlook other measures of knowledge apart from education level. For example, human capital. Despite there being several definitions of this concept, most researchers agree that it refers to peoples' competences, knowledge, skills, experiences and abilities (Mention, 2012, p. 3). Employees' human capital was also found to be one of the core components of firm's intellectual capital, which in turn has positive effect on firm's productivity (Kalkan et al., 2014). Therefore, we can assume employees' human capital to play a significant role in their innovative behavior (*Hypothesis 8*).

Final demographic characteristic mentioned by Hammond and colleagues (2011) was tenure. As for its relationship with innovative behavior, in Hammond and colleagues' (2011) and Kurz and colleagues' (2018) studies tenure was not a significant driver of employees' innovative

behavior. Furthermore, Ng and Feldman (2013), contrary to common belief, did not find negative relationship between tenure and innovation-related behaviors; they found it to be rather unrelated to this type of behavior, or even positively related, when contextual factors are taken into account. Thus, it can be hypothesized that tenure will not be a significant predictor of employees' innovative behavior in Russian organizations (*Hypothesis 9*).

Job factors. The three job-related factors, outlined by Hammond and colleagues (2011) – job complexity, autonomy and role obligations/expectations – correspond well with the EDI approach. All of these factors refer to job design, which is usually considered to be an important contributor to employee motivation (Schreurs et al., 2011).

First of them – job complexity, – as argued by Hammond and colleagues, (2011) is expected to promote idea generation due to tasks being less routine and more challenging. Their research showed this factor to hold a relatively strong positive relationship with innovation, confirming their assumption about jobs that do not need a fixed set of skills and behaviors to complete them to promote innovation. Therefore, more complex character of one's job can be positively associated with one's innovative behavior (*Hypothesis 10*).

The second job-related factor – job autonomy – was found to have both direct positive effect on innovative behavior (Kurz et al., 2018, p. 413) and indirect positive effect through self-leadership, which in turn has a positive relationship on all stages of EDI (Echebiri, 2020). Similar relationship can be expected in Russian organizations as well (*Hypothesis 11*).

The third job-related factor is role obligations/expectations. Yuan and Woodman (2010) demonstrated that innovativeness as a job requirement is positively related to expected positive performance outcomes and image gains from innovative behavior. They referred to this factor as to a contextual one, however, it should rather be considered as a job-related one, because it describes certain role of an employee in an organization and consequently his or her job obligations. Such role obligations/expectations can lead employees to invest more time and energy in innovative behavior (Hammond et al., 2011). Consequently, we expect this factor to be a driver of employees' innovative behavior Russian organizations as well (*Hypothesis 12*).

Contextual factors. The last group of factors, according to Hammond and colleagues (2011), consists of organizational climate, organizational resources, perceived supervisory support and leadership type. However, other researchers related other factors to this group. For example, Nagano and colleagues (2014) considered innovation culture, organizational structure and governance, and external relationships to be contextual factors. Due to there not being a commonly established set of such factors, in our research we are going to select several rather broad contextual factors that would not overlap.

First contextual factor, which refers mostly to internal environmental characteristics of the organization, that we are going to use will be organizational climate. By organizational climate we

will understand two sets of employees' perceptions (1) of "support for creativity and innovation" and (2) of "a positive, open, and supportive work environment" (Hammond et al., 2011, p. 93). Therefore, we will view organizational climate as consisting of innovative and positive types. These two types of organizational climate were found to display moderately positive relationship with innovation (Ibid, p. 98). Furthermore, similar to positive climate concept of workplace happiness was also found to be a significant predictor of innovative behavior (Bani-Melhem et al., 2018). Therefore, we assume both innovative and positive types of organizational climate to positively affect employees innovative behavior in Russian organizations (*Hypothesis 13, 14*)

Second contextual factor that we will focus on will be organizational structure and governance. According to Nagano and colleagues (2014), this factor refers to ways in which organization operates, to the configuration of its resources, processes and values, and to the system of governance, which integrates innovation into the organization's strategic agenda (p. 71). In addition to that, ownership structure of organization also needs to be mentioned as it was also found to affect innovation (Lee, 2005). In our research, we will assume that ownership structure will significantly affect innovative behavior, i.e. we hypothesize owner's institutionally predetermined governing preference to lead to innovative or not innovative outcome (*Hypothesis 15*).

Last contextual factor that we will focus on will be organizations' relationships with external environment. For example, regional networks and policy instruments of local and regional government as well as dissemination of learning experiences and a regional vision were determined to be important habitat factors of innovations and success of sustainability experiments (van den Heiligenberg et al., 2017, p. 213). Therefore, we can assume that geographical location of an organization will significantly affect its employees' innovative behavior (*Hypothesis 16*).

2. Methodology

2.1. Data

Our data comes from a 2018-2019 wave of Monitoring Survey of Innovative Behavior of the Population (http://www.hse.ru/en/monitoring/innpeople/). This survey focuses on public perception of science, technology and innovation (including individual engagement in generation and dissemination of innovation), skills for innovation, attitudes and other factors of innovative behavior of the Russian population. Furthermore, due to this survey being conducted on the basis of the Russia Longitudinal Monitoring survey, RLMS-HSE (https://www.hse.ru/en/rlms/), a wide variety of individual characteristics are also available for analysis. All things considered, this data allows us to comprehensively analyze the process of individuals' integration into innovative activity. The overall sample included 7584 observations. For purposes of current research only adults, aged 18 to 65, who work in organizations were selected. Therefore, final sample included 4434 observations.

2.2. Measures

Employee innovative behavior. In line with the definition of EDI, we are going to define innovative behavior as a multistage process, during which employees need to exhibit different types of behavior at each stage of this process (Kurz et al., 2018, p. 399). In our study these stages will be idea generation and idea implementation (Anderson et al., 2014).

To assess the first stage of innovative behavior, i.e. *idea generation stage*, following OECD and European Commission (2018) definition of business innovation a question of whether an employee suggested ideas related to new or existing products or processes in the last three years was selected. In our sample only 7% of respondents expressed such ideas. As for types of these suggestions, 6% of respondents suggested ideas related to business processes for one or more business functions, while only 3% suggested new or improved product related ideas.

To assess the second stage of innovative behavior, i.e. *idea implementation stage*, we used the question "Was your suggestion implemented?" for at least one of four types of innovative suggestions mentioned in the questionnaire: (1) improvement of business or manufacturing process, (2) new good or service, (3) improvement for an existing good or service or (4) improvement of marketing strategy. In 61% of cases at least one innovative suggestion was fully implemented in organization.

Individual factors. To measure individual factors of innovative behavior a wide set of questions was used. First of all, we used gender, age, tenure in current organization and education level. Apart from education, to assess one's human capital, i.e. stock of knowledge, skills and abilities, we used (1) number of digital skills that one has, (2) one's self-assessment of professionalism, (3) one's involvement in self-education process and (4) one's participation in scientific activities. Furthermore, an additional science and technology (S&T) related variable was used – *S&T awareness index* that reflects one's awareness about scientific and technological developments and regularity of different S&T information sources usage.

As for personality traits, to measure openness and resistance to change we used outside work innovative experience as a proxy. It was assessed through following question: "Over the past three years, did you invent something new in your free time, create or improve any product/thing that you and/or your family use in everyday life?". Next, we assessed intrapreneurial behavior via question about whether individual perceives his current job as having entrepreneurial elements and entrepreneurial behavior via question about past experience of entrepreneurship. Consumer's innovative buying behavior was measured with the help of a question about how one views him- or herself in regard to novelty products (option about buying such products when none or few acquaintances have them was used as answer of interest). Last personality trait – tendency to trust others – was assessed via the generalized trust question and two questions about trust towards colleagues and towards supervisor.

Additional individual factors used in our analysis included (1) individual's happiness assessed via questions about satisfaction with life in general and with material state, (2) one's marital status and (3) number of children, (4) number of personally owned gadgets and self-placement on (5) material wellbeing, (6) respect and (7) power scales.

Job factors. Second group of innovative behavior factors was assessed with the help of three measures. First measure that was included in our analysis was whether innovative activity is a job requirement. To measure one's job autonomy, a question about whether employee has subordinates was selected. Lastly, to assess complexity of the job, in our analysis we used the question about whether employee had to work from home in the past month as a proxy.

Contextual factors. To measure contextual factors, four variables were selected. Firstly, we assessed positive organizational climate via workplace satisfaction/happiness index that included not only general satisfaction with current job but also satisfaction with working conditions, salary and opportunities for professional growth. Secondly, we combined several questions about innovation recognition and presence of different mechanisms for innovation stimulation in organization into a variable that measures overall innovative organizational climate.

Next, to assess ownership structure we used a set of questions about who partially or fully owns the company: (1) the state, (2) international company, (3) Russian company or (4) the organization is owned by the respondent. Lastly, to assess location of organization we used a question about the type of settlement employee lives in: (1) Moscow or Saint Petersburg, (2) large city (population over 500000 people), (3) city (population of 100000-500000 people), (4) town (population under 100000 people) and (5) rural settlements.

2.3. Method

As it was previously mentioned, innovative behavior was expresses by only 7% of respondents. This type of behavior was 13.2 times less likely to occur compared to non-innovative one. Due to such low frequency of occurrence, we can consider employee innovative behavior to be a rare event. Thus, we are likely to face two problems: (1) sharp underestimation of the probability of rare event by logistic regression (King, & Zeng, 2001) and (2) small sample bias (Gim, & Ko, 2017, p. 620) when only innovative employees are assessed. In order to overcome these obstacles, Firth's (1993) bias-reduced logistic regression was used, as Firth's penalized likelihood method imposes a bias term, that is sensitive to small sample sizes and few successes, on the standard likelihood function (Gim, & Ko, 2017, p. 621). Both models – with (1) innovative behavior and (2) innovative idea full implementation as dependent variables and same set of independent variables[3] – were estimated with backward elimination option in R with the help of '*logistf*' package (Heinze et al., 2020).

[3] The only additional independent variable that was added to the second model was the number of innovative ideas that employee suggested in the past three years.

3. Analysis and results

Let's start off with what affects employees' innovative behavior during the idea generation stage of innovative process. As we can see from *Table 1*, it is highly unlikely that an employee will suggest any innovative ideas as exponentiated intercept value is close to zero. Nevertheless, a relatively wide set of determinants can change this outcome for the better.

First and most noticeably, if innovative activity is one's job requirement it is close to impossible for such a person not to come up with new and innovative ideas, as otherwise he or she would likely be fired. Second strongest determinant of innovative behavior during the first stage, is outside work innovative activity, which increases the chances of an employee suggesting new ideas by more than five times. Similar strong increase in likelihood of innovative behavior is caused by involvement in the self education process. Next factor that leads to two-fold increase in the chances of idea suggestion by an employee is job autonomy, i.e. the fact of employee having subordinates. Increase in likelihood of innovative behavior during idea generation stage, yet to a lesser extent, was also caused by (1) living in a city with population of 100 to 500 thousand people, (2) life satisfaction, (3) innovative organizational climate, (4) S&T awareness and (5) self-assessment of being respected by others.

However, not all predictors increase the chances of innovative behavior. For example, early innovative goods buyers are more than 60% less likely to come up with innovative ideas, which suggests that early innovation adopters are not likely to be innovators themselves. Secondly, the self placement of the power ladder is also negatively associated with innovative behavior. In other words, those with more power are less likely to suggest new and innovative ideas. Third finding, interestingly enough, appears to be a logical continuation of the second one: partial or full ownership of the organization by the state leads to 44.5% decrease in probability of an employee expressing innovative behavior. Next factor that decreases likelihood of idea generation by employee is trust towards supervisor. Lastly, tenure in current organization is negatively associated with employees' innovative activity, i.e. the longer one works in a given company, the less likely one is to show innovative behavior.

Table 1. Firth's Bias-Reduced Logistic Regression on innovative ideas generation (*n = 3828*)

Variables	**B**	**S.E.**	**exp^B**	**Sig.**
(Intercept)	-5.464	0.495	0.004	0.000
Early innovative goods buyer	-1.033	0.405	0.356	0.005
Involvement in self education process	1.648	0.260	5.195	0.000
S&T awareness index	0.181	0.050	1.199	0.000
Self placement on 9-point ladder of power	-0.126	0.061	0.882	0.042
Self placement on 9-point ladder of respect	0.163	0.067	1.177	0.014
Satisfaction with life in general	0.245	0.105	1.277	0.019
Outside work innovative activity in past 3 years	1.677	0.237	5.350	0.000
Innovative activity as a job requirement	8.600	1.433	5432.065	0.000
Level of trust towards supervisor	-0.364	0.093	0.695	0.000
Tenure in current organization, years	-0.029	0.012	0.972	0.014
A person has subordinates	0.827	0.195	2.286	0.000
Innovative climate	0.223	0.048	1.250	0.000
State partially/fully owns the company	-0.589	0.188	0.555	0.002
City (Population between 100 000 and 500 000)	0.452	0.196	1.571	0.026
Likelihood ratio test = 1031.176 (*Sig. = 0.000*), Wald test = 248.345 (*Sig. = 0.000*), df = 14				

Let's move on to the second model, that shows which factors affect innovative behavior during the second, i.e. idea implementation stage of innovative process. From the *Table 2*, we can see that it is about 50% more likely that any innovative suggestion of an employee will not be implemented. However, three factors can significantly alter this outcome by more than doubling the chances of at least one of their innovative idea full implementation.

First of all, if one's job is to come up with innovative ideas for a company, it is more than twice as likely that at least one novel idea of this person will be fully implemented. Secondly, if an employee is in a supervising position, i.e. if he or she has subordinates, it is also more than twice as likely for innovative idea of such person to be brought to life. Lastly, it appears that in Russian organizations innovative suggestions by female employees will be more than twice as likely to be fully implemented compared to suggestions by male employees.

Table 2. Firth's Bias-Reduced Logistic Regression on full implementation of innovative ideas (*n = 295*)

Variables	**B**	**S.E.**	**exp^B**	**Sig.**
(Intercept)	-0.711	0.250	0.491	0.003
Innovative activity as a job requirement	0.804	0.262	2.234	0.002
A person has subordinates	0.798	0.268	2.221	0.002
Gender (1 – Female)	0.823	0.262	2.277	0.001
Likelihood ratio test = 31.343 (*Sig. = 0.000*), Wald test = 27.24 (*Sig. = 0.000*), df = 3				

4. Discussion

The aim of this paper was to investigate how different determinants of innovative behavior affect EDI in Russian institutional context. The innovative process was divided into two stages – idea suggestion and idea implementation. For each stage, a logistic regression model was estimated.

4.1. Determinants of employees' innovative behavior: idea generation stage

During ideas generation stage, it was determined that not all individual factors play role in employees innovative behavior. For example, the majority of demographic variables turned out to be unrelated to employees' innovative behavior, thus supporting our fifth, sixth and seventh hypotheses. In other words, no matter the age (Gong et al., 2010), gender (Mendonça, & Reis, 2020) or formal education level (Hammond et al., 2011) of employee, the chances of him or her coming up with novel ideas about business processes or products are equal.

Despite education level not being a driver of innovative behavior, human capital, in line with eighth hypothesis, turned out to have a positive effect on it. However, only two of initial six measures of human capital were significant predictors. To be more precise, employee's involvement in self-education process and awareness about current S&T advancements make it more likely for a person to come up with innovative ideas. This finding can support the idea of learning, both life-long (Žnidaršič, & Jereb, 2011) and workplace (Høyrup, 2010) being positively associated with innovation. Yet, such factors as number of digital skills that one has, one's self-assessment of professionalism and one's participation in scientific activities appear unrelated to innovative behavior. This can be attributed to limitations of our data. Firstly, measured digital skills relate mostly to daily life activities. Secondly, self-assessment of professionalism can be unrepresentative of genuine professionalism. Thirdly, scientific participation may as well show that an employee has higher human capital, yet in a domain unrelated to innovation, for example, showing that one's stock of knowledge is rather theoretical than practically applicable.

The only demographic variable that significantly affected employees' innovative behavior was tenure in current organization. Therefore, we had to reject our nineth hypothesis. Furthermore, contrary to Ng and Feldman's (2013) findings, tenure was found to decrease likelihood of idea generation. Thus, similarly to Camelo-Ordaz and colleagues' (2012) conclusion about older intrapreneurs being more prone to adoption of conservative strategies, we can argue employees who work in an organization for longer periods of time to become less likely to come up with unconventional solutions to different problems,

Moving on to personality traits, contrary to Åmo and Kolvereid's (2005) results, intrapreneurial behavior was not found to be associated with innovative behavior of Russian organizations' employees. Same goes for entrepreneurial behavior, thus fully supporting second hypothesis. These findings do not appear surprising, if Russia's extractive institutional context is considered (Acemoglu, & Robinson, 2013). This shows us, that if entrepreneurship was considered

as something negative during major part of country's history (Hedlund, 2011), it will also be unlikely for such behavior to be related to EDI, i.e. innovations from below.

Levels of generalized trust and trust towards colleagues, contrary to our fourth hypothesis, also turned out to be unrelated to innovative behavior, while level of trust towards supervisor turned out to have a negative affect, even though previous studies showed trust to be driver of innovation (Dakhli, & De Clercq, 2004; Doh, & Acs, 2010). However, negative relationship between trust towards supervisor and innovative behavior can be explained by long history of top-down interventions in Russia (Hedlund, 2011) that possibly made people more passive and acceptive of their supervisors' choices. Thus, we can argue that the more employee trusts his or her supervisor, the more unlikely he or she will be to express any suggestions that can potentially contradict supervisor's opinion.

Consumer's innovative buying behavior, initially expected to be positively associated with innovation (Alpert, 1994), turned out to have quite the contrary effect, thus making us reject our third hypothesis. This means that people, who are likely to be among the first one to buy and start using some novel product, are unlikely to be innovative, i.e. the chances of them generating innovative ideas appear to be quite low.

Among individual factors, the most pronounced effect on employees' innovative behavior during idea generation stage was imposed by outside work innovative experience, which supports our first hypothesis. In other words, people, who came up with some sort of innovative solutions for their daily life problems, were a lot more likely to generate work-related novel ideas as well. Thus, as we initially hypothesized, such people can be viewed as more open to something new and less resilient to change, thus they are also likely to be innovative.

Moving on to job related factors, job autonomy and innovative activity as a job requirement turned out to be significant drivers of idea generation, suggesting our eleventh and twelfth hypotheses to be correct. Firstly, we can argue that people, who are more autonomous in their job are also more likely to be innovative due to being more independent in the choice of procedures to carry out their tasks (Hammond et al., 2011, p. 93). As for those, whose jobs imply innovative activity, Hammond and colleagues (2011) assume that due to belief in expected engagement in innovative behaviors, such employees will invest more time and energy in these behaviors. In our case, however, a more straightforward explanation can be produced: such employees are not simply expected to suggest innovative ideas, they are obliged to do so, thus, they have no other option but to generate new ideas.

Job complexity, contrary to our tenth hypothesis, turned out to be unrelated to innovative behavior. This finding can be interpreted in two possible ways. On the one hand, job complexity may indeed be unrelated to innovative behavior of employees in Russian organizations. On the other hand, our measure of job complexity – whether one had to work at home – may not be a very

good proxy for job complexity, disproving our initial assumption that if a job requires employee to work overtime at home then it must be a complex one. Thus, further investigation of this job-related factor's relationship with innovative behavior is needed.

Next come contextual factors. Starting of with innovative organizational climate, it was found to be positively associated with idea generation, thus supporting our thirteenth hypothesis. Positive climate, however, turned out to be unrelated to innovative behavior, contrary to fourteenth hypothesis. Nevertheless, it was determined that people, who view themselves as respected and satisfied with life are more likely to be innovative. It can be argued that such employees are happier, thus productive, effective and more likely to come up with innovative ideas (Gupta, 2012). In other words, in Russian organizations, workplace happiness or satisfaction is likely to play little to no role in innovative behavior, unlike overall happiness.

Another contextual factor – organizations' relationships with external environment – that was assessed via geographical location turned out to be only partially related to innovative behavior of employees. Therefore, we can not fully reject our sixteenth hypothesis. However, it appears a little confusing that only in medium sized cities, i.e. ones with population of 100 to 500 thousand people, employees would express more innovative behavior. A commonsense finding would be that in most developed cities, like Moscow or Saint Petersburg, innovative behavior would be higher, yet this is not the case. A better approach for assessment of geographical location and thus regional context would be to use regions variable. However, our database, despite being representative on a county level, is not representative on a regional level. Therefore, inclusion of such predictors in the models could lead to spurious results and unjustified conclusions.

Last, but not least important finding about innovative behavior relates to ownership structure, partially supporting our fifteenth hypothesis. In particular, it does not matter who owns the company – Russian company, international company or a person him- or herself – the likelihood of employee expressing innovative behavior will be the same. However, things change, when Russian state comes into play. In this case, the chances of employee suggesting novel ideas sharply drop. Following Hedlund's (2011) logic, we can argue that when state owns a company, reproduction of the top-down governing in organization becomes inevitable. Thus, we can not expect high innovative activity in state owned enterprises as its governing tradition stifle innovation from below, i.e. EDI. Consequently, to stimulate business innovations in Russia, separation of state from private business is necessary.

4.2. Determinants of employees' innovative behavior: idea implementation stage

Moving on to the second stage of innovative process, it was determined that only three factors – job autonomy, innovativeness as a job requirement and female gender – are significant drivers of innovative ideas implementation.

First two findings go along well with practice of top-down interventions that exists in Russian governing tradition. They show that ideas of those in power and of those who are obliged to come up with something new are more likely to be implemented. In this regard, a possible drawback needs to be outlined. As previously mentioned, the longer a person works for an organization, the less likely this person is to come up with new ideas. Therefore, if a company wants to come up with new, innovative goods, services or solutions for various existing problems, more frequent rotation of employees in R&D and management departments would be needed.

In real life, however, average tenure in current organization is 8 years for those, whose job is to come up with innovative ideas, and 10.5 years for those, who are in supervising positions. Therefore, the quantity of innovative ideas by such employees is expected to be lower. Furthermore, following Camelo-Ordaz and colleagues' (2012) finding about intrapreneurs' age, we could also argue that higher tenure of such employees would lead to implementation less innovative ideas due to lower flexibility and higher resistance to change of such employees.

As for the gender-related finding, it appears surprising that during innovation implementation stage there is a preference towards women's innovative ideas (in accordance with fifth hypothesis, the opposite was expected). We can argue that women due to being equally likely to be innovative, yet more adaptive, suggest rather incremental innovative ideas that are more expected in Russian organizations. This could explain the existing preference for female innovative ideas during the implementation stage.

Furthermore, if we are to combine gender and supervising-related findings, we could argue in favor of women managers to be a substantial source for innovativeness of a company. However, previous studies showed higher representation of women in management to be positively associated with performance only in innovation-focused firms (Dezsö, & Ross, 2012; Chen et al., 2018).

Acknowledgement

This article was prepared within the framework of the Basic Research Program at the National Research University Higher School of Economics.

References

Abdullah, I., Omar, R., & Panatik, S. A. (2016). A literature review on personality, creativity and innovative behavior. International Review of Management and Marketing, 6(1S), 177–182. https://econjournals.com/index.php/irmm/article/view/1741/pdf

Acemoglu, D., & Robinson, J. A. (2013). Why nations fail: The origins of power, prosperity, and poverty. Profile Books.

Agénor, P.-R., & Neanidis, K. C. (2015). Innovation, public capital, and growth. Journal of Macroeconomics, 44, 252–275. https://doi.org/10.1016/j.jmacro.2015.03.003

Agnete Alsos, G., Ljunggren, E., & Hytti, U. (2013). Gender and innovation: State of the art and a research agenda. International Journal of Gender and Entrepreneurship, 5(3), 236–256. https://doi.org/10.1108/IJGE-06-2013-0049

Alpert, F. (1994). Innovator Buying Behavior Over Time: The Innovator Buying Cycle and the Cumulative Effects of Innovations. Journal of Product & Brand Management, 3(2), 50–62. https://doi.org/10.1108/10610429410061915

Åmo, B. W., & Kolvereid, L. (2005). Organizational strategy, individual personality and innovation behavior. Journal of Enterprising Culture, 13(01), 7–19. https://doi.org/10.1142/S0218495805000033

Anderson, N., Potočnik, K., & Zhou, J. (2014). Innovation and Creativity in Organizations: A State-of-the-Science Review, Prospective Commentary, and Guiding Framework. Journal of Management, 40(5), 1297–1333. https://doi.org/10.1177/0149206314527128

Apanasovich, N., Alcalde Heras, H., & Parrilli, M. D. (2016). The impact of business innovation modes on SME innovation performance in post-Soviet transition economies: The case of Belarus. Technovation, 57–58, 30–40. https://doi.org/10.1016/j.technovation.2016.05.001

Bani-Melhem, S., Zeffane, R., & Albaity, M. (2018). Determinants of employees' innovative behavior. International Journal of Contemporary Hospitality Management, 30(3), 1601–1620. https://doi.org/10.1108/IJCHM-02-2017-0079

Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. Management Decision, 47(8), 1323–1339. https://doi.org/10.1108/00251740910984578

Bică, G., Constantinescu, M., & Bică, E. (2015). Innovation and knowledge management in a knowledge-based economy. World Review of Entrepreneurship, Management and Sustainable Development, 11(2/3), 156. https://doi.org/10.1504/WREMSD.2015.068576

Binz, C., & Truffer, B. (2017). Global Innovation Systems—A conceptual framework for innovation dynamics in transnational contexts. Research Policy, 46(7), 1284–1298. https://doi.org/10.1016/j.respol.2017.05.012

Bubanja, M. V., & Madzar, L. (2019). The Importance of Innovation and Knowledge for Economic Development of the Country and the Competitive Business of Companies. Journal of Social Sciences, 11(XI), 157–173. https://www.gdn.rs/index.php/GDN/article/view/43/17

Camelo-Ordaz, C., Fernández-Alles, M., Ruiz-Navarro, J., & Sousa-Ginel, E. (2012). The intrapreneur and innovation in creative firms. International Small Business Journal: Researching Entrepreneurship, 30(5), 513–535. https://doi.org/10.1177/0266242610385396

Chen, J., Leung, W. S., & Evans, K. P. (2018). Female board representation, corporate innovation and firm performance. Journal of Empirical Finance, 48, 236–254. https://doi.org/10.1016/j.jempfin.2018.07.003

Dakhli, M., & De Clercq, D. (2004). Human capital, social capital, and innovation: A multi-country study. Entrepreneurship & Regional Development, 16(2), 107–128. https://doi.org/10.1080/0898562040010016778 35

Dezsö, C. L., & Ross, D. G. (2012). Does female representation in top management improve firm performance? A panel data investigation. Strategic Management Journal, 33(9), 1072–1089. https://doi.org/10.1002/smj.1955

Doh, S., & Acs, Z. J. (2010). Innovation and Social Capital: A Cross-Country Investigation. Industry & Innovation, 17(3), 241–262. https://doi.org/10.1080/13662711003790569

Echebiri, C. K. (2020). An Empirical Study into the Individual-Level Antecedents to Employee-Driven Innovation. Technology Innovation Management Review, 10(6), 42–52. https://doi.org/10.22215/timreview/1367

Feldmann, P., Jacomossi, R., Barrichello, A., & Morano, R. (2019). The relationship between Innovation and Global Competitiveness: The mediating role of Management Practices

evaluated by Structural Equation Modeling. Review Of Business Management, 21(2), 195–212. https://doi.org/10.7819/rbgn.v21i2.3970

Firth, D. (1993). Bias reduction of maximum likelihood estimates. Biometrika, 80(1), 27–38. https://doi.org/10.1093/biomet/80.1.27

Gim, T.-H. T., & Ko, J. (2017). Maximum Likelihood and Firth Logistic Regression of the Pedestrian Route Choice. International Regional Science Review, 40(6), 616–637. https://doi.org/10.1177/0160017615626214

Gong, H., Shi, K., & Liu, D. (2010). The moderating effects of age stereotypes on the relationship between age and innovative behavior. 2010 IEEE 2nd Symposium on Web Society, 5607372. https://doi.org/10.1109/SWS.2010.5607372

Guillén, L., & Kunze, F. (2019). When age does not harm innovative behavior and perceptions of competence: Testing interdepartmental collaboration as a social buffer. Human Resource Management, 58(3), 301–316. https://doi.org/10.1002/hrm.21953

Gupta, A. K. (2012). Innovations for the poor by the poor. International Journal of Technological Learning, Innovation and Development, 5(1/2), 28. https://doi.org/10.1504/IJTLID.2012.044875

Hammond, M. M., Neff, N. L., Farr, J. L., Schwall, A. R., & Zhao, X. (2011). Predictors of individual-level innovation at work: A meta-analysis. Psychology of Aesthetics, Creativity, and the Arts, 5(1), 90–105. https://doi.org/10.1037/a0018556

Heinze, G., Plonerm M., Dunkler, D., Southworth, H., & Jiricka, L. (2020). logistf: Firth's Bias-Reduced Logistic Regression. R package version 1.24. https://cran.r-project.org/web/packages/logistf/logistf.pdf

Hedlund, S. (2011). Invisible hands, Russian experience, and social science: Approaches to understanding systemic failure. Cambridge University Press.

Høyrup, S. (2010). Employee-driven innovation and workplace learning: Basic concepts, approaches and themes. Transfer: European Review of Labour and Research, 16(2), 143–154. https://doi.org/10.1177/1024258910364102

Kalkan, A., Bozkurt, Ö. Ç., & Arman, M. (2014). The Impacts of Intellectual Capital, Innovation and Organizational Strategy on Firm Performance. Procedia - Social and Behavioral Sciences, 150, 700–707. https://doi.org/10.1016/j.sbspro.2014.09.025

Kesting, P., & Parm Ulhøi, J. (2010). Employee-driven innovation: Extending the license to foster innovation. Management Decision, 48(1), 65–84. https://doi.org/10.1108/00251741011014463

King, G., & Zeng, L. (2001). Logistic Regression in Rare Events Data. Political Analysis, 9(2), 137–163. https://doi.org/10.1093/oxfordjournals.pan.a004868

Kotsemir, M. N., & Meissner, D. (2013). Conceptualizing the Innovation Process – Trends and Outlook. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2249782

Kowal, J., & Paliwoda-Pękosz, G. (2017). ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies. Information Systems Management, 34(4), 304–307. https://doi.org/10.1080/10580530.2017.1366215

Kurz, V., Hüsig, S., & Dowling, M. (2018). What drives different employee types of innovative behaviour? Development and test of an integrative model of employee driven innovation in German firms. International Journal of Entrepreneurship and Innovation Management, 22(4/5), 397. https://doi.org/10.1504/IJEIM.2018.092955

Lee, P. M. (2005). A comparison of ownership structures and innovations of US and Japanese firms. Managerial and Decision Economics, 26(1), 39–50. https://doi.org/10.1002/mde.1188

Lee, S., Lee, H., & Lee, C. (2020). Open innovation at the national level: Towards a global innovation system. Technological Forecasting and Social Change, 151, 119842. https://doi.org/10.1016/j.techfore.2019.119842

Luksyte, A., Unsworth, K. L., & Avery, D. R. (2018). Innovative work behavior and sex-based stereotypes: Examining sex differences in perceptions and evaluations of innovative work behavior. Journal of Organizational Behavior, 39(3), 292–305. https://doi.org/10.1002/job.2219

Maradana, R. P., Pradhan, R. P., Dash, S., Gaurav, K., Jayakumar, M., & Chatterjee, D. (2017). Does innovation promote economic growth? Evidence from European countries. Journal of Innovation and Entrepreneurship, 6(1), 1. https://doi.org/10.1186/s13731-016-0061-9

Mendonça, J., & Reis, A. (2020). Exploring the mechanisms of gender effects in user innovation. Technological Forecasting and Social Change, 155, 119988. https://doi.org/10.1016/j.techfore.2020.119988

Mention, A.-L. (2012). Intellectual Capital, Innovation and Performance: A Systematic Review of the Literature. Business and Economic Research, 2(1). https://doi.org/10.5296/ber.v2i1.1937

Millward, L. J., & Freeman, H. (2002). Role Expectations as Constraints to Innovation: The Case of Female Managers. Creativity Research Journal, 14(1), 93–109. https://doi.org/10.1207/S15326934CRJ1401_8

Nagano, M. S., Stefanovitz, J. P., & Vick, T. E. (2014). Innovation management processes, their internal organizational elements and contextual factors: An investigation in Brazil. Journal of Engineering and Technology Management, 33, 63–92. https://doi.org/10.1016/j.jengtecman.2014.02.004

Ng, T. W. H., & Feldman, D. C. (2013). A meta-analysis of the relationships of age and tenure with innovation-related behaviour. Journal of Occupational and Organizational Psychology, 86, 585–616. https://doi.org/10.1111/joop.12031

Nov, O., & Ye, C. (2008). Personality and Technology Acceptance: Personal Innovativeness in IT, Openness and Resistance to Change. Proceedings of the 41st Annual Hawaii International Conference on System Sciences (HICSS 2008), 448–448. https://doi.org/10.1109/HICSS.2008.348

O'Reilly, C., & Binns, A. J. M. (2019). The Three Stages of Disruptive Innovation: Idea Generation, Incubation, and Scaling. California Management Review, 61(3), 49–71. https://doi.org/10.1177/0008125619841878

OECD, & European Commission (Eds.). (2018). Oslo manual 2018: Guidelines for collecting, reporting and using data on innovation (4th edition). OECD Publishing.

Rodionova, I. (2013). Competitiveness of Countries in the World Innovation Economy: Central-Eastern Europe and Russia. Quaestiones Geographicae, 32(2), 15–24. https://doi.org/10.2478/quageo-2013-0010

Rodionova, I., Kokuytseva, T., & Semenov, A. (2018). Mathematical Model of the Influence of Innovative Development Factors on the Economy of Leading Countries and Russia. International Journal of Engineering & Technology, 7(4.38), 406–411. https://doi.org/10.14419/ijet.v7i4.38.24592

Schreurs, B., Van Emmerik, H., De Cuyper, N., Notelaers, G., & De Witte, H. (2011). Job demands-resources and early retirement intention: Differences between blue-and white-collar workers. Economic and Industrial Democracy, 32(1), 47–68. https://doi.org/10.1177/0143831X10365931

Silvestre, B. S., & Ţîrcă, D. M. (2019). Innovations for sustainable development: Moving toward a sustainable future. Journal of Cleaner Production, 208, 325–332. https://doi.org/10.1016/j.jclepro.2018.09.244

Skinner, N. F. (1989). Behavioral implications of adaption innovation: Managerial effectiveness as a function of sex differences in adaption-innovation. Social Behavior and Personality: An International Journal, 17(1), 51–55. https://doi.org/10.2224/sbp.1989.17.1.51

Tohidi, H., & Jabbari, M. M. (2012). Different Stages of Innovation Process. Procedia Technology, 1, 574–578. https://doi.org/10.1016/j.protcy.2012.02.125

van den Heiligenberg, H. A. R. M., Heimeriks, G. J., Hekkert, M. P., & van Oort, F. G. (2017). A habitat for sustainability experiments: Success factors for innovations in their local and regional contexts. Journal of Cleaner Production, 169, 204–215. https://doi.org/10.1016/j.jclepro.2017.06.177

Yesil, S., & Sozbilir, F. (2013). An Empirical Investigation into the Impact of Personality on Individual Innovation Behaviour in the Workplace. Procedia - Social and Behavioral Sciences, 81, 540–551. https://doi.org/10.1016/j.sbspro.2013.06.474

Yuan, F., & Woodman, R. W. (2010). Innovative Behavior in the Workplace: The Role of Performance and Image Outcome Expectations. Academy of Management Journal, 53(2), 323–342. https://doi.org/10.5465/amj.2010.49388995

Žnidaršič, J., & Jereb, E. (2011). Innovations and Lifelong Learning in Sustainable Organization. Organizacija, 44(6). https://doi.org/10.2478/v10051-011-0020-y

Appendix

Appendix 1. Descriptive and collinearity statistics for Firth's Bias-Reduced Logistic Regression on innovative ideas generation (n = 3828)

Variables	Descriptive statistics			Collinearity diagnostics	
	Mean	S.D.	N	Tolerance	VIF
Innovative activity in past 3 years	0.074	0.262	3828	-	-
Innovative activity is part of work	0.034	0.182	3828	0.905	1.105
Outside work innovative activity in past 3 years	0.046	0.208	3828	0.935	1.069
Early innovative goods buyer	0.076	0.264	3828	0.981	1.019
Involvement in self education process	0.471	0.499	3828	0.798	1.253
Scientific awareness index	2.446	1.779	3828	0.747	1.339
Self placement on 9-point ladder of power	3.222	1.613	3828	0.759	1.318
Self placement on 9-point ladder of respect	5.443	1.523	3828	0.792	1.263
Satisfaction with life in general	2.434	0.965	3828	0.882	1.134
Level of trust towards supervisor	2.788	0.896	3828	0.909	1.100
Tenure in current organization, years	8.405	8.896	3828	0.920	1.087
A person has subordinates	0.205	0.403	3828	0.895	1.117
State partially/fully owns the company	0.439	0.496	3828	0.925	1.081
N. of innovation stimulating mechanisms in organization	1.870	1.859	3828	0.871	1.149
City (Population between 100 000 and 500 000)	0.207	0.406	3828	0.985	1.015

Appendix 2. Descriptive and collinearity statistics for Firth's Bias-Reduced Logistic Regression on full implementation of innovative ideas (n = 295)

Variables	Descriptive statistics			Collinearity diagnostics	
	Mean	S.D.	N	Tolerance	VIF
At least one innovative idea was fully implemented	0.607	0.489	295	-	-
Innovative activity is part of work	0.468	0.500	295	0.920	1.087
A person has subordinates	0.502	0.501	295	0.888	1.127
Gender (1 – Female)	0.502	0.501	295	0.963	1.039