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GOD HELPS THOSE WHO HELP THEMSELVES! A STUDY OF USER-INNOVATION IN RUSSIA

This paper studies the specificities of Russian user-innovators on a sample of 1670 home interviews. The percentage of end users who innovate in their daily life in the Russian population and the willingness to share one's ideas and developments is much higher in comparison to western countries and probably historically rooted in long-standing community activities which spread during soviet times. Our data suggests the existence of two different groups of user-innovators: one group of urban, male, well educated, and financially better-situated individuals who innovate for career reasons (or for fun) vs. a much more diverse group of small town folks who innovate out of necessity. While the first group confirms findings well described in the literature, the second group seems to be unique to developing markets and to Russia in particular. User-innovation happens also in remote areas, and among user groups outside of the working age. As these user-innovators are reluctant to share their innovations with others and would rather keep them for themselves, a great source of ideas and commercial opportunity remains untouched. Russia's innovation system has so far concentrated on the classical innovation modes around major cities or big companies. Given Russia's extensive presence of user-innovators, it might be a promising policy move to provide greater support to existing and emerging amateur communities. We believe that our study adds insights into the informal and totally neglected viewpoint on Russia's innovation.

Keywords: user innovation, innovation community, Russia

JEL classification: H00, O31, O32, O33

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Introduction

Over centuries, households produced goods for own consumption and for trade, mostly in connection with a merchant who arranged for distribution. This ended when steam-engines summoned the workers in the factory, which became the primary workplace. Still, households continued to produce goods for own everyday use in parallel to industrial mass production. And while mass production did not allow for tailoring a product to certain customers' needs, home-production was doing exactly that. Often centered on the larger family, available resources were used to meet a great variety of needs. The economic importance of such activities attracted attention already in the 1960s, especially for food production and child care (Ghez and Becker, 1975; Berk, 1987). In this tradition, Wu and Pretty (2004) demonstrate innovation in poor farming households in rural areas of China.

Still, with increasing technological penetration into most parts of life, households could not provide any such alternatives. Instead, users engaged with available products from mass production and adopted them to their needs. Some users showed remarkable levels of sophistication in this adaption exercise. Von Hippel (1978, 1986) suggested firms to identify very active individuals who are ahead of the market and integrate these lead users into the firm's innovation process. The term "users" is not limited to individuals but also include other firms. Especially when an industry is characterized by the presence of few but very powerful customers, a strong presence of user-innovation is likely. In a study of innovations in oil refining, Enos (1962) showed the central role that user firms play. Historical studies furthermore demonstrated that user innovation drove technological development for whole industries, like in eighteenth-century iron smelting (Allen, 1983) or in the development of mine pumping engines (Nuvolari, 2004). More recent studies on industries with user innovation activities thematize the development of medical equipment (von Hippel and Finkelstein, 1979), semiconductor process equipment (Lim, 2000), library information systems (Morrison et al.; 2000), embedded Linux software (Henkel, 2003) or sporting equipment (Franke and Shah, 2003). Especially in the latter field, well-researched examples of user innovation are innovations in skateboarding, windsurfing, or snowboarding (Shah, 2000; von Hippel, 2001).

User-innovation has been facilitated by cheap computer hardware and software. The arrival of the C64 home computer, which triggered interest among kids to engage in videogame development and code, was shared in journals. These days, programmable computers are readily available, like raspberry Pi or Arduino. Also, freely accessible – and very powerful – computer-based design tools help to integrate users into aesthetic decisions (Baldwin and von Hippel, 2011).

For the longest time the innovative user was living a lonely life, only sporadically connecting locally with like-minded individuals. This, however, has changed over the last decade due to broadband Internet connections and the emergence of Web 2.0 technologies (e.g. Facebook, Instagram, Flickr) through online forums, bulletin boards and online communities (Kietzmann et

al., 2011; Ritzer and Jurgenson; 2010; Franke and Shah, 2003). User innovators though take benefits out of the use of products, which implies non-competition. Intellectual property rights have very little importance for users, especially at the development stage and therefore such rights are voluntarily given up to make the information a public good (Harhoff et al. 2003; Allen, 1983; von Hippel, 2005). It has been found that willingness to freely reveal an innovation decreases if the agents compete with one another, for example, if they are individuals competing in a sport (Franke and Shah 2003; Baldwin et al. 2006). Firms struggle to properly engage the user-innovator into traditional production processes. Difficulties around consumer generated intellectual property and the emotional property that comes with user innovation still remain (Berthon et al., 2015).

Motivation of research and central question

The development of user-innovation has been conceptualized by academic research now for quite some time, and previous studies have revealed great insights into the phenomenon. This paper studies people in urban and rural community environments that modify or develop goods or services for their own benefit. This approach is similar to Von Hippel (2005) but stands in contrast to official statistics which require a connection to the market (OECD/Eurostat, 2005). There is an ongoing debate on whether the OECD/Eurostat (2005) definition is suitable to accommodate users that share knowledge with a peer group or community of practice. Considering the user innovation phenomenon may not only help to clarify existing definitions, but also supports including users (not only individuals) to the measurement framework (Gault 2012).

Today's contributions have long moved beyond the original demographic studies of end-user (or consumer) innovators by von Hippel et al. (2011) and now discuss how users can be motivated and their creative potential be harvested to pursue commercial opportunities. Still, we are of the believe that there is yet a lot to learn about who the user innovator actually is. This is especially true as large-scale studies build on data from the UK, the US, Japan and recently Finland. Although these nations surely count for a significant portion of the world's economy, we believe that the reality of the user innovator in these nations is entirely different to many others. Taking this potential bias of the literature into account, this paper studies the characteristics of user-innovators in Russia and how the Russian user-innovator is distinctive to the mere user. We propose Russia as a well-suited case for direct comparison with findings out of the aforementioned countries. Russians still face harsh living conditions due to the country's geographical location, and making ends meet was often difficult. Here, especially the vast distances between settlements made supplies difficult to arrange, and survival often relied on the ability to adjust.

Furthermore, the literature took great interest in market-oriented viewpoints towards user innovation. Franke and von Hippel (2003) already stressed the commercial potential of user innovations, and Shah and Tripsas (2007) introduced the term "user entrepreneurship" for such commercialization activities. Block et al (2016) stressed the role of user-manufacturers for commercialization success of user innovations. Still, for the vast majority of people living on this planet, commercialization channels are not accessible. User innovators might live in rural areas, lack the knowledge to approach the right actors, have no access to capital or live in countries without the necessary institutional environment. Hence, this paper provides very valuable insights into the user-innovation phenomenon in the absence of such commercialization opportunities and an entrepreneurial culture. Again here, Russia is a particularly interesting example as the country underwent a very distinctive economic development in comparison to the western world. It is common knowledge that Russia, despite 20 years of reforms and attempts of modernization, struggles to leave the legacy of the Soviet Union behind. Russia's economy suffers from poor framework conditions: political environment and stability, regulation quality, rule of law and general quality of institutions (Polischuk 2013), wrong incentives and stimuli resulting from flaws in Russia's corporate governance models (Enikolopov & Stepanov 2013). Most contributions culminate in stressing negative examples of the institutional environment in which entrepreneurship in Russia attempts to flourish (Bruton et al. 2010; Puffer et al. 2010). Also, enterprises pursue rents through various forms of vertical integration or close connections with state authorities (Yakovlev 2014). Russia's attempt to shift the economy from low-tech, resource-intensive economic model to a knowledge-based, innovative logic is showing little success. Especially during the first years of transition (1991 – 99), public spending in R&D went down significantly, and private companies reduced their already minimal engagements even further (HSE, 2015a). Russia lost most of its scientific potential, and her finest talent seeked employment in universities in western countries. In the early 2000s, expenditures on R&D rose again, largely due to military related R&D activities. To this day, contribution of industry to R&D sits at 0.3% of GDP, against 1.4% average for the OECD countries (OECD, 2013). Only 9% of Russia's firms do engage in technological innovation (HSE, 2015b).

Another aspect proposes Russia an interesting case to study user-innovation. Russia has historically stood out in the provision of an excellent schooling system, but struggled to make proper use of the talent. When in 1957 Sputnik sent the first signals from orbit and in 1961 Juri Gagarin safely returned from an expedition into space, the Soviet Union was seen as a worthy competitor in scientific and technological development. At the end of the 1960s though, this development took a sudden turn and productivity together with the number of intellectual workers - started to decline (Volkov 1999; Bergson, 1978; Gomulka, 1986). After the removal of Nikita Khruschev in 1964, the inefficiencies in the economic planning system could no longer be ignored as the central planning system failed to cope with the increasing complexity of economic activity. The Kosygin or Liberman reforms in 1965 were inspired by suggestions from economic "optimizers", who advocated a greater use of the country's computational abilities that stemmed from technological advancements. The reform pushed towards decentralization of planned

economy, highly computerized decision-making processes and introduced profitability and sales as key performance indicators. Although the reform was cancelled in the 1970s again, the share of semiskilled work positions increased up to the 1980s. In the early years of 2000s, the trend reversed and demand for managerial positions grew rapidly but turned around again in the mid of the first decade. Still, even today Russia struggles to make efficient use of her degree-holding specialists (Anikin, 2013).

To this day, most studies discuss innovation in Russia through the lens of the National Innovation System and criticize weaknesses in the necessary institutional environment to support economic growth and firms' competitiveness (e.g. Puffer and McCarthy, 2011). Some mention domination of "technological imitators" in national innovation system (Gokhberg et. al. 2010), unreliable enforcement of property rights, transparency in political governance, a weak and inefficient judiciary (Chadee and Roxas, 2013; Estrin and Prevezer, 2011) or a dysfunctional governance system (Guriev and Rachinsky, 2005; OPORA Russia, 2006). Others identified the over boarding bureaucracy as a central problem (Sah and Stiglitz, 1986)[3]. However, academic research has to this date not paid attention to Russia's informal lines of innovation resting on the creative potential of her people. We believe that our study adds insights into the informal and totally neglected viewpoint on Russia's innovation.

This paper continues with an overview of previous findings on user innovators. Subsequently, we discuss the innovation environment in Russia and develop our hypothesis. This is followed by the presentation of our findings and a discussion of these results in the light of previous contributions.

Demographics – Who is the user innovator?

Defining the user innovator is a tricky business. The literature suffers from a general lack of robust large-scale studies on the characteristics of user-innovators, as most studies build on small-sized samples or case studies (Bogers et al.,2010). Two large-scale studies analyzed the presence of user innovation in the UK. Von Hippel et al (2012) estimated that 6.1% of the UK consumer population aged 18 and older are in fact innovating consumers. These users made eight innovations (creations and/or modifications) during the period of three years. A second large-scale survey by NESTA suggested that 8 per cent of UK consumers create or modify one or more products to better suit their needs. Around half of these innovators see their contribution as new or modified in such a manner that the outcome qualifies as original innovations (Flowers et al., 2010). Findings from Japan estimate the share of innovators among users at 3,7%, in the US at 5,2% (Ogawa and Pongtanalert, 2011) and in Finland at 5,4% (de Jong et al., 2015). The UK

[3] For interesting insights into the centralized organization of science and technology in the Soviet Union, we refer readers to the Chulkov (2014).

surveys, though, covered user innovation at both individual and firm level, while the others focus only on individual's user-innovations.

The sample size of user innovators increases though when the subject shifts to sports. About a quarter of enthusiasts work on improving the equipment they use (Franke and Shah 2003 in four extreme sports; Lüthje et al., 2005 in mountain biking; Tietz et al., 2005 in kitesurfing, Raasch et al., 2008 on Moth class sailing). Similarly high percentages have been reported from other hobbyist communities, like the Lego model building community (Antorini, 2007). Von Hippel (2004) gave an overview of the empirical studies at the time and suggested a range of user-innovator base (varying in size and focus) from 10 % to nearly 40 % of users.

Previous studies showed that characteristics of user-innovators are heterogeneous, depending on the industries or the role of the user. Hence, information needs, required skills and knowledge show a great variance and are task-depending (von Hippel, 2005). Generally speaking, user-innovators are largely male and highly (technically) educated (von Hippel et al., 2011). Jong et al (2015) showed a much higher likelihood to innovate among people with at least a bachelor degree and particularly among those who perform a technical job. If users innovate in technical aspects (vs aesthetic aspects), these individuals do have a higher level of knowledge e.g. of how bikes work (Lüthje et al., 2005). Compared with non-innovating users, user-innovators tend to be at the leading edge of an important market trend (von Hippel, 2005). Also, they are sophisticated in the use of technologies and related products (Morrison et al., 2000; Luthje et al., 2005 Tietz et al., 2005).

De Jong et al. (2015) show that the share of innovators was greater among the male subgroup than among the general consumer population. Also K. Pongtanalert, S. Ogawa (2015) show the same slight overhang towards men. The gender bias towards male users is also repeated by small-scale studies. In a study on the online gaming community, 14 were males and three were females (Bryman and Bell, 2015). The suggested difference in the gender of innovators might very well be a matter of interest. If electronic components were easy to build into clothing, it attracted a great number of fashionistas – mostly women (Buechley and Hill, 2010).

Quite some insights have been provided on the motivation of users. Especially for volunteer users, there is a drive to develop and improve their own skills (Lakhani and Wolf, 2003; Lerner and Tirole, 2002; von Hippel and von Krogh, 2003). Studies on programming communities have shown that these individuals are often strongly motivated by personal learning opportunities (Hertel et al. 2003; Lakhani and Wolf 2005). Also, once members have received help from the community, there is a good chance that they want to give something back to the community (Lakhani and von Hippel, 2003). And strangely enough, some find activities like fixing bugs joyful. Sure, engagement in such groups might very well raise one's own visibility and recognition from other users might well attract potential employers (Lerner and Tirole, 2002; Hertel et al.,2003; Jeppesen and Frederiksen, 2006).

With the increasing complexity of survey tools to capture user-innovation behavior, studies have started to put a price tag to user innovation activities. Most of these studies suggest an aggregate spending of tens of billions of dollars annually (e.g., de Jong et al., 2015). Internationally competing moth sailors spent 435 Euro on equipment innovations per year (Raasch et al.; 2008), and top notch whitewater kayak riders spent an average of $707 and 27 days per year (Hienerth et al.; 2011). Each respondent spent 4.8 person-days and £101 on their most recent consumer innovation. The aggregated value of innovation in the UK was estimated at £3.2 billion.

Methodology

This research builds on a large-scale survey conducted in September 2014 within the framework of the Monitoring Survey of Innovative Behaviour of the Population (http://www.hse.ru/en/monitoring/innpeople/). The overall stratified sample included 1670 home interviews with respondents of 16 years of age and above. The sample is representative for the Russian population by age, sex, education level, region (at federal district level), and city size. The sample has been proportionally distributed among 97 urban and 37 rural areas, including 12 large cities with a population of over 1-mln residents. The sample excludes the Chechen and Ingush republics as well as five sparsely populated and hard-to reach regions (mostly Far North) with the overall number of residents not exceeding 3% of the total adult population. Citizens of very small settlements (less than 50 inhabitants), military, imprisoned and homeless people – around 4% of the total adult population – are not covered either.

Table 1: Survey summary

Addresses visited, total	8526
Non-living premises	263
Out of reach	2721
Total number of contacts	5528
Did not agree	1670
Did not fit	1650
Did not speak Russian	35
Could not respond	38
Ceased interviews	519
Successful interviews Included to the initial dataset	1670

To ensure a consistently high quality, 30% of the interviews were follow-up by phone calls as well as through logical controls of the final dataset. Our study targets user-innovation on an individual level. We did not ask for 'household sector innovators' by any of the individuals in all residents in a household or unincorporated businesses (Ferran, 2000).

The questionnaire included three parts. In the first part, participants were asked about their general perception of and attitudes towards science and technology. We asked respondents about their familiarity with the term 'innovation' and requested to give examples. The second part covered questions about the respondents' experience in user innovation. Following the approach initially developed by (von Hippel et al., 2010; von Hippel et al., 2012) we asked participants to give a short description of their proclaimed user innovation (creation of new things or modification of existing products adopting them to respondents' needs) over the last three years. Unlike de Jong and von Hippel (2009) or Pongtanalert and Ogawa (2015), we did not distinguish between the creation of new things and the modification of existing products. Neither did we give any hints or examples of the areas of application for innovations in the initial question. If the interviewees responded to the first question positively, we invited them to specify their motivation for innovation and the areas of use. The third part of the survey collected data on sharing with others (incl. use of social networks) and whether the innovators protected these innovations through intellectual property rights. Finally, we asked respondents if they belong to any amateur community or club.

In a first step, we describe in detail which social and demographic characteristics constitute the Russian user-innovators. The correlation matrix (in the annex) demonstrates weak correlations between variables except income and social status of respondents as well as level of education and knowledge of innovations. In a second step, we apply a discriminatory analysis to study statistical differences between the group of mere users versus user-innovators. For the analysis we apply three different models: The first run includes all observations unrestricted by age. In a second model we limit our observations to Russia's working age of 16-72.[4] Thereby, the sample is more comparable to international practice. To match the sample in size, in model 3 we randomly selected a similar sized sub-sample of non-innovators and compared it with our sub-sample of user-innovators. For a survey summary and the weighting results (see tables 1 and 2).

Table 2: Weighting results

	Statistical data (%)	Non-weighted cases (%)	Weighted cases (%)
SEX			
Male	45.3	45.3	45.3
Female	54.7	54.7	54.7
AGE GROUP			
16-24	16.0	16.4	16.0
25-39	27.7	27.5	27.7
40-54	26.2	26.4	26.2
55 and older	30.1	29.8	30.1
EDUCATION LEVEL			
Higher	28.5	29.0	28.6
Secondary	50.1	50.4	50.1
Primary	21.4	20.6	21.3

[4] In accordance with national statistical standards economically active population include those aged from 15 to 72 (Ekonomicheskaya aktivnost' naseleniya Rossii. Statisticheskiy sbornik. Moscow: Rosstat, 2014).

Selection bias for controlled social groups is not exceeding 0.03%. Range of weight coefficients: from 0.295 to 2.224. Total sum of weight coefficients is equal to 1670 (overall sample size).

Description of the variables

So far, only a few studies give insights into the innovation attitudes and skills in the Russian population (e.g. Gokhberg and Poliakova, 2014; Gokhberg and Shuvalova, 2004). These contributions are valuable indicators for variables that help describe the user innovators in Russia and help to separate them from mere users.

We start with our choice of variables with a specificity in the Russian population: while over a third of respondents believe innovation is a source of economic growth, only 17% see innovations having an impact on their daily lives. Also knowledge of the economic value of innovation is much lower than the EU average (Gokhberg and Poliakova, 2014). Many Russians see no direct link to their own quality of life, we first ask whether our respondents are in fact **familiar with the term innovation**. Especially among people who have a very positive approach to new technology – so called "technology admirers" – the percentage of men is high, while among older women a negative approach to technology dominates. Hence, we check whether **gender** of the respondent is indeed a good predictor of the likelihood that a person will innovate.

It should be noted that the Soviet Union has historically placed great emphasis on its educational system. Advanced skills were in dire need to drive the country's industrialization processes after WWII.[5] The aforementioned group of technology admirers has a much higher share of university graduates then other users. Also, the same study shows that successful innovators have well elaborated e-skills. Here, especially an efficient use of search engines is worth mentioning. However, analysis of innovator teams showed that innovators are often efficient technology users with - less frequently - university diploma (e.g. see Pongtanalert and Ogawa, 2015). Hence, we include **education** into our list of variables. Around one third of technology admirers enjoy a high income. Furthermore, such an attitude can be considered as an attribute of a specific lifestyle. So, we include **income** into our list of variables. Former studies showed that many Russians get acquainted with advanced technologies in their jobs as these technologies are necessary to perform their work more efficiently. To take this into account we include **occupation** in our list of variables.

Although Russians are rather skeptical about the living and working conditions of Russian scientists, research activities are very positively regarded. A scientific career is still seen as admirable and prestigious. The high social value of scientific work, and the complexity that comes with R&D activities, are distinctive features of the "image" of science and were mentioned by every second respondent (Gokhberg and Shuvalova, 2004). As such a lifestyle can

[5] This is clearly seen in the change of school curriculum in the post-war period towards increasing the number of hours related to practical work (Hans, 2012).

very well be achieved without a higher education, we include **status** into our list of variables. Technology users can be further separated between active and passive ones. Active users are those who have upgraded one's own competencies in these technologies over the last five years. In Russia, and probably in many parts of the world, the group of active users corresponds with younger ages, while passive users are mostly older people. Age has also been connected to different views on science in general. Especially younger people view scientific research as a socially important occupation. Taking these findings into account, we include **age** into our list of variables.

About a quarter of Russia's population lives in villages and settlements spread out over the countryside (Rosstat, 2010). Many of these villages are in fact hundreds of kilometers away from the next bigger towns, and supply of daily goods can be a challenge – let alone technology. It is possible that in such settings, people are more incentivized to innovate than in the well-supplied cities. Furthermore, surveys showed that inhabitants of big cities had a rather critical view on the social importance of scientific activities. Hence, we include **community size** to our list of variables. We use Moscow as an own category due to her size of over 12 million inhabitants.

Findings

In a first step, we set out to describe the characteristics of the Russian user innovator. Our first observation rests on the size of user innovators. The sample consists of 160 user-innovators and 1510 mere users, which results in a surprisingly large size of 9,6%. The biggest share of user-innovators has never heard of the word before (32,5 %), and over a quarter is familiar with the meaning, but hardly uses the term (27,5%). Like in many other studies, we find a slight bias towards gender in the group of user-innovators (48.8% to 51.2%). There is also a difference in motivational reasons for innovation. While men indicate that they like doing it, women search for cheaper subsidies. Also, there is a difference in the areas of innovation. Men are widely engaged in computer and IT, also in housekeeping, while women are likely to innovate around arts, craft or garden.

The user-innovator in Russia does not belong to a specific age group. Besides the very young and very old cohorts, the age distribution is fairly well balanced. The age group of 25 to 34 was the most innovative, indicate that they want to learn new skills or develop existing ones, because friends were in need of help. Among the older group of 55 to 64 were mostly people who were enthusiastic about their activities. The age group of 25 to 34 and 35 to 44 are those that share their innovation most openly, while the oldest group are less likely to share. The latter might be the consequence of lesser inclusion of older population to social networking and lacking of other channels for sharing knowledge.

The Russian user innovator is financially not very well situated. The majority indicated that there is money for food and new clothes, but new home appliances (TV set, washing machine, etc.) are

out of reach. The second largest group indicates that new home appliances are affordable for them, but not a car. The majority of user innovators see themselves as part of Russia's lower and middle class. High-income earners innovate because they are enthusiastically about it and develop new ideas in housekeeping and arts and crafts. Low-income earners focus on innovations around kids.

The biggest group of user innovators enjoyed an upper-secondary (regular school) or post-secondary (technical school or college) education (40,3%), followed by individuals with tertiary (higher) education (24,5%) and secondary education (11.9%). In education, the noticeable difference is lying between tertiary and secondary levels. Innovators with university degrees explain their willingness to create new things because of personal interest or their friends' or relatives' need of assistance, while innovators who finished a regular or technical school enjoyed doing something new, due to a personal need or because of their wish to develop (learn) new skills. Interestingly, people with secondary levels of education have a much higher likelihood to share their innovations with others. While the overall share of those who seek protection of their intellectual property is low, there is an increased interest in sharing such user-innovations among others on a reciprocal basis. A total of 49% of user-innovators actually share their findings with others. In contrast, the older age group between 55 to 64 innovate out of curiosity and interest, but keep their ideas for themselves.

It seems there is no linear dependence between readiness to innovate and professional status. CEOs or individual entrepreneurs are as active in user innovations as farmers and unemployed people. The difference lies in their motivation. While the representatives of the first groups enjoyed doing something new or assisted their friends, unemployed user innovators or respondents engaged in agriculture share their enthusiasm, but relatively often mention a need for some new developments. Moreover, their innovations are mostly related to home computers, housekeeping and kids.

Most user-innovators live in relatively small cities with less than a 100.000 inhabitants (35,6%), followed by villagers (23,8%). The number of user-innovators declines with the increase of city-size, which is fairly remarkable. Especially Moscow – Russia's economic and political hub – is the home for less than 10% of user innovators in our sample. Community size shows a difference in which areas innovation happens. Especially in small towns, people innovate with relatively greater likelihood in the areas of cars and transport or housekeeping. Moscow is relatively strong in computer and IT innovations. In the same time, these innovators in small towns don't share their developments. There is, however, another noteworthy difference. Only 11% of all user-innovators are members of a local association or club, which corresponds to other studies (Ogawa and Pongtanalert, 2011).

In a second step we study factors that separate the user-innovator from the mere user. In our first model, we apply a discriminatory analysis to the full sample of user innovators and compare them to the other users that did not report any innovations. As mentioned earlier, we see that

gender plays a significant role to separate between the two groups. The group of user innovators has a much higher percentage of men. Secondly, user innovators have a greater income then the average user, but also believe to have a higher status. Also, the user innovator is higher educated. The word innovation is better known, and the user-innovator is better organized in local associations. We were surprised to see no difference in the age group. Consequently, we sharpened our sample size and reduced our observations to Russia's working age group between 16 to 72 years. The resulting model shows only a significant discriminant factor in status and city size. The importance of city size was finally showing statistical relevance. However, the reduction of the age group was probably too restrictive as also the percentage of correctly classified observations in fact declines. We conclude from this observation that the 25% of user innovators we excluded are in fact of relevance as the young ones and the old-age pensioners are a source of user innovation. In Model 3, we adjust the sample size of the non-user innovators to the sample size of user innovators through a randomized selection. This statistical model now shows that the user innovator in Russia is slightly younger, thinks of himself as of a higher status and lives in a smaller city than the average Russian user. The Model 3 has the highest number of correctly classified cases.

Table 3: Tests of equality of group means

	Model 1			Model 2			Model 3		
Variable	Wilks' Lambda	F	Sig.	Wilks' Lambda	F	Sig.	Wilks' Lambda	F	Sig.
gender	0,998	3,089	0,079*	0,999	1,858	0,173	0,999	0,384	0,536
age group	0,999	1,678	0,195	1,000	0,115	0,735	0,986	4,270	0,04*
income group	0,998	3,504	0,061*	0,999	1,709	0,191	0,996	1,121	0,291
status group	0,99	17,161	0,00*	0,991	13,254	0,00*	0,969	9,999	0,002*
education	0,998	3,105	0,078*	0,999	1,459	0,227	0,996	1,178	0,279
community	0,999	2,430	0,119	0,998	2,854	0,091*	0,986	4,318	0,039*
knowledge of innovation	0,997	4,780	0,029*	0,999	1,426	0,233	0,969	9,851	0,002*
member in association	0,997	4,744	0,03*	0,998	2,315	0,128	0,994	1,937	0,165
Number of valid cases (% of sample)	1622 (97,1%)			1519 (96,9%)			313 (96,9%)		
Cases correctly classified:	59%			58%			62%		

Discussion and conclusion

This paper studies the specificities of the Russian user-innovator. While also in Russia, male user-innovators are over-represented, we see differences in the area of innovation and the motivation. The male user-innovator is engaged in innovations in computing and IT, lives in Moscow and has a high income. The female user-innovator engages in innovation around arts, crafts and gardens, which corresponds to living in smaller towns or villages and often point out to the need for cheaper substitutes for existing products. Similar differences appear in the age

groups. The cohort of 25 to 34 year olds see innovations as a way to improve one's skills, which corresponds with fairly recently received education. Being at an early career stage, innovation activities might well boost their career perspectives or open the way into entrepreneurship. Previous studies have not looked into such nuanced differences, but we find them rather revealing.

When trying to track the specificities of Russian user-innovators vs mere users, we were pleased by the high percentage of correctly classified observations of our models. Reducing the user-innovators to individuals in the working age lowers the predictability of the model. We take this as a hint of the importance of user-innovators outside this age group. In a second observation, we struggled to reach a certain consistency among the variables with statistical significance. Variables like income showed significance initially, but lost this attribute in our most accurate model 3. The only variable that remained significant was the social value of status, an estimation of one's own belonging to a social status. This was even more surprising as income and social status has shown an (expected) cross-correlation. We explain these observations as follows. What our data suggests is the existence of two different groups of user-innovators: one group of urban, male, well educated, financially better-situated individuals who innovate for career reasons (or for fun) vs a much more diverse group of small town folks who innovate out of a necessity. While the first group confirms findings, the second group seems to be a fairly unique specificity of developing markets and of Russia in particular. Life in small towns in Russia is exceptionally challenging due to long supply routes, and the ability to make ends meet still remains a requirement in today's time. There, these user-innovators are not well off, work in jobs lower than their actual qualification. However, they think highly of themselves and their activities - in line with Russia's tradition as a country that is home to exceptional thinkers and scientists. Such high social standing of innovation activities in Russia has been confirmed by previous studies. We notice the consistently significant contribution of the value social status.

Russia's user-innovators are driven both by egocentric (hedonic or personal development) and altruistic (help others or fun, interest) motives rather than by goal oriented (career opportunities or desire for a new market product) ones. This might also explain very low percentage of respondents, protecting their innovations with patents or contacting manufacturers in comparison with previous findings.

This research was motived by comparing the data out of Russia to studies from western economies with a much stronger market drive. The differences of Russia's user innovators to others are actually stunning. Firstly, the high percentage (9,6%) of user-innovators in the Russian population by far exceeds numbers suggested in other studies, where numbers range between 3-6%. We suggest this high level of user-innovators to be linked with a long-standing history of user-innovation and sharing of information in the country. Already during Soviet times, popular journals like "Do It Yourself" (http://zhurnalko.net/journal-85), "Young Technician" (http://zhurnalko.net/journal-204) and others were well-suited communication channels for the sharing of user-innovations. Elements of DIY activities were also promoted through popular

science journals, like "Science and Life" (https://www.nkj.ru/archive/) that connected existing amateur communities and supported reciprocity and a knowledge sharing culture. This might explain the relatively high number of user-innovators compared to other countries conducted similar surveys. Furthermore, such practices are also indicative of the very high willingness to share one's own innovative ideas. Almost 50% of the user innovators engage in such sharing activities. If the older cohort is taken out, the number would be even higher. These numbers are much higher than those found in western studies of around 20% of user-innovators who actually share their ideas.

Historically, touristic clubs at schools, universities, research institutes and factories provided opportunities for creative work and different types of inventory activities. The presence of similar institutions and their importance for knowledge adaption and sharing have been demonstrated by Wu and Pretty (2004) in rural China. User-innovation in Russia – as probably in many emerging economies - can be considered as a compensatory mechanism of a non-market economy. As user-innovation happens also in remote areas, and among user groups outside of the working age and these user-innovators are reluctant to share their innovations with others and rather keep them for themselves, a great source of ideas and commercial opportunity remains untouched.

Our findings provided new insights into the activities related to innovation practiced by the Russian people. These insights can also inform policy makers to better support Russia's creative potential. As Russia's innovation system has so far concentrated on the classical innovation modes around major cities or big companies, our findings suggest that a growing group is actually not properly supported in their innovative potential. Given Russia's extensive presence of user-innovators, it might be a promising policy move to provide greater support to amateur communities instead of continuous investments to innovation clusters and/or business incubators. These user-driven innovations can play a crucial role in developing economies as a compensation of non-developed mass markets. If the required infrastructure is available and accessible, growth through user innovations might foster transition to a post-industrial stage. One vital step towards this goal is the establishment of a local infrastructure for innovation and leading to better communication channels between users and manufacturers and, in time, giving rise to a culture of innovation.

Our study is based on a fairly small number of user-innovators which again is due to the limited presence of user-innovators in a population. Hence, further statistical analysis within the group of user-innovators was not possible. It would of course be desirable to get more robust material about differences within user-innovators and how a country's social and economic factors encourage such behavior. This would also require more insights out of less-developed parts of the world. Further research should extend the research to innovative behavior of total populations which might include a range of individual consumer practices (lifelong learning) and collective actions (car sharing, crowd funding, etc.).

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Appendix

Table 4: full questionnaire and responses

Question	Freq.	%
Gender		
Male	914	54,7
Female	756	45,3
Age of the respondent		
16 – 24	267	16,0
25 – 34	325	19,5
35 – 44	287	17,2
45 – 54	288	17,2
55 – 64	284	17,0
65 +	219	13,1
Income group		
1 – We barely make end meet, sometimes we can hardly buy food	46	2,8
2 – We have money for food, but new clothes is too expensive for us	221	13,3
3 – We have money for food and new clothes, but we can hardly afford new home appliances (TV set, washing machine, etc.)	801	48,0
4 – We can easily buy new home appliances, but cannot buy a car	520	31,2
5 – We can buy a car, but can hardly afford a country house or good apartment	73	4,4
6 – There is nothing we lack in	7	,4
Status		
1 – lowest	219	13,1
2 – lower than average	502	30,0
3 – middle layer	849	50,8
4 – above average	85	5,1
5 – highest	15	,9
Level of education		
1 – Pre-primary education	21	1,3
2 – Primary education	103	6,3
3 – Lower secondary education	77	4,7
4 – Secondary education	294	18,1
5 – Upper-secondary education	114	7,0
6 – Post-secondary non-tertiary education	543	33,3
7 – Not finished tertiary education	51	3,1
8 – Full tertiary education	413	25,4
9 – Post-graduate or second tertiary education, MBA	9	,6
10 – Doctorate degree	3	,2
City (community) size		
1 – village	426	25,5
2 – small city (population below 100 thousands)	407	24,4
3 – medium city (100-500 thousands of population)	309	18,5
4 – big cities (over 500 thousands of opulation)	389	23,3
5 – Moscow-city	140	8,4
Are you familiar with the term «innovation»?		
1 – No, I hear it for the first time	504	30,2
2 – I've heard this term, but not sure about its meaning	409	24,5
3 – I am familiar with the term, but hardly use it	549	32,9
4 – I know the meaning of the term and actively use it in my professional or daily life	207	12,4
Are you a member of any local amateur community, club or association		
0 – No	1543	92,8
1 – Yes	120	7,2

Table 4: Correlation matrix of key variables used for modelling

	Mean	SD	Age	Education	Income group	Status group	Community	Knowledge of innovations	Membership in association
Age	43,9	17,3	1,000	– 0,169**	– 0,244**	– 0,213**	– 0,043	– 0,226**	– 0,078**
Education	5,7	1,9	– 0,169**	1,000	0,289**	0,173**	0,285**	0,372**	0,076**
Income group	3,2	0,8	– 0,244**	0,289**	1,000	0,398**	0,198**	0,287**	0,106**
Status group	3,5	0,8	– 0,213**	0,173**	0,398**	1,000	– 0,017	0,147**	0,029
Community	2,6	1,3	– 0,043	0,285**	0,198**	– 0,017	1,000	0,230**	0,031
Knowledge of innovations	2,3	1,0	– 0,226**	0,372**	0,287**	0,147**	0,230**	1,000	0,091**
Membership in association	0,1	0,3	– 0,078**	0,076**	0,106**	0,029	0,031	0,091**	1,000

**. Correlation is significant at the 0.01 level (2-tailed); N=1670

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