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## Article

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Article

# What Drives the Private Innovation in Rural Areas? In-Depth Case Study of Slovak Rural Region

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**Abstract:** Innovation and small fast-growing knowledge-intensive enterprises are often described as a potential engine for development of rural economies of the post-socialistic countries, struggling with problem of depopulation, decline of agriculture, monostructural economic base, overexploitation of natural resources and many others. However, we still know too little about, how private innovation emerge in underdeveloped space or how knowledge-intensive economic activities can successfully operate in small municipalities, providing almost non business services, basic infrastructure or potential for local networking. Thus, in this regional case study, we wanted to shed a light on a phenomenon of private innovation emergence in small rural settlements, provide baseline knowledge about motivation and determining factors of development of the innovative business in the rural, local economies. Special attention was devoted to examining the relationship between family entrepreneurship, residence of entrepreneur, interest to contribute to solution of local challenges and localization of knowledge-intensive business in rural municipality.

**Keywords:** innovation; private sector; rural economy; local economic development

## 1. Introduction

Innovations are nowadays considered to be the main engine of economic growth in a knowledge economy of 21 century (Kotaskova and Rozsa 2018; Tóth and Mura 2014; Klofsten et al. 2019). Even the well-established enterprises must continuously innovate to survive the creative destruction phenomenon, caused by constant technological change (Aryal et al. 2018). Innovation is also a precondition of success of new innovative startups and their ability to enter emerging markets (Schumpeter 1942). National economies also need to support its competitiveness and thus to deliver policy tools to support innovation-based entrepreneurship (Mann and Shideler 2015).

Sectoral approach to classification of private innovation action resulted into creation of concept of knowledge-intensive entrepreneurship, a new socioeconomic phenomenon raising the dynamics of economic growth (Anyakoha 2019), considered as a fundamental source of macroeconomic competitiveness and an innovation potential of a country (Fischer et al. 2018). Knowledge intensive ventures (further refereed as KIF—knowledge intensive firms) are innovative enterprises, in case of which a significant knowledge intensity can be observed (technological or organizational) and which use innovative opportunities (Malerba and McKelvey 2018). Therefore, it can be expected that these companies are more motivated to make location decision close to significant sources of new knowledge relevant to their industry (Guerini and Rossi-Lamastra 2014).

However, there is an assumption, that even in case of small rural municipalities located in underdeveloped regions, certain level of innovation dynamics exists. The literature concerning regional innovation was, however, focused primarily on urban space (Dabson 2011). Many studies conclude that innovation activity in rural space is significantly lower, than in urbanized space (Porter et al. 2004; Wojan et al. 2015). This higher level of innovation dynamics in urban space is generally considered to be the result of agglomeration effects, which cannot be reached in rural municipalities (e.g., Glaeser et al. 1992). Rural entrepreneurship delivers the value creation on the basis of utilization of specific resources from given rural environment (Kotaskova and Rozsa 2018; Cepel et al. 2019; Mikhaylova et al. 2019; Fenyvesi 2015).

Müller et al. (2015) distinguish between two kinds of entrepreneurship that utilize rural resources—entrepreneurship in rural and rural entrepreneurship. The first concept represents business activities with limited integration into the local networks, which provide profitable and mobile space logic. The second concept highlights entrepreneurial activities that pull local resources to create value added in a business, deeply rooted in the setup of rural space. Actually, the spatial aspect of rural entrepreneurship plays crucial role (Melichová et al. 2018a), as space involves enhancing the creation of value added, putting value into local existing resources and developing of quality of life in specific rural areas (Müller et al. 2015). Thus, rural entrepreneur is locally embedded entrepreneur, that formed enterprise in order to utilize local resources (Jašková 2019), and often, also in order to solve specific local problems (Melichová et al. 2018b), support the development processes in the locality and generate new employment opportunities (Hoy 1983). Thus, rural entrepreneurship is a result of the utilization of natural, cultural, historical, human, social and financial resources of a given specific rural settlement (Răzvanță Puie 2019).

Innovation in rural space appear to be relatively rare, as rural firms have lower skilled and educated managers, technicians and professionals and higher transaction costs of getting access to services (Acs 2006) and networks (Mura and Rózsa 2013) on distance. Rural firms tend to be less growth-oriented (Knickel et al. 2009), new firms in rural space are rather found from necessity than utilization of opportunity (Henderson 2002) and based on family—resp. multi-generation business models, not willing to take risks (Renski and Wallace 2012).

From the policy perspective, rural areas are still highly understood as primarily agricultural (Chreneková et al. 2016), while substantive amount of state incentives for development of rural regions are focused on cost-saving technologies for development of agricultural enterprises (Mowery et al. 2010). In the current European conditions, employment in agriculture still continue to decrease, what put a task on policy makers to find the way, how to raise the diversity of rural economies (Stauber 2001). Thus, we need to provide policy makers with the better understanding of obstacles, faced by rural firms in terms of innovation delivery and adoption.

The underlying motivation for this study is to understand basic aspects of innovative entrepreneurship in Slovak rural regions, to get necessary information for conceptualization of nationwide quantitative analysis of the rural innovation phenomenon. We work with in-depth information about innovation activities of 14 enterprises located in municipalities in the Nitra region that responded on our survey. All of these enterprises are located in municipalities that are in Slovak conditions classified as “villages”, thus below 5000 citizens.

As we want to investigate knowledge intensive ventures with a visible economic impact (Oláh et al. 2019; Mura and Sleziak 2015), we focus only on small and medium size enterprises, that are considered to be the backbone of every national economy due to their voluminousness in the economy, high impact on employment, flexible response to innovation opportunities or stability during economic fluctuations (Mahmudova and Kovács 2018; Dvorský et al. 2019).

In conditions of a “village”, the knowledge-intensive ventures miss required infrastructure, services, co-localization with another innovative ventures and many other aspects of locality that are considered to be a basic precondition of innovation action in private sector (Rogalska 2018; Kalchenko et al. 2018). We observe what kind of innovation these ventures were capable to deliver,

what the nature of this innovations was, what kind of cooperation was a precondition of innovation delivery, which aspects of “village” environment were utilized to deliver innovation and what role the residence of owners and family business model plays in the location decision of innovative ventures, as rural entrepreneurship is expected to be embedded in rural life (Răzvanță Puie 2019).

The article is organized as follows: in the second chapter, we specify research design, objectives and methods used, in the third chapter, we describe the research results in three thematic chapters: characteristics of knowledge intensive activities in investigated region, the results of innovation monitor and knowledge intensive entrepreneurship in rural space.

## 2. Objectives and Methods

Due to its location conditions, the traditional rural economy is characterized by low productivity due to low levels of innovation activity. This causes rural development problems, which result in its gradual decline and loss of its development potential. The starting point for policy efforts to support the development of rural areas is the model of the new rural economy based on innovation, communication networks and small and medium-sized enterprises.

Main objective of this article is to obtain, on the basis of case studies of 14 companies, the information needed to compile hypotheses about the factors influencing the decision of small and medium-sized enterprises from knowledge-intensive sectors, to make localization decision in small municipalities in a rural region. Second, we want to investigate, what is the nature of concrete innovations that emerged in recent 3 years in chosen region and to analyze the motives and conditions for their creation and development.

Thus, this study has a character of regional case study of rural innovation delivery in the private sector that will bring valuable knowledge about specifics of private innovation action in smallest rural municipalities. We chose to analyze the rural NUTS III region of Nitra in Slovakia, which is according to his agrarian tradition a perfect example of regional economy in transition from agriculture to activities with higher value added. As we already stated, we decided to investigate only enterprises located in the “villages”, in order to observe, whether innovation can appear also in areas that appears to be “blank” from perspective of availability of business services, counselling, knowledge through various local networks, clusters and required infrastructure.

We adopted the approach of qualitative research, as objective of the study is rather to formulate hypotheses, not to test them. Our primary data were obtained via questionnaire survey. First, we identified all enterprises that can be considered as knowledge-intensive (both manufacturing and services) on the level of investigated region using “Register of institutional units in Slovakia” (Ellis) for year 2019. Then, we filtered only small and medium-sized enterprises from these knowledge-intensive sectors located in municipalities below 5000 inhabitants (“villages”).

We used the methodology of Eurostat (2013) for sectoral classification of knowledge-intensive activities to filter for knowledge intensive manufacturing and knowledge-intensive service sectors. Surprisingly, we found only 69 ventures meeting these criteria that were asked to provide information about their innovation activities via questionnaire. The questionnaire consisted of 4 closed, 20 semi-closed and 4 open questions. From structural point of view, questionnaire can be divided into three parts—basic information about entrepreneur, innovation monitor and rural conditions for running innovative business. Innovation monitor was built on Community innovation survey methodology. The “Community innovation survey” (CIS) is an innovation statistic, which is part of the EU’s scientific and technological statistics. The surveys are conducted by EU Member States on a biennial basis (Eurostat 2020).

We follow the classification of innovation in CIS, as we distinguish between product and service innovation, process innovation and marketing innovation. Information obtained from this section describes very concrete innovation activities in responded rural knowledge-intensive ventures. Information from Section 3 “rural conditions for running innovative business” connect innovation

performance of given firms with attributes of rural space, motivation of entrepreneur to locate venture on “village” and decisions to network with other actors

From 69 addressed knowledge-intensive ventures, we got 14 responses (20.3% return rate). Thus, in this study, we deliver in-depth analysis and comparison of innovation performance of these 14 enterprises and evaluate, how rural conditions, residence in location of the venture, and specific local networks support innovation performance of investigated rural firms.

### 3. Results

In this chapter, we describe the knowledge intensive activities allocated in Nitra region, innovation delivery of knowledge-intensive ventures in the sample of our survey, and finally, we investigate, how are these knowledge-intensive ventures rooted in rural municipalities, resp. what motivated them to make decision to locate venture in small municipality.

#### 3.1. Characteristics of Knowledge Intensive Activities in Nitra Self-Governing Region

Nitra self-governing region is a NUTS III. region in western Slovakia, with area of 6344 km<sup>2</sup>, inhabited by 676,672 citizens (Statistical office of Slovak republic, 2019). This Slovak rural region reached population density of 107 inhabitants on 1 km<sup>2</sup> in 2019, having just 15 municipalities over 5000 inhabitants and 45% share of population living in urbanized space (Statistical office of Slovak republic, 2019). From 70,264 enterprises located in region in 2019, 25.2% ventures were falling under knowledge intensive sectors. More specifically, 24.1% of entrepreneurs in regional economy can be considered as knowledge-intensive service providers (KIS) and 1.1% as knowledge intensive manufacturers (KIM).

From 2010 to 2019, amount of knowledge intensive activities in region raised by 19.2%, what means, that regional economy is opening to new activities with higher value added. Of course, that would be not only the result of private investments, but possibly also a cause of support from state programs, EU structural funds and programs of Nitra self-governing region provided to private sector in a given time period.

From sectoral perspective, the highest share on knowledge intensive manufacturing in region was recorded in case of manufacture of machinery and equipment (31.48% of KIM), manufacture of electrical equipment (29.15% of KIM) and manufacture of computer, electronic and optical products (17.23% of KIM). In case of knowledge-intensive services in the region, we found to be dominant the sector of professional, scientific and technical activities (58.28% of KIS in the region), sector of information and communication (14.12%) and financial and insurance activities (9.6%).

In Table 1, we can observe that a majority of knowledge-intensive service providers in the region are established as natural persons or limited liability enterprises, what can be considered as logical in case of service provision. However, the fact that 40.8% of knowledge intensive manufacturers with a legal form of natural person shows that even without or with minimal number of employees, natural persons can deliver knowledge intensive products.

**Table 1.** Comparison of knowledge intensive manufacturers (KIM) and knowledge-intensive service providers (KIS) in terms of legal form.

	KIS	KIM
Natural persons	59.88%	40.80%
Public company	0.01%	0.13%
Limited liability company	39.50%	56.61%
Limited partnership	0.12%	0.65%
Joint stock company	0.33%	1.42%
Cooperatives	0.04%	0.26%
Foreign enterprise	0.12%	0.13%

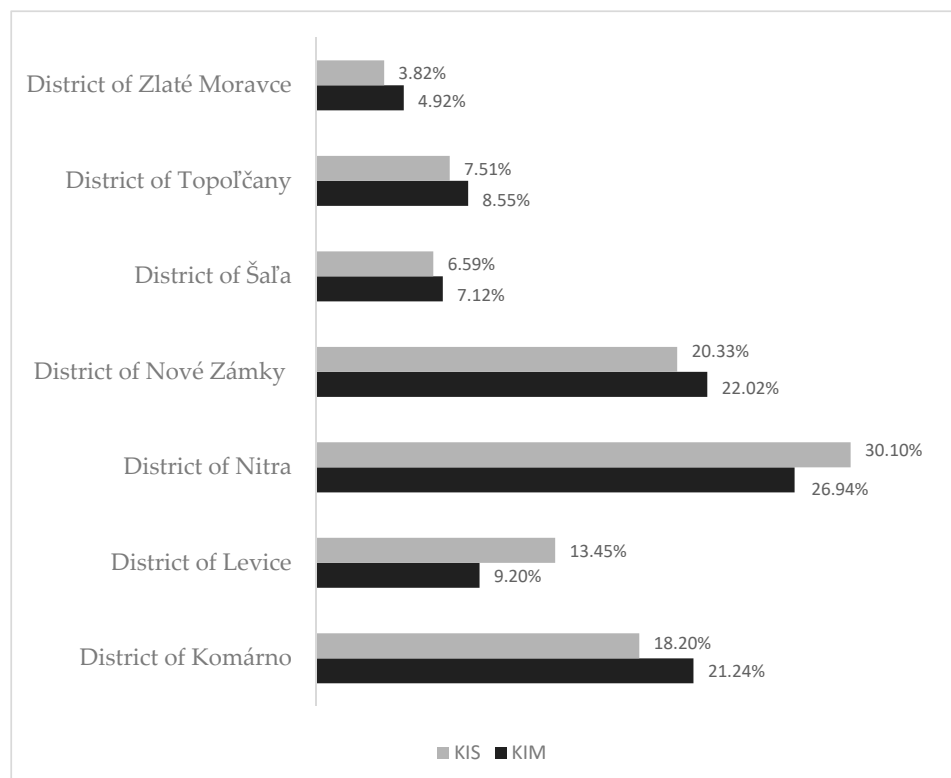
Most knowledge intensive manufacturers are still established as limited liability companies, what is connected with very small proportion of small, medium and large knowledge intensive enterprises in the region, as showed in Table 2. Up to 98.5% of knowledge-intensive service providers and 85% knowledge-intensive manufacturers fall under category of micro enterprise if we define the size categories of entrepreneurship by employment. However, we can still observe higher shares of knowledge intensive manufacturers in size categories of small (8.3%), medium (4.27%) and large enterprises (2.46%) in comparison with knowledge intensive services.

**Table 2.** Comparison of KIM and KIS in terms of size of enterprise.

	KIS	KIM
micro	98.49%	84.97%
small	1.25%	8.29%
medium	0.22%	4.27%
large	0.05%	2.46%

Knowledge intensive activities are unequally distributed in region. As expected, the highest share of knowledge intensive ventures was recorded in Nitra district, where regional center—city of Nitra is allocated. The allocation of the rest of the knowledge intensive ventures can be considered as surprising, as almost half of these ventures reside in southern districts of Nové Zámky and Komárno, which were traditionally agrarian districts lying in a hearth of Danuban Lowland, with a high share of very fertile soils.

On the other hand, we can see very small share of knowledge intensive activity in districts of Zlaté Moravce and Topoľčany, that are neighboring with Nitra district from the north and west, what can be considered as troubling for balanced development of the region. As we can see in Figure 1, if we would like to compare the distribution of knowledge-intensive services and knowledge-intensive manufacturing, we can find the same localization pattern.



**Figure 1.** Localization of KIM and KIS enterprises in Nitra-region districts.



### 3.2. A Brief Characteristic of the Sample of Our Survey

From 69 responded knowledge-intensive, small and medium sized ventures allocated in municipalities below 5000 inhabitants, 14 responded on call to participate on in-depth survey of their innovation activities. In all tables in the next section, we summarize the information about innovation performance of the respondents in table, where respondents are listed from no. 1 to no. 14, to keep information split to several interconnected tables.

Table 3 provides basic characteristic of our 14 respondents from knowledge-intensive sectors. Up to 6 of 14 of these ventures are located in southern districts of the region, what follows distribution of all knowledge-intensive activities presented in Figure 1. We can see that from year of establishment perspective, the sample is very saturated, as establishment date range from 1992 to 2018.

**Table 3.** Basic characteristics of the obtained sample of knowledge-intensive ventures.

Respondent	Year of Establishment	District	Number of Employees	Share of Employees with Higher Education
1	2007	Komárno	120	2%
2	2008	Komárno	38	5%
3	2018	Komárno	13	15%
4	1992	Topoľčany	14	30%
5	2004	Nové Zámky	32	5%
6	1992	Levice	19	10%
7	2014	Nitra	50	25%
8	2001	Nitra	86	5%
9	2006	Nové Zámky	10	60%
10	2012	Komárno	18	20%
11	2010	Zlaté Moravce	105	15%
12	2011	Levice	46	60%
13	2001	Nitra	32	20%
14	2014	Zlaté Moravce	16	50%

Thus, we can observe and compare innovation performance of both well-established ventures and relatively new startups in regional economy. From employment point of view, 10 of 14 enterprises falls into category of small enterprise and 4 to category of medium sized enterprise. In average, 24% of employees of these ventures have tertiary education, while 3 of them declare 50% and more have higher education, and only 4 of investigated enterprises have less than 10% of employees with tertiary degree. While none of responded ventures produce products or provide services having zero university-educated employees, we support general assumption, that business in knowledge-intensive sector is considerably requiring high-quality human capital.

The sectoral distribution of survey respondents is also relatively varied: 4 industrial companies, 2 companies from the health and social assistance sector, 2 companies from the sector of professional, scientific and technical activities, 2 companies from the administration and support services sector and 1 company from the sectors: information and communication technology; agriculture; culture, arts and recreation; and the “other” took part in the survey.

### 3.3. Results of the Innovation Monitor

In this chapter, we would like to summarize the results of innovation monitor. With such a small sample, it would be relatively easy to expect, that none of survey respondents delivered innovation in recent three years. However, we found that 7 of 14 respondents delivered innovation of its products and services, 2 of 14 delivered process innovation and 4 of 14 marketing innovation. An overview of different kinds of innovation delivery in case of our 14 respondents is presented in Table 4. Up to 5 of 14 participating knowledge intensive ventures brought a combination of these kinds of innovation.

Before we start to describe these innovation actions, we need to fully understand named types of innovation, as described by Eurostat (2020).

**Table 4.** Comparison of innovation delivery in the sample.

Respondent	Product/Service Innovation	Process Innovation	Marketing Innovation
1	no	no	no
2	no	no	no
3	no	no	no
4	yes	yes	no
5	no	yes	yes
6	no	no	no
7	yes	no	yes
8	yes	no	no
9	yes	no	yes
10	yes	no	no
11	no	no	no
12	yes	no	no
13	yes	no	yes
14	no	no	no

A product innovation is the launch of a new or significantly improved product or service with respect to its capabilities, user-friendliness, components or subsystems. They must be new to the company, but they do not have to be “new” to the market. Process innovation is the introduction of a new or significantly improved production process, distribution method or support activity in the production of goods or provision of services. Marketing innovation is the implementation of a new marketing concept or strategy that differs significantly from the company’s existing marketing methods and has not been used before (Eurostat 2020).

In case of both product (service), process and marketing innovation, we asked surveyed knowledge intensive ventures to briefly describe the innovation itself, its nature, level of originality and level of market-novelty. These information for innovators of products and service in the sample is summarized in Table 5.

Between 7 innovations identified in this category, 5 were new services and 2 new products. The rural environment was suitable for the localization of a knowledge-intensive company in the field of health care services, which brought a new treatment procedure to a small village in the district of Topoľčany, specifically the treatment of the body by neutralizing some negative energy impulses by bioresonance method. The company identifies this service as an original innovation, but it is new at the level of the regional market. In this case, we would rather consider it as an adapted innovation, as this technology can be widespread abroad and in Slovakia in other regions - thus, trying to “look good” when completing a questionnaire can sometimes lead to a distortion of the reality in the results.

An example of a technical innovation is the novel service of company no. 7, which is located in the district of Nitra. Enterprise reallocated to rural settlement, even though it is a technically intensive company, which in the past 3 years has devised a way to provide a service in the field of cleaning industrial machines using ultrasonic waves for the automotive industry. This decision to move out of the Nitra city was mainly connected with expectation of reduced costs (available land, land price, labor costs in case of several job positions). This company stated that this innovation can be considered a “global” new, in-house innovation, which they originally developed through their own development, in order to provide novel services mainly to the automotive industry located in the Nitra Industrial Park.



**Table 5.** An overview of product and service innovations in the sample.

Resp. No.	Brief Description of the Innovation	Nature	Originality	Novelty
4	Treatment of the organism by neutralization of some negative energy impulses in the body by the bio resonance method	service	product adaptation	in Slovakia
7	Method of providing services in the field of cleaning of industrial machines, using the ultrasonic waves - for the automotive industry located in Nitra	service	original innovation	world market
8	Providing a more technically advanced sheet metal processing service for consumers through the purchase of new technology based on the use of laser plasma	service	original innovation	regional market
9	Introduction of 12G Internet thanks to the purchase of the necessary technologies and construction of other television transmitters in the region	service	product adaptation	local market
10	Use of new types of conveyors for the design of postharvest lines for cereal storage	product	product adaptation	regional market
12	A new generation of nutraceuticals, cosmeceuticals and medical products of natural origin	product	original innovation	world market
13	Involvement in a joint project to introduce tracking of the movement of meat from the farmer to the final consumer through the application	service	in partnership	regional market

We found a similar localization intent in the case of company no. 8, which was similarly located in the rural village in the district of Nitra and provide services mainly to industry in city of Nitra. This company delivered innovative service—since 2019 they can provide more technically advanced sheet metal processing services to consumers through the purchase of new technology based on the use of laser plasma. This, as they say, allows the company to process sheet metal in new ways and thus innovation increased their competitiveness. They created this innovative service without imitation; however, it can be still considered as novel only on regional market.

Company no. 9 is an example of the fact, that relatively common services in urban areas can be still novel in the rural regions, and thus, to be an opportunity for businesses in rural. In recent years, the company has introduced 12G Internet through the purchase of the necessary technology and the construction of additional television transmitters in the southern part of the region, bringing high-quality Internet to many villages where it was missing aspect of technical infrastructure. Thus, the entrepreneur correctly states in the survey that this is an adopted innovation that is new on the regional market.

Respondent no. 10 takes advantage of the opportunities arising from the agrarian nature of the region. Thanks to new technologies, it can design and manufacture more innovative conveyors for postharvest cereal storage lines. The company is located in the south of the region, what results in synergistic effects with the agricultural companies with which it cooperates and to which they supply. The result of innovation process are therefore new products, conveyors, although it must be said that the company designs them, and this innovation allows them to design more advanced types. As the essence is again the acquisition of technology and procedures that exists, the company perceives it as an adapted innovation and they also expressed that it is new in the regional market.

Today, much-needed organic products can be developed in rural regions with rich natural potential, quality soil and suitable climatic conditions. This is also the case of our company, no. 12, which thanks to the regional suppliers, produce innovative organic products. In the past 3 years, this enterprise has

brought product innovations in the form of the development of a new generation of nutraceuticals, cosmeceuticals and medical drugs of natural origin. Despite the fact that the company operates in the village, the management believe that these are original products that are not adapted and are novel in its nature on the worldwide market.

Moreover, the last identified case of innovation is related to short supply chains on the line: farmer–food industry–final seller–consumer. The farm located in the Nitra district participated on a joint innovative product with other actors in the supply chain—a novel application to trace the origin and method of meat processing. Such innovation in the regional market can bring significant growth in competitiveness for all involved stakeholders. However, it is an even more interesting example because it stands on the border between product innovation and marketing innovation. Such applications are already relatively “basic” in western Europe; however, we still know only about several cases in Slovakia. Thus, enterprise considered it as “innovation created in partnership”, novel on regional market.

We also wanted to compare investments into innovation and expected profit. Table 6 displays the shares on profit in case of 7 knowledge-intensive ventures that was invested into development and introduction of innovation on the market linked with expectation of an increase in profit due to innovation in the horizon of 3 years. Several innovations, as, e.g., meat tracking application, new technological approach of sheet metal processing or use of new types of conveyors for the design of postharvest lines for cereal storage are expected by entrepreneurs to have very small impact on profit generation. this means, that innovation delivery cannot be perceived only from profit generation perspective. As this result was expected, we investigate motives for decisions to innovate in the next chapter. However, for example respondent no. 7 expect high level on returns from development of new machinery for cleaning of industrial machines, using the ultrasonic waves—thus motivation for innovation can be differentiated according to prior need of given entrepreneur. In certain cases, main driver is the profit, in another cases rather factors connected with competitiveness, prestige and fighting local challenges.

**Table 6.** An overview of investment in product and service innovation and expectations of profit.

	Share of Profit for the Last 3 Years Invested in Development/Implementation of Innovation	Expectation of an Increase in Profit Due to Innovation in the Horizon of 3 Years
4	viac ako 25%	25%–50%
7	5%–10%	50%–100%
8	1%–2%	3%–5%
9	10%–25%	25%–50%
10	3%–5%	5%–10%
12	5%–10%	10%–25%
13	less than 1%	1%–2%

Table 7 presents information about networking directly connected with production of described innovation in investigated ventures. First, we got answer on question, whether it is possible to deliver innovation in rural areas without networking with other firms. Every innovative knowledge-intensive firm in a sample declare, that cooperated on different stages of innovation process with other actors of private sector. We can also observe, that in several cases the academic sector and private R&D entities can stimulate innovation dynamics in private firms. In the regional city seat of Nitra, two universities are allocated, covering majority of research areas in both social and life sciences.

**Table 7.** Collaborating actors in generating product and process innovations in the sample.

	4	7	8	9	10	12	13
other private sector companies	x	x	x	x	x	x	x
private R&D institutions	–	x	–	–	x	–	x
higher education	–	x	–	–	x	x	–
secondary education	–	–	–	–	–	–	–
counselling institutions and incubators	–	–	–	–	–	–	x
local government	–	–	–	–	–	–	–
regional self-government	–	–	–	x	–	–	–
non-profit sector	x	–	–	–	–	x	–

Thus, regional economy can benefit from knowledge diffusion and spill-overs from academic public research. However, we also found a case of cooperation with third sector, regional government and counselling institutions and incubator. The non-profit sector has long been underestimated in terms of its power to support broad range of processes in the private sector enterprises. Even the academic community still does not fully perceive diversity of activities, ability to provide education and support to entrepreneurs or quality of human capital and new ideas accumulated in this sector entities. Innovation-based networking with regional government is also expected result, as regional government in Nitra region is in Slovak conditions considered to be leader in development of cooperation and innovative programs for the private sector entities.

We found only two cases of more “basic” process innovation in our sample. We assume that this may be due to the fact that it is more difficult to understand the essence of process innovation for a responded entrepreneur. As can be seen in Table 8, a company no. 4 in the healthcare sector in the municipality within the Topoľčany district also declares process innovation associated with employee training and the introduction of a system for using new technology for medical treatment in practice. We can expect entrepreneurs to consider process innovation as original if new processes are the result of internal planning.

**Table 8.** An overview of process innovations in the sample.

Respondent	Brief Description	Nature	Originality
4	education and introduction of a new process of patient care with purchased technology	improved service delivery methods	original innovation
5	creation of a new organizational model of the festival, redistribution of tasks, creation of new functions and inclusion of partners from Hungary in the team of organizers and their work during the year through the Trello application	improved logistics and communication methods	in partnership

Here we can see the thin line between process and product innovation, mainly in case or service provision. The second case is a company no. 5 established to run the organization of a festival in the district of Nové Zámky—the identified process innovation was in the nature of an improved method of communication. In this company, a new organization of the team work was introduced using the modern communication tool Trello and the online planning procedure, which enabled foreign partners to become to be the part of the organizational team. This can be considered as a very interesting example, where the use of ICT tools that are new in rural space, enabled the introduction of new processes. However, we have not gained many examples of process innovations, we believe that their

main purpose is not only to increase the efficiency of production processes, but also the organization of work, teams, production sites, trainings and corporate culture.

Table 9 provides an overview of marketing innovations. Up to three of them had the character of new models of product promotion. In the first case (company no. 5) a new website, logo and web design were introduced. This type of innovation can be considered as relatively common. Company no. 7 has brought a new e-mail notification system with original visuals and also has invested in minor design changes in various promotional materials. In the case of company 9, new “bundles” of combined services were introduced as the company started to offer new web hosting and server hosting services. Thus, they rather decided to integrate these services into new bundles with those previously provided, rather than operating them separately. Last company that stated marketing innovation delivery in recent three years—company no. 13, was a farm located in the Nitra district that also brought a product innovation in form of tracking application for food origin.

**Table 9.** An overview of marketing innovations in the sample.

Respondent	Brief Description	Nature	Originality
5	new website, logo, web design	new media or techniques for product promotion	original innovation
7	email notifications for consumers requiring investment in the web, along with a new design	new media or techniques for product promotion	in partnership
9	creation of combined packages of service provision while expanding the offer with web hosting and server hosting	new methods of valuing goods or services	original innovation
13	organizing a farmer’s market in the village	new media or techniques for product promotion	original innovation

This farmer also decided to, initiate the organization of a small farmers’ market in the village where the farm is located, to make the promo for year-round sale of fresh meat directly from the yard. Thus, marketing innovations appear to be logically linked to novel products and services.

#### 3.4. Knowledge Intensive Entrepreneurship in Rural Space

In the previous chapter, we described innovations that were delivered in recent three years by responded knowledge-intensive ventures in Nitra region. Now, we would like to put forward a question of localization factors and motivation to allocate the knowledge-intensive business in rural space. We investigate, why the investigated rural enterprises innovated and how these rural knowledge-intensive enterprises located in villages organize the cooperative networks.

Our main assumption was met, as 10 of 14 responded enterprises allocated their knowledge-intensive business in rural village, as they wanted to run a business in locality of residence (Figure 2). Thus, the first hypothesis, that we could formulate is, that localization of educated human capital in rural areas can raise the number of knowledge intensive ventures and innovation dynamics in rural areas. As we expected, based on previous research (see, e.g., [Martyniuk 2016](#); [Peráček 2019](#); [Vilčeková et al. 2018](#)), family conditions and attitudes towards entrepreneurship influence localization decisions of small and medium enterprises.

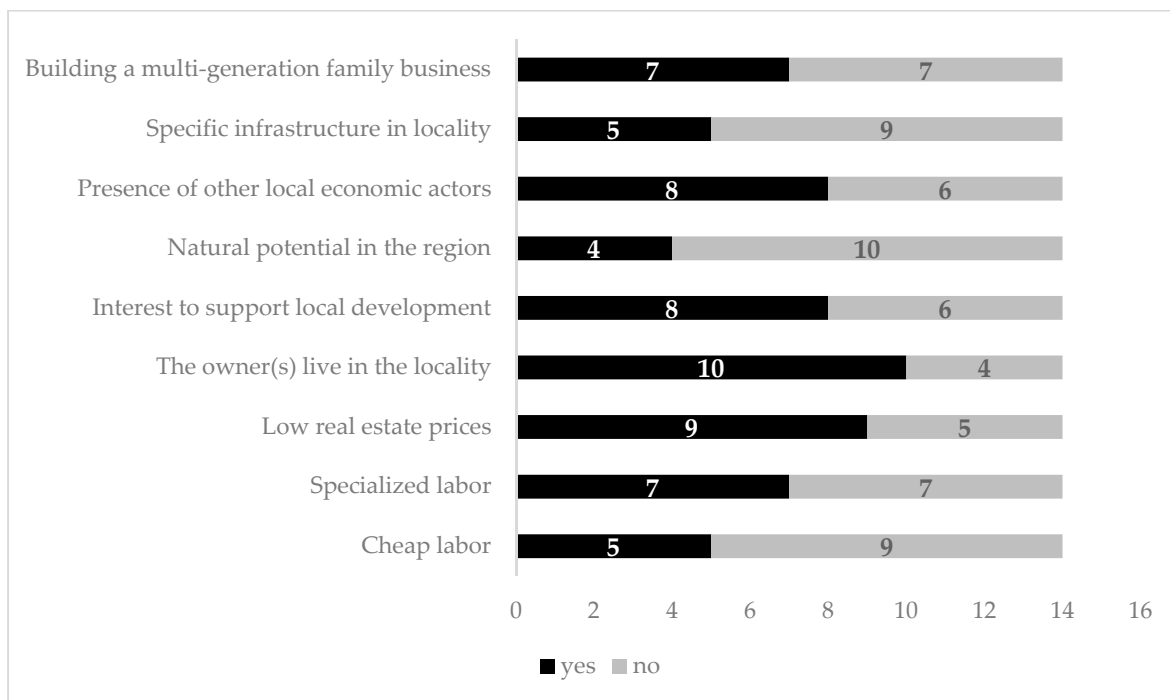
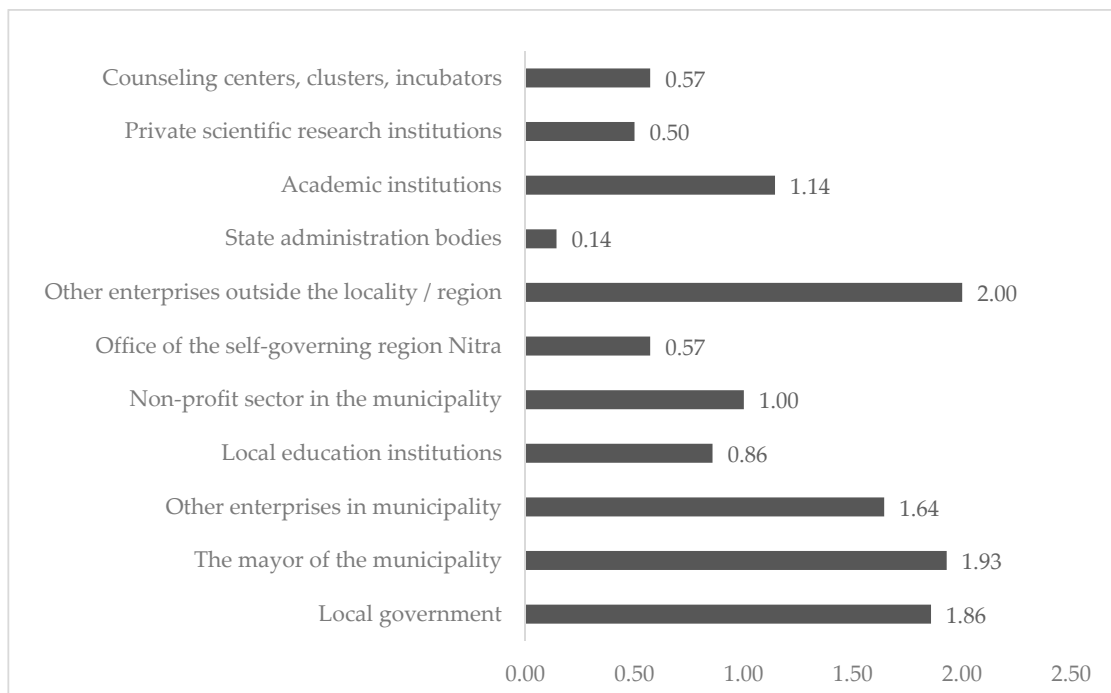


Figure 2. Factors affecting localization of knowledge intensive ventures on village.

A half of the respondents found their enterprise on the basis of multi-generation family business. Interest to hand down the business to children ñ also affect creation of KIF ventures in rural areas and gives to these businesses’ certain expectation of sustainability. Up to 8 of 14 respondents consider an interest to support local development as driver of their business activities—thus, we can hypothesize, that rural enterprises care for over-all development of given rural locality due to informal relations with development actors and rest of the population. The impact of relations with another businesses in given rural area is declared also by fact, that 8 of 14 responded knowledge-intensive ventures consider as important precondition of running business, the presence of other economic agents in the municipality.

Several enterprises consider cheap labor, specialized labor and mainly low real estate costs (9 of 14 respondents) to be important localization factor. We still expected these factors to play more intensive role in comparison with previously described cost-free-related determinants. Thus, in our sample we can observe certain innovation activity not only in municipalities in nodal region of the city, but also in those peripheral. Even if knowledge intensive ventures in rural settlements can be found as the response to local opportunities, family needs and locality problems, there is still possible to observe their need to build networks with actors allocated in urbanized space.

In the next part of this chapter, we interpret the average importance of cooperation with individual types of actors. Each company that participated in the survey was asked to determine the importance of cooperation with a given type of actor on a scale from 0—no importance, to 3—key importance. In this case, we ask about maintaining cooperation with these actors in general—not about the emergence of their specific innovations as in the previous chapter. In Figure 3, we display the values of the average importance of cooperation with a given type of actors for 14 respondent knowledge-intensive companies. The highest average score was recorded in case of the cooperation with other companies outside the locality, resp. region. Thus, we can construct the hypothesis that doing business in knowledge-intensive industries in rural municipalities requires networking inside the private sector at a distance. However, some companies still use the purchase of basic inputs from local companies (average score 1.64).



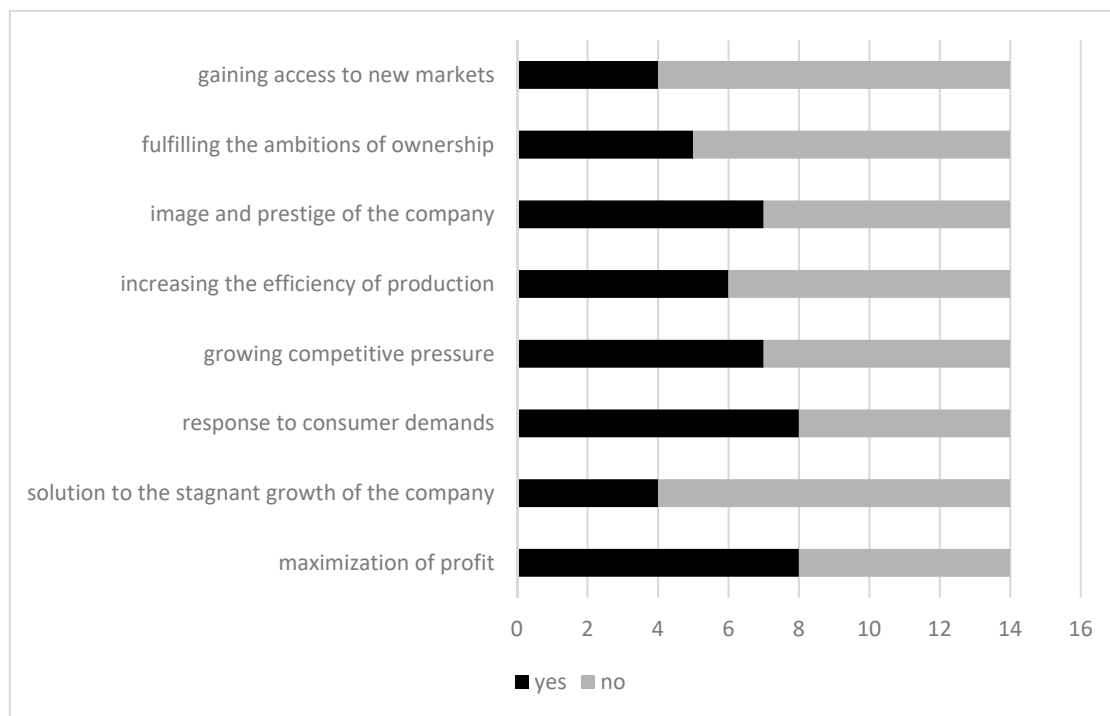
**Figure 3.** Average importance of networking with selected actors on scale 0–3.

We consider the results for networking with the local government, represented by the municipal council and the mayor, to be extremely important. Local government achieved an average significance of 1.86, which means that although knowledge-intensive ventures do not network too much at the local level (rather at greater distances), every enterprise can handle some matters (land plots, building permits, materials, common projects, etc.) through informal cooperation with municipal self-government. The personal contact with the mayor allows these companies to settle their affairs even more easily in Slovak conditions, as contact with the mayor received an even higher average score, up to 1.93.

Once again, we have shown that the academic sector and the private scientific entities have an impact on the development of knowledge-intensive activities. There is also a certain dynamics of cooperation between rural knowledge-intensive companies and the non-profit sector (we assume that especially in the level of counseling and educational activities) and also between these companies and education in the municipality, although we assume, that cooperation with local schools is not connected with production of products and services by KIF (e.g., rental of premises or catering).

Figure 4 shows the motives for investing in innovation by the researched knowledge-intensive companies. As many as 8 out of 14 ventures consider maximizing profit as the main reason for investing in innovation, the same number of companies consider the cost of innovation to be a necessary prerequisite for keeping their products sufficiently attractive to consumers. Interest to respond on the competitive pressure led 7 of 14 investigated KIF to innovate. A similar share of ventures wanted to improve the company's image.





**Figure 4.** Motives for innovation declared by knowledge intensive ventures in the sample.

Thus, innovation not only pursued financial benefits and cost savings, but also non-financial benefits in form of brand and company image (which is logical especially in case of marketing innovations). Up to 6 out of 14 respondents was driven to innovate in order to increase the efficiency of production, resp. service provision. In some cases (4 of 14 ventures), the fulfillment of long-term goals can be monitored through innovations, resp. sometimes the innovation can represent the fulfillment of the ambitions of company ownership. Only 4 companies tried to gain access to new markets through innovation, which can definitely be considered a specific feature of knowledge-intensive business in the rural space.

#### 4. Discussion and Conclusions

Qualitative approach, that we adopted to get the basic knowledge about private innovation activities in such specific environment, as small rural municipalities are, helped us to formulate several hypotheses to be tested in future nationwide responding of rural knowledge-intensive firms. This study is limited in geographical scope, as every NUTS III region in country has different potential for rural development (Oláh et al. 2020), therefore also on small population of SMEs form knowledge intensive sectors available in region in year 2019 for deeper case study, and finally, we must still admit, that filtering innovative economic actors on sectoral basis gives us no real precondition of innovation production in these ventures. Due to Malerba and McKelvey (2018), enterprises of knowledge intensive sectors tend to be found on concrete innovation opportunities. Both global and local-specific opportunities can be due to our survey a precondition of running knowledge-intensive business in rural. Here we come to concept of Müller et al. (2015), that distinguished between entrepreneurship in rural and rural entrepreneurship. We found that rural environment generates very different, local-specific opportunities for innovation action (e.g., use of specific natural potential, missing infrastructure, which is relatively common in cities, opportunities connected with needs of agrarian sector, etc.). Thus, these ventures can be easily marked as rural enterprises, as in case of these firms, a richer ties (often informal) in locality and region were observed and also interests to support local developmental initiatives. Very often, there is an intention of entrepreneur to live in the locality, where KIF has a seat. In line with Răzvanță Puie (2019), intention to run business in order to secure

income to multiple family members appears to be another driver of growth of knowledge intensive activities in rural. In addition to the benefits that these companies often employ family members, they represent a significant source of employment opportunities for educated human capital, retention of which is very crucial for development of rural areas.

At the other hand, we also found “entrepreneurs in rural”, that run business rather on global opportunities, while these ventures often reallocated their production from urban, to rural space, in order to reduce costs, without building intensive local ties. However, it appears that spatial proximity to concentrations of industries in city appears to be crucial for them in case of repeated location decision. In case of both rural enterprise and enterprises in rural, cooperation with other economic actors even on higher distances appears to be crucial. Both kinds of innovative knowledge-intensive ventures also need to keep close relationships with local self-government, and especially, with mayor of the municipality, what points on expectation, that several needs of entrepreneur in rural municipality can be resolved due to informal relationships with important local stakeholders. We found some support for many times tested hypothesis (e.g., [Guerini and Rossi-Lamastra 2014](#)) that knowledge intensive activities need to be allocated close to significant sources of knowledge. Even in rural space, several respondents kept relationship with academic sector allocated in central city of a region.

We do not expect that we would find support for hypotheses of [Porter et al. \(2004\)](#), that innovation production dynamics is significantly higher in urbanized space, as from 14 enterprises that responded to our survey, up to eight delivered innovation in recent three years. Therefore, idea of [Renski and Wallace \(2012\)](#), that rural businesses rather tend to not be taking risks, is possibly not valid anymore in the second decade of the 20th century. We also found some support for future hypothesis, that innovation of products and services is often precondition, resp. driver of emergence of supporting process or marketing innovations. To the interplay between different kinds of innovation in private firm should be paid bigger attention in scientific literature.

Thus, we recommend to take into consideration in case of further quantitative research findings, that rural innovative business can be affected by nature of local community, specific local ties, willingness of family members to work in a “family enterprise”, specific local resources, availability of high-quality human capital in given rural settlement or specific local challenges.

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