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The Usage of Open Innovation, Innovation Problems and Trends

Comprehensive View on Innovation Activities Service SMEs in the Czech Republic

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***Abstract*— Innovation is the driving force of competitiveness. At the same time, services are a significant contributor to GDP in all developed economies. Therefore, it is interesting to map out innovative activities in this area. Our interest focuses on a specific area – open innovation, problems and trends in innovation. The paper and further research describe comprehensive view on innovation activities of small and medium-sized companies in the Czech Republic. The research was divided into two parts - quantitative research and qualitative research. The results of quantitative research provide an analysis of a questionnaire survey among 1,701 service companies. The main findings describe where companies find their ideas for innovation, who is involved in the innovation process and who is involved in testing. Qualitative research complements these findings by in-depth interviews with experts on the topic of innovation problems and trends.**

***Keywords*— innovation, services, service innovation, open innovation, SMEs, Czech Republic, problems, data**

I. Introduction

Innovations are the major topic in current discussions about acquiring and maintaining of the competitive advantage of the businesses or economies as whole. The necessity of the development of new technologies, R&D investments, startup (tech) incubators etc are often the common topic in these discussions. As the service sector is in developed economies very important – its contribution to GDP often tends to 70%. These facts motivated us to this research.

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Nowadays' trend in the field of innovations are open innovations and co-creation. These approaches open the innovational activities also to the subjects outside of the firm's environment. Evidence shows the direction of this approach as necessary – because of the globalization, evolution of IT, big power of customers over the companies (the excess of the supply over the demand) etc. The main aim of our research is to bring the compact approach to the innovational activities of the companies in service sector.

The subject of our research are small and medium-sized companies (SMEs), i.e. companies with annual sales up to 50 million Euro and the number of overall employees lower than 250. In the further research we divide these companies into two subgroups: micro companies (up to 10 employees) and small-and-medium-sized companies (from 10 to 250 employees). We also study differences between B2B and B2C relationships of these companies.

The main aim of the research was:

- to identify where these companies take inspiration to topics of the innovations and who is involved in development and testing. This finding was put in further research in terms of open vs. closed innovation.
- to find the most common problems and trends in the service innovations. This finding was also put in further examination in terms of open vs. closed innovation.

The first aim was realized thru quantitative research (internet survey), second aim thru interviews with experts. Both parts were made in Czech Republic only.

II. Literature Review

A. *Innovation*

Innovations can be defined several ways. Firstly defined by Schumpeter [1]. He divided innovations into five different types: 1.) The introduction of a new good or a new quality of a good, 2.) The introduction of a new method of production, 3.) The opening of a new market, 4.) The conquest of a new source of supply of raw materials or halfmanufactured goods and 5.) The carrying out of the new organization of any industry, like the creation of a monopoly position.

Some authors consider innovations in a narrower way: e.g. Nelson & Rosenberg [2] consider innovations in technical point of view only, forgetting about organizational, institutional or social innovations [3].

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Very simple and straightforward definition of innovations is brought by Thompson [4] *"Innovation is the generation, acceptance and implementation of new ideas, processes products or services"*. Based on this Kuniyoshi Urabe [5] defines innovations as *"generation of a new idea and its implementation into a new product, process or service leading to the dynamic growth of the national economy and the increase of employment as well as to creation of pure profit for the innovative business enterprise"*.Urabe [5] also divide innovations into two groups: major and minor changes.

B. *Services and service innovation*

According to Cherubini [6] and many others [7–9], services tend to be intangible and not visible.

Goffin and Mitchel [7] name several characteristics of the services: Intangibility, customer contact, inhomogeneity, perishability and multifaceted nature.

Although the services are intangible they often come together with products. This concept is called augmented service offering [10]. If the products are not different or when they are similar, the service part of the augmented service offering become the leading part and major competitive advantage.

According to Ian Miles [11] the importance of the innovations in services is not caused only by the importance of the service sector itself. *"Some services play central roles in innovation processes throughout the economy, as agents of transfer, innovation support and sources of innovations for other sectors."* Additionally the service innovations can be performed in other economy sectors.

III. Methodology

As stated above, the research consisted form two parts: quantitative – the survey and qualitative. – The interviews. The former was done in 2013, whereas the latter was done in 2014. The aim of the quantitative research was to collect representative results of the innovational activities of Czech SMEs and assess them in the way of open innovations (outside of the company).The goal of the qualitative research was to map main difficulties and problems in the innovational activities. The following lines describe both parts of the research.

A. *Quantitative research*

For the purpose of this research an internet survey was made. It consisted from several general topics including innovational activities of SMEs. In the question set were included three questions with listing of answers:

- Who do you use for suggestions of the innovations of your company?
- Who is usually directly involved in the new service preparation?
- Who is usually involved in testing of the newly developed service?

The answers were linked to databases Albertina and Magnus which consist of number of employees, NACE categorization and id or name of the company. The survey was distributed to SMEs in the service sector through e-mail. We send the request to the small and medium companies from Albertina database that belonged to the sector of services (NACE category 45 or higher) and that have an e-mail listed. The information about sales, number of employees was taken from both Magnus and Albertina. The purpose of the research was to analyze small and medium companies in the sector of services in Czech Republic. It was not possible to address all companies which suit these criteria. Therefore we chose only companies listed in Albertina database and with e-mail. We cannot bring the conclusion from this dataset to all SMEs, but it gives us the nearest possible finding about Czech SME in the sector of services.

We send 32 924 survey requests and get back 2 462 responses, which is 7% response rate. For the further research let's suppose that it was a question of chance whether the responder will fill in the survey or not for example due to his time possibilities. We also eliminated those companies without entries in previously mentioned databases. Therefore we used 1 701 company entries. At first the selective dataset and the basic dataset were tested with chi-squared test. This test stated that the basic and selective dataset have the same structure (by both NACE and number of employes). The structure by region was not precisely the same, but in comparison of the capital and other regions have the same structure in both datasets.

We used chi-square test for analysis of issues. Differences were observed in the innovation activities of micro businesses (0-10 employees) and small and medium-sized companies (11-250 employees). We tested the following hypotheses:

H0(1): There are NOT differences between micro and small/medium sized businesses in terms of sources of ideas for innovation.

H1(1): There are differences between micro and small/medium sized businesses in terms of sources of ideas for innovation.

H0(2): There are NOT differences between micro and small/medium sized businesses in terms of involvement in new service development.

H1(2): There are differences between micro and small/medium sized businesses in terms of involvement in new service development.

H0(3): There are NOT differences between micro and small/medium sized businesses in terms of involvement in new service testing.

H1(3): There are differences between micro and small/medium sized businesses in terms of involvement in new service testing.

B. *Qualitative research*

The research was conducted through interviews with experts. Two groups of experts have been addressed - experts of everyday life and experts from organizations that support

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innovation. Experts of everyday life are experts from companies, people who have a real experience of the executive. Research respondents were approached both from established companies and startups. Although, there was a condition for startups: at least 3 years of operation. This condition provided a sufficient time interval for evaluation of what works and what does not.

Experts from organizations that support innovation are people who have perspective and are able to see trends. The main criterion for the selection of experts in this group was their active work and participation in professional conferences and events. On the other hand, experts from academia were not involved in the research.

We prepared questions for semi-structured interviews that were thematically grouped in several areas: services and service innovation, innovation process, problems with innovation and trends. There were two versions of an interview schedule – for experts of everyday life and for experts from organizations that support innovation. Their focus was identical. Our goal was to capture detailed answers so we can later analyze even the small nuances in content. We used open-ended questions, e.g., "What is the biggest challenge in service innovation?" and "Do you see higher use of innovative techniques in service innovation?"

We conducted 22 face-to-face interviews. 14 of them were interviews with experts of everyday life and 8 interviews with experts from organizations that support innovation.

IV. Results

A. *Quantitative research*

The results of the questionnaire are presented in the following tables Tab. 1, Tab. 2 and Tab 3. The tables show the possible answers and the number of firms that have ticked the answer as a percentage. The percentage is always relative to the base, the base is shown in the table footer. First, it is possible to evaluate data based on frequency. In the second step, the previously mentioned hypotheses are tested for analyzing the differences between micro firms (under 10 employees) and small and medium-sized companies (11-250 employees).

Tab. 1 presents the sources of ideas for innovation. Interestingly, the most used is *Customer feedback*. In terms of open innovation, it can be considered positive, although it is a reactive approach. In second place is surprisingly another open approach which is on the contrary proactive – *Observing of customers using our services*. *Brainstorming* is the most used of closed approaches. The value of *Questioning of extreme users* is unexpectedly high. Other proactive approaches *Customer community questioning* and *Professional community questioning* are used very little. On the other hand, it is alarming that they are used more than passive approaches like *Mystery shopping in our company* or *The use of Competitive services*. The overall look, in terms of open innovation, companies are very open in searching of ideas for innovation. The voice of the customer plays a high role.

TABLE I. SOURCES OF IDEAS FOR INNOVATION

Sources of ideas for innovation	Micro	Small / Medium	Delta
Closed approach			
Brainstorming	21,2%	36,7%	15,5%
Leader in the company management	15,2%	27,8%	12,6%
Benchmarking	21,6%	31,7%	10,2%
The use of competitive services	3,8%	4,6%	0,9%
Mystery shopping in our company	1,3%	5,0%	3,7%
Reactive open approach			
Customer feedback	68,7%	79,1%	10,5%
Reasons for rejection	16,3%	23,2%	6,9%
Posts on social networks or forums	7,4%	14,4%	7,1%
Proactive open approach			
Professional community questioning	8,6%	12,5%	3,9%
Customer community questioning	9,1%	13,9%	4,8%
Questioning of extreme users	15,4%	22,8%	7,5%
Observing of customers using our services	30,4%	36,4%	6,0%
Other			
Nothing	14,2%	6,6%	7,6%
Something else	5,8%	3,7%	2,0%

Base for micro: 1140, base for small/medium: 561

Tab. 2 shows the involvement in new service development. There are companies that engage *Customers* or *Suppliers* in development but these approaches are not common used. *Front-line staff* and *Senior manager or owner* play an important role. It is clear, that closed approaches are preferred. *Consulting agencies* are not used at all.

TABLE II. INVOLVEMENT IN NEW SERVICE DEVELOPMENT

Involvement in New Service Development	Micro	Small / Medium	Delta
Closed approach			
Senior manager or owner	62,6%	74,7%	12,1%
Innovation manager or responsible person	10,4%	24,8%	14,4%
Product manager	10,9%	27,3%	16,4%
Front-line staff	54,8%	67,4%	12,6%
Back-office staff	10,8%	22,8%	12,0%
Open approach			
Consulting agency	0,9%	1,8%	0,9%
Customers	16,6%	15,3%	1,3%
Suppliers	13,6%	16,9%	3,3%
Other			
Nobody	12,3%	6,2%	6,1%
Somebody else	3,3%	1,8%	1,5%

Base for micro: 1140, base for small/medium: 561

Tab. 3 shows the involvement in new service testing. Still, closed approaches are preferred. The results are interesting especially in comparison with the previous table Tab. 2. A significant increase in customer engagement in testing can be seen – a third of companies involves *Customers*. On the other hand, we can see an evident decrease in all of the closed approaches. The most important change is in *Senior manager or owner* engagement in testing. A decrease of 23,2 % respectively 37,4 % is very substantial.

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TABLE III. INVOLVEMENT IN NEW SERVICE TESTING

Involvement in New Service Testing	Micro	Small / Medium	Delta
Closed approach			
Senior manager or owner	39,4%	37,3%	2,1%
Innovation manager or responsible person	8,1%	20,1%	12,1%
Product manager	9,6%	19,6%	10,0%
Front-line staff	45,4%	58,3%	12,9%
Back-office staff	9,5%	19,4%	10,0%
Open approach			
Consulting agency	0,5%	1,2%	0,7%
Customers	31,1%	37,6%	6,5%
Suppliers	5,3%	9,3%	4,0%
Other			
Nobody	16,0%	8,6%	7,4%
Somebody else	0,0%	0,0%	0,0%

Base for micro: 1140, base for small/medium: 561

In the second step, the previously mentioned hypotheses are tested. Tab. 1 has a dimension of 13 x 2 (we exclude the option "*Something else*"), therefore we have 12 degrees of freedom. The critical value of chi-square statistics for 12 degrees of freedom and a significance level of 5 % is 21.03. Tab. 2 and Tab.3 have a dimension 9 x 2 (we excluded the option "*Somebody else*"), therefore we have 8 degrees of freedom. The critical value of chi-square statistics for 8 degrees of freedom and a significance level of 5 % is 15.51. Calculated values of chi-square statistics are: 90.19 for Tab. 1, 106.68 for Tab. 2 and 97.31 for Tab. 3. The critical values are exceeded, we accept the alternative hypotheses H1(1), H1(2) and H1(3). There are differences between micro and small/medium sized businesses in terms of all three aspects: sources of ideas for innovation, involvement in new service development and involvement in new service testing.

About sources of ideas for innovation, the most significant differences can be seen in closed approaches *Brainstorming*, *Leader in the company management* and *Benchmarking* and in oppen approach *Customer feedback* which are more used by small and medium-sized companies than micro firms. About the involvement in new service development and new service testing, small and medium-sized companies achieve a much higher percentage in almost all closed approaches. But, it is evident that the micro company has fewer employees and fewer work positions than small and medium-sized companies in general. Therefore, this result is not so surprising as it might seem at first glance. We can see interesting value in engagement of *Senior manager or owner* in development respectively testing. If the *Senior manager or owner* is engaged in development, he is more frequently engaged in testing as well in micro firms than in small and medium-sized companies.

Additionally, it is interesting to compare the totals frequency in both groups. The average number of responses for both groups is evident from that data. For micro firms, we obtain 2.4 answers for sources of ideas for innovation, we obtain 2.0 answers for the involvement in new service development and 1.6 answers for the involvement in new service testing. For small and medium-sized companies, we obtain 3.2 answers for sources of ideas for innovation, we obtain 2.6 answers for the involvement in new service development and 2.1 answers for the involvement in new service testing. From these results we can conclude that micro firms use less sources of ideas and engage less types of subjects in developing and testing than small and medium-sized companies.

B. *Qualitative research*

Key findings from qualitative research can be divided into two main areas: trends and problems. In trends we can identify three main findings: the increasing role of services in general; the inspiration from successful leaders and the return to the people. At first, we can see the expansion of services in the Czech Republic in general. Especially banking, transport, restaurants or services offered via the internet are rapidly developing. It is related to the change of people's thinking. A price used to be the main criterion for customer's choices. Today we can see a trend that people want quality and are willing to pay a little bit more.

To the second point, leader with a clear vision is one of the main reasons for the success of new services. Czech culture is known for its conservatism so it is difficult to enforce new services into practice. This situation is slowly changing as the country gets more and more positive examples of successful leaders like Radim Jančura who changed the transport market or Tomáš Karpíšek who developed several original restaurant concepts.

Finally, we can see the emergence of lean startup trend in companies of all sizes. The main point is to fail quickly and cheaply. This trend responds to a common problem in companies - overestimation of the benefits of innovation for the customer and the subsequent failure: *„I see a trend to return to the people, let's make innovation around the customer, not to force our ideas that finally fail.“* Human centered innovation is coming. This is associated with more frequent involvement of customers in innovation activities. In this sense, it is also interesting insight that the innovation process can be opened for customers not only in the idea creation phase, but also in the idea selection stage.

In problems we can identify five main findings: lack of strategy; low degree of creativity; naivety; implementation and weak sales skills. The first one, lack of strategy, is associated primarily with micro firms, but we can see this problem in small and medium-sized companies too. Companies solve problems of everyday life and respond to customer suggestions. But only a few companies solve strategic issues of long-term development.

To the second point of low degree of creativity in service innovation. Among the respondents are appreciated positive cases of service innovation in the Czech Republic. At the same time they mention that it is nothing dramatically new: *"We have clean trains running on time and employees who smile at customers and it is a great innovation. But this is standard in Germany or Austria."* Copying of successful foreign services is a separate phenomenon. There is a consensus that the future will need a higher level of creativity in order to gain a competitive advantage. A possible way is to focus on business model innovation.

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The third problem is naivety in the context of the use of innovative techniques. We see an increase in public interest in innovation and startups in the last 5 years. This entails education in the field of innovative techniques like lean canvas or personas. But innovators mistakenly think that these techniques are sufficient and solve their problems alone. Innovation is the buzzword and there is insufficient focus on the problem respectively on solutions that bring value.

The fourth problem with service innovation relates to implementation in terms of people. The problem is both the customer and at the front-line staff. In general, the Czechs are conservative and satisfied with the current state. From the perspective of the company it is difficult to succeed in the market with innovations. At the same time, companies need to sell innovations to employees: *"There's a difference when we look at physical products and services. At one point, the machine starts to fall out new physical products. But with services... There's a big problem with implementing something new. People need to start behaving differently."*

Finally, there is a problem that people have weak sales skills. Again, this problem reflects the Czech culture and history. The problem of weak sales skills is especially relevant for services because you need to sell something invisible, something intangible. The man has a meaningful service innovation idea, overcomes all obstacles to the development, testing and implementation, and finally he can not monetize it. Innovative efforts are ineffective in this case.

v. Conclusion and limitations

The research results can be summarized in the following findings:

Open innovation approaches are used in the Czech Republic. The innovation process is opened mainly in the idea creation and idea selection stage. On the other hand, closed approaches are preferred for development and testing new services. The most used sources for service innovation are: *Customer feedback*, *Brainstorming* and *Observing of customers using our services*. The most engaged types of subjects in developing are: *Senior manager or owner* and *Front-line staff*. The most engaged types of subjects in testing are: *Front-line staff*, *Customers* and *Senior manager or owner*.

The most significant differences can be seen in closed approaches *Brainstorming*, *Leader in the company management* and *Benchmarking* and in oppen approach *Customer feedback* which are more used by small and medium-sized companies than micro firms. Furthermore, micro firms use less sources of ideas and engage less types of subjects in developing and testing than small and medium-sized companies.

In trends in terms of service innovation in the Czech Republic we can identify three main findings: the increasing role of services in general; the inspiration from successful leaders and the return to the people in terms of human centered innovation.

In problems we can identify five main findings: lack of strategy; low degree of creativity; naivety; implementation and weak sales skills. Most problems are associated with the conservative culture of the Czech Republic.

The main limitation of quantitative research is that we do not know exactly who filled out a questionnaire. For organizational reasons, the questionnaire was sent to contact persons in the database. We believe that the relevant people completed the questionnaire. And vice versa, that the irrelevant people would not waste time with the questionnaire. On the other hand, the strength of the research is a large sample of respondents: 1701 companies. We consider that this sample contains sufficient information.

Limitation of qualitative research can be seen in the selection of respondents. The selection of experts was designed according to the best knowledge and belief. Nevertheless, it is real that when addressing other experts, the results could be different.

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