Innovative behaviour of Latvian companies during COVID-19 pandemic

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ABSTRACT

Demand for innovative technologies and digital transformation increased during the COVID-19 pandemic. This paper analyzes the findings of a research project conducted by researchers from Riga Technical University within the National research program "Towards the Post-pandemic Recovery: Economic, Political and Legal Framework for Preservation of Latvia's Growth Potential and Increasing Competitiveness (*reCOVery-LV*)". The analysis of the data of the first survey revealed the innovative solutions adopted to overcome the crisis caused by the COVID-19 pandemic in companies. The second survey showed that 2/3 of the surveyed companies in the reporting period (2019-2020) have implemented at least one product or business process innovation, or performed an innovation that is still ongoing. The analysis of inventions, trademarks, and design applications (2016-2020) indicates that the creation of intellectual products will continue in the crisis. Based on the analysis of expert interviews, sets of factors hindering and promoting the development of innovation were created.

Keywords: survey, innovation, behaviour, COVID-19 pandemic

1. INTRODUCTION

Researchers from Riga Technical University took part in the project as part of National research program "Towards the Post-pandemic Recovery: Economic, Political, and Legal Framework for Preservation of Latvia's Growth Potential and Increasing Competitiveness (*reCOVery-LV*)", which was started in July 2020 and finalised at the end of March 2021.

The project "Evaluation of Latvian enterprises crisis resilience and solutions for its improving" was aimed at assessing the degree of crisis-resilience of Latvian enterprises, evaluation of Latvian companies' innovation potential and researching on the impact of problems caused by COVID-19 on the Latvian enterprises and opportunities for overcoming the negative consequences. Within the framework of this project, the innovative behaviour of Latvian companies during COVID-19 pandemic was studied also.

The Covid-19 pandemic had a markedly negative impact in a short period of time, exposing many countries of the world and the EU, including Latvia, to a deep crisis. The dramatic economic downturn caused by COVID-19 is very different to the classical economic crisis, when the economic activity is to decline affect all economic sectors. The international movement of goods and services was severely affected, but the movement of people practically stopped, which had a very significant impact on the world's logistics, aviation, tourism, and many other industries. The Covid-19 pandemic is significantly different from the previous crisis, as the economy is not only experiencing a demand shock, but also a supply shock. The supply shock was caused both by the inability of the companies themselves to continue working due to labor shortages and by restrictions imposed by governments. Many companies faced economic difficulties during the Covid-19 crisis and had to suspend or significantly reduce their operations and working hours. Demand for innovative technologies and digital transformation increased during the pandemic.

2. SOURCES OF INFORMATION FOR THE ANALYSIS OF LATVIAN COMPANIESS' INNOVATIVE BEHAVIOUR DURING THE COVID-19 PANDEMIC

The analysis of Latvian companies' innovative behaviour during the COVID-19 pandemic was based on the following sources of information:

1. Riga Technical University's research group surveys:
   a. The first survey is devoted to the study of the impact of the problems caused by the COVID-19 pandemic on Latvian companies and the possibility of eliminating their negative consequences (conducted in August – October 2020). The questionnaire was developed for the acquisition and analysis of both quantitative and qualitative data. The questionnaire was designed in four parts: (a) general information on the companies that participated in the survey (status

of the respondents in the company, age of the company, location, industry, and number of employees); (b) the overall impact of COVID-19 on the company's operations (remote working opportunities, number of redundancies, impact of COVID-19 on the company's processes and turnover); (c) the effect of external factors on the entity's internal processes; (d) the company's solutions to the crisis.

b. To obtain information on the innovative activities of enterprises during the Covid-19 pandemic, a second survey was conducted in February 2021, based on the Central Statistical Bureau's enterprise survey methodology [1]. In the analysis of innovative behaviour of enterprises, the terms included in the methodology of the Central Statistical Bureau (CSB) were used - innovative enterprise, innovatively active enterprise, and innovative activities. An innovative enterprise is an enterprise that introduced at least one innovation of a product (good or service) or business process (marketing, organizational or process) during the reporting period. Innovatively active enterprise - an enterprise that has implemented at least one innovation of a product (good or service) or business process (marketing, organizational or process) during the reporting period and / or has carried out innovative activities, including discontinued innovative activities or innovative activities that are still ongoing. Innovative activities - all scientific, technological, organizational, financial, and commercial activities, the actual or at least planned result of which is the implementation of innovations. Innovative activities also include research and development that is not directly related to the development of a specific innovation. These companies were divided into three categories: innovatively active companies - 22 (60%), innovative company - 1 (3%), and other companies - 14 (38%). Data on innovative behaviour of enterprises in the 2nd survey refer to 2019–2020, but data on enterprise turnover, number of employees, and expenditure on innovation refer to 2019. Companies from all regions of Latvia participated in the survey.

2. Research results from other countries [2, 3, 4. 5. 6].
3. Interviews of invited experts who provided their opinion on the factors hindering the development of innovation in Latvia.
4. Interviews of Latvian companies provided by European Investment Bank (EIB) [7]. The EIB survey collects data on the company's characteristics and performance, previous investments, incl. the development of new products / services and future plans, financial sources, financing issues, and other challenges facing companies. The 2020 report pays particular attention to the impact of the COVID-19 pandemic.
5. Other statistical and financial data (statistical data of the Patent Office Republic of Latvia [8]; financial statements of public enterprises [9]).

3. THE COURSE OF THE RESEARCH AND THE FINDINGS

3.1 Strategic and tactical initiatives of Latvian companies in response to the impact of the pandemic

In their study, Wenzel et al. [10] proposed four strategic initiatives in response to the effects of the crisis, which were used as a basis for analysis:

1) "Retrenchment" is a widespread strategic response to the crisis. This means that firms are taking steps to reduce their costs.
2) "Persevering" focuses on maintaining the current operations of the company. Businesses are trying to maintain the status quo and mitigate the adverse effects of the crisis.
3) "Innovating" is focused on strategic business renewal.
4) "Exit" is the last possible reaction if other strategies are considered unsuccessful.

During the Covid-19 crisis, some companies have managed to find new solutions to overcome this crisis and even improve the efficiency of their companies. The qualitative content analysis of answers to the question "Did you see and use any new opportunities that had a positive impact on the operation of your company during Covid-19?" from the first questionnaire revealed three groups of categories: (a) revenue growth due to the introduction of new products and services, the creation of new sales channels and the attraction of new customers; b) digitalisation of processes: new forms of work organization, introduction of new forms of internal and external communication, new forms of document circulation thanks to new IT solutions; (c) cost savings through the introduction of IT solutions and the recruitment of new professionals at a "reasonable cost", which increases the competitive advantage of companies. As a result, an increase in work efficiency was observed.

This result was demonstrated by small companies with up to 50 employees and over 18 years of business experience. These companies took advantage of strategic initiatives for "persevering" and "innovating", saved jobs, and did not reduce, but some even increased turnover.

Representatives of the companies were asked to answer the question about possible solutions to overcome the current situation "Which of the following solutions could improve the performance of your company in the long run?". The companies were offered nine different solutions for the further development of the company:

1. Flexibility of work organization;
2. Outsourcing;
3. Increasing the professional competencies of employees;
4. Investment in technology;
5. Digitization of processes;
6. Introduction of new products / services in the market;
7. New solutions in customer service;
8. Optimization of various processes;
9. Attracting new funding.

Evaluating the answers provided by the companies, it can be concluded that the entrepreneurs considered the six solutions as development-promoting, which are shown in Table 3.1.

Table 3.1.

Analysis of companies' responses to development-promoting solutions

Proposed solution	Estimate % of total answers
Optimization of various processes	18
Digitization of processes;	14
Investment in technology	13
Introduction of new products / services in the market;	12
New solutions in customer service	11
Increasing the professional competencies of employees	11

Source: Riga Technical University's research group the first survey

In new companies with a duration of less than one year, "flexibility of work organization" and "digitization of processes" are valued at 27%, the highest rating in this group. In turn, in all other companies it is "optimization of various processes" (1-6 years: 16%; 7-12 years: 14%; 13-18 years: 16%; over 18 years: 20%). Regardless of the number of employees, all companies have the highest rating for the "optimization of various processes" (up to 10 employees: 17%, 11-50 employees: 17%, 51-100 employees: 19%, 101-250 employees: 19%, over 250 employees: 18%).

Thus, the new business solutions developed and implemented by the surveyed Latvian companies correspond to the response to the Covid-19 crisis adopted by other companies around the world [2, 3, 4, 5, 6].

3.2 Innovative activities of Latvian companies in 2019-2020

Small, medium, and large industry and service companies from all regions of Latvia participated in the second survey on companies' innovative activities. The results show that 63% of the surveyed companies have implemented at least one product or business process innovation during the reporting period, or carried out an innovative activity that is still ongoing. The respondents of the second questionnaire, who demonstrated innovative behaviour, mainly belong to large companies.
The innovative behaviour activity of Latvian companies, which was researched by the European Investment Bank, is shown in Table 3.2

Table 3.2

Proportion of surveyed companies that introduced innovations

Type of companies	Development or introduction of new products, processes or services	
	Latvia	EU
All companies	38.92	41.55
Micro	27.56	27.23
Small	35.04	33.93
Medium	40.42	41.42
Large	42.68	47.6

Source: EIB Investment survey [7].

Latvian companies surveyed by the European Investment Bank demonstrate innovative behaviour similar to European companies, but the share of companies investing in new products, services or processes is lower than the European average. The EIB study provides a comparative analysis between all EU countries. Large companies are more innovative than small ones, which confirms the results of the 2nd survey.

Respondents shared their experiences of investment efficiency related to the introduction of innovation. Answering the question of the RTU 2nd survey "Did the introduced innovation meet the expected result" 55% of the surveyed entrepreneurs admitted that the result had been achieved, 6% indicated that the result was better than expected, while 6% admitted that the result was only partially achieved, 9% of the surveyed companies believed that the result was not achieved, while 24% could not assess the result yet.

Innovative companies, which were asked to answer the questions of the second survey of Riga Technical University, provided limited information on expenditures related to innovation. The problem is with cost accounting. There are actual expenses, but they are not identified in the financial statements. 26% of the surveyed companies that spend on innovation could not answer the question of how much is spent. 35% of the respondents indicated that they spent up to 10% of

turnover and 35% - from 10% to 20% of turnover, only one company answered that they spend 30% of turnover. Companies only provided information on the structure of expenditure (Source: Riga Technical University's research group the second survey) (see Figure 3.1).

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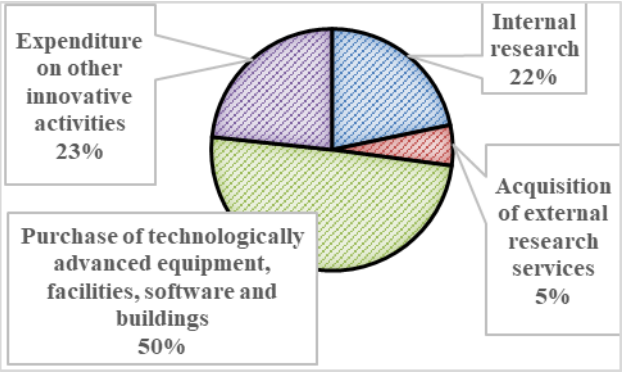

Figure 3.1: Expenditure structure for innovation in enterprises with product and business process innovation in 2019

Even companies listed on NASDAQ Riga provide information on R&D expenses only in the notes (text) to the financial statements and not in the income statement or balance sheet.

Table 3.3

R&D expenditures of companies listed on NASDAQ

Company	**R&D/turnover**	**Intangible assets / total assets**
HansaMatrix	15,8%	3,16%
SAF Tehnika	11,1%	9,7%
Olainfarm	2019 year 0,5% (plan for 2021 year 10%)	22.8%

Source: Nasdaq [9].

The result of the survey of Latvian companies conducted by the European Investment Bank on the investment structure is presented in Table 3.4.

Table 3.4

Investment structure [7]

Type of companies	Investment objective			
	Replacement of existing buildings, machinery, equipment, and IT	Capacity building of existing products/services	Development or introduction of new products, processes or services	Other
All companies	36	32	14	19
Micro	32	33	15	20
Small	30	34	20	16
Medium	33	35	15	17
Large	43	28	8	21
	100	100	100	100

The result of RTU's second survey on expenditure on innovation does not contradict information on expenditure on innovation from other sources (NASDAQ, EIB).

Excessive costs (51%), lack of funding (12%), other company priorities (18%), lack of human resources and time (9%) were cited by companies as the main factors hindering innovation activity between 2019 and 2020, but 10% believe all above.

Obstacles such as the availability of financing, high costs, and lack of human resources are also identified in other studies, namely, the EIB's survey of Latvian companies. In the analysis of factors hindering innovation activity in enterprises performed by the CSB [1], high costs for innovation were noted as primary.

3.3 Additional facts that testify to the innovative behaviour of Latvian companies

Innovative behaviour of companies can also be characterized by patent, trademark, and design application activities (see Tables 3.5 - 3.7).

Table 3.5

Dynamics of invention applications

	National applications, number	Growth rate of national applications, %
2020	93	13
2019	82	-5
2018	86	-4
2017	90	-11
2016	101	100

Source: Patent Office Republic of Latvia [8].

It was found out that on average 30% of the applicants are companies.

Table 3.6

Number of trademark applications

	Number of trademark applications	Growth rate of trademark applications, %
2020	2214	-21
2019	2790	-22
2018	3571	11
2017	3203	26
2016	2540	100

Source: Patent Office Republic of Latvia [8].

There is a declining trend in the number of trademark applications. Information on trademark applications in 2021 January (134 applications) shows that the innovation process continues despite the crisis.

Table 3.7

Design applications

	Total number of applications	Applications of Latvian origin, number	Growth rate of applications originating in Latvia, %
2020	79	79	34
2019	61	59	20
2018	51	49	2
2017	49	48	-21
2016	61	61	100

Source: Patent Office Republic of Latvia [8].

The growth rate of the number of design applications is positive. In 2020, the increase in the number of applications was 34% compared to 2019.

In the interviews, the invited experts (experienced entrepreneurs and venture capital funds' managers) gave their opinion on the factors that hinder the development of innovation in Latvia, as well as on the factors that promote the creation of innovations. Analysis of the experts' opinions allowed us to identify 10 different groups of factors that inhibit and stimulate innovation in Latvia.

4. CONCLUSIONS ON INNOVATIVE SOLUTIONS AND FACTORS INFLUENCING INNOVATION IN LATVIAN COMPANIES

The analysis of the data of the first survey revealed the solutions adopted to overcome the crisis caused by the COVID-19 pandemic in companies:

- introduction of new products and services, creation of new sales channels, and attraction of new customers, which gave an increase or stabilization of revenues;
- digitization of processes - new forms of work organization, introduction of new forms of internal and external communication, new forms of document circulation;
- implementation of IT solutions and attraction of new specialists, which increased the competitiveness and work efficiency of companies.

The second survey showed that 2/3 of the surveyed companies in the reporting period (2019-2020) have implemented at least one product or business process innovation, or performed an innovation that is still ongoing. In addition, large companies have the highest rates compared to small and medium-sized enterprises; this result is in line with the findings of a study conducted by the European Investment Bank in Latvia. In addition, 2/3 of the companies believe that the investment efficiency has been fully achieved, while the rest achieved part or no results. ¼ of the respondents could not assess their achievements; this indicates a lack of innovation accounting methodology.

The analysis of inventions, trademarks, and design applications (2016-2020) did not show a clear upward or downward trend, but it does indicate that the creation of intellectual products will continue in the crisis.

Based on the analysis of expert interviews, sets of factors hindering and promoting the development of innovation were created. Factors hindering the development of innovation are:

- High costs for creating and implementing innovation;
- Low level of innovation culture in the country;
- Lack of qualified human resources;
- Lack of experience in global business;
- Priority of traditional business solutions over innovative solutions;
- Insufficient financial resources for research, innovation-friendly education and innovation;
- Inadequacy of educational content to labor market needs and trends in the global economy;
- Problems with understanding the essence of innovation and lack of a unified methodology for innovation accounting;
- Lack of communication and collaboration between researchers and entrepreneurs;
- The demographic situation in a country with a rapidly aging society and the lack of immigration, which would encourage innovation and the entry of new technologies.

Factors that promote the development of innovation are:

- Access to finance, financial instruments, and state aid;
- Legal regulation, incl. tax policies that stimulate innovation;
- Cooperation and effective communication between industry and science;
- Strengthening the role of higher education in creating and implementing innovation;
- Professional development of human resources;
- Dissemination of good business practices as a source of motivation;
- Infrastructure improvement;
- Seeing and exploiting the potential of immigration.

Recommendations for promoting the development of innovation:

1. State support for the acceleration and further growth of start-ups through venture capital must be provided;
2. University study programs should update the use of different creativity methods in the study process;
3. Tax policy needs to change.

5. ACKNOWLEDGEMENT

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