The Impact of the COVID-19 Pandemic on Startups Operating in the Lublin Region

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Abstact:

Purpose: The purpose of this work is to explore the problems that the startups operating in the Poland's Lublin region are struggling and then to select the pairs problem-industry where there is a statistically significant relationship.

Design/Methodology/Approach: The research method was a diagnostic survey with the use of a questionnaire as a research tool. The questionnaire was sent out through Google Forms to the startups run the Lublin region. In total, the study covered 219 entities.

Findings: The conclusions from the research indicate that startups experienced serious hardship during the pandemic, which included problems with financial liquidity, decreasing sales volume, maintaining existing clients and acquiring new customers, and logistics difficulties. The research shows that the occurrence of particular groups of problems at a given level of significance, depends on a relatively small number of features. Analyzing individual problems, we found that the industry in which a given enterprise operates has no significant relation with the problems it experienced. Only in case of such problems as introducing remote work, access to new capital, sales drop, retaining present customers, ensuring health security of employees, renegotiation of contracts, and the issues concerning cybersecurity, there is a statistically significant relationship.

Practical Implications: The paper provides knowledge on the problems faced by startups in particular sectors of the economy. This knowledge can influence decisions made both by decision-makers within institutions providing support to businesses, as well as by entities operating in the surveyed industries.

Originality/Value: The paper presents the outcome of the recent study, carried out at the turn of 2020 and 2021, on the situation of startups operating in the Lublin region and their performance in a time of the pandemic.

Keywords: Startups, pandemic, COVID-19.

JEL codes: M10, M13, O1.
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1. Introduction

The emergence of coronavirus, which the World Health Organization (WHO) later named COVID-19, triggered a severe world economic crisis. Governments of many countries, including Poland, in an effort to combat the progressing pandemic introduced lockdowns and undertook other restrictions to protect their societies. Although these measures have proved to be effective in limiting the numbers of infections, introduced restrictions have severely impacted many businesses, including startups, which due to their nature are especially vulnerable to economic turbulences. A report prepared by the Inter-American Development Bank states that the present crisis may ruin the productive and societal fabric of many countries and thus can lead to a new reality, which would require stakeholders to assume various new roles in entrepreneurial and innovation ecosystems. This new normal will also bring new innovative business models, financing structures, and collaboration networks (Inter-American, 2020).

A number of studies show that both the pandemic and the resultant economic crisis have had a strong impact on the functioning of many enterprises and their market performance (Grima *et al.,* 2020; Khan *et al.,* 2020). The pandemic and its ramifications have threatened the future growth and development of innovative potentials of many businesses, and by limiting sales and thus threatening their financial liquidity, the crisis has pushed many businesses to the brink of bankruptcy (Prohorovs, 2020). Start-ups are no exception, they also face many adversities and hardship. However, some start-up businesses are doing well in the new reality and even managed to introduce innovative solutions enabling them to adapt flexibly to the new situation (Kuckertz *et al.*, 2020).

In 2020-2021, we carried out a study of startups operating in the Poland's Lublin region. The purpose of this study was to identify their major problems and challenges they face in the time of the COVID-19 pandemic. The study, which covered in total 219 startups, has greatly enriched our knowledge about the current situation of these entities.

2. Theoretical Background

The concept of start-up is not defined unambiguously in literature. Originally, the term start-up referred to all new business initiatives entering the market (Skala, 2018). Nowadays, in defining the start-up, attention is paid to such elements as the startup's industry, its size and stage of development, growth, search for a business model, and the lack of ready product or service that could be immediately offered. Many researchers claim that innovation is one of the most prominent distinctive features of startups (Blank and Dorf, 2013). Oftentimes, the concept of startups is linked with the need to use modern technologies (Grycuk, 2019), some authors directly point to businesses operating in the sector of ITC technologies, mainly in the Internet (Skala, 2018), while others point to enterprises involved in a wider field of

advanced technologies, nor named specifically (Cegielska and Zawadzka, 2018). However, this type of approach seems to be discriminatory as it excludes from the debate quite a big part of startup businesses that are not technologically advanced.

A startup can be perceived as a kind of experiment that is carried out in constantly changing economic conditions (Kogut, 2017). Another characteristic feature of startups is the search for optimal business model as they operate in conditions of uncertainty. S. Blank even argues that this quest for the most optimal business model is the purpose of the startup's existence. According to Blank's definition, the optimal model is characterized by the repeatability, profitability, and scalability, which means that the scale of a business undertaking can increased easily (Blank and Dorf, 2013).

In Estonia, one of the conditions that a business entity must meet to be named a startup is focusing on the development of a repeatable business model. For example in Germany, startups are defined as enterprises introducing innovations not only in offered products and used technology, but also in their business models (Beauchamp and Kowalczyk, 2017). For N. Robehmen a duration of an enterprise is crucial. In his opinion, after a period of three years most startups either ceased their operations or were took over by bigger enterprises. Robehmen claims that one point is beyond question – the key attribute of a startup is its capability to grow (Robehmen, 2013). D. Cockayne supports this approach, however, he points to major difficulties in defining growth (Cockayne, 2019).

In Poland, government institutions have adopted a definition according to which startups are entities that operate for a period of up to 3.5 years and use technologies that are available on the market no longer than 5 years (Nieć, 2019). The authors of this study have decided to adopt this definition for the purpose of their research.

A review of empirical research carried out in recent months has allowed the authors to understand how the COVID-19 pandemic influenced the functioning of enterprises, especially startups, which – according to G.S. Walsh and J.A. Cunningham – are among the most vulnerable players in every economy (Walsh and Cunningham, 2016). Although in order to prevent economic collapse governments across the world undertook various aid measures, innovative startups were largely neglected in this difficult time. Political initiatives were mainly centered on protecting larger companies and their employees (Kuckertz *et al.*, 2020).

3. Material and Methods

The research method was a diagnostic survey with the use of a questionnaire as a research tool. In order to verify the correctness of the questionnaire, a pilot study was carried out in a group of 10 experts. The survey was conducted from December 2020 through February 2021 using Google Forms. The link to the questionnaire was sent out to the startups operating in the Lublin region, selected by the research team.

The purpose of the study was to perform a broad analysis of the situation of regional startups and included such questions as their development stage, finance resources, applied business models, and other issues that have emerged following the outbreak of the COVID-19 pandemic.

For the purpose of the final analysis, the research team has selected 219 questionnaires, as follows:

- 46 questionnaires were collected using the platforms of Eastern Business Accelerator based in the city of Pulawy (34 questionnaires) and Lublin-based Unicorn (12 questionnaires);
- 47 questionnaires were gathered through regional labor offices;
- 30 questionnaires were provided by entrepreneurs that in the past were financially supported within the framework of the Rural Areas Development Program supporting such initiatives as Local Action Groups; and
- 56 questionnaires completed by other entities, including customers of branch offices of banks operating in the Lublin region.

This study uses some of the findings obtained during the study which show the problems faced by startups as a result of the crisis caused by the pandemic and numerous "lockdowns" introduced in order to stop it. The research question was formulated as follows:

RQ1: What problems hindered the functioning of startups in operating in the Lublin region in given industries during the COVID-19 pandemic?

The calculations were made using the KNIME Analytics Platform (www.knime.com). The independence test χ^2 was selected to analyze the impact of the COVID-19 pandemic on the operations of companies covered by the study.

4. Results

In order to meet the assumptions of the test, the results of the questionnaires were rebuilt in such a way that each of the possible answers was treated as a separate variable. In this way, a number of problems were obtained, which were then aggregated into the following three groups: A – Problems relating to employment and employees, B – Financial problems, C – problems relating to the functioning of organization (Table 1).

Due to the fact that the respondents had an option to choose more than one industry in which they run their business, in order to analyze the impacts of the pandemic on the operations of startups in the Lublin region, the following industries were distinguished: C11 – automation and robotics (9.59%), C12 – building industry (13.7%), C13 – education (5.48%), C14 – trade (12.79%), C15 – IT (26.94%), C16 – medicine (9.59%), C17 – agriculture and food processing (17.35%), C18 – event

organizers (10.05%), C19 – telecommunication (1.83%), C20 – financial services (10.5%), C21 – other services (21%), C22 – other (5.02%).

The respondents were asked to indicate the problems observed in their enterprises. The groups of identified problems are shown in Table 1 below along with the number of corresponding indications.

Table 1. *Problems experienced by startups operating in the Lublin region resulting from the COVID-19 pandemic*

|		Number of indications
Group A	Problems relating to employment and employees	77
Problem code	Problem description	
P1	Introduction of remote work (work from home)	45
P2	Problems with staff recruitment	21
P3	Staff reduction and freeze	11
Group B	Financial problems	425
Problem code	Problem description	
P4	Problems relating to financial liquidity	109
P5	Cost optimization/reduction	37
P6	Difficult access to new capital	62
P7	Difficult collaboration with investor(s) / lack of their support	19
P8	Sales drop	103
P9	Difficult access to aid measures designed to support entrepreneurs hit by the pandemic	46
P10	Late payments from customers / business partners	49
Group C	Problems relating to functioning of organization	387
Problem code	Problem description	
P11	Retaining current customers	90
P12	Logistic problems	71
P13	Ensuring personnel's health safety	32
P14	Decrease / optimization of marketing budgets	23
P15	Ensuring the health safety of customers / product users	23
P16	Development of new business model	14
P17	Renegotiations of contracts / agreements	20
P18	Maintaining high team morale	19
P19	Cybersecurity issues	5
P20	Acquiring new customers	90

Source: *Developed by the authors based on their research.*

An important element of the analyzes is to determine whether there are dependencies between the occurrence of individual problems, as well as their aggregated versions, and the industry in which startups operate. The relationship between the features and groups of problems indicated by the respondents was tested with the χ^2 test.

In all of the issues, a null hypothesis was made that there is no relationship between groups against the alternative hypothesis that such a relationship exists. In all tests,

the significance level was p = 0.05 and p = 0.1. The results of analyzes with the test of independence for aggregated groups of problems are presented in Figure 1.

***Figure 1.** Number of features (industries) with which the groups of problems indicated by startups depend*
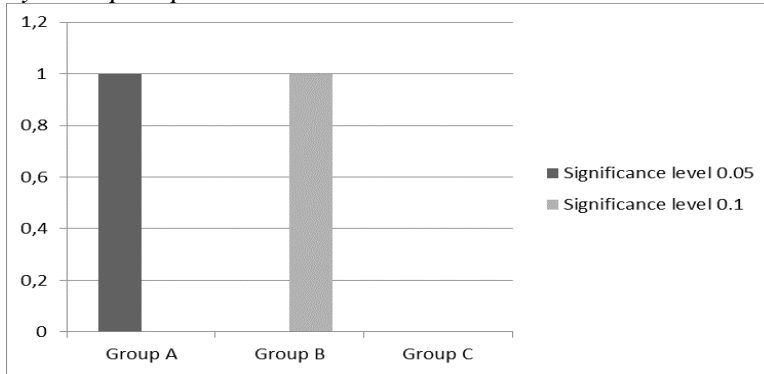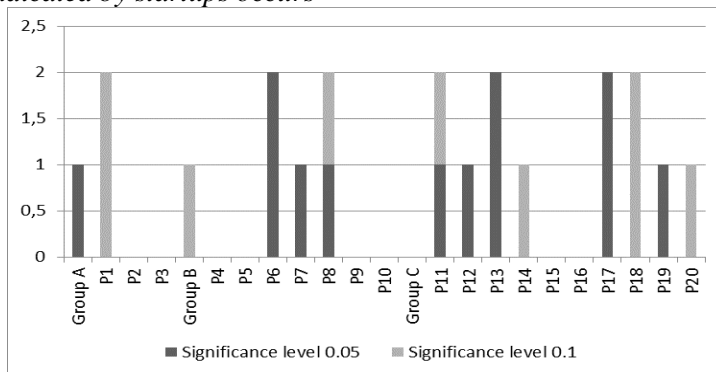

Source: *Own study based on own research.*

The occurrence of particular groups of problems at a given level of significance depends on a relatively small number of features. Only in the case of group A there is a statistically significant correlation for one industry, with the significance level p = 0.05. In the group of problems B, only one industry shows a significant relationship at the level of p = 0.1. An important issue seems to be whether a similar relation exists for particular problems (Figure 2).

As it is easy to notice in the case of the analysis of individual problems, the industry in which a given company operates is not related to the problems occurring in it. Only in the case of the problems P1, P6, P8, P11, P13, P17 and P18 for two industries there is a statistically significant correlation. In other words, for the two industries, the above-mentioned problems are not random.

***Figure 2.** Number of features (industries) with which the dependence of individual problems indicated by startups occurs*

Source: *Own study based on own research.*

The industries in which no statistically significant correlation with the problems caused by COVID can be found are C15 and C16, i.e., IT and Medicine, respectively. For other industries, one can indicate at least one problem with which a given industry is statistically significantly related.

Figure 3. *The number of problems associated with COVID in various industries startups in Lublin region*
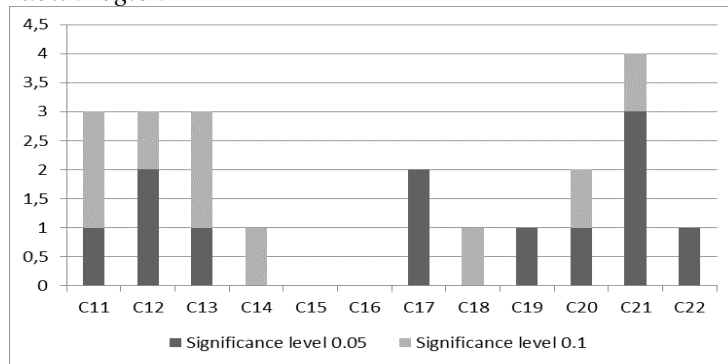
Source: Own study based on own research.

The detailed results of the analyzes carried out using the χ^2 independence test are shown in Fig. 4. The cases where the significance level of 0.05 should be rejected for the independence of the compared features. The cases where, at the significance level of 0.1, are marked in gray, the hypothesis about the independence of the compared features should be rejected. The remaining cases are marked in white.

Figure 4. *Results of analyzes of the independence of COVID problems indicated by the surveyed startups and industries*
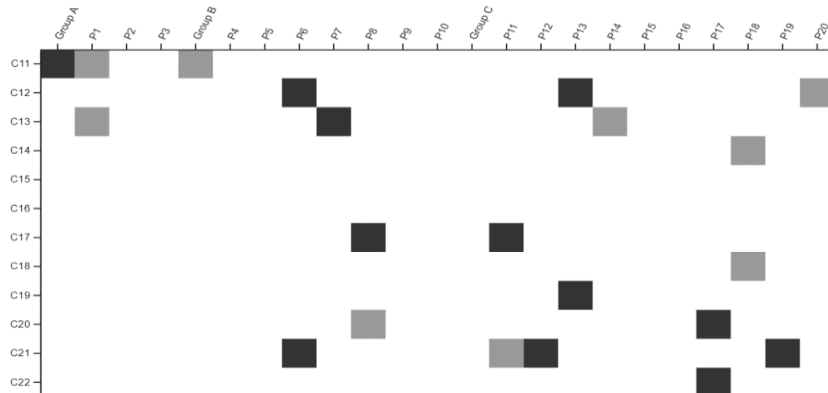
Source: Own study based on own research.

When analyzing the relationships presented in Figure 4, it can be noticed that at the significance level of 0.1, there is a number of relationships between the problems indicated by startups in the Lublin region and the industry in which they operate:

- automation and robotics (C11) and problems: aggregated results from group A and group B, as well as the P1 problem considered independently.
- construction (C12) and problems: P6, P13 and P20 considered independently.
- education (C13) and the problem: P1, P7 and P14 considered independently.
- trade (C14) and the P18 problem considered independently.
- IT (C15) - this industry does not show a statistically significant correlation.
- medicine (C16) - this industry does not show a statistically significant correlation.
- agriculture and food processing (C17) and problems: P6 and P11 considered alone.
- event organizers (C18) and problem P18 considered independently.
- telecommunications (C19) and the P13 problem considered independently.
- financial services (C20) and problems: P8 and P17 considered alone.
- other services (C21) and problems: P6, P11, P12 and P19 considered independently.
- others (C22) and problem P17 considered independently.

5. Discussion and Conclusion

The crisis caused by the COVID-19 pandemic has created difficult conditions for operations of many young enterprises. Our research has shown that during the pandemic, startups in the Lublin region, alike other market players, had to struggle with many problems related to employment, financing both the current, day-to-day operations and future investment plans, and many serious organizational issues.

Work from home was indicated by the respondents as one of the most important problems they faced (45 indications, 20.5%). This is similar to the findings of the study conducted in Serbia where 20% of entrepreneurs decided to introduce remote work (Beraha and Duricin, 2020). The χ^2 analysis of this issue in relations to industries where the startups in the Lublin region operate has confirmed the dependence only with two industries, i.e., automation and robotics, and education. As regards group A, which includes issues relating to staff employment, in categories such as problems with staff recruitment (21 indications), and staff reductions (11 indications), there were no significant statistical correlations with any of the industries covered by our study.

The second aspect we analyzed, involved a group of problems related to finances, which are not only Poland's specificity. For example, as shown by research conducted among 5,800 small and medium-sized enterprises in the United States (Bartik *et al.*, 2020), among innovative startups in Egypt (Zaazou and Abdou, 2020) and 184 Pakistani enterprises (Shafi, Liu, and Ren, 2020), during the pandemic, small businesses are mainly suffering financial problems. These observations only confirm the findings of our study. The problems with financial liquidity were the most frequently indicated by the surveyed entities (109 responses, 49.8%).

However, further analysis with the use of advanced statistical tools showed that that there were no statistically significant correlations with any of the industries. The analyzed problem affected the surveyed companies equally hard, regardless of the industry they operate in. The second most frequently raised problem was decreasing sales (103 indications, 47%). Similar conclusions result from a study carried out in Pakistan (Shafi, Liu, and Ren, 2020), and research run by the Poznan Science and Technology Park within the framework of the project Scale-up Champions, which included startups across Europe, especially startups operating in Central and Eastern European countries (PPNT, 2020). Our study showed that there was a significant statistical correlation at a significance level p=0.05 in agriculture and food processing, and in the financial services industry at a significance level p=0.1.

The other issue raised by the respondents, in which performed statistical analysis revealed dependence on the industry, was difficult collaboration with investor(s) and/or the lack of their support (19 indications, 8.7%). This dependence was identified in the sector of education. Other problems in this area that the respondents raised are not industry-dependent.

According to research carried out within the framework of the project Scale-up Champions , the most severe difficulty the startups had to cope with, was the lack of sufficient sales and inability of meeting with their clients. These observations agree with the outcome of our study. Within the group of problems associated with the functioning of organization (group C), the most frequent responses were: retaining current customers (90 indications) and acquiring new customers (90 indications), which makes up in total 41.1%. Statistically significant dependency occurred between the problem of retaining current customers and the sector of other services (p=0.05), and between acquiring new customers and the building industry (at the level p=0.1).

Another significant problem indicated by the surveyed startups were logistic difficulties (71 indications, 32.4%). This problem has been extensively discussed in literature (Shafi, Liu, and Ren, 2020). Our study found that there was is a statistical relationship between this problem and the industry defined as "other services".

In the sector of IT and medicine, we found no statistically significant relationship with the problems caused by the COVID-19 pandemic.

These findings are in accord with data presented in the report "Polish Startups 2020", developed by the Foundation Startup Poland. Research carried out in Poland show that the sector of modern digital solutions, where startups often locate their business interests, finds itself in a relatively good situation, as compared to other sectors of economy. Similar situation is observed in the medical sector, where 44% of respondents point to some good aspects of the pandemic for their business operations; 16% of surveyed respondents view the impact of the pandemic as definitively positive (Startup Poland, 2020).

In-depth analyses of the dynamics and directions of the impacts of particular problems resulting from the COVID pandemic on the industries considered in this work will be presented in subsequent papers. This work was aimed at selecting pairs "problem-industry", where there could be found a statistically significant relationship. In future research, we plan to perform an in-depth analysis of obtained research findings with the use of advanced tools such as machine learning techniques.

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