DIAGNOSTICS OF INNOVATIVE ACTIVITY OF SMALL ENTREPRENEURSHIP STRUCTURES IN THE LVIV REGION

Khrystyna P. Danylkiv, Lviv Polytechnic National University
Lev G. Kloba, Lviv Polytechnic National University
Mário Nuno Mata, ISCAL-Instituto Politécnico de Lisboa
José Moleiro Martins, Instituto Universitário de Lisboa (ISCTE-IUL)
Anabela Batista Correia, ISCAL-Instituto Politécnico de Lisboa
Rui Miguel Dantas, ISCAL-Instituto Politécnico de Lisboa
Iryna Zelenitsa, Kyiv National University of Trade and Economics
Maryana Havran, Lviv Polytechnic National University

ABSTRACT

The article examines the peculiarity, role and importance of small business in a market economy. The basic approaches to understanding the content of innovation activity of small business structures are presented. The opinions of different authors on the definitions of "innovation activity" and "innovation-active enterprise" are summarized.

The scientific approach to the research of innovative activity of small business structures at the level of individual region due to the ABC-XYZ-analysis and matrix modeling. Based on the use of this method, calculations were made, which made it possible to draw conclusions on the management of innovative activity at small enterprises in the Lviv region.

The integrated matrix of ABC and XYZ analysis of innovatively active small enterprises of Lviv region was built. Analyzing the results of the matrix, the leaders of innovative activity and the most effective leaders of small innovative enterprises in the region are identified.

It is revealed that out of twenty-eight innovatively active small enterprises of the Lviv region only the Public JSC "Galichfarm", "San Garden" Subsidiaries, Agrotorg Trade and Manufacturing Company, LLC and Agropobutiailice Limited but low reliability. In particular, Additional Liability Company "Spring-West", "Domain-Printing" LLC and others are characterized by average sales volume of innovative products. It is determined that the following enterprises: "Safe Glass Factors" LLC, "Kormotech" LLC, "Snezhka-Ukraine" LLC and others have low sales of innovative products, low degree of reliability of predictions due to stochastic activity.

Theoretical provisions and conclusions can be used to substantiate and implement decisions on state support for the development of small innovative business in the conditions of modernization of the Ukrainian economy, as well as contribute to the further scientific development of this topic. Positive experience gained by the region can be a potential example in the implementation of innovation policy in other regions of Ukraine in order to balance the level of their socio-economic development.

Keywords: ABC-XYZ Analysis, Mathematical Analysis, Innovation, Innovative Products, Small Businesses, Lviv Region.

JEL Classification: O32, O18, L25, M11

INTRODUCTION

Modern economy, as a complex system, covering almost all spheres and system of social production of the state, is impossible without the presence in its structure of various organizational-production subsystems that perform appropriate functional actions. Small business is rightly regarded as one of such subsystems in the overall structure of the economy, since it is an integral element of the market system, a powerful manufacturing sector, a special type of production and trading activity, an important factor for innovative development and efficient functioning of the domestic economy.

The peculiarity, role and importance of small business in a market economy and in society in general is that it is one of the leading sectors of national economies, as it determines the pace of economic development, demonstrates the expansion and renewal of offers in the domestic market of goods and services, ensures the growth of gross product, promotes competition in the innovation sphere, leads to saturation of the domestic market and filling the state budget, and makes a significant contribution to improvement and diversification market structure in the economy. With small scales of activity, these businesses respond to the expectations of the target markets and have the flexibility and ability to adapt quickly to new circumstances. The regional dimension affects the rationalization of the use of all types of resources, the activation of human capital accumulation and the accumulation of scientific and technical potential. In the conditions of systematic restructuring of the national economy, this business sector plays its leading role and acts as a guarantor of the stability of the economy and raising the standard of living of its citizens.

In the conditions of dynamic development of modern society, the main direction of stimulating the economic growth of small business entities is innovative development, which involves the use of fundamentally new advanced technologies, the transition to the production of high-tech products and the development of mechanisms for implementing management decisions in innovation.

LITERATURE REVIEW

Understanding the content of innovation activity of small business structures can be reduced to three main approaches. Two points of view are the most popular: the first is when innovation is seen as a purposeful activity in the field of innovation creation and implementation (Zamryha, 2014, p.95), and the second is as a characteristic of innovation activity (Illiashenko & Bilovodska, 2010; Khoma, 2014 ; Khoma, 2015; Shinkevich et al., 2016) reflecting the ability of a small business to update elements of a productive innovation system. According to the first point of view, the category "innovation activity" is identified with innovation activity and covers "a set of actions aimed at developing and introducing new or improved products (Chumak, 2009), technological processes (Polozova & Kryvtsun, 2015; Moroz, Khoma & Horyslavets, 2021), methods related to the sale of innovative products" (Khoma, 2013; Tsogla, 2016; Oliinyk et al., 2018). Accordingly, the system of indicators on the basis of which determine the level of innovation activity of small businesses, includes the diagnosis of indicators of efficiency and effectiveness of small businesses in the field of innovation. In this interpretation, any enterprise that conducts innovative transformations can be considered innovative indicates O. Polinkevych (2016a, p.60; 2017; 2018). In fact, this approach is applied in international innovation statistics.

According to the classification of UNESCO Institute for Statistics, all enterprises engaged in any activity related to creation of innovation during a certain reporting period (OECD/Eurostat, 2019), belong to the category of innovative-active, regardless of whether the specified activity led to real introduction of innovations.

Innovations are an important factor conditioning the development of small and medium enterprises since the development of innovativeness in these companies is one of the indicators of their competitiveness (Lisowska & Stanisławski, 2014, p. 319).

Scientists & Phlegont (2009, p.13) defines innovative activity as "the enterprise's actions to innovate without taking into account their intensity, level of novelty, and other similar characteristics that allow the enterprise to improve or maintain its existing position in the market environment".

Innovation activity writes Zhuk (1995, p. 40) is also considered as "a complex characteristic of small business innovation activity, which determines the degree of efficiency and intensity of actions for development, creation (or acquisition), development and introduction of new products, processes, organizational or marketing changes, as well as their timeliness, ability to mobilize innovation potential". That is, innovative activity characterizes not the end result of activity of the enterprise, but only its opportunities in sphere of development of innovations (Kaigorodova, Mustafina & Alyakina, 2018), (Koziuk et al., 2019), economic development (Polinkevych, 2016b; Achkasova, 2020; Danylkiv et al., 2020) and promotion on the market (Trynchuk, 2011; Horyslavets, Plonka & Trynchuk, 2018; Polinkevych & Kamiński, 2018), investment in education (Kaigorodova et al., 2017; Cwynar, 2019) and environmental protection (Grzebyk & Stec, 2015; Klapkiv et al., 2019; Trunina, Khovrak & Bilyk, 2020; Glonti et al., 2020).

The third group of definitions treats the innovative activity of entrepreneurship as a sign of its innovative activity, the economic essence of which is related to the intensity of actions to create and implement innovations. Thus, according researcher Trifilova (2005, p.52), innovative activity "reflects the intensity of activity of economic entities in the development and attraction of new technologies or improved products to economic circulation".

The realization that small businesses play an active role in innovation has led to a number of insights about the mechanisms by which small businesses improve and introduce new products and services (Danylkiv, 2013; Danylkiv, 2017). The researchers R. Rothwell & Whiston (2007, p.196) suggests that small firms can have an innovative advantage due to differences in management structures. Similarly, Scherer (1991, p.26) argues that the bureaucracy in large firms is not conducive to undertaking risky R&D.

The solution of many socio-economic problems of innovatively active small business structures lies in the plane of an effective system of sales of innovative goods and services, which depends on the range of products being produced. Product range management requires consideration of the influence of many factors and the use of appropriate analysis methods for criterion decision making. One of the effective tools for solving this problem is the widely used ABC-XYZ analysis approach, developed by General Electric in the 1950s (Dickie, 1951, p.93).

METHODOLOGY

Conduct monitoring and analysis of innovatively active small business structures in Lviv region on the basis of the proposed ABC-XYZ analysis algorithm. This, in turn, will allow to identify the enterprises-leaders of innovative activity and the most effective leaders of

innovatively active small enterprises, as well as to create conditions for stable development, implementation and realization of innovative activity.

The most available monitoring method is the ABC-XYZ analysis. ABC analysis allows you to identify the most and least innovative enterprises. XYZ analysis allows evaluating the stability of implementation, implementation and acquisition of innovations on innovatively active business structures. The consolidation of both methods leads to the assumption that not all innovative enterprises are characterized by the same impact on the effectiveness of innovation management (Figure 1).

The application of the ABC-XYZ analysis method is carried out in three stages, which includes carrying out the ABC analysis (Ng, 2007), XYZ analysis (Dhoka & Choudary, 2013) and the combination of the results of the two steps in the ABC-XYZ matrix (Pandya & Thakkar, 2016, p.84; Stojanović & Regodić, 2017, p.37). So, first, it is advisable to consider each method individually, and then in interaction.

It should be noted that ABC analysis is an important method that can be used to identify the key points and priorities of innovation. This, in turn, makes it possible to identify the most significant areas of activity, to direct business activity in the field of increased economic importance and at the same time reduce costs in other areas by eliminating unnecessary functions and types of work and increase the effectiveness of organizational and management decisions due to their target orientation.

In our case, the use of ABC analysis is based on the Pareto principle of "Rule 80:20" or the law of "important minority" (first discovered and theoretically substantiated in 1897), which can be formulated as follows: "for most possible results, 80% a relatively small number of reasons corresponds to 20%, that is, 80% of the annual sales volume of innovative products is provided by 20% of innovative enterprises". In particular, innovative small businesses are divided into three groups.

Group A: includes small innovative enterprises that account for approximately 80% of the annual sales of innovative products.

Group B: includes small businesses that account for approximately 15% of the annual sales of innovative products.

Group C: Includes innovative small businesses that account for approximately 5% of annual sales of innovative products.

The ultimate goal of ABC analysis is to focus on the priority areas for the development of innovative small businesses, as well as to identify real ways to increase the sales of their innovative products.

XYZ analysis is an important method that can be used to group and classify innovation assets. XYZ analysis can be formulated as follows: "the accuracy of forecasting the reliability of innovation, which is ensured by effective management, depends on the stability of innovation activity, which is manifested in the periodic implementation of costs for innovation, implementation, implementation and acquisition of any innovations".

Group X: characterizes sustainable innovation. Effective management of innovative activities leads to stable implementation of costs for implementation, implementation and acquisition of innovations at the enterprises of Lviv region. The coefficient of variation is 0-10%.

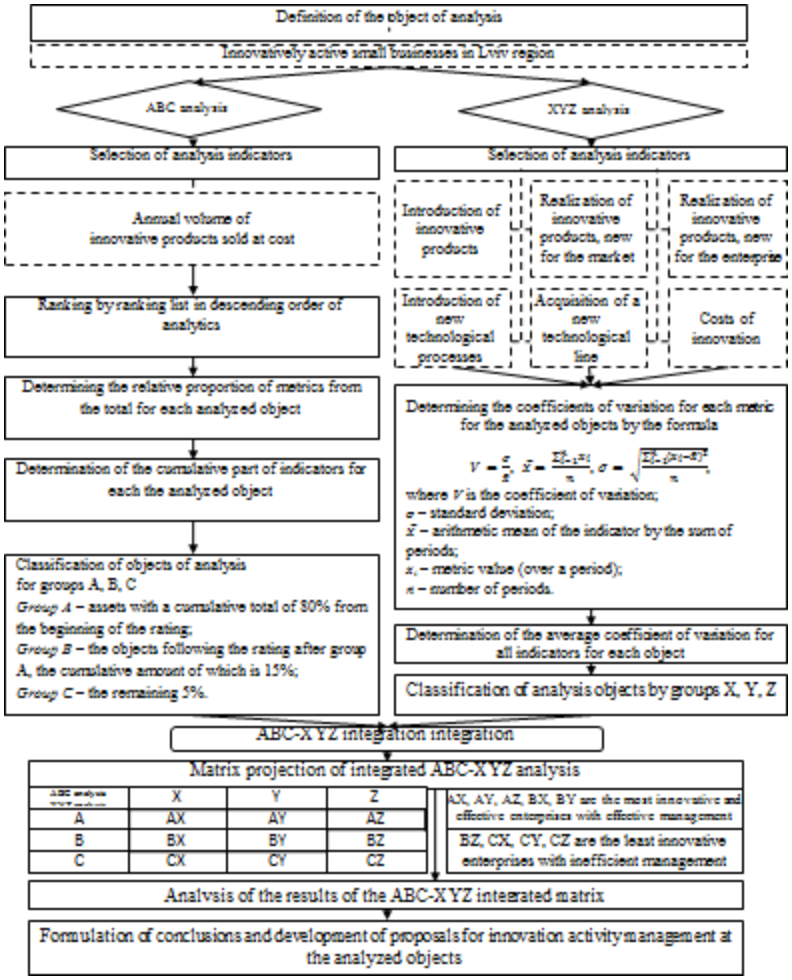

FIGURE 1
ABC-XYZ ANALYSIS ALGORITHM

Group Y: characterizes moderate, possibly unstable innovation activity. It characterizes instability and instability in the costs of implementation, implementation and acquisition of innovations in small business structures of Lviv region. The coefficient of variation is 10-25%.

Group Z: characterizes unstable and irregular innovation activity. The coefficient of variation is more than 25%.

The ultimate goal of ABC-XYZ analysis is to analyze the leading innovation activities and to formulate conclusions and proposals on the effectiveness of management in innovatively active small enterprises in the Lviv region.

RESULTS

Let's take a closer look at the ABC-XYZ analysis method on the example of innovative small enterprises in Lviv region.

Investigating the management of innovation activity, we determine that the object of analysis is to select innovatively active small enterprises in the Lviv region in 2019-2020, for

which ABC and XYZ analysis will be conducted. From the statistical data of the Main Directorate of Statistics in the Lviv region and the accounting of enterprises, we form data on the state of innovation activity of small business structures in the Lviv region: the number of innovatively active enterprises, the list of innovative small enterprises, the directions of innovation activity.

We perform the ABC analysis, which is performed in the following sequence:

- From the statistical data the list of innovative small enterprises of the Lviv region in 2018 is formed.
- From the accounting data provided by innovatively active enterprises of the Lviv region, data on the annual volume of innovative products sold by cost are selected.
- The dimensions of the annual volume of innovative products sold by value are recorded in the ranking list in order from larger to smaller.
- The share of each small innovative enterprise in the Lviv region is determined by the cost of Ci in the total annual volume of innovative products sold as a percentage.
- The cumulative sum of the value of the annual volume of innovative products sold at the cost ∑Ci of each innovative small enterprise of Lviv region is found.
- The innovative enterprises of Lviv region are classified according to groups A, B and C according to the cumulative share of the indicator ∑Ci in the order of its growth (80%/15%/5%).
- The calculated results are shown in Table 1 and are shown in Figure 2.

Table 1
RESULTS OF INNOVATIVELY ACTIVE SMALL BUSINESS STRUCTURES OF LVIV REGION ACCORDING TO ABC ANALYSIS

№	Legend	Name of Company	The relative part	Cumulative part	Normalized object number	Group
1	2	3	4	5	6	7
1	D7	PUBLIC JOINT STOCK COMPANY "GALICHFARM"	0,443	0,331	0,05	A
2	D5	"SAN GARDEN" SUBSIDIARIES	0,449	0,423	0,07	A
3	D14	AGROTORG TRADE AND MANUFACTURING COMPANY, LLC	0,453	0,453	0,08	A
4	D1	AGROPOBUTSERVICE LLC	0,342	0,761	0,14	A
5	D13	"JOINT UKRAINIAN-GERMAN ENTERPRISE" ELECTRONTRANS LLC	0,247	0,800	0,16	A
6	D15	ADDITIONAL LIABILITY COMPANY "SPRING-WEST"	0,033	0,831	0,18	B
7	D25	"DOMAIN-PRINTING" LLC	0,032	0,845	0,21	B
8	D11	"GREEN MOUNTAIN" LLC	0,030	0,861	0,24	B
9	D12	LIABILITY COMPANY "IMVO" SCIENTIFIC AND MANUFACTURING COMPANY	0,026	0,887	0,29	B
10	D28	"HETMANN" RESEARCH AND PRODUCTION COMPANY	0,025	0,912	0,35	B
11	D8	LLC RESEARCH AND PRODUCTION ENTERPRISE "TECHNOWAGS"	0,027	0,912	0,35	B
12	D24	"EMBAVUD" UKRAINE LLC	0,019	0,912	0,35	B
13	D6	"SAFE GLASS FACTORS" LLC	0,018	0,927	0,40	C

14	D10	"KORMOTECH" LLC	0,013	0,921	0,44	C
15	D26	"SNEZHKA-UKRAINE" LLC	0,012	0,958	0,46	C
16	D4	"BAKER-UKRAINE" LLC	0,022	0,934	0,46	C
17	D9	"FURNITURE-SERVICE" LLC	0,017	0,951	0,47	C
18	D18	"FAKRO LIVES" LLC	0,014	0,965	0,53	C
19	D27	"VEEM-METALAVTOPROM" LLC	0,013	0,978	0,59	C
20	D3	"HINKEL-KOGUT" LLC	0,012	0,991	0,65	C
21	D17	"FARMATRADE" SUBSIDIARY	0,006	0,987	0,69	C
22	D20	UKRAINIAN-ENGLISH JOINT VENTURE IN THE FORM OF LLC "HALKA LTD"	0,001	1,000	0,73	C
23	D21	PRIVATE JOINT STOCK COMPANY "ENZYM COMPANY"	0,000	1,000	0,79	C
24	D23	PRIVATE JOINT STOCK COMPANY "LVIV REFRIGERATOR"	0,000	1,000	0,87	C
25	D2	"ELGRAF" LLC	0,000	1,000	0,92	C
26	D22	"LIABILITY INVEST" LLC	0,000	1,000	1,00	C
27	D19	"AKO INDUSTRIES" LLC	0,000	1,000	1,00	C
28	D16	"TAIFUN-PLUS" PRIVATE ENTERPRISE	0,000	1,000	1,00	C

We perform XYZ analysis, which is performed in the following sequence:

- The list of small innovative enterprises of the Lviv region for the years 2019-2020 is formed from the statistical data.

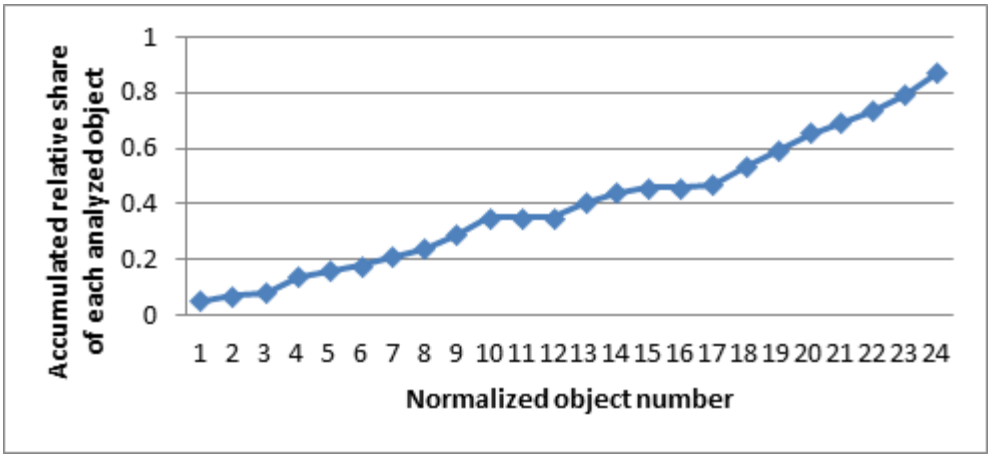

FIGURE 2
INNOVATIVELY ACTIVE SMALL BUSINESSES ABC GROUP OF LVIV REGION

- From statistical data information on directions of realization of innovative activity is formed: introduction of innovative types of products, realization of innovative production, new for the market, realization of innovative production, new for the enterprise, introduction of new technological processes, acquisition of a new technological line, realization of innovation costs of each innovative active small business.

- The coefficient of variation $V_{j,k}$ is calculated for each innovative small enterprise of Lviv region according to a separate direction of innovation activity. To calculate the coefficient of variation $V_{j,k}$ we use the following formulas:

$$V_{j,k} = \frac{\sigma_{j,k}}{\bar{x}_{j,k}} \quad V = \frac{\sigma}{\bar{x}}, \quad \bar{x}_{j,k} = \frac{\sum_{i=1}^{n} x_i}{n} \quad \bar{x} = \frac{\sum_{i=1}^{n} x_i}{n}, \quad \sigma_{j,k} = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x}_{j,k})^2}{n}} \tag{1}$$

where, $V_{j,k}$ – is the coefficient of variation; $\sigma_{j,k}$ – is the root mean square deviation; $\bar{x}_{j,k}$ – is the arithmetic mean of the indicator by the sum of periods; x_i – is the i-th value of the indicator (in a certain period); n – is the number of periods; j, k – is the number of an innovative small business enterprise and the direction of innovation activity. $\sigma = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n}}$

- The generalized coefficient of variation V_j of each innovative small business is calculated using the following formula:

$$\bar{V}_j = \frac{\sum_{k=1}^{m} V_{j,k}}{m} \tag{2}$$

where, $\bar{V}_j$ – is the generalized coefficient of variation; t – number of directions of innovative activity; t=6.

- The generalized coefficient of variation V_j of innovatively active industrial enterprises of Lviv region is decreasing from the lowest to the largest.

- Classification of innovatively active industrial enterprises of the Lviv region by groups X, Y and Z is carried out according to the range of changes of the calculated coefficient of variation.

- The results of the calculation are summarized in Table 2.

Table 2
RESULTS OF INNOVATIVELY ACTIVE SMALL BUSINESS STRUCTURES OF LVIV REGION BY XYZ-ANALYSIS

№	Legend	Name of Company	The coefficient of variation	The cumulative value of the coefficient of variation	Normalized object number	Group
1	2	3	4	5	6	7
1	D27	"HETMANN" RESEARCH AND PRODUCTION COMPANY	0,5640	0,5640	0,05	Z
2	D23	PRIVATE JOINT STOCK COMPANY "LVIV REFRIGERATOR"	0,6721	1,2360	0,07	Z
3	D19	"AKO INDUSTRIES" LLC	0,6824	1,2472	0,08	Z
4	D12	LIABILITY COMPANY "IMVO" SCIENTIFIC AND MANUFACTURING COMPANY	0,8080	2,0441	0,14	Z
5	D27	"VEEM-METALAVTOPROM" LLC	0,8333	2,8774	0,16	Z
6	D15	ADDITIONAL LIABILITY COMPANY "SPRING-WEST"	0,8333	3,7107	0,18	Z
7	D7	PUBLIC JOINT STOCK COMPANY "GALICHFARM"	0,8351	4,5458	0,21	Z
8	D14	AGROTORG TRADE AND MANUFACTURING COMPANY, LLC	0,8881	5,4339	0,24	Z

9	D22	"LIABILITY INVEST" LLC	0,9171	6,2400	0,29	Z
10	D20	UKRAINIAN-ENGLISH JOINT VENTURE IN THE FORM OF LLC "HALKA LTD"	0,9261	6,3600	0,35	Z
11	D21	PRIVATE JOINT STOCK COMPANY "ENZYM COMPANY"	0,9435	7,3034	0,35	Z
12	D1	"AGROPOBUTSERVICE" LLC	0,9435	7,3034	0,35	Z
13	D26	"SNEZHKA-UKRAINE" LLC	0,9857	8,2634	0,40	Z
14	D13	"JOINT UKRAINIAN-GERMAN ENTERPRISE" ELECTRONTRANS LLC	0,9962	8,2997	0,44	Z
15	D2	"ELGRAF" LLC	0,9966	9,2963	0,46	Z
16	D8	LLC RESEARCH AND PRODUCTION ENTERPRISE "TECHNOWAGS"	1,0000	10,2641	0,46	Z
17	D16	"TAIFUN-PLUS" PRIVATE ENTERPRISE	1,0000	10,2963	0,47	Z
18	D17	"FARMATRADE" SUBSIDIARY	1,0000	11,2963	0,53	Z
19	D11	"GREEN MOUNTAIN" LLC	1,0000	12,2963	0,59	Z
20	D24	"EMBAVUD" UKRAINE LLC	1,0000	13,2671	0,65	Z
21	D4	"BAKER-UKRAINE" LLC	1,0000	13,2963	0,69	Z
22	D3	"HINKEL-KOGUT" LLC	1,0000	14,2471	0,73	Z
23	D5	"SAN GARDEN" SUBSIDIARIES	1,0000	14,2762	0,79	Z
24	D18	"FAKRO LIVES" LLC	1,0000	15,2741	0,87	Z
25	D6	"SAFE GLASS FACTORS" LLC	1,0000	15,2862	0,92	Z
26	D9	"FURNITURE-SERVICE" LLC	1,0000	15,2862	1,00	Z
27	D25	"DOMAIN-PRINTING" LLC	1,0000	15,2863	1,00	Z
28	D10	"KORMOTECH" LLC	1,0000	15,2871	1,00	Z

Integrate ABC and XYZ analysis into the combined table 3.

Table 3
INTEGRATION OF ABC AND XYZ ANALYSIS OF INNOVATIVELY ACTIVE INDUSTRIAL ENTERPRISES OF LVIV REGION

№	Name of Company	Legend	ABC and XYZ analysis
1	PUBLIC JOINT STOCK COMPANY "GALICHFARM"	D7	A Z
2	"SAN GARDEN" SUBSIDIARIES	D5	A Z
3	AGROTORG TRADE AND MANUFACTURING COMPANY LLC	D14	A Z
4	AGROPOBUTSERVICE LLC	D1	A Z
5	"JOINT UKRAINIAN-GERMAN ENTERPRISE" ELECTRONTRANS LLC	D13	A Z
6	ADDITIONAL LIABILITY COMPANY "SPRING-WEST"	D15	B Z
7	"DOMAIN-PRINTING" LLC	D25	B Z
8	"GREEN MOUNTAIN" LLC	D11	B Z
9	LIABILITY COMPANY "IMVO" SCIENTIFIC AND MANUFACTURING COMPANY	D12	B Z
10	"HETMANN" RESEARCH AND PRODUCTION COMPANY	D28	B Z
11	LLC RESEARCH AND PRODUCTION ENTERPRISE "TECHNOWAGS"	D8	B Z

12	"EMBAVUD" UKRAINE LLC	D24	B Z
13	"SAFE GLASS FACTORS" LLC	D6	C Z
14	"KORMOTECH" LLC	D10	C Z
15	"SNEZHKA-UKRAINE" LLC	D26	C Z
16	"BAKER-UKRAINE" LLC	D4	C Z
17	"FURNITURE-SERVICE" LLC	D9	C Z
18	"FAKRO LIVES" LLC	D18	C Z
19	"VEEM-METALAVTOPROM" LLC	D27	C Z
20	"HINKEL-KOGUT" LIMITED LIABILITY COMPANY	D3	C Z
21	"FARMATRADE" SUBSIDIARY	D17	C Z
22	UKRAINIAN-ENGLISH JOINT VENTURE IN THE FORM OF LLC "HALKA LTD"	D20	C Z
23	PRIVATE JOINT STOCK COMPANY "ENZYM COMPANY"	D21	C Z
24	PRIVATE JOINT STOCK COMPANY "LVIV REFRIGERATOR"	D23	C Z
25	"ELGRAF" LIMITED LIABILITY COMPANY	D2	C Z
26	"LIABILITY INVEST" LLC	D22	C Z
27	"AKO INDUSTRIES" LLC	D19	C Z
28	"TAIFUN-PLUS" PRIVATE ENTERPRISE	D16	C Z

Based on the calculations made, in order to analyze and draw conclusions about innovatively active industrial enterprises in the Lviv region, it is necessary to use the matrix representation method of integrated ABC and XYZ analysis, which is shown in Figure 3.

ABC-analysis / XYZ-analysis	A	B	C
X	-	-	-
Y	-	-	-
Z	D7; D5; D14; D1; D13	D15; D25; D11; D12; D28; D8; D24	D6; D10; D26; D4; D9; D18; D27; D3; D17; D20; D21; D23; D2; D22; D19; D16

Source: authoring.

FIGURE 3
ABC AND XYZ ANALYSIS MATRIX OF INNOVATIVE SMALL ENTERPRISES IN LVIV REGION

As a result of combining ABC analysis and XYZ analysis into an integrated matrix of ABC-XYZ analysis, we will get 9 groups that will allow us to form conclusions on innovation management at small enterprises in Lviv region (Figure 4).

ABC-analysis / XYZ-analysis	A	B	C
X	high volume of sales of innovative products and high degree of reliability of the forecast due to stability of innovative activity	medium volume of sales of innovative products and high degree of reliability of forecasting due to stability of innovative activity	low volume of sales of innovative products and high degree of reliability of the forecast due to stability of innovative activity
Y	high volume of sales of innovative products and average degree of forecasting reliability due to cyclical innovation activity	average sales volume of innovative products and average degree of forecast reliability due to cyclical innovation activity	low sales volume of innovation products and average degree of forecast reliability due to cyclical innovation activity
Z	high volume of sales of innovative products and low degree of reliability of the forecast due to stochastic innovation activity	average sales volume of innovative products and low degree of reliability of forecasting due to stochastic innovation activity	low volume of sales of innovative products and low degree of reliability of the forecast due to stochastic innovation activity

FIGURE 4
INTEGRATED ABC AND XYZ ANALYSIS MATRIX ON MANAGING INNOVATION IN SMALL BUSINESSES LVIV REGION

CONCLUSIONS

Analyzing the results of the integrated matrix ABC-XYZ-analysis, it is found that out of seventeen innovative small enterprises of Lviv region only Public JSC "Galichfarm", "San Garden" Subsidiaries, Agrotorg Trade and Manufacturing Company, LLC and Agropobutservice LLC have a high volume of innovative products, but low. In particular, Additional Liability Company "Spring-West", "Domain-Printing" LLC, "Green Mountain" LLC, Liability Company "IMVO" Scientific and Manufacturing Company, "Hetmann" Research and Production Company, LLC Research and Production Enterprise "Technowags" and "Embavud" Ukraine LLC, is characterized by an average sales volume of innovative products. It is determined that all other research enterprises have low volume of sales of innovative products, low degree of reliability of the forecast due to stochastic innovation activity.

Therefore, the use of combined ABC and XYZ analyzes allows:

- identify the functional areas of innovation and innovation management in innovative small enterprises;
- identify key factors for effective innovation management that affect the number of small innovative enterprises;
- to increase the efficiency of the innovation management system in innovatively active enterprises;
- increase the share of innovatively active industrial enterprises by taking on the experience of effective management of innovative activity;

- redistribute management efforts according to skills and experience.

The implementation of these measures will allow industrial enterprises of Lviv region and Ukraine, in particular, to update products, technologies, receive information, financial, tax, legal support for the implementation of innovative programs, fully implement the innovative development strategy.

Positive experience gained by the region can be a potential example in the implementation of innovation policy in other regions of Ukraine in order to balance the level of their socio-economic development.

REFERENCES

Achkasova, S. (2020). Implementation the fuzzy modeling technology by means of fuzzytech into the process of management the riskiness of business entities activity. *Eastern-European Journal of Enterprise Technologies, 5*(3-107), 39–54.

Chumak, O. (2009). Socio-philosophical analysis of the concept of "innovation" and "innovation activity". *Humanities Bulletin of Zaporizhzhya State Engineering Academy, 36,* 152-165.

Cwynar, A., Cwynar, W., Dankiewicz, R., Ostrowska-Dankiewicz, A., & Oratowski, P. (2019). Why do consumers remain financially illiterate? The empirical test of some less investigated reasons. *Journal of Eastern European and Central Asian Research, 6*(1), 40–55.

Danylkiv, K. (2013). Economic essence and role of small business in the conditions of market economy development. *Formation of market economy in Ukraine, 29* (1), 126-133.

Danylkiv, K. (2017). *Innowacyjne instrumenty finansowe i kredytowe w małych strukturach biznesowych na Ukrainie w Zb. nauk. prats «Innowacyjna edukacja jako składowa inteligentnego miasta*». Wyższa Szkoła Techniczna w Katowicach, 11-23.

Danylkiv, K., Gorbova, K., Hembarska, N., Trynchuk V., Paida, Y., & Havran, V. (2020). Methods of economic evaluation of concession project effectiveness. *Montenegrin Journal of Economics, 16*(4), 67–84.

Dhoka, D., & Choudary, Y. (2013). «XYZ» Inventory classification & challenges. *IOSR Journal of Economics and Finance (IOSR-JEF), 2*(2), 23-26.

Dickie, H. (1951). ABC inventory analysis shoots for dollars, not pennies. In: *Factory Management and Maintenance*, *109*(7), 92-94.

Glonti, V., Trynchuk, V., Khovrak, I., Mokhonko, G., Shkrobot, M., & Manvelidze L. (2020). Socialization of organization sustainable development based on the principles of corporate social responsibility, *Montenegrin Journal of Economics, 16*(1), 169-182.

Grzebyk, M., & Stec, M. (2015). Sustainable development in EU countries: Concept and rating of levels of development. *Sustainable Development, 23*(2), 110–123.

Horyslavets, P., Plonka, M., & Trynchuk, V. (2018). Experience marketing and its tools in promoting the insurance services. *Innovative Marketing, 14*(1), 41–48.

Illiashenko, S., & Bilovodska, O. (2010). *Management of innovative development of industrial enterprises: a monograph*. Sumy: Universytetska knyha.

Kaigorodova, G., Kosarenko, N., Shapovalov, D., Sayfutdinova, G., Sharonov, I., Ignatov, S., & Kartushina, I. (2017). Integrative module technology of future engineers training in the field of ecological-economic safety. *Eurasian Journal of Analytical Chemistry*, *12*(7), 1079 – 1088.

Kaigorodova, G., Mustafina, A., & Alyakina, D. (2018). Directions of improving information system of insurance company. *Journal of Physics: Conf. Series,* 1015.

Khoma, I. (2013). Rapid diagnostics of trends of economic protectability of enterprise by monitoring indicators of innovation. *Naukovyi visnyk Natsionalnoho hirnychoho universytetu, 4*, 101–106.

Khoma, I. (2014). Applied aspects in formation and application of diagnostics toolkit for enterprise innovation security. *Actual Problems of Economics, 3*, 220-229.

Khoma, I. (2015). Enterprise's economic protectability diagnostics under the impact of unsettled business conflicts. *Economic Annals-XXI, 3-4*(1), 46–50.

Klapkiv, Y., Koziuk, V., Dluhopolskyi, O., & Ivashuk, Y. (2019). Environmental welfare: Quality of policy *vs*. society's values. *Problemy ekorozwoju – Problems of sustainable development, 14*(1), 19-28.

Koziuk, V., Dluhopolskyi, O., Hayda, Y., & Klapkiv, Y. (2019). Does educational quality drive ecological performance? Case of high and low developed countries. *Global Journal of Science and Management, 5*, Special Issue, 22-32.

Lisowska, R., & Stanisławski, R. (2014). Institutional support system for the development of SME innovation. *International Journal of Innovation and Learning, 16*(3), 319-337.

Moroz, L., Khoma, I., & Horyslavets, P. (2021). Modeling of production processes with regeneration for ensuring enterprise competitiveness. *Mathematical Modeling and Computing, 8*(1), 78–88.

Ng, W. (2007). A simple classifier for multiple criteria ABC analysis. *European Journal of Operational Research, 177*(1), 344-353.

OECD/Eurostat (2019), Oslo Manual 2018: *Guidelines for Collecting, Reporting and Using Data on Innovation, (4th Edition).* The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris/Eurostat, Luxembourg. from: http://www.oecd.org/sti/oslo-manual-2018-9789264304604-en.htm

Oliinyk, V., Kozmenko, O., Wiebe, I., & Kozmenko, S. (2018). Optimal control over the process of innovative product diffusion: The case of sony corporation. *Economics and Sociology, 11*(3), 265-285.

Pandya, B., & Thakkar, H. (2016). A review on inventory management control techniques: ABC-XYZ analysis. *REST Journal on Emerging trends in Modelling and Manufacturing, 2*(3), 82-86.

Polinkevych, O. (2016a). Factors of enterprises' outstripping development in conditions of global economic crisis. *Economic Annals-XXI,* 156, 59-62.

Polinkevych, O. (2016b). Methodical approaches to expert selection for evaluation of enterprise innovative development. *Actual Problems of Economics, 176*(2), 421–428.

Polinkevych, O. (ed.). (2017). *Process and socially competent management of innovative development of business systems: monograph.* Lutsk: Vezha-Druk.

Polinkevych, O. (ed.). (2018). *Corporate innovation development strategies and technologies*: *monograph* (416 p.). Lutsk: Vezha-Druk.

Polinkevych, O., & Kamiński, R. (2018). Corporate image in behavioral marketing of business entities. *Innovative Marketing, 14*(1), 33–40.

Polozova, T., & Kryvtsun, D. (2015). Innovative activity of enterprise and economic essence of innovation process. *Scientific Bulletin of the International Humanities University. Series: Economics and Management, 12*, 108-113.

Rothwell R., & Whiston, T. (2007). Design, innovation and corporate integration. *R&D Management, 20*(3), 193-201.

Scherer, F. (1991). *Changing perspectives on the firm size problem. In Innovation and Technological Change; An International Comparison (edited by Z. J. Acs and D. B. Audretsch), Ann Arbor*, MI: University of Michigan Press, 24-38.

Shinkevich, M., Shinkevich, A., Chudnovskiy, A., Lushchik, I., Kaigorodova, G., Ishmuradova, I., … & Zhuravleva, T. (2016). Formalization of sustainable innovative development process in the model of innovations diffusion. *International Journal of Economics and Financial Issues, 6*(1), 179-184.

Stojanović, M., & Regodić, D. (2017). The significance of the integrated multicriteria ABC-XYZ method for the inventory management process. *Acta Polytechnica Hungarica, 14*(5), 29-48.

Trifilova, A. (2005). *Evaluation of efficiency of innovative development of the enterprise: a monograph*. Moskva: Finansy i statystyka.

Trunina, I., Khovrak, I., & Bilyk, M. (2020). Academic entrepreneurship in ukraine: Determinants of development and performance indicators. *Proceedings of the 25th IEEE International Conference on Problems of Automated Electric Drive. Theory and Practice, PAEP 2020,* 9240891.

Trynchuk, V. (2011). Fire marks as a type of external advertisement for insurance company. *Actual Problems of Economics, 122*(8), 50-59.

Tsogla, O. (2016). Investment and innovative activity of industrial enterprises of Lviv region. *Bulletin of the National University "Lviv Polytechnic". Management and entrepreneurship in Ukraine: stages of formation and development problems*, *851*, 146–149.

Zamryha, A. (2014). The essence of the concepts of "innovation process" and "innovation activity" in the theory of agrarian economy. *Economy AIC, 9*, 92–95.

Zhits, H., & Flehont, A. (2009). On innovative activity and factors determining its level in industrial enterprises]. *Innovatsyonnaia deiatelnost – Innovative activity, 2*(7), 11-17.

Zhuk, O. (1995). Small business in the world and in Ukraine. *Economy of Ukraine, 7*, 37-46.