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THE IMPACT OF LENDING ON THE INNOVATIVENESS OF LIGHT MANUFACTURERS

ABSTRACT

The companies' innovative activities are a foundation for strengthening their position in the industry and ensuring sustainable access to advanced technologies. Analysis of the correlation between access to loans and innovative activity gives grounds not only to evaluate the effectiveness of companies' investment decisions but also to identify barriers that hinder their progress. This determines the relevance of the issue under research. The aim of this study is to determine the impact of lending on the innovativeness of light manufacturers globally, which is essential for understanding the mechanisms that contribute to the development of the industry. The Granger test was used to establish causality. The Dickey-Fuller test was performed to verify the model. The impact was assessed and analysed using correlation and regression analysis. The results of the study indicate that there is no causal relationship between lending and the growth of the number of innovative light manufacturers. According to the regression analysis, investment in innovative companies in Sweden shows a significant positive effect, as an increase of USD 1 million in funding leads to an 11% increase in the number of such companies. In the US, an increase in lending by the same amount stimulates only a 4% growth of innovative light manufacturers. The UK recorded a similar figure at 2%, while it reached 6% in Singapore. These differences indicate the variability of investment efficiency in different countries. The obtained results can significantly contribute to the deepening of research on the use of credit for the introduction of innovations in light manufacturers. A promising direction for further analysis is the study of the influence of credit mechanisms on the innovative development of the light industry in developing countries. This research has the potential to identify key factors that contribute to successful innovation in this area.

Keywords: bank loans, innovative companies, light industry, innovation financing, financial support, credit resources, company development

JEL Classification: D20, G21, O31

INTRODUCTION

In modern conditions of globalization and constant changes in the market of financial services, credit resources have become an important tool for stimulating innovation processes.

Scientific and technological innovations are an extremely important element of the strategy of increasing the key competitiveness of the state. Technological innovations determine the companies' ability to adapt to dynamic market conditions, but also to outpace their main competitors on a global scale. In this context, technologies play a decisive role in creating added value and improving financial results. However, practice shows that many companies face significant financial constraints, which impedes making large-scale investments in research and development (R&D). Given resource limitations, these companies are forced to limit themselves only to incremental innovations. This does not sufficiently stimulate their technological growth, but also seriously complicates the process of acquiring key competencies that are necessary to achieve technological breakthroughs. This, in turn, creates risks of insufficient endurance and adaptability under fierce competition. In today's context, the search for more effective financing mechanisms for innovative activities is particularly relevant. This becomes not only

an important but also a complex problem that requires an urgent and well-reasoned solution on the part of the state and business.

Technological innovation occupies a central place in the process of rapid economic growth. They provide an opportunity to significantly reduce production costs, but also significantly contribute to the increase in production volumes. In turn, this has a positive effect on the companies' competitiveness in the global market. The introduction of the latest technologies and the automation of production processes allows organizations to optimize the use of resources, reduce production time and increase product quality. Therefore, technological innovations are a catalyst for increasing business models' efficiency and adaptability to changes in consumer demands and the competitive environment. This creates a stable basis for the sustainable development of the economy as a whole (Vikia, 2023; Zakiyyah, 2023).

LITERATURE REVIEW

A large number of studies identify the relationship between corporate financial policies and green innovation (Chang et al., 2024). Recent studies have actively applied environmental policy as quasi-natural experiments, allowing for a more detailed exploration of potential endogeneity problems (Zhang et al., 2022; Wang et al., 2023). This approach provides an opportunity to analyse the impact of policy decisions on environmental outcomes, providing a more accurate understanding of the relationships between economic and environmental systems (Lu et al., 2022; Wang et al., 2022). This helps researchers to identify and correct problematic aspects of policy impacts on the natural environment (Hu et al., 2020). However, it should be noted that these cited studies focus only on environmental innovations. This approach, for example in the research (Zhang et al., 2022; Wang et al., 2023), neutralizes the impact of another type of innovation on increasing labour productivity.

In some works, a positive relationship was found between bank lending and the innovative activities of borrower companies. Thus, Dou and Xu (2021) note that bank lending contributes to innovation, but regulation is a factor that can adversely affect the effectiveness of lending, potentially posing significant obstacles to innovation. This is because banks experiencing excessive regulatory pressure are less inclined to provide large amounts of loans. At the same time, Giebel and Kraft (2020) noted that the complexity of access to credit only significantly affects the decisions of companies regarding their innovative strategies in the long term. Instead, a lack of access to credit can hurt in the short term. For example, this may lead to the need for changes in current innovation activities, in particular, to reduce innovative projects. Toxopeus et al. (2021) explored ways to improve access to bank lending for companies engaged in an innovative circular business model. Among such ways, scientists have identified the possibility of signalling the expected cash flows, establishing relationships with banks and customers, and developing long-term cyclical assets that can serve as collateral.

Along with bank lending, consortium lending can play an essential role in supporting the innovative development of companies (Palchevich & Petrenko, 2019). Kravchenko et al. (2020) note that this tool is a temporary association of subjects of the banking and real sectors of the economy to achieve their goals. Such goals can be, in particular, support for large and risky innovative projects. At the same time, such a tool is relatively new in Ukraine and is rarely used.

Particular attention should be paid to venture financing and innovative company activities. Tretyakova et al. (2020) explain the importance of such funding by attracting long-term financial resources to the creative sector to finance projects with a high level of risk. In addition, it will allow for the diversification of financing to mitigate risks. Kirichenko (2020) attested to the importance of venture finance in supporting firms with high growth potential through their innovation. The scientist emphasizes the need to develop and implement a mechanism for such financing in Ukraine. In some works, the importance of financial leasing is noted, which positively affects the innovativeness of enterprises.

In some works, the importance of financial leasing is noted, which positively affects the innovativeness of enterprises (Lian, 2024; Jiang et al., 2023), (Kuznyetsova et al., 2017). Compared to traditional bank loans and other forms of debt financing, financial leasing offers a number of significant advantages, which are especially relevant for enterprises seeking to optimize their financial flows. In turn, this reduces the credit risk for the investor and also provides both parties with the possibility of flexible regulation of the rent. This approach contradicts the approaches of previous authors, who note the need to reduce lending.

Financial leasing is an essential tool that promotes adequate financing between the demand and production of equipment in the context of its essence and practical application in developed countries. In turn, this introduces positive changes in the functioning and development of the real economy (Liu & Wang, 2022). Being an integral part of the modern financial environment, financial leasing provides companies access to modern equipment without significant capital investment,

which can only sometimes be made due to limited budgets or market instability (Kulikov et al., 2022). This enables companies to optimize production processes, improve productivity, and compete globally. In addition, financial leasing moves into short-term or medium-term obligations, reducing the financial burden on enterprises and facilitating liquidity management. So, leasing contracts provide anti-crisis financing and technological progress, which is extremely important for the sustainable development of the economic system as a whole.

The loan repayment scheme is a critically important aspect of financial planning, as its competent development can significantly affect the general economic condition of both the borrower and the lender. According to the research conducted by Gu (2022), a strategic approach to establishing a loan repayment schedule allows for maximum benefit to both parties. This approach is a continuation of the study of financial leasing as a basis for innovative financing, as noted by the authors of earlier studies. The essence of the continued research is that lenders get confidence in the stability of their income thanks to a well-planned repayment scheme. Clearly defined terms and repayment amounts enable forecasting cash flows. Therefore, ensuring harmony in the management of the repayment scheme is an integral component of effective relations between the lender and the borrower, as it allows not only to reduce risks but also to increase the overall reliability of financial transactions.

The issue of attracting loans by light manufacturers remains unexplored, as there is quite a lot of research on innovation loans and investments in "green" innovations. This research is conducted in this area.

AIMS AND OBJECTIVES

The aim of this study is to determine the impact of lending on the innovativeness of light manufacturers at the global level, which is essential for understanding the mechanisms that contribute to the development of the industry.

The goal was achieved through the implementation of the following research tasks:

- to study the relationship between bank lending and the share of innovative light manufacturers using the Granger test;
- to determine a correlation between the level of innovations in light industry and lending for innovations;
- to assess the impact of loans on increasing the share of innovative light manufacturers.

METHODS

Research design

In the article, a three-stage modelling is proposed taking into account the complexity of the relationships (Figure 1).

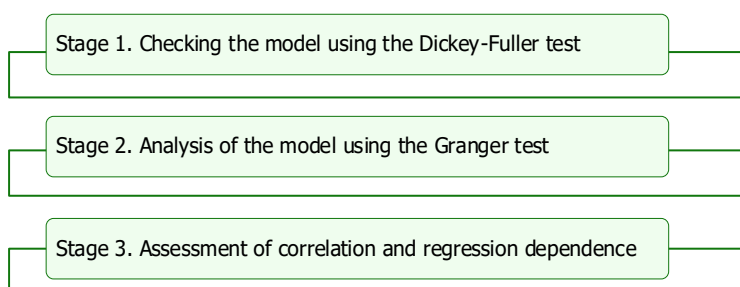


Figure 1. Research design.

The first stage involved testing the model using the Dickey-Fuller test in order to prepare statistics for further research using the Granger test. The second stage is the stage of evaluating and analysing the results of the Granger test to determine the causal relationships between loans and light industry innovations. The third stage is a continuation of the assessment of the relationship between loans and innovation. However, the correlation between loans and innovations is investigated, and a regression model is also studied in the third stage. A regression model is necessary to determine the quantitative impact of loans on innovation in light industry.

Sampling

The main indicator of the implementation of innovations is the Global Innovation Index. According to it, Switzerland ranked first in 2023 with an indicator of 67.6 (Dutta et al., 2023). The top five most innovative countries also include Sweden, the United States, the United Kingdom, and Singapore. Therefore, the results of the innovative activity of the light manufacturers of the leading countries in the field of innovation are the most indicative of the quantitative results of the study. Two main indicators were chosen for the analysis. The first indicator for the study is the innovations lending rate in Sweden, the USA, Great Britain, and Singapore. The second indicator is the share of innovative companies in the light industry. The 5 most innovative countries according to the Global Innovation Index in 2023 are Sweden, the USA, Great Britain, and Singapore. The data are selected for the analysis from 2015 to 2023, inclusive, to cover various innovation trends. This period is particularly interesting because of the crisis and the coronavirus pandemic, as well as the war in Ukraine. These indicators are the most illustrative for achieving the research objectives. All statistical data for analysis are taken from World Bank analytics (World Bank Group, n.d).

Methods

The study applied unit root tests, particularly the Dickey-Fuller test, to check the stationarity of time series. The null hypothesis of the Dickey-Fuller test refers to the properties of time series, in particular, it states that the series is non-stationary and has a unit root, while the parameter $\mu = 0$ is equal to zero. This means that the variables can be identified as random walk processes with a constant. In contrast, the alternative hypothesis states that the series is stationary and that the parameter $\beta < 1$ is less than unity. Dickey and Fuller recommended estimating the autoregression model using standard statistics for similar hypotheses in order to ensure the correctness of the statistical test of the null hypothesis. However, it is worth noting that the assumption that the variables follow a first-order autoregressive process with uncorrelated errors is significantly limiting (Yun et al., 2020).

The equation is the following:

$$\Delta Y_t = (\beta - 1)Y_{t-1} + \sum_{j=1}^k \gamma_j \Delta Y_{t-j} + \varepsilon_t$$

$$\Delta Y_t = (\beta - 1)Y_{t-1} + \varepsilon_t \quad (1)$$

where Y_t – the variable being modelled; t – time change; β – coefficient; ε_t – prediction error; Δ – the first differentiation operator.

The Granger causality test is one of the most common concepts of causality. This method is used for components of a stationary random process and determines whether one variable causes another. This test is based on the fundamental presumption that the future cannot be influenced by the past. Granger argues that in order to establish a causal relationship between variables x and y , it is necessary to estimate how much of the variation in the current value of y is explained by its past values. This explanation improves when past values of x are added. If there is a reduction in the variance of y because of information from x , then x can be considered the cause of y . In the context of vector autoregression, the variable x will be recognized as the cause of y if the corresponding lag coefficient is statistically significant, which opens up prospects for further study of the causal relationship between the two variables (Yun et al., 2020):

$$x_t = \sum_{j=1}^p a_j x_{t-j} + \sum_{j=1}^p b_j y_{t-j} + \varepsilon_t$$

$$x_t = \sum_{j=1}^p C_j x_{t-j} + \sum_{j=1}^p D_j y_{t-j} + \varepsilon_t \quad (2)$$

where x_{t-j} , y_{t-j} – studied time series; p – the number of studies; a_j , b_j , c_j , d_j – node matrices; ε_t – prediction errors.

The absence of a causal relationship between x and y means that $d_j=0$, $j=1, \dots, p$. In other words, past values of x do not affect y . The existence of no causality in the opposite direction means that $b_j=0$, $j=1, \dots, p$. In the case of a stationary process, the possibility of testing hypotheses regarding cause-and-effect relationships can be implemented with the help of F-statistics. The null hypothesis in this context states that one variable is not the cause of another according to the Granger causality. It is important to note that Granger causality should not be equated with the traditional form of causality,

as it is context-specific in which one variable predicts another. This approach emphasizes the importance of the previous variable, as well as its ability to provide information that provides a more accurate prediction of the behaviour of another variable, but does not draw conclusions about deeper causal relationships (Yun et al., 2020).

Regression analysis is another method used in the study, which characterises the relationship between the studied indicators. Regression analysis is a way to study the one-way relation between a random variable y and one or more variables x . In other words, if the average value of the dependent variable y is considered as a function of the explanatory variable x , which indicates the correlation between the variables, the simple paired regression model has the following form. The main purpose of this analysis is to establish and quantify the degree of relationship between the variables, which makes it possible to make further predictions and optimize decisions based on the obtained data:

$$\hat{y} = f(x) \tag{3}$$

and the multiple regression model looks like this:

$$\hat{y} = f(x_1, x_2, \dots, x_k) \tag{4}$$

where the mean value of the dependent variable is considered as a function of the k^{th} independent variables (Bigliardi et al., 2020).

RESULTS

Before building models for regression analysis, a necessary step is to check the data for stationarity. The extended Dickey-Fuller test is used as one of the modern approaches in this area, and it belongs to the class of cointegration tests or unit root tests. Methods such as de-trending, calculating differences, or error-correction modelling make the time series stationary. As a rule, the alternative hypothesis of this test is the stationarity of the series; therefore, if the calculated coefficient is less than the critical value, this indicates the presence of a unit root and, accordingly, the non-stationarity of the series. The data shown in Table 1 were obtained from the analysis.

Table 1. Results of Dickey-Fuller test calculation. (Source: created by the author based on (World Bank Group, n.d.))		
Indicator	Coefficient	
	Calculated	Critical
Switzerland		
Innovation loans for light manufacturers	1.816	0.1122
The share of innovative light manufacturers	0.8370	0.4302
Sweden		
Innovation loans for light manufacturers	2.655	0.0327
The share of innovative light manufacturers	4.221	0.0039
USA		
Innovation loans for light manufacturers	4.320	0.0035
The share of innovative light manufacturers	7.234	0.0002
Great Britain		
Innovation loans for light manufacturers	1.491	0.1797
The share of innovative light manufacturers	4.396	0.0032
Singapore		
Innovation loans for light manufacturers	5.014	0.0015
The share of innovative light manufacturers	7.651	0.0001

The results of the Dickey-Fuller test allow us to conclude the stationarity of the time series of innovation activity in the studied countries. Given that the determined values of the coefficients for most indicators are higher than the corresponding critical values, we can talk about the stationarity of these time series. Therefore, further regression analysis can be performed without additional data transformations. From an economic point of view, this means that the studied indicators of innovation activity are not subject to significant fluctuations or random wanderings. In other words, the innovation activity of countries is stable, which allows analyzing data without the risk of distortion of results due to non-stationary.

Before proceeding with the regression analysis, it is important to establish whether the dependent variables are truly a consequence of the choice of the principal component. This will significantly affect the interpretation of the results. In the case of stationary time series, it is appropriate to apply the Granger test to check the causal relationship between the variables. The critical value is determined based on the Fisher distribution and depends on the chosen degrees of freedom. The Granger test results are presented in Table 2 for a more detailed analysis of the relationships between the studied variables in order to confirm or refute the existing hypotheses.

Table 2. The Granger test results. (Source: created by the author based on (World Bank Group, n.d.))

Name of dependencies	F-test	Granger test
Switzerland		
Innovation loans for light manufacturers do not Granger Cause The share of innovative light manufacturers	0.54800	0.6460
The share of innovative light manufacturers does not Granger Cause Innovation loans for light manufacturers	0.23613	0.8090
Sweden		
Innovation loans for light manufacturers do not Granger Cause The share of innovative light manufacturers	2.94004	0.2538
The share of innovative light manufacturers does not Granger Cause Innovation loans for light manufacturers	0.45532	0.6871
USA		
Innovation loans for light manufacturers do not Granger Cause The share of innovative light manufacturers	0.81458	0.5511
The share of innovative light manufacturers does not Granger Cause Innovation loans for light manufacturers	0.83781	0.5441
Great Britain		
Innovation loans for light manufacturers do not Granger Cause The share of innovative light manufacturers	0.63770	0.6106
The share of innovative light manufacturers does not Granger Cause Innovation loans for light manufacturers	7.26451	0.1210
Singapore		
Innovation loans for light manufacturers do not Granger Cause The share of innovative light manufacturers	3.45023	0.2247
The share of innovative light manufacturers does not Granger Cause Innovation loans for light manufacturers	1.05939	0.4856

The analysis's results conclude that there is no causal relationship between the volume of innovative loans for light industry manufacturers and the share of innovative enterprises in these countries. This indicates that changes in one of the elements do not lead to corresponding changes in another, which is important to consider when advancing further hypotheses and models. An analysis was conducted using the Granger test to check the reliability of the created model. The results of the analysis are presented in Table 3.

Table 3. Results of the Granger test statistics calculation. (Source: created by the author based on (World Bank Group, n.d.))

Switzerland			
Mean	335.3333	Standard deviation	115.5335
Sum of the squares of the remainders	97068.69	Root mean square error of the regression	117.7580
R-squared	0.900981	Adjusted R-squared	0.388790
Log probability	-54.55722	Akaike criterion	113.1144
Schwartz criterion	113.5089	Hannan–Quinn criterion	112.2632
Rho parameter	0.926872	Durbin Watson statistic	0.256917
Sweden			
Mean	41.66667	Standard deviation	10.28348
Sum of the squares of the remainders	238.6259	Root mean square error of the regression	5.838614
R-squared	0.717936	Adjusted R-squared	0.677642
Log probability	-27.51997	Akaike criterion	59.03994
Schwartz criterion	59.43439	Hannan–Quinn criterion	58.18872
Rho parameter	0.156221	Durbin Watson statistic	1.320802
USA			
Mean	50.44444	Standard deviation	18.78238
Sum of the squares of the remainders	333.0133	Root mean square error of the regression	6.897342
R-squared	0.882003	Adjusted R-squared	0.865146
Log probability	-29.01976	Akaike criterion	62.03951
Schwartz criterion	62.43396	Hannan–Quinn criterion	61.18829
Rho parameter	0.380181	Durbin Watson statistic	1.215639
Great Britain			
Mean	1292.070	Durbin Watson statistic	421.3982
Sum of the squares of the remainders	377720.4	Root mean square error of the regression	232.2930
R-squared	0.734114	Adjusted R-squared	0.69131
Log probability	-60.67153	Akaike criterion	125.3431
Schwartz criterion	125.7375	Hannan–Quinn criterion	124.4918
Rho parameter	0.410197	Durbin Watson statistic	0.889081
Singapore			
Mean	53.18889	Durbin Watson statistic	6.606520
Sum of the squares of the remainders	37.29852	Root mean square error of the regression	2.308324
R-squared	0.893179	Adjusted R-squared	0.877919
Log probability	-19.16823	Akaike criterion	42.33646
Schwartz criterion	42.73090	Hannan–Quinn criterion	41.48524
Rho parameter	-0.068528	Durbin Watson statistic	1.918059

The data acquired during this test allow us to assess whether the volume of innovative credits for light industry manufacturers can predict the future value of the share of innovative enterprises in these countries. The obtained statistical indicators indicate the need for further study and possibly a revision of the chosen methodology, as the absence of a cause-and-effect relationship may indicate that additional factors or external influences that were not taken into account in this analysis are needed for a better understanding of the problem under study.

The results of the Granger test indicate the absence of a causal relationship between the independent variables, as well as between them and the dependent variable, which may indicate that changes in the same factors do not lead to changes

in the results of the dependent variable. However, it is important to note that even in the absence of causal relationships, significant correlations are possible that may reflect common trends or patterns in the data. That is why correlation analysis is recommended to identify and evaluate the strength and direction of relationships between variables. This analysis can reveal significant dependencies that were not noticed in the Granger test and can serve as an important additional tool for a comprehensive understanding of the studied phenomena. For example, if there is a positive correlation between the volume of innovative loans and the share of innovative enterprises, we can say that the growth of investment in innovation is accompanied by an increase in the pace of innovation. As a result, correlation analysis becomes important in many applied scenarios, such as financial forecasting, social research, and market trend analysis, enabling researchers to formulate more well-founded hypotheses and recommendations based on discovered correlations.

Based on the results of the correlation analysis, we have the following data:

- the correlation between the amount of innovation loans and the share of innovative light manufacturers in Switzerland is 0.930163;
- the correlation between the amount of amount of innovation loans and the share of innovative light manufacturers in Sweden is 0.9098;
- the correlation between the amount of amount of innovation loans and the share of innovative light manufacturers in the USA is 0.951846;
- the correlation between the amount of amount of innovation loans and the share of innovative light manufacturers in Great Britain is 0.9375;
- the correlation between the amount of amount of innovation loans and the share of innovative light manufacturers in Singapore is 0.967463.

Such calculation results indicate a close correlation and the influence of loans on the innovativeness of companies. The final stage is regression analysis, which models and quantifies dependencies between indicators. In our case, regression analysis will help solve the following problem: to identify the impact of innovative credits on the share of innovative light producers. To build the model, the dependent variable Y (The share of innovative light manufacturers) and the independent variable X (Innovation loans for light manufacturers) were used. The results of the regression analysis are shown in Table 4.

Table 4. The results of the regression analysis. (Source: created by the author based on (World Bank Group, n.d.))

Name	Switzerland	Sweden	USA	Great Britain	Singapore
Multiple R	0.301630535	0.90923395	0.951845797	0.856779262	0.967463082
R-squared	0.909809795	0.82670638	0.906010422	0.734070704	0.935984815
Normalized R-squared	-0.038878881	0.80195015	0.892583339	0.696080804	0.926839789
Standard error	4.655337556	4.57643645	6.155827397	7.124219657	1.786941157
Regression equation	$Y=41.1097 - 0.0119X$	$Y = 13782+0.111X$	$Y = 5.302 + 0.0459X$	$Y = 0.0547+0.0262X$	$Y = 38.687 + 0.0668X$

Therefore, the research results give grounds to state that the influence of loans on the innovativeness of light manufacturers has a complex structure that cannot be reduced to a simple cause-and-effect relationship. It means that such an impact can have a more complex system of interactions, which requires additional research. Instead, the analysis shows a correlation and regression relationship, which indicates a certain interdependence between these two indicators. The constructed regression equations indicate that the growth of innovative loans usually leads to an increase in the share of innovative producers. Consequently, lending is important for developing and contributing to innovation. As regards Switzerland, it is worth noting that the reverse relationship is observed in this country only. An increase in lending volumes for innovations in light manufacturers is accompanied by a decreased share of innovative companies. This phenomenon can be explained by the specific features of innovation financing in Switzerland, which are significantly different from other countries. At the same time, countries that occupy leading positions in the Global Innovation Index demonstrate a positive impact of lending on innovativeness. For example, in Sweden, the growth of an innovative enterprise by USD 1 million leads to an increase in the number of such enterprises by 11%. In the USA, an increase in innovation lending volumes by a similar amount contributes to the growth of innovative light industry enterprises by 4%. Similarly, in Great Britain this figure is 2%, while in Singapore it is 6%. These data indicate the importance of adequate financial support to stimulate innovation processes in the field of light industry at the global level.

DISCUSSION

The provisions of our research are aimed at determining the impact of lending on the innovation of the light industry. It was found that the impact of lending on innovation is complex and cannot be reduced only to a causal relationship. At the same time, regression analysis demonstrates the interdependence between the studied indicators. These results are reflected in Deng et al. (2021), which examined the impact of banks' "geographic diversification on companies" innovation through lending. Toxopeus et al. (2021) also note that the credit resources of banks are a necessary requirement for the innovative development of firms (2021). Dou and Xu (2021) observed that reduced access to bank loans negatively impacts companies' innovation activities. This is because banks are less inclined to provide loans, which leads to their borrowers reducing investment in research and development. This reduces the quality and quantity of their patents. Wang et al. (2021) also revealed the positive impact of bank financing on innovation. Scientists noted that access to financing should be facilitated because it will facilitate companies' introduction of advanced technologies and the implementation of expensive innovative projects. Liu and Li (2020) concluded that banking competition will contribute to the innovation activity of firms, as it will provide better access to lending, eliminating credit restrictions and reducing interest rates.

In contrast to our work, individual studies considered factors such as duration of exposure - short- or long-term. Thus, Giebel and Kraft (2020) did not reveal the long-term impact of reduced access to lending on companies' innovation. At the same time, scientists assume the existence of influence in the short term. In addition, in some works, the type of innovation is considered when determining the impact of lending on innovation. So, Khan et al. (2021) observed that financial constraints impact incremental innovation more strongly than radical innovation. The researchers noted that such findings point to the significant role of bank financing in supporting innovation in developing countries.

In the context of innovation, an important stage is the study proposed by Mou (2024), which focuses on the analysis of Internet banking as part of corporate innovation. This work is a detailed analysis of a specific type of innovation, as it perfectly illustrates how financial technologies can transform traditional business processes, creating new opportunities for enterprises. Compared to our study, which focuses on the impact of lending on the level of innovativeness of the company, the works of Zhang and Liu (2022) and Sun et al. (2023) focus on ways of introducing innovations. This study aims only to analyse such an influence, which is an important, but rather specific aspect in terms of innovative processes taking place in the corporate sector.

The foregoing gives grounds to make a conclusion regarding the achievement of the aim of the research by fulfilling the research objectives. The absence of a cause-and-effect relationship between bank lending and the share of innovative light manufacturers was investigated using the Granger test. The correlation between the level of innovation in light industry and innovation lending in Sweden, the USA, Great Britain and Singapore was also determined. Based on the existence of a correlation relationship, the effect of loans on increasing the share of innovative light manufacturers in the selected countries was estimated.

Given the importance of the light industrial sector in the economic structure of the country, the results of the conducted research can become the basis for the development of effective recommendations for increasing the competitiveness of the industry. One of the key aspects is the optimization of investment strategies, which will improve the economic performance of companies and significantly affect the innovative development and adaptability of the sector to changing market conditions. So, the practical use of research findings can become an important step towards the stable growth of the light industry in the modern economy.

CONCLUSIONS

The relevance of the research is that the implementation of innovations occupies a significant place in the development of the economies of all countries. Innovative processes are the basis for ensuring competitiveness in the global market, increasing production efficiency, and optimizing management strategies. In modern conditions, where the changes in the technological environment are becoming increasingly rapid, national economies are forced to adapt to new challenges. Innovations contribute not only to the growth of the gross domestic product but also to the creation of new jobs and stimulation of entrepreneurial activity, as well as improving the social standards of life of the population.

Based on the research results, it can be concluded that the influence of loans on the innovativeness of light manufacturers is many-sided. It is not reduced to a simple causal relationship, which is often characteristic of most economic relationships. The study found that there is a correlation and regression relationship between these two indicators, which indicates a significant interdependence that manifests itself in different contexts. The situation in Switzerland shows that there is a special phenomenon of reverse relationship. The increase in lending volumes for innovations in light manufacturers is

accompanied by a decrease in the share of such companies. This may be determined by the specifics of innovation financing in this country, which is significantly different from other economies. At the same time, countries that occupy leading positions in the Global Innovation Index demonstrate the positive impact of credit resources on the development of innovativeness. In Sweden, a USD 1 million increase in investment in innovative companies leads to an 11% increase in the number of such companies, while in the US, an increase in lending by a similar amount stimulates the growth of innovative light manufacturers by only 4%. In Great Britain, this figure is 2%, and in Singapore it reaches 6%.

The study's main limitation is its focus on data from exclusively developed countries. The proposed approach's results for developing countries may vary. In view of the importance of the light industrial sector in the country's economy, the results of this study can be the basis for providing recommendations for increasing the competitiveness of the industry. The obtained results can be used to deepen research on the use of loans for the introduction of innovations by light manufacturers. Further research will focus on the analysis of the impact of lending on the innovativeness of the light industry in developing countries.

ADDITIONAL INFORMATION

AUTHOR CONTRIBUTIONS

All authors have contributed equally.

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CONFLICT OF INTEREST

The Authors declare that there is no conflict of interest.

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ВПЛИВ КРЕДИТУВАННЯ НА ІННОВАЦІЙНІСТЬ ПІДПРИЄМСТВ ЛЕГКОЇ ПРОМИСЛОВОСТІ

Інноваційна діяльність підприємств виступає як фундамент для зміцнення їхньої позиції в галузі, забезпечуючи стійкий доступ до передових технологій. Аналіз взаємозв'язків між доступом до кредитування та інноваційною діяльністю дозволяє не лише оцінити ефективність інвестиційних рішень підприємств, а й визначити бар'єри, що заважають їхньому прогресові. Саме це обумовлює актуальність обраної теми дослідження. Метою цього дослідження є визначити вплив кредитування на інноваційність підприємств легкої промисловості, що є суттєвим для розуміння

механізмів, які сприяють розвитку галузі. Для встановлення причинно-наслідкових зв'язків використано тест Грейнджера. Для перевірки моделі проведено тест Дікі-Фулера. Оцінку впливу та аналіз здійснено за допомогою кореляційно-регресійного аналізу. Результати дослідження вказують на те, що відсутній причинно-наслідковий зв'язок між кредитуванням і зростанням кількості інноваційних підприємств легкої промисловості. Згідно з даними регресійного аналізу, інвестиції в інноваційні підприємства в Швеції демонструють значний позитивний ефект, адже збільшення фінансування на 1 мільйон доларів веде до 11% зростання кількості таких компаній. У США підвищення кредитування на ту саму суму стимулює лише 4% зростання інноваційних підприємств легкої промисловості. Великобританія зафіксувала подібний показник на рівні 2%, водночас у Сінгапурі він сягає 6%. Ці відмінності свідчать про варіативність ефективності інвестицій у різних країнах. Отримані результати можуть значно сприяти поглибленню досліджень застосування кредитування для впровадження інновацій на підприємствах легкої промисловості. Перспективним напрямом подальшого аналізу є вивчення впливу кредитних механізмів на інноваційний розвиток галузі легкої промисловості в країнах, що розвиваються. Це дослідження має потенціал для виявлення ключових факторів, які сприяють успішному впровадженню нововведень у цій царині.

Ключові слова: банківські кредити, інноваційні підприємства, легка промисловість, фінансування інновацій, фінансова підтримка, кредитні ресурси, розвиток підприємств

JEL Класифікація: D20, G21, O31