

Rudyanova, Tatyana; Lebid, Oksana

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## Kontakt/Contact

ZBW – Leibniz-Informationszentrum Wirtschaft/Leibniz Information Centre for Economics  
Düsternbrooker Weg 120  
24105 Kiel (Germany)  
E-Mail: [rights\[at\]zbw.eu](mailto:rights[at]zbw.eu)  
<https://www.zbw.eu/>

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Tatyana Rudyanova,  
Oksana Lebid

## ANALYSIS OF INNOVATIVE TECHNOLOGIES AND IDENTIFICATION OF NEW INFORMATION TOOLS FOR EFFECTIVE ACTIVITIES OF ENTERPRISES ON THE EXAMPLE OF THE FINANCIAL MARKET OF UKRAINE

*The object of research is modern innovative information technologies as a factor in market transformation. The subject of research is the theoretical and methodological foundations of the use of financial technologies in the financial sector of the economy. One of the important problems for the world financial market today is to increase the efficiency of its functioning through the introduction of modern management methods based on innovative information technologies. The most problematic areas is the use of proprietary software. The importance of the latter factor is increasing every year due to the strengthening of legislative requirements and pressure from rightholders. That is why it is advisable to offer the Blueshift platform, which will help expand the capabilities and functions of financial and economic activities.*

*The study used methods of collecting, processing and interpreting information about innovative financial products, and theoretical generalization, analysis of definitions, comparative analysis, concretization and systematization of modern financial technologies, observation and visual presentation of the analysis results.*

*The main hypothesis of the study is the assumption that the use of modern innovative information platforms will allow active users to increase the efficiency of making ready-made decisions when solving problems arising in the financial sector of the economy. It is impossible to confirm this hypothesis without a detailed analysis of financial technologies, as well as innovations associated with modern open source systems, which allow market participants to reduce costs and maximize the likelihood of data protection. In paper, it was proposed to use the Blueshift platform for research and implementation of systematic investment strategies based on its built-in capabilities. The advantages and disadvantages of using the Blueshift platform as a «platform as a service» are analyzed. Thanks to this innovation, such advantages in functionality as information security, ease of adaptation, and economic benefits can be obtained.*

**Keywords:** innovative processes, information technology, financial market, visual programming, open source, Blueshift platform.

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### 1. Introduction

A feature of the current stage of world economic development is the transition to a post-industrial economic system based on knowledge as a leading innovative resource. The global financial sector is undergoing major changes, and innovation processes have a significant impact on its activities. The use of the latest information technologies allows financial institutions to optimize the provision of services to customers and provides an opportunity to achieve a fundamentally new quality of business. According to Gartner forecasts, global IT spending in 2021 will

amount to 3.9 trillion USD, having increased by 6.2 % compared to last year [1].

In the innovative society of the XXI century, knowledge, information and methods of their processing become a decisive factor in the economic development of countries. It is the innovative acceleration that is designed to help quickly overcome the negative consequences of the global economic crisis, the consequences of the COVID-19 pandemic, ensure the dynamic development of the economy and achieve a higher standard of living for the population.

The financial systems of the countries of the world are actively involved in the processes of globalization of the

digital economic space and carry out the transformation to the digital economy. Digitalization expands the possibilities for effective management of financial transactions and increases their security, reduces the cash costs of all participants in the financial market, increases the number of clients, and increases the transparency of relations in the financial market.

Financial Technologies (Fintech, FinTech) – a technology that is used in the financial industry to optimize costs, increase profits, the speed of passage of various processes, ensure security through the use of new software applications and business models. The theoretical aspects of the formation and functioning of financial technologies are investigated in [2]. The problems of implementation and development of FinTech are highlighted in works [2, 3]. The works [4–6] are devoted to the issues of technology development.

At the same time, scientists and researchers are working on finding new methods, means, platforms that will not only increase the efficiency of the financial market entities, but also save money and determine the priorities of innovative financial market instruments in terms of investment attractiveness.

An important aspect of economic activity the world has recently become the use of free and open source software, as well as determine the feasibility of their inclusion in the existing information systems, but these issues are not well understood. The relevance of the chosen topic is also explained by the need to study the features of visual programming platforms as innovative technologies for the provision of financial services that have certain specific features.

So, *the object of research* is modern innovative information technologies as a factor of market transformation. *The aim of research* is to analyze the current technological innovations in the field of information technologies that optimize and improve the work of financial institutions, banks, as well as to study the possibility of introducing new financial innovative technologies, methods of obtaining new solutions that will contribute to the modernization of the financial system. This will allow studying the possibilities of using modern technologies based on the Blueshift platform and developing strategic proposals for the implementation of these technologies in the financial sector on the example of Ukraine.

## 2. Methods of research

The research used the following scientific methods:

- method of analysis in the study of the latest trends in the development of financial technologies, the problems of introducing financial technologies in Ukraine and the prospects for their use;
- methods of classification of innovative financial products;
- comparative analysis of free and open source software, as well as determining the possibility of its inclusion in information systems.

## 3. Research results and discussion

On December 26, 2019, the National Bank of Ukraine approved the Fintech Development Strategy in Ukraine until 2025 [7], which contains concrete steps to create

a Fintech ecosystem in Ukraine with innovative financial services and affordable digital services. In modern conditions, Ukraine has a significant potential for the development of the FinTech industry. At the same time, the existing financial institutions are competing with FinTech startups, which use a combination of innovative technologies and customer-centric service. Such business structures have great development prospects in the Ukrainian financial services market, therefore they are actively looking for investors.

For the first time the term «innovation» was used at the beginning of the twentieth century by the author of work [8], who considered innovations and innovative activity as the driving forces of economic development. The trends of our time, given the ongoing technological revolution, require constant changes in traditional economies for innovative forms of their activities. This situation is also typical for the Ukrainian financial system. The regular introduction of new solutions will contribute to the modernization of the financial system of Ukraine, which will be based on new theoretical and methodological approaches and the results of their scientific research.

Let's note 8 main innovative technological trends that are currently taking place, using the example of banking:

- 1) accelerating architectural evolution – banks embrace the principles of deep business orientation, true agnosticism, comprehensive analytics, open source and comprehensive automation of architectural principles to achieve new levels of agility, scalability and resilience;
- 2) Artificial Intelligence;
- 3) Blockchain – chains of formed blocks of transactions built according to certain rules with an economic motivator for ensuring the operation of nodes;
- 4) Public Cloud – public cloud will be the preferred choice of second and third tier banks looking to expand their operations;
- 5) acceleration of E-commerce;
- 6) an increase in interactive dimensions – mixed reality is starting to become common for banks, banks will use virtual branches, as well as new generations of applications for mobile devices with augmented reality;
- 7) Big Data – data collected in banks are so complex that they cannot be processed by any traditional software tool. Analytical tools solve the problem of storing, managing and analyzing complex and big data;
- 8) Smart Contracts – an electronic algorithm that describes a set of conditions, the fulfillment of which entails some events in the real world or digital systems. To implement reasonable contracts, a decentralized environment is needed that completely excludes the human factor, and to be able to use the transfer of value in a reasonable contract, cryptocurrency is used.

Digital innovative banking, as one of the components of modern innovative technologies, is a must-have strategy to survive in a highly competitive environment. One of the most promising and demanded areas of Fintech startups is the creation of neobanks or online banks, which use exclusively mobile applications to provide their services [9]. The Internet of Things (IoT), which has revolutionized many industries, is also present in the financial space, and machine learning and artificial intelligence are being studied to improve customer experience [10].

To confirm the chosen hypothesis of researching modern developments of innovative financial market instruments

in the context of modernizing business process reengineering and identifying effective tools for improving the quality of financial services, it is necessary to consider the current global technological innovations in the field of information technologies that optimize and improve the operation of financial institutions. For this, modern technological possibilities for creating applications in the financial sector are considered, for which it is not possible to write program code. Unlike proprietary software, open source software is publicly available for viewing and modification. Systems using such platforms provide financial institutions and businesses with the following benefits:

- reducing the cost of developing and maintaining such systems;
- ability to quickly respond to changes in the business process and prompt implementation of these changes;
- reduction in the cost of errors during their creation;
- acceleration of the time for the development of new software through the use of artificial intelligence.

This research examines Blueshift® – a platform for trading systematic investment strategies, implemented on the basis of Python [11]. The real-time platform flexibly and reliably supports multiple asset classes and instruments such as Forex, stocks and futures. It is possible to use factorial strategies, technical indicators or advanced machine learning. This facilitates the development of complex strategies, as well as the transition of the strategy from testing to real trading, that is, it allows to apply and analyze strategies in real markets without installing and downloading.

Real E-commerce algorithms are complex and require much more flexibility than a step-by-step selection of options and parameters, so a great advantage of the Blueshift platform is the implementation of possibilities through the use of visual programming. To implement an intuitive way to create trading strategies have been adapted Blockly from Google. Blueshift – Platform as a Service – provides opportunities for developing applications without the need to write a lot of code and does not require programming skills. At the same time, the use of the visual environment allows the user to select functional blocks from the developed libraries, visually connect them to their own script by dragging them into the working field.

The main advantages of Blueshift are speed and partial flexibility, which is implemented using drag-and-drop func-

tionality. Reducing the development cost is realized due to the possibility of creating more strategies in a short time. The use of Blueshift provides a partial reduction in dependence on information technology and increased productivity when time is no longer a constraint on innovation. The platform allows quick change of source data and ease of maintenance. This makes it possible to customize the strategy in accordance with new requirements at any time, as well as the ability to run it in a browser, regardless of which operating system the user is running on.

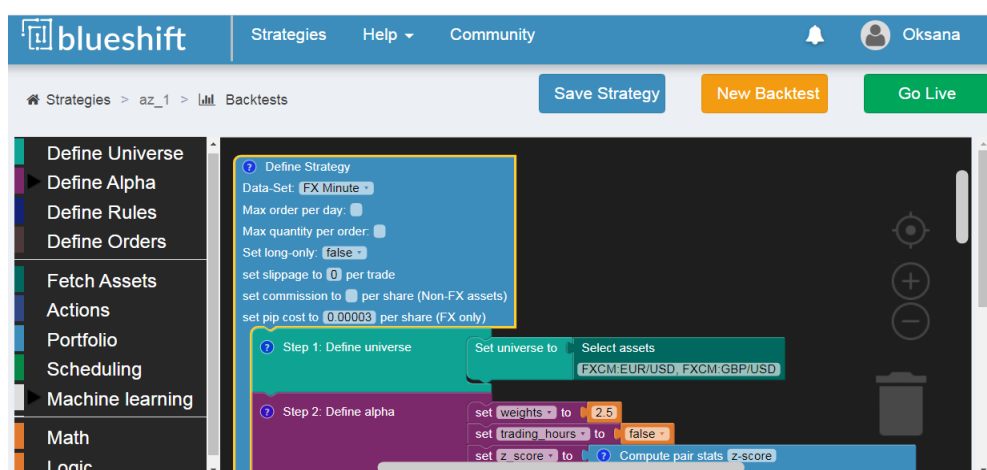
Blueshift is a platform with a library of ready-made components, support for artificial intelligence algorithms and machine learning. It should be noted that it is artificial intelligence that does the previously impossible – to make quick decisions based on the right options.

The main disadvantages of Blueshift include relative flexibility, compared to writing code from scratch, as users need to clearly understand their requirements and determine if they match the capabilities and limitations of a particular platform tool. The next drawback is associated with being tied to the software provider, if a financial institution decides to stop using the Blueshift platform, and if a deep dive into algorithms is required, it may be difficult to find detailed documentation on the implemented algorithms.

The platform interface and an example of creating your own strategy are shown in Fig. 1.

Using the Blueshift platform, financial market data were used for forecasting. Various quantitative methods used for different asset classes and impulse trading functions, option pricing models, and time series modeling are considered. Let's use the real market data to create predictive models using machine learning algorithms. New trading strategies have been created. New trading strategies have been tested based on historical data.

The strategies implemented include a simple strategy to buy and hold stocks. When buying specific shares, 50 % of the portfolio value is invested. Further Cover strategy is the sale of some of them. When the stock price goes down, buy to reach the 50 % target. Machine learning occurs so on the basis of actual data for the last 10 years. In the future, it is planned to define an analysis function that corresponds to an event and is launched when the strategy ends, as well as generate time-based events. This will allow a rich set of date and time rules to be defined.



**Fig. 1.** An example of creating your own strategy based on Blueshift

According to [12], Fort Ross Ventures – the management company focused on investments such as financial technology, cloud computing, artificial intelligence, Internet of Things, cybersecurity and Marketing – invested in US startup – platform client data (the CDP) Blueshift. The total amount of attracted investments in the company amounted to 65 million USD. Blueshift continues to attract investment and plans to strengthen its position in the CDP market and expand its presence – to enter the European market, this fact is also an argument for the feasibility of this research study.

It should be noted that the main contribution to the innovative development of the financial system of any country in the world, including Ukraine, – information technology – is carried out through human capital, as the main productive factor in the development and growth of the economy. This is an increase in the level and quality of education, its diversity and at the same time narrow specialization, computerization, the latest and available knowledge, the effectiveness of their use, restructuring of institutions and firms, cost reduction, access to innovation, and corruption reduction.

In the future, it is advisable to conduct research aimed at studying new tools and mechanisms for the operation of E-business, E-commerce (front office, virtual digital coworking centers) to further understand the digital reality in Ukraine and the world.

#### 4. Conclusions

The study analyzed the latest trends in the development of financial technologies in the world: acceleration of architectural evolution; Artificial Intelligence; Blockchain; Public Cloud; acceleration of E-commerce; increased interactive measurements; Big Data; Smart Contract. The development of new information and communication technologies, their constant improvement is a catalyst for all market transformations. One of the features of market changes in recent years is the rapid development and use of artificial intelligence systems, machine learning, which not only exclude personnel costs, human emotions, but also help in the process of financial activities to find the optimal toolkit when making a decision. The problems of introducing financial technologies and the prospects for their use were identified on the example of Ukraine.

The classification of innovative financial products has been carried out. A comparative analysis of free and open source software is carried out, the advantages of including the latter in modern financial and information systems are determined. It was noted that the main advantage of open source software is its general availability for viewing and the ability to quickly make changes.

It is proposed to use the Blueshift platform for research and implementation of systematic investment strategies based on its built-in capabilities. The article analyzes the

disadvantages and advantages of using the Blueshift platform as a «platform as a service»; it is indicated that its distinctive feature is the ability to develop applications without writing a large amount of code that does not require programming skills.

The research results will be useful to market marketers, allowing them to develop strategies and forecast exchange tasks on the basis of the Blueshift platform, which will ensure effective marketing management.

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✉ **Tatyana Rudyanova**, PhD, Associate Professor, Department of Computer Science and Software Engineering, University of Customs and Finance, Dnipro, Ukraine, e-mail: [rudyanova@i.ua](mailto:rudyanova@i.ua), ORCID: <https://orcid.org/0000-0002-8685-4132>

✉ **Oksana Lebid**, PhD, Associate Professor, Department of Computer Science and Software Engineering, University of Customs and Finance, Dnipro, Ukraine, ORCID: <https://orcid.org/0000-0001-5346-4464>

✉ *Corresponding author*