

Vladimir S. Osipov¹
Dmitry V. Martynov
Igor A. Shulyatyev
Tatiana V. Panova

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FINANCIAL PROVISION OF QUALITY: STATE FINANCING OF INNOVATIONS VS. DIRECT FOREIGN INVESTMENTS

Abstract: *The purpose of this paper is to form a new approach to provision of quality of entrepreneurship's products, which is based on financial management and the idea of company's large interest in increasing product quality for the formation of sustainable, long-term, and unique competitive advantages in the target market, which cannot be achieved by means of marketing or prices. This approach is oriented at a progressive society, in which living standards are differentiated but allow consumers to accept higher price due to higher product quality, and marketing effects are limited due to higher level of awareness and responsibility of consumers. Originality of this work is due to the following advantages as compared to the competing studies. Firstly, the structure of quality is specified: the commercial and non-commercial components are distinguished. The indicators of official statistics with which the both components of quality could be measured quantitatively are determined. Secondly, the level of socio-economic development of countries and its influence on preference for financing and the created positive effects for product quality in entrepreneurship are determined. Thirdly, the differences are determined and the preference for sources of financial provision of quality in entrepreneurship is substantiated – state financing of innovations and direct foreign investments. Fourthly, the methodological recommendations on financial management of product quality in entrepreneurship depending on consumers' priorities are offered.*

Keywords: *Quality; Financial provision; State financing of innovations; Direct foreign investments; Developed countries; Developing countries; Underdeveloped countries; Quality management.*

1. Introduction

Quality is the main characteristic of products and the strategic landmark of entrepreneurship's development. In the modern scientific and economic literature, there are two approaches to product quality management in entrepreneurship. Both approaches allow for the supposition that

competitiveness of products in the target market is determined not only by quality but also by price and marketing.

It is supposed that consumers in countries with low living standards or segments of consumers with low incomes in any countries are guided mainly by price, paying

¹ Corresponding author: Vladimir S. Osipov
Email: vs.ossipov@gmail.com

little attention to quality. In its turn, marketing (advertising, PR, packaging, and service) could ensure high demand for products with moderate or low quality and high price. That's why it is necessary to stimulate growth of product quality in entrepreneurship.

The first approach is based on external stimulation of quality growth. In countries with centralized management of entrepreneurship's development, the state implements the standards of product quality, which increase in the course of growth of the global competition and technological progress. In countries with decentralized management of entrepreneurship's development (liberalism), competition is regulated – due to which natural (market) stimuli for increase of quality are created.

The second approach envisages internal strong motivation and stimulation of quality growth. In this case, quality management is the function of management. In case of high corporate social responsibility, company implements the initiatives on increase of product quality. The existing approaches reflect external requirements to quality and company's interest in their execution, but company's abilities to conform to the requirements regarding quality are not taken into account.

Even with simultaneous increase of state standards and competition, as well as high level of corporate responsibility, a company might not be able to raise quality – which might lead to its bankruptcy. This predetermines the topicality of financial provision of quality management in entrepreneurship.

The problem consists in the fact that financing of entrepreneurship's development is performed not in the interests of stimulating the growth of quality but in the interests of improvement of country's position in global rankings, the criterion of countries' positions in which is financial support for entrepreneurship. The cause of this empirical problem lies in

underdevelopment of the theory of financial quality management in entrepreneurship due to a range of research gaps.

One of the gaps is uncertainty of the structure of product quality and the methodology of its indicative evaluation, due to which quality cannot be measured quantitatively. Accordingly, study of the dynamics of change of company's product quality, as well as comparison of quality of different companies in the market, is complicated. There are certain scientific developments, which show heterogeneity of quality and the necessity for distinguishing its complex structure.

The gaps include insufficient elaboration of differences in quality management in entrepreneurship of different countries. The accumulated scientific and practical experience shows that there are sustainable differences between countries with different levels of socio-economic development. These differences are manifested in most economic processes, including managerial ones.

Without consideration of the specifics of countries of different categories, recommendation for quality management would be generalized and more fundamental than applied. Or there will be a need for strong scientific proofs of the absence of differences between quality management in countries of different categories, which would be the basis for developing a universal methodology.

Another gap is lack of clarity of preferable sources of financial support for quality management in entrepreneurship. Private investments are unavailable in sufficient volume for countries with low investment attractiveness of economy, and state financing is difficult in the conditions of deficit of the national budget. There's a need for strong evidence in favor of effectiveness (return of investments) of a certain source of financing of quality for developing high-precision regulatory practices that are aimed at the search of opportunities for state

financing or at increase of the investment attractiveness of economy.

This research is to fill the mentioned gaps and to form a new approach to provision of quality of entrepreneurship's products, which would be based on financial management and the supposition of large interest of a company in increasing product quality for the formation of sustainable, long-term, and unique competitive advantages in the target market, which cannot be achieved by means of marketing or prices. The new approach is oriented at progressive society, in which living standards are differentiated but allow consumers to accept higher price due to higher product quality, and marketing effects are limited due to high level of awareness and responsibility of consumers.

Originality of this work is due to the following advantages as compared to the competing studies. Firstly, the structure of quality is specified: the commercial and non-commercial components are distinguished. The indicators of official statistics with which the both components of quality could be measured quantitatively are determined. Secondly, the level of socio-economic development of countries and its influence on preference for financing and the created positive effects for product quality in entrepreneurship are determined. Thirdly, the differences are determined and the preference for sources of financial provision of quality in entrepreneurship is substantiated – state financing of innovations and direct foreign investments. Fourthly, the methodological recommendations on financial management of product quality in entrepreneurship depending on consumers' priorities are offered.

The hypothesis of this research (H_0) is that private investments are more accessible and preferable in developed (liberal) economies and ensure improvement of the commercial component of quality. State financing of quality is preferable in developing and underdeveloped countries, where investment

attractiveness is lower and private investments are inaccessible, while non-commercial advantages for quality, provided due to state financing, are in higher demand. According to the set goal, this paper has the following logic and structure. Introduction is followed by literature review and description of materials and methodology of the research. Results include the following:

- studying the causal connections of financial provision of quality in countries with different levels of socio-economic development;
- determining the conditions and perspectives of improvement of the practice of financial provision of product quality in entrepreneurship;
- offering applied recommendations for improving the practice of financial provision of product quality in entrepreneurship.

Conclusion sums up the performed research.

2. Literature Review

The general issues of financial provision of quality of entrepreneurship's products and substantiation of its necessity and significance are given in the works Calavrezo (2007), Savoia et al. (2016), Fetai et al. (2020), Borović et al. (2020), Stanovicic et al. (2016), Susilowati et al. (2019), and Vuorensyrjä (2018). Al Fathan and Arundina (2019) note the significant connection between financial support, development of entrepreneurship, and economic growth (by the example of financial provision of entrepreneurship in Indonesia).

Bizri et al. (2018) study financing of family farms in the Middle-East and note the complexity of choice between the Islamic and traditional financing. Jung (2020) note variability of financing of development, mixed financing, and insurance in entrepreneurship. Kong and Xin (2019) offer recommendations for improving corporate finances management in China.

Yonge (2017) notes the advantages of update information on regulation of operations on financing of securities in the EU. Preda and Muradoglu (2019) perform a qualitative study of financial markets and distinguish the key groups and social processes that are very important for decision making in financing of entrepreneurship's development. Chotia and Rao (2018) perform an empirical study and determine the connection between financing of infrastructure and economic growth in India.

Specific features and needs of financial provision of quality of entrepreneurship's products in the conditions of the innovative economy and digitalization are given in the works Alpidovskaya and Popkova (2019), Bogoviz et al. (2020a), Bogoviz et al. (2020b), Bogoviz et al. (2019a), Bogoviz et al. (2019b), Inshakova and Bogoviz (2020), Popkova and Sergi (2020), Popkova (2017), Popkova (2019), Popkova (2020), Popkova et al. (2020), Popkova et al. (2017), Popkova and Sergi (2018), Popkova and Sergi (2019), Ragulina (2019), Sergi et al. (2019a), Sergi et al. (2019b), Sergi et al. (2019c), and Shulus et al. (2020).

Mand et al. (2018) substantiate the vivid influence of bank financing and internal sources of financing on female's motivation for e-commerce. Thurner (2018) dwell on a case of reverse securitization in financing of a supply chain by the blockchain technology. Burger-Helmchen et al. (2020) study financial novelties and describe new tools and practices for stimulation and control of innovative processes in entrepreneurship. Monaco et al. (2017) describe the process when the U.S. Securities and Exchange Commission's Department on investment management issues recommendations regarding robots-consultants on investments in development of entrepreneurship.

The fundamental and applied issues of state financing of innovations are studied in the following works. Zhang et al. (2019) points out the significant influence of equity and

debt financing on technological innovations (based on empirical data from developed countries). Sahut et al. (2018) draws the connection between ethic finances and quality management in entrepreneurship. Hudspeth and Wellman (2018) determine the issues of justice and state finances during state subsidizing of public transportation.

Azrai Azaimi Ambrose et al. (2018) suggest using the waqf model for financing public benefits and mixed public benefits in Malaysia. Nkundabanyanga et al. (2019) outline the perspective mechanisms of management, measures of restraint, and correspondence to the normative requirements to state finances in Uganda. Carratù et al. (2019) determine the connection between air pollution and state finances (based on the data on European countries).

Chen (2017) proves that the volume of financing is important for the results of infrastructure. He also notes the influence of financing of state infrastructure on quality of state infrastructure.

Babatunde and Perera (2017) describe barriers on the path of financing by means of obligations for the infrastructural projects of public-private partnership in development markets (indicators by the example of Nigeria).

Private financing and foreign direct investments in economy are discussed in the following works. Suradiyanto (2019) shows an important role of development of investment law for increase of investments in Indonesia. Nguyen and Trinh (2018) point out the influence of state investments on private investments and economic growth (based on the data on Vietnam). Xu and Xu (2019) show sensitivity of innovations in entrepreneurship to internal capital and sensitivity to investment money flows during payment of dividends. Muthu (2017) thinks that state investments out private investments in India.

Oh and Fratianni (2017) calculate the optimal size of a network of bilateral

investment agreements in the flows of foreign direct investments. Hossain and Bhabra (2020) offer new rules of development and implementation of corporate financial and investment policy, which guarantee the growth of its effectiveness. Nair and McLeod (2020) describe the lessons drawn from experience of the Caribbean countries in the sphere of coordination of investments, business, and operations in tourism with the UN Sustainable Development Goals. French (2019) substantiates the influence of minimum standards of energy efficiency on the UK investment market.

The performed literature review has shown a high level of elaboration of theoretical and empirical aspects of financial provision of entrepreneurship in economy. However, the set problem remains unsolved due to certain gaps. 1st gap: insufficient elaboration of the causal connections of financing of entrepreneurship from the positions of contribution of different sources of financing to increase of product quality.

2nd gap: insufficiency of methodological developments on the topic of indicative evaluation of quality, which hinders the economic and mathematical modeling of financial quality management in entrepreneurship and leads to the use of expert evaluations and subjectivity of the studies of quality financing in entrepreneurship. 3rd gap: fragmentary elaboration of the experience of quality financing in countries with different levels of socio-economic development, which hinders the development of specific recommendations for each category of countries.

This research aims at systemic study of financial provision of product quality in entrepreneurship with application of the proprietary methodology of indicative evaluation of quality in view of its specified structure, mathematical tools, and high-precision study of causal connections and specifics of quality management in

entrepreneurship of countries with different levels of socio-economic development.

3. Materials and methodology

As a result of systematization of data on the internal structure of product quality in entrepreneurship, two its components are distinguished. 1st: commercial component. It characterizes quality of products from the positions of satisfying individual needs of consumers. According to it, manifestations of product quality in entrepreneurship are as follows:

- progressiveness of products, use of the capabilities of technological progress during production, distribution, and consumption, as well as the ability to satisfy the specific needs of consumers that emerge in the conditions of the digital economy. Its indicator is Digital Competitiveness Ranking;
- global competitiveness of products, the possibility of internal sales at hi-tech markets and export. Its indicator is Global Competitiveness Index 4.0;
- Innovativeness of products in the aspect of new features and application of new technologies of production. Its indicator is innovation index.

These indices are calculated and presented in annual reports of the corresponding international organizations. For the convenience of collection and processing of data in this paper, the values of indicators of the commercial component of quality are taken from “Big Data of the Modern Global Economy: Digital Platform for Data Mining – 2020”, compiled by the Institute of Scientific Communications (2020a) and available in open access. The advantage of using the data set is also a simplified possibility of verifying the correctness of data and their analysis by all interested

parties.

2nd: commercial component. It characterizes quality of products in view of observation of society's priorities. It takes into account the following manifestations of product quality in entrepreneurship:

- Completeness of satisfaction of consumers and society's needs by means of products and the consequences for employees (creation of highly-efficient and well-paid jobs, realization of human potential). Its indicator is quality of life index;
- Consequences of production, distribution, and consumption of products for society and economy of environment and their contribution to implementation of sustainable development goals. Their indicator is sustainable development index;
- Corporate social responsibility and implementation of non-commercial initiatives in entrepreneurship. Its indicator is social entrepreneurship index.

The data on quality of life index and sustainable development index are available in the above data set of the Institute of Scientific Communications (2020a). Social entrepreneurship index is calculated by the Institute of Scientific Communications (2020b) and presented in the data set "Social Entrepreneurship in the World Economy: a Path from Virtual Scores to Big Data – 2020". The research objects are countries from different categories, which are classified by the level of socio-economic development:

- Developed countries – leaders by all described indicators of product quality and by volume of financing of entrepreneurship's development;
- Developing countries, which occupy peripheral positions in the rankings by the described indicators of product quality and by volume of

financing of entrepreneurship's development;

- Underdeveloped countries, which occupy the lowest positions in the rankings by the values of the described indicators of product quality and by volume of financing of entrepreneurship's development.

Correlation analysis is used for studying causal connections of financial provision of quality in countries with different levels of socio-economic development. Correlation between the indicators of product quality and the indicators of financial provision of quality management in entrepreneurship is calculated; the latter indicators are as follows:

- volume of foreign direct investments according to World Economic Outlook Database, compiled by International Monetary Fund (2020);
- State financing of innovations according to World Bank (2020).

The advantage of the selected indicators is that they are both measured in per cent of GDP, which makes comparison of the data simpler and makes the research results more representative.

The research is performed on the basis of the most recent data that could be applied for studying quality and financing of entrepreneurship in 2020. The selection of data is shown in Table 1.

For determining the conditions and perspectives of improving the practice of financial provision of product quality in entrepreneurship, the economic and mathematical modeling of quality of entrepreneurship's products depending on the sources of financing with the help of regression analysis on the full selection of countries is performed. Substitution method is used for determining the preferable values of the indicators of financing for maximizing of the values of the indicators of quality by 2025.

Table 1. Indicators and financial provision of quality in countries with different levels of socio-economic development in 2020.

Category	Country	Commercial component of quality			Non-commercial component of quality			Financial provision	
		Digital Competitiveness Ranking, points 1-100	Global Competitiveness Index 4.0, points 1-100	Innovation index, points 1-100	Quality of life index, points 1-200	Sustainable development index, points 1-100	Social entrepreneurship index, points 1-100	Volume of foreign direct investments, % of GDP	State financing of innovations, % of GDP
Developed countries	USA	100.000	83.7	61.73	176.77	74.5	73.238	21.002	2.73
	Singapore	99.373	84.8	58.37	146.09	69.6	72.114	26.484	2.19
	Sweden	96.070	81.2	63.65	180.52	85.0	60.923	26.321	3.16
	South Korea	91.297	79.6	56.55	151.19	78.3	59.327	30.472	4.29
	Australia	88.897	78.7	50.34	189.73	73.9	64.166	25.487	2.20
Developing countries	China	84.292	73.9	54.82	99.87	73.2	46.685	41.957	2.05
	Russia	70.406	66.7	37.62	104.05	70.9	61.147	21.189	1.19
	India	64.952	61.4	36.58	115.41	61.1	54.086	32.093	0.82
	South Africa	60.865	62.4	34.04	135.75	61.5	46.878	19.589	0.73
	Mexico	60.411	64.9	36.06	122.44	68.5	40.597	23.954	0.54
Underdeveloped countries	Philippines	59.439	61.9	36.18	88.23	64.9	46.773	29.049	0.14
	Indonesia	58.011	64.6	29.72	101.90	64.2	45.161	34.591	0.08
	Brazil	57.346	60.9	33.82	103.87	70.6	49.027	19.554	1.24
	Peru	54.029	61.7	32.93	88.14	71.2	35.881	23.391	0.16
	Mongolia	49.846	52.6	36.29	-	64.7	36.009	46.950	0.23

Source: compiled by the authors based on Institute of Scientific Communications (2020a), Institute of Scientific Communications (2020b), International Monetary Fund (2020), World Bank (2020).

4. Results

4.1 Causal connections of financial provision of quality in countries with different levels of socio-economic development

For determining the causal connections of financial provision of quality in countries with different levels of socio-economic development, let us use the results of regression analysis that are obtained based on the data from Table 1 and that are presented in view of the indicators of quality in Figures 1-6.

As shown in Figure 1, the inflow of direct foreign investments leads to reduction of digital competitiveness of developed countries (correlation -54.28%) and underdeveloped countries (-57.74%), but leads to its increase in developing countries (79.06%). Increase of the volume of state financing of innovations in developed countries also reduces digital competitiveness of entrepreneurship (-26.76%), but increases it in developing countries (99.40%) and underdeveloped countries (14.26%).



Figure 1. Correlation between the sources of financing and digital competitiveness of products in the given categories of countries in 2020, %.
 Source: calculated and compiled by the authors.

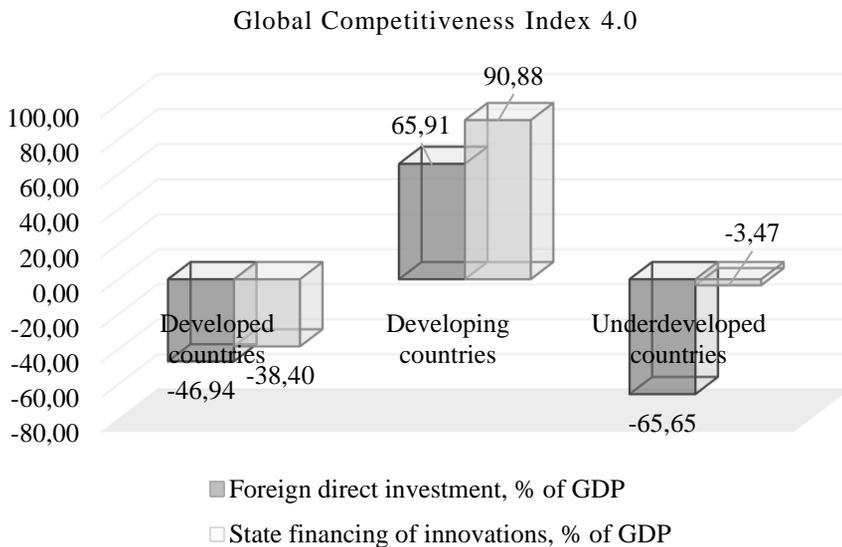


Figure 2. Correlation between the sources of financing and global competitiveness of products in the given categories of countries in 2020, %.
 Source: calculated and compiled by the authors.

As shown in Figure 2, the inflow of direct foreign investments leads to reduction of global competitiveness of developed countries (-46.94%) and underdeveloped countries (-65.65%), but leads to its growth in developing countries (65.91%). Increase of the volume of state financing of

innovations in developed countries also reduces global competitiveness of entrepreneurship (-38.40%) in underdeveloped countries (-3.47%), but increases it in developing countries (90.88%).

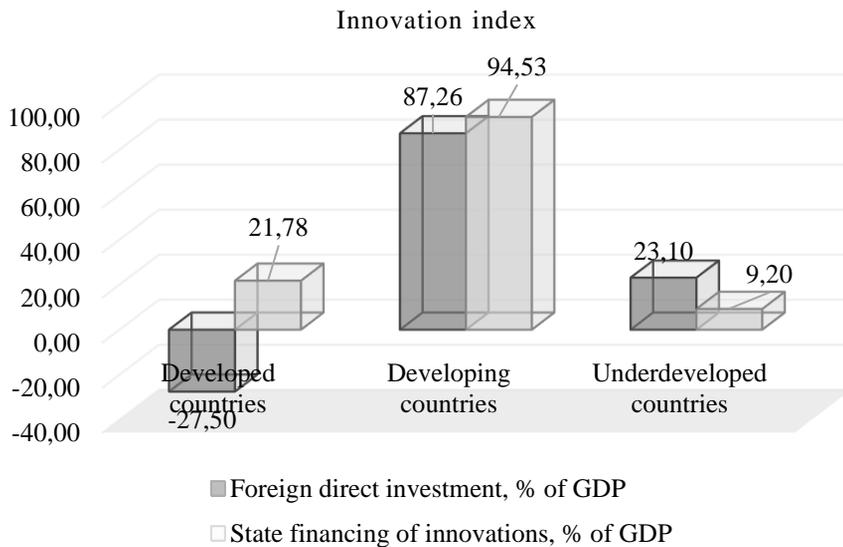


Figure 3. Correlation between the sources of financing and products' innovativeness in the given categories of countries in 2020, %.
Source: calculated and compiled by the authors.

As shown in Figure 3, inflow of foreign direct investments leads to reduction of products' innovativeness in developed countries (-27.50%), but leads to its increase in developing countries (87.26%) and underdeveloped countries (23.10%). Increase of the volume of state financing of innovations increases innovativeness of entrepreneurship's products in developed countries (21.78%), developing countries (94.53%), and underdeveloped countries (9.20%).

As shown in Figure 4, inflow of foreign direct investments leads to reduction of quality of life in developed countries (-52.85%), developing countries (-63.22%) and underdeveloped countries (-1.20%).

Increase of volume of state financing of innovations also reduces quality of life in developed countries (-32.04%) and developing countries (-78.77%), but increases it in underdeveloped countries (60.56%).

As shown in Figure 5, inflow of direct foreign investments stimulates sustainable development of developed countries (23.98%) and developing countries (37.25%), but hinders sustainable development of underdeveloped countries (-77.80%). Increase of volume of state financing of innovations stimulates sustainable development of developed countries (58.67%), developing countries (69.06%), and underdeveloped countries (57.00%).

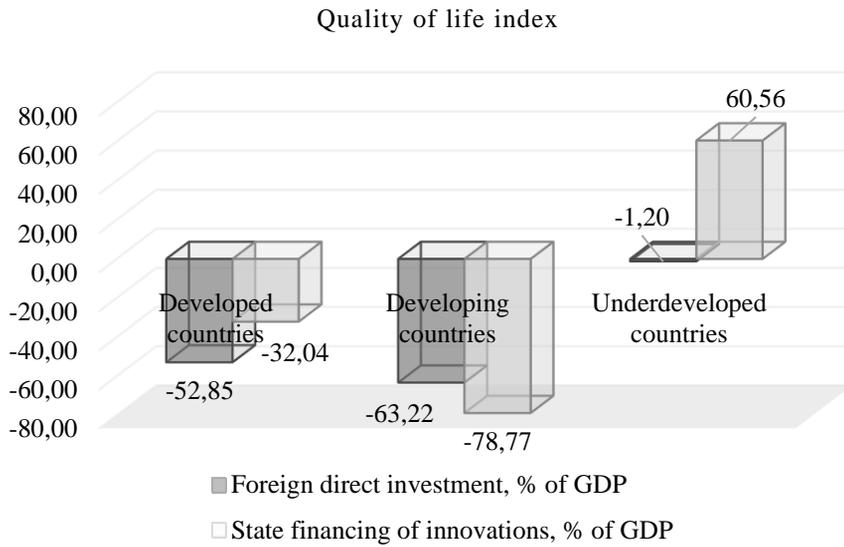


Figure 4. Correlation between the sources of financing and quality of life in the given categories of countries in 2020, %.
Source: calculated and compiled by the authors.

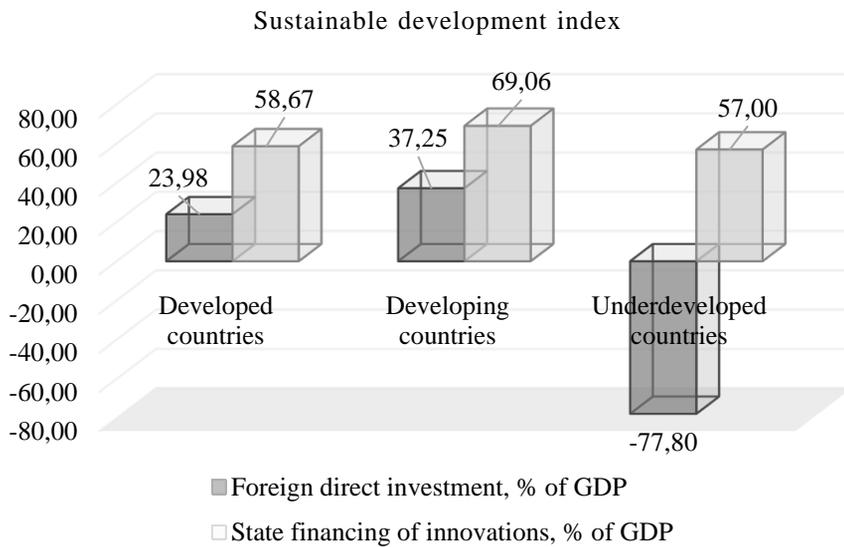


Figure 5. Correlation between the sources of financing and sustainable development in the given categories of countries in 2020, %.
Source: calculated and compiled by the authors.

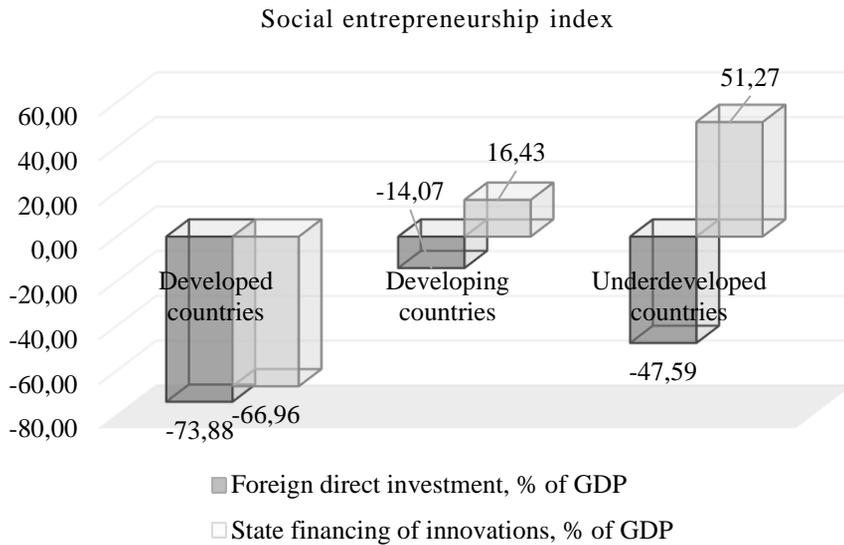


Figure 6. Correlation between the sources of financing and social responsibility of entrepreneurship in the given categories of countries in 2020, %.

Source: calculated and compiled by the authors.

As shown in Figure 6, inflow of direct foreign investments leads to reduction of corporate social responsibility in developed countries (-73.88%), developing countries (-14.07%), and underdeveloped countries (-47.59%). Increase of volume of state financing of innovations in developed countries also reduces social responsibility of entrepreneurship (-66.96%), but increases it in developing countries (16.43%) and underdeveloped countries (51.27%).

Average correlation between sources of financing and the components of quality in the given categories of countries in 2020 is shown in Figure 7.

As shown in Figure 7, inflow of foreign direct investments leads to reduction of the non-commercial advantages of innovations as a component of product quality – their correlation in developed countries constitutes -34.25%, in developing countries

-13.35%, and in underdeveloped countries -42.20%. Inflow of foreign direct investments also reduces the commercial advantages of innovations in developed countries (-34.10%) and underdeveloped countries (-34.10%), but increases them in developing countries (77.41%).

Increase of the volume of state financing of innovations in developed countries decreases non-commercial advantages of innovations as components of product quality in developed countries (-13.44%) and developing countries (-2.24%), but increases them in underdeveloped countries (56.28%). Increase of the volume of state financing of innovations leads to decrease of the commercial component of quality of entrepreneurship's products in developed countries (-14.46%), but leads to its increase in developed countries (94.94%) and underdeveloped countries (6.66%).

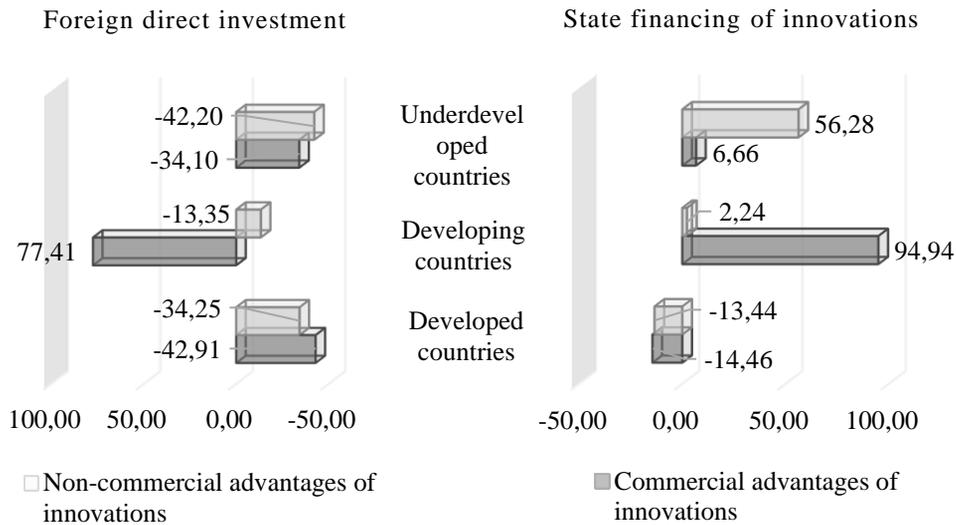


Figure 7. Average correlation between sources of financing and the components of quality in the given categories of countries in 2020, %.

Source: calculated and compiled by the authors.

4.2 Conditions and perspectives of improving the practice of financial provision of product quality in entrepreneurship

For determining the conditions and perspectives of improving the practice of financial provision of product quality in entrepreneurship, let us determine a generalized regression dependence of the indicators of quality (y) on the factors of financing: volume of direct foreign investments (x_1) and volume of state financing of innovations (x_2). Based on the full selection of data (on all countries) from Table 1, we have obtained the following equations of multiple linear regression:

- $y_1 = 57.93 - 0.11x_1 + 12.46x_2$, according to which increase of the volume of foreign direct investments by 1% of GDP leads to decrease of Digital Competitiveness Ranking by 0.11, and increase of the volume of state financing of innovations by 1% of GDP leads to increase of Digital Competitiveness Ranking by

12.46 points. Large multiple correlation shows that the change of digital competitiveness by 88.16% is explained by the change of the volume of financing (values of factor variables x_1 and x_2);

- $y_2 = 64.67 - 0.17x_1 + 6.57x_2$, according to which increase of the volume of foreign direct investments by 1% of GDP leads to decrease of Global Competitiveness Index by 0.17 points, and increase of the volume of state financing of innovations by 1% of GDP leads to increase of Global Competitiveness Index by 6.57. High multiple correlation shows that the change of global competitiveness by 85.65% is explained by the change of the volume of financing (values of factor variables x_1 and x_2);
- $y_3 = 27.15 + 0.16x_1 + 8.49x_2$, according to which increase of the volume of foreign direct investments by 1% of GDP leads to increase of innovation index by 0.16 points, and increase of the volume of state financing of innovations by 1% of GDP leads to increase of innovation

index by 8.49 points. Large multiple correlation shows that change of innovation index by 89.21% is explained by the change of the volume of financing (values of factor variables x_1 and x_2);

- $y_4=141.02-1.63x_1+20.44x_2$, according to which increase of volume of foreign direct investments by 1% of GDP leads to decrease of quality of life index by 1.63 points, and increase of volume of state financing of innovations by 1% of GDP leads to increase of quality of life index by 20.44 points. Large multiple correlation shows that the change of quality of life by 78.07% is explained by the change of the volume of financing (values of factor variables x_1 and x_2);
- $y_5=66.05-0.06x_1+4x_2$, according to which increase of volume of foreign direct investments by 1% of GDP leads to decrease of sustainable development index by 0.06 points, and increase of volume of state financing of innovations by 1% of GDP leads to increase of sustainable development index by 4 points. Large multiple correlation shows that the change of sustainable development index by 80.13% is explained by the change of volume of financing (values of factor variables x_1 and x_2);
- $y_6=55.89-0.44x_1+6.36x_2$, according to which increase of volume of foreign direct investments by 1% of GDP leads to decrease of corporate social responsibility index by 0.44 points, and increase of volume of state financing of innovations by 1% of GDP leads to increase of corporate social responsibility index by 6.36 points. Large multiple correlation shows that the change of corporate social responsibility by 76.97% is explained by the change of volume of financing (values of factor variables x_1 and x_2).

The obtained results of regression analysis show that instead of expected stimulation the inflow of foreign direct investments restrains growth of quality of entrepreneurship's products – in the commercial and non-commercial components of quality. Contrary to this, state financing of innovations ensures increase of the both components of product quality in entrepreneurship – commercial and non-commercial.

That's why a condition of improving the practice of financial provision of product quality in entrepreneurship is increase of the volume of state financing of innovations. Substituting various values x_2 in the above regression equations, we determine its control values for optimization (achievement of maximum possible values) of all indicators of product quality in entrepreneurship of countries of the selection until 2025 (Figure 8).

As shown in Figure 8, the basic (direct average from Table 1) volume of state financing of innovations in 2020 constitutes 1.45% of GDP. The perspectives of improving the practice of financial provision of product quality in entrepreneurship are connected to increase of the volume of state financing of innovations in the period until 2025:

- up to 3.7% of GDP for maximizing digital competitiveness ranking (=100 points);
- up to 5.2% of GDP for maximizing quality of life index (=200 points);
- up to 6.2% of GDP for maximizing global competitiveness index 4.0 (=100 points);
- up to 8.1% of GDP for maximizing innovations index (=100 points);
- up to 8.9% of GDP for maximizing social entrepreneurship index (=100 points);
- up to 9% of GDP for maximizing sustainable development index (=100 points);

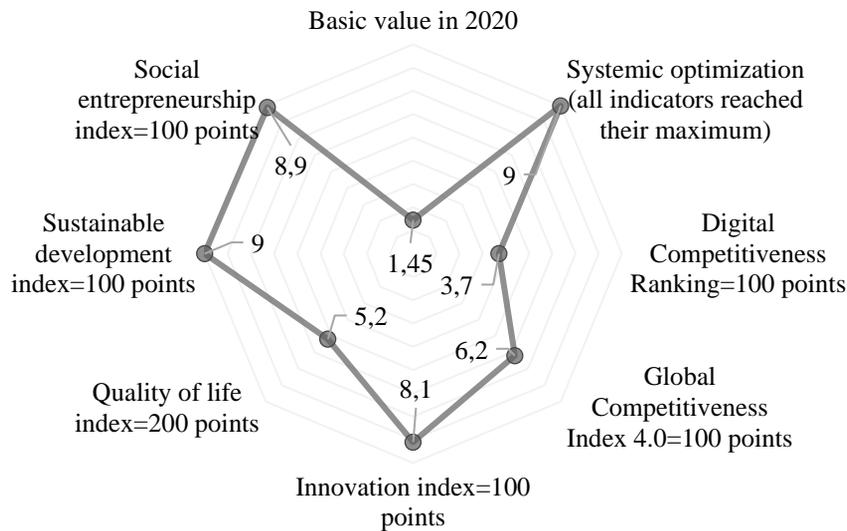


Figure 8. Control volume of state financing of innovations depending on the optimization goals, % of GDP.

Source: calculated and compiled by the authors.

For systemic optimization, at which all indicators of quality reach their maximum, the volume of state financing of innovations in the period until 2025 has to reach 9% of GDP.

4.3 Applied recommendations for improving the practice of financial provision of product quality in entrepreneurship

For improving the practice of financial provision of product quality in entrepreneurship in the period until 2025, we have developed the following applied recommendations on state financing of innovations. Firstly, it is necessary to ensure the priority of financing of innovations among the directions of spending of state budget's assets. At present, financing of innovations in most countries is conducted

by a leftover principle – i.e., assets are allocated after other, more significant, directions of state financing.

The contribution of state financing of innovations into increase of the non-commercial component of product quality in entrepreneurship, in particular into growth of population's quality of life, sustainable development, and corporate social responsibility, allows assigning this direction of budget assets' spending to socially important projects, which priority is the highest. Based on this, it is necessary to redistribute budget assets in favor of state financing of innovations.

Secondly, it is necessary to change the target character of financing of innovations. At present, target financing envisages a requirement to commercial results at the level of companies (and research institutes), which are measured in the number of publications and patents, and at the level of

economy – in digital progress, growth of global competitiveness, and acceleration of innovative development.

In addition to this, there should be requirements to non-commercial results, expressed in increase of quality of life, sustainable development, and manifestation of corporate social responsibility. Also, there should be regular (e.g., annual) monitoring of quality of entrepreneurship's products by commercial and non-commercial criteria. As a result of monitoring, decisions on continuation or termination of financing, its recipients, conditions, and volume of financing should be made.

Thirdly, acknowledging the urgency of the problem of deficit of state budgets of many countries, it is recommended to differentiate the means of state financing of innovations. Direct financing in the form of grants and subsidies should be conducted when other alternatives are unavailable. In most cases, it is offered to conduct indirect financing in the form of tax subsidies, tax vacations, and subsidized crediting of innovations in entrepreneurship. This will allow reducing expenditures of state budget on financing of innovations and making this financing widely accessible for companies.

Fourthly, it is recommended to change the regulation of direct foreign investments. It is necessary to perform a transfer from favorable investment climate and attraction of foreign investments as a goal in itself to the practice of stimulation of target direct foreign investments, which ensure the improvement of the commercial and non-commercial components of product quality in entrepreneurship. This will allow redistributing the burden on financial provision of quality from state budget to private investments.

5. Conclusion

The results of the performed research have shown that there are large differences in the causal connections between financing of

innovations and quality of products in entrepreneurship in countries with different levels of socio-economic development. However, the offered hypothesis (H_0) has been disproved by the research results. In developing countries, commercial advantages of innovations are achieved by means of direct foreign investments (correlation 77.41%) and state financing of innovations (94.94%). However, non-commercial advantages are not achieved in both cases (correlation -13.35% and -2.24%, accordingly).

In developed countries, financing of innovations does not determine quality of products in entrepreneurship, regardless of the source of financing. In underdeveloped countries, there is no demand for direct foreign investments, and state financing of innovations provides the improvement of the commercial (6.66%), and non-commercial (56.28%) components of product quality in entrepreneurship.

On the whole, in the studied countries – without their division into categories, i.e., regardless of the level of socio-economic development, state financing of innovations is the only factor of increase of quality from the positions of the commercial and non-commercial components. Maximization of the values of all indicators of product quality is possible in the period until 2025 if the volume of state financing of innovations grows from 1.45% of GDP in 2020 (on average in the selected countries) up to 9% of GDP. Applied recommendations are offered for improving the practice of financial provision of product quality in entrepreneurship.

Contribution of the performed research to development of economics consists in specifying the structure of product quality in entrepreneurship. The commercial component is distinguished – its quality's manifestations are progressiveness of products (its indicator is Digital Competitiveness Ranking), global competitiveness (its indicator is Global

Competitiveness Index 4.0), and innovativeness of products (its indicator is innovation index).

The non-commercial components' manifestations are fullness of satisfaction of consumer and society's needs (its indicator is quality of life index), consequences of production, distribution, and consumption of products for society (their indicator is sustainable development index), and corporate social responsibility and implementation of non-commercial initiatives in entrepreneurship (its indicator is social entrepreneurship index).

Practical significance of the research is explained by the fact that quantitative (9% of GDP) and qualitative (priority and target character of financing, differentiation of its means, and regulation of direct foreign investments) requirements to the financial provision of product quality in entrepreneurship are obtained. This allowed for the most complete and correct reflection of the perspectives of increase of quality based on financial management.

Empirical value of the conclusions consists in substantiating the preference of state financing of innovations for increase of product quality in entrepreneurship. This allows increasing the effectiveness of the measures of financial provision of quality and achieving high precision during implementation of financial quality management in economy. Consideration of

the influence of the socio-economic development's level on financial management of quality allows implementing the specific practices of management in developed, developing, and underdeveloped countries.

It should be concluded that the issue of low significance of direct foreign investments for increase of product quality in entrepreneurship is revolutionary and requires further elaboration. It will probably become the object of scientific discussion. It seems that the cause of the insignificant contribution of direct foreign investments to increase of product quality in entrepreneurship is the absence of this goal with investors.

This allows offering the following hypothesis – of there is the corresponding and sufficient state and market stimulation, foreign direct investments could have a more vivid contribution. Private investments have a potential of increase of product quality in entrepreneurship, which is not yet implemented due to absence of stimuli. The issue of the measure and proportion of the contribution for the commercial and non-commercial components of quality is open. The answer to this question and the causal connections and perspectives of financial management of product quality in entrepreneurship based on direct foreign investments should be elaborated in further works.

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Vladimir S. Osipov

Moscow State Institute of
International Relations
(University) of the Ministry of
Foreign Affairs Russian
Federation, Moscow, Russia
vs.ossipov@gmail.com;

Dmitry V. Martynov

Independent Researcher,
Vladivostok, Russia
martynov-dv@mail.ru

Igor A. Shulyatyev

Institute of Legislation and
Comparative Law under the
Government of the Russian
Federation, Moscow, Russia
iash7@mail.ru

Tatiana V. Panova

Russian Presidential Academy
of National Economy and
Public Administration,
Moscow, Russia
planetaart@gmail.com
