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MARKETING MANAGEMENT OF EDUCATION QUALITY IN THE PROCESS OF UNIVERSITY REORGANIZATION IN INDUSTRY 4.0: GOALS OF APPLICATION AND NEW TOOLS

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Abstract: *The purpose of the article is to determine the activity of marketing management of education quality in the process of reorganization of universities in Russia, to substantiate the influence of this management on effectiveness of universities' activities (as the secondary goal of quality management), and to develop recommendations for increasing the activity of marketing management of education quality based on new tools that are accessible in the conditions of Industry 4.0. The scientific and methodological provision of the article includes the method of trend analysis, which is used for evaluating the annual growth rate of values of the indicators of effectiveness of the activities of regional flagship universities by the example of regions of the Volga Federal District of the Russian Federation in 2018. The authors also use the method of assessment of marketing management of higher education quality in a university. The authors also use the method of regression analysis for determining the influence of marketing management of education quality on effectiveness of universities' activities as a result of their reorganization. As a result, it is substantiated that the processes of reorganization of universities during creation of regional flagship universities in modern Russia are accompanied by modern activity and efficiency of marketing management of education quality, which does not allow achieving significant growth of the values of the indicators of their effectiveness. An important reason of this problem is low effectiveness of the applied marketing tools. Effectiveness of universities' activities in the process of their reorganization during creation of regional flagship universities in modern Russia could be increased by the offered new tools of marketing management of education quality in the conditions of Industry 4.0 based on digital marketing.*

Key words: *Marketing activities; Reorganization of university; Regional flagship universities; Industry 4.0; Modern Russia; Management of education quality*

1. Introduction

In modern Russia, in the conditions of transition to Industry 4.0 under the influence

of general digital modernization of economy, an active reorganization of universities takes place. This tendency is part of the project of the Ministry of Education and Science of the

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Russian Federation (2019b) on creation of regional flagship universities for the purpose of socio-economic development of the subjects of the Russian Federation, including by means of creation of university centers of innovative, technological, and social development of regions.

Reorganization of universities in modern Russia in the conditions of Industry 4.0 is to ensure the digital modernization of the educational, research, and innovative activities, the system of the university management, the material and technical basis, and socio-cultural infrastructure, develop personnel potential, and ensure the development of local communities and city and regional environment based on the key role of universities in development of the regional economy and their systemic interaction with economic subjects in the region.

Increased attention to reorganization of universities in the conditions of Industry 4.0 in Russia is shown by expansion of the list of regional flagship universities (from 11 in 2016 to 51 in 2018, to reach 150 as the result of the project) and intense development of the studied project (e.g., growth of the volumes of financing from RUB 14 million in 2016 to RUB 13 billion in 2018), according to the Ministry of Education and Science of the Russian Federation (2019b). This leads to increase of requirements to universities that performed reorganization. The key requirement is growth of effectiveness of universities' activities.

This causes a scientific and practical problem – changes in the universities' activities, caused by their reorganization, do not guarantee growth of their effectiveness. On the contrary, changes could lead to an opposite effect, causing the difference between expectations (plans and goals of the reorganization) and reality (consequences of the reorganization). Increase of the burden, reduction of wages, and limitation of opportunities for career building undermines the motivation of academic staff and could

lead to decrease of labor efficiency (e.g., decrease of publication activity).

Connections between universities and regional entrepreneurship during change of administrative personnel who are responsible for them could weaken, as they are not always formalized. This complicates the employment of graduates and decreases demand for target studies in a university. Reputation (brand) of the university could decrease due to reorganization. This is especially characteristic of the universities that join other universities and – fully or partially – lose their economic independence. As a result, effectiveness of reorganized universities could reduce or decrease insignificantly (not reaching the planned values of its growth).

That's why it is important to search for the means of increasing the effectiveness of universities in the process of their reorganization in the conditions of Industry 4.0. Here we offer a working hypothesis that growth of effectiveness of universities in the process of their reorganization in the conditions of Industry 4.0 could be ensured by marketing management of education quality. A logical substantiation of the offered hypothesis is that quality is a source of creation of value by universities and a source of their competitive advantages. The formed market relations in the system of higher education predetermined the necessity for applying the marketing methodology to quality management.

The purpose of the paper is to determine the activity of marketing management of education quality in the process of reorganization of universities in Russia, to substantiate the influence of this management on effectiveness of universities' activities (as the secondary goal of quality management), and to develop recommendations for increasing the activity of marketing management of education quality based on new tools that are accessible in the conditions of Industry 4.0.

2. Literature review

In the process of studying the materials of the existing studies and publications in the selected topic we determined that marketing activities of modern universities are studied in detail in the works of modern scholars. Gregory-Smith et al. (2018) substantiate the influence of ecological and social marketing on university's employees. Lafuente-Ruiz-De-Sabando et al. (2018) draw a notion "marketing philosophy of university" and show its determining the marketing activities of a modern university. Peruta and Shields (2018) suggest conducting marketing of university's educational services in social media – e.g., Facebook. Rădulescu et al. (2018) think that university's web-site is a perspective tool of its marketing activities. Sekerin et al. (2018) point out that application of interactive methods of marketing allows increasing the quality of university's educational services.

The essence, logic, new needs and opportunities, and the current problems of reorganization of modern universities in the conditions of Industry 4.0 are outlined in multiple published scientific works. Duvivier (2019) writes that integration of universities based on new digital technologies provides future perspectives of usage and expansion of the educational space and increase of effectiveness of the educational process. Hogan (2012) states that reorganization of universities has acquired a global coverage in recent years. In particular, reorganization is actively conducted in universities of the UK. Huang et al. (2019) suggest using pedagogue's attitude to digital technologies (e.g., digital human, who grew up in the age of digital technologies and has skills with them) as a criterion of effectiveness of a modern university's activities (they created a digital scale of evaluation of university's activities for China).

Jones (2018) substantiates that digital modernization of economy actualizes the processes of reorganization of universities,

which, according to the scholars, are inevitable in the modern economy in the conditions of transition to Industry 4.0. Kim (2018) thinks that issues of responsibility for the results (and effectiveness) should be in focus during reorganization of universities, as uncertainty of responsibility could lead to high probability of reduction of effectiveness of universities' activities as a result of their reorganization. Maltese (2019) points out that digital transformation of the modern society and economy creates new challenges for universities, which have to offer digital educational services in the market (e.g., remote training).

The processes of reorganization and marketing activities are studied in the works Sozinova (2018a), Sozinova (2018b), Popkova (2017), Popkova (2019), Popkova and Sergi (2019), Sozinova (2019), Sukhodolov et al. (2018), Vinichenko et al. (2018), and Zinkovsky and Derkachev (2018). The scholars' opinions as to whether the processes of reorganization of universities should be accompanied by active marketing activities for supporting and strengthening the market positions of universities and supporting its competitiveness at a high level differ a lot.

Various issues of marketing management of higher education quality are studied in different works. Ogunnaike et al. (2014) substantiate that marketing management of higher education quality is the key direction of activities of a modern university. Vučijak et al. (2018) think that marketing management of education quality is very important for success of entrepreneurial activities of a university. Osman et al. (2018) provide arguments in favor of the fact that the brand (image) of the university determines the quality of provided educational services and is a tool of marketing management of this quality.

Pedro et al. (2018) confirm the expedience of application of marketing for management of quality of universities' educational services and point out that one of the methods of this

management is provision of educational services. Clark et al. (2017) offer social media as another tool of marketing management of services' quality in higher education. Safi et al. (2015) are sure that marketing management of education quality should be conducted by modern universities for supporting their competitiveness (by the example of universities of Pakistan).

Sharok (2018) writes that during marketing management of education quality it is necessary to take into account high complexity of this management due to subjectivity of treatment of quality of education (shown by the example of the influence of socio-psychological factors). Ogunnaike et al. (2018) point out that marketing management of education quality should be interactive – i.e., it should take into account the changes in the market environment, in which the university functions. Polkinghorne et al. (2017) analyze the indicators of marketing management of higher education quality and come to conclusion that one of these indicators is involvement of students into the process of studies.

Zhang et al. (2019) think that marketing management of education quality should envisage measures on reduction of inequality among students and lecturers (analyzing the data of modern China). Sfakianaki (2019) offer the tools of measuring the results of marketing management of education quality in Greece. Naim et al. (2019) substantiate that development of online training is a perspective tool of marketing management of services' quality in the sphere of higher education. Felce (2019) also deems it necessary to conduct marketing management of higher education quality, as only the guarantee of high quality could ensure popularization of training that is necessary in the conditions of the "knowledge economy".

Susanto and Suyatno (2019) note that quality of higher education is an object of management at the level of university (including with the help of marketing tools),

but its results influence the society and economy on the whole, which determines its high socio-economic significance. Simasathiansophon (2019) develops the strategies of online marketing of education quality for universities (the strategy is approved by the example of Suan Sunandha Rajabhat University). Shahrudin et al. (2019) suggest applying the tools of web marketing for management of services' quality in the sphere of higher education (approved by the example of Malaysia).

Przhedetskaya and Borzenko (2019) offer a marketing model of promotion of remote education of a modern university and substantiate advantages for quality of education. Ravina-Ripoll et al. (2019) think that marketing management of education quality is a path to a happy, creative, and social university and receipt of higher education (substantiated by the example of non-profit marketing in the university of Cadix). Farooq et al. (2019) analyze the influence of servicing private university libraries in Malaysia on quality of education in the age of transformation marketing and substantiate their close interconnection.

A large number of works of the fundamental and empirical character shows that the problem has been studied thoroughly. At the same time, the serious gaps in the existing scientific and economic paradigm are uncertainty of the ties between marketing management of education quality and effectiveness of activities of the universities that performed reorganization and poor elaboration of new tools of marketing management of higher education quality that are available in the conditions of Industry 4.0. These gaps are to be filled by this research.

3. Materials and method

The scientific and methodological provision of verification of the offered hypothesis is the method of trend analysis, which is used for evaluating the annual growth rate of the values of the indicators of effectiveness of the

activities of regional flagship universities by the example of regions of the Volga Federal District of the Russian Federation. As the first precise list of federal flagship universities in Russia was adopted in 2018, the basic period is 2017, and the current period is 2018.

The basic statistical material is information & analytical materials as a result of monitoring of effectiveness of the activities of educational organizations of higher education of the Ministry of Education and Science of the Russian Federation (2019a). For representation purposes we use the following indicators of effectiveness, which are applied

in the materials of monitoring:

- E.1: Educational activities;
- E.2: Research activities;
- E.3: International activities;
- E.4: Financial & economic activities;
- E.5: Wages of academic staff;
- E.6: Employment.

Secondly, the authors use a specially developed method of assessing the marketing management of higher education quality in a university. According to the offered method, a sociological survey of the university's management, students, and academic staff is conducted (Tables 1 and 2).

Table 1. Form for evaluating the university's activity as to marketing management of education quality (for management).

Goals of marketing activities of the university	Priority of the goal for the university and activity of its implementation
Attraction of new students (product marketing)	points 1-10
Attraction of foreign students (international marketing)	points 1-10
Maximization of revenues (investment marketing)	points 1-10
Attraction of employees, growth of labor efficiency (personnel marketing)	points 1-10
Commercialization of innovations (marketing of innovations)	points 1-10
Cooperation with business for employment of graduates (marketing of interrelations)	points 1-10

Source: developed and compiled by the authors.

As is seen from Table 1, survey of the university's management is aimed at determining the priority of the goals of marketing management of education quality for the university and activity of this management in the directions of marketing, each of which conforms to a certain goal. As a result of the survey, direct averages of all indicators are calculated (the survey is conducted in each university).

As is seen from Table 2, the survey of academic staff and students is aimed at determining the results of marketing management of education quality in the university. Each direction of marketing conforms to certain criteria of quality. As a result of the survey, direct averages of all indicators are calculated (the survey is

conducted in each university separately).

As a result, the coefficient of marketing management of education quality is calculated according to the following formula:

$$MMEQ = R_{MMEQ} / A_{MMEQ}, \quad (1)$$

MMEQ – coefficient of marketing management of education quality, shares of 1 (the higher the better);

R_{MMEQ} – efficiency of marketing management of education quality, points 1-10 (the higher the better);

A_{MMEQ} – activity of marketing management of education quality, points 1-10 (the lower the better).

Table 2. Form for assessing the results of marketing management of education quality in university (for academic staff and students).

Direction of marketing	Criterion of quality evaluation	Evaluation
Product marketing	Correspondence of the educational programs to the current needs of the labor market	points 1-10
	Organization of the educational process (level of equipment of classrooms, work load of academic staff)	points 1-10
	Level of mastering of competencies as a result of studies	points 1-10
International marketing	Conditions for teaching foreign students (translation of educational materials to foreign languages, consideration of specific educational needs of foreign students)	points 1-10
	Value of the issued diplomas abroad and perspectives of employment by the specialty in other countries	points 1-10
Investment marketing	Perspectives of investments' return in case of paid education	points 1-10
	Attractiveness of services for target studied for business	points 1-10
Personnel marketing (only academic staff is evaluated)	Effectiveness of the system of motivation and stimulation of labor	points 1-10
	Competitiveness of university as an employer (employment and career building)	points 1-10
Marketing of innovations	Conditions for research activities in the university	points 1-10
	Demand and activity of promotion of university's innovations (opportunities for commercialization)	points 1-10
Marketing of interrelations	Demand and activity of promotion in business environment of cooperation with the university as the basis of the practice	points 1-10
	Activity of university's stimulation of the graduates' employment	points 1-10
	Competitiveness of graduates in the labor market (perspectives of employment by the specialty)	points 1-10

Source: developed and compiled by the authors.

Efficiency of marketing management of education quality (R_{MMEQ}) is direct average of the results of survey of managers according to the form from Table 1. Activity of marketing management of education quality (A_{MMEQ}) is direct average of the results of the survey of academic staff and students according to the form from Table 2.

Thirdly, we use the method of regression analysis for determining the influence of marketing management of education quality on effectiveness of universities' activities as a result of their reorganization. The dependent variable (y) is direct averages of annual growth rate of effectiveness of universities' activities, and the independent variable (x) is coefficients of marketing management of education quality (MMEQ) in the universities. A model of paired linear

regression is compiled: $y = a + \beta * x$ (regression curve). Presence of direct ($\beta > 0$) connection between the above directions will be a proof of the working hypothesis of the research.

4. Results

4.1. Evaluation of the change of effectiveness of activities of the universities in Russia as a result of reorganization

The dynamics of values of the indicators of effectiveness in eight federal flagship universities of the Volga Federal District of the Russian Federation in 2017-2018 are outlined in Table 3, and the results of their trend analysis – in Table 4.

Table 3. Dynamics of the values of the indicators of effectiveness of the federal flagship universities of the Volga Federal District of the Russian Federation in 2017-2018.

Regional flagship university	2017						2018					
	E.1.	E.2.	E.3.	E.4.	E.5.	E.6.	E.1.	E.2.	E.3.	E.4.	E.5.	E.6.
Ufa State Oil Technical University	66.11	275.08	7.31	2660.55	207.82	80	66.64	368.31	7.62	2410.76	208.76	80
Vyatka State University	65.64	92.77	1.82	1761.92	201.75	80	65.96	108.25	1.96	2020.69	198.45	75
Mari State University	63.73	127.92	12.93	1881.06	174.98	75	62.83	103.26	19.73	1761.61	195.84	75
Nizhny Novgorod State Technical University	65.21	553.97	1.81	2001.09	166.96	85	65.44	854.84	1.44	2909.17	218	85
Samara State Technical University	63.03	295.38	2.16	1986	176.67	85	63.44	421.43	2.1	2448.96	214.31	85
Tolyatti State University	60.33	172.85	4.41	1834.81	156.71	75	61.07	230.82	5.1	2543.54	163.3	70
Saratov State Technical University	60.61	178.93	3.8	1607.29	175.41	70	61.43	295.33	4.06	2290.74	192.81	65
Ulyanovsk State University	59.60	243.12	5.46	1748.54	163.07	70	61.18	250.46	8.53	1820.15	188.97	70

Source: compiled by the authors based on (Ministry of Education and Science of the Russian Federation, 2019a).

The data from Table 4 show that the most effective reorganization is reorganization of Saratov State Technical University (average growth for all indicators constituted 19.76%), Nizhny Novgorod State Technical University (average growth for all indicators constituted 18.36%), and Tolyatti State University (average growth for all indicators constituted 14.43%). The highest average growth in all universities was achieved for indicator E.2: Research activities (28.74%), E.4: Financial and economic activities (19.11%), and E.3: International activities (15.00%). At the same

time, indicator E.6: Employment has negative average growth (-2.51%).

As a result of the performed trend analysis, we determined that growth of the values of the indicators of their effectiveness as a result of reorganization is moderate and could have been achieved without the reorganization. This shows low effectiveness of marketing activities in the process of reorganization of universities of modern Russia in the conditions of Industry 4.0.

Table 4. Results of trend analysis of the indicators of effectiveness of the federal flagship universities of the Volga Federal District of the Russian Federation in 2017-2018.

Regional flagship university	Annual growth rate (calculated by the formula: $2018 \times 100\% / 2017 - 100$), %						On average for the university (y)
	E.1.	E.2.	E.3.	E.4.	E.5.	E.6.	
Ufa State Oil Technical University	0.80	33.89	4.24	-9.39	0.45	0.00	5.00
Vyatka State University	0.49	16.69	7.69	14.69	-1.64	-6.25	5.28
Mari State University	-1.41	-19.28	52.59	-6.35	11.92	0.00	6.25
Nizhny Novgorod State Technical University	0.35	54.31	-20.44	45.38	30.57	0.00	18.36
Samara State Technical University	0.65	42.67	-2.78	23.31	21.31	0.00	14.19
Tolyatti State University	1.23	33.54	15.65	38.63	4.21	-6.67	14.43
Saratov State Technical University	1.35	65.05	6.84	42.52	9.92	-7.14	19.76
Ulyanovsk State University	2.65	3.02	56.23	4.10	15.88	0.00	13.65
On average for each indicator	0.76	28.74	15.00	19.11	11.58	-2.51	12.11

Source: calculated and compiled by the authors.

4.2. Analysis of marketing management of education quality and its influence on effectiveness of universities' activities as a result of reorganization in Russia

We performed a sociological survey of the parties that are interested in marketing management of education quality in 8 reorganized universities of the Volga Federal District of the Russian Federation in 2018. We surveyed 50 representatives of the management in each university (deans, heads of chairs, etc.) and 500 academic staff and students. The results of the survey of the universities' management are shown in Table 5, and the results of the survey of academic staff and students are presented in Table 6.

According to the results shown in Table 5, the highest activity of marketing management of quality among the universities of the Volga Federal District of the Russian Federation in 2018 was observed in Mari State University (4.61 points) and Vyatka State University (4.21 points); the lowest activity was observed in Ulyanovsk State University (3.37 points). Let us consider the results for each

university in detail. In Ufa State Oil Technological University, activity of product marketing constituted 3.21 points, activity of international marketing – 3.19 points, activity of investment marketing – 4.35 points, activity of personnel marketing – 3.69 points, activity of marketing of innovations – 4.55 points, and activity of marketing of interrelations – 4.23 points.

In Vyatka State University, activity of product marketing constituted 3.73 points, activity of international marketing – 4.36 points, activity of investment marketing – 4.61 points, activity of personnel marketing – 4.65 points, activity of marketing of innovations - 4.58 points, and activity of marketing of interrelations – 4.43 points. In Mari State University, activity of product marketing constituted 4.01 points, activity of international marketing – 4.75 points, activity of investment marketing – 3.91 points, activity of personnel marketing – 4.22 points, activity of marketing of innovations – 3.09 points, and activity of marketing of interrelations – 4.21 points.

Table 5. Results of evaluation of the activity of marketing management of education quality in reorganized universities of the Volga Federal District in 2018, points.

Direction of marketing	Ufa State Oil Technical University	Vyatka State University	Mari State University	Nizhny Novgorod State Technical University	Samara State Technical University	Tolyatti State University	Saratov State Technical University	Ulyanovsk State University
Product marketing	3.21	3.73	4.01	3.99	4.39	3.63	4.61	3.62
International marketing	3.19	4.36	4.75	3.35	4.96	3.12	3.04	3.06
Investment marketing	4.35	4.61	3.91	3.18	4.12	3.32	3.27	4.32
Personnel marketing	3.69	4.65	4.22	4.71	3.60	4.56	4.24	3.53
Marketing of innovations	4.55	4.58	3.09	3.39	4.89	4.65	3.96	4.80
Marketing of interrelations	4.23	4.43	4.21	4.98	3.96	4.45	3.76	4.53
On average (R _{MMEQ})	3.73	4.21	4.61	3.12	3.72	3.85	3.84	3.37

Source: developed and compiled by the authors.

In Nizhny Novgorod State Technical University, activity of product marketing constituted 3.99 points, activity of international marketing – 3.35 points, activity of investment marketing – 3.18 points, activity of personnel marketing – 4.71 points, activity of marketing of innovations – 3.39 points, and activity of marketing of interrelations – 4.98 points. In Samara State Technical University, activity of product marketing constituted 4.39 points, activity of international marketing – 4.96 points, activity of investment marketing – 4.12 points, activity of personnel marketing – 3.60 points, activity of marketing of innovations – 4.89 points, and activity of marketing of interrelations – 3.96 points.

In Tolyatti State University, activity of product marketing constituted 3.63 points, activity of international marketing – 3.12 points, activity of investment marketing – 3.32 points, activity of personnel marketing – 4.56 points, activity of marketing of

innovations – 4.65 points, and activity of marketing of interrelations – 3.85 points. In Saratov State Technical University, activity of product marketing constituted 4.61 points, activity of international marketing – 3.04 points, activity of investment marketing – 3.27 points, activity of personnel marketing – 4.24 points, activity of marketing of innovations – 3.96 points, and activity of marketing of interrelations – 3.76 points.

In Ulyanovsk State University, activity of product marketing constituted 3.62 points, activity of international marketing – 3.06 points, activity of investment marketing – 4.32 points, activity of personnel marketing – 3.53 points, activity of marketing of innovations – 4.80 points, and activity of marketing of interrelations – 4.53 points. Average activity of implementing various directions of marketing management of education quality in reorganized universities of the Volga Federal District in 2018 is shown in Figure 1.

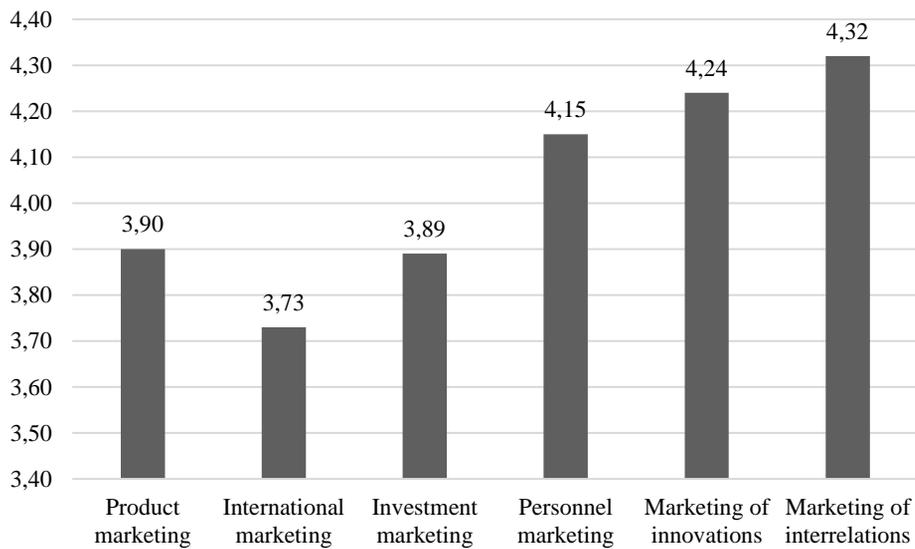


Figure 1. Activity of implementing various directions of marketing management of education quality in reorganized universities of the Volga Federal District in 2018.

Source: calculated and compiled by the author

As is shown in Figure 1, the top-priority goal and the most actively implemented direction of marketing management of education quality in reorganized universities of the Volga Federal District in 2018 was marketing of interrelations (4.32 points). It is followed by marketing of innovations (4.24 points), personnel marketing (4.15 points), product marketing (3.90 points), and investment marketing (3.89 points). The last position belongs to international marketing (3.73 points).

According to the results of the survey shown in Table 6, the highest efficiency of marketing management of quality among the universities of the Volga Federal District of the Russian Federation in 2018 was observed in Vyatka State University (6.93 points) and Mari State University (6.37 points); the lowest – in Samara State Technical University. Let us consider the results for each university in detail. In Ufa State Oil Technological University, effectiveness of product marketing constituted 6.92 points, effectiveness of international marketing –

5.24 points, effectiveness of investment marketing – 5.79 points, effectiveness of personnel marketing – 5.16 points, effectiveness of marketing innovations – 5.20 points, and effectiveness of marketing of interrelations – 5.60 points.

In Vyatka State University, effectiveness of product marketing constituted 6.62 points, effectiveness of international marketing – 5.14 points, effectiveness of investment marketing – 5.79 points, effectiveness of personnel marketing – 6.72 points, effectiveness of marketing innovations – 5.33 points, and effectiveness of marketing of interrelations – 5.88 points. In Mari State University, effectiveness of product marketing constituted 6.21 points, effectiveness of international marketing – 6.16 points, effectiveness of investment marketing – 5.51 points, effectiveness of personnel marketing – 6.89 points, effectiveness of marketing innovations – 5.18 points, and effectiveness of marketing of interrelations – 6.51 points.

Table 6. Results of evaluation of efficiency of marketing management of education quality in reorganized universities of the Volga Federal District in 2018, points.

Direction of marketing	Ufa State Oil Technical University	Vyatka State University	Mari State University	Nizhny Novgorod State Technical University	Samara State Technical University	Tolyatti State University	Saratov State Technical University	Ulyanovsk State University
Product marketing	6.92	6.62	6.21	5.16	6.72	6.03	5.88	6.04
International marketing	5.24	5.14	6.16	6.49	5.29	6.15	6.46	5.77
Investment marketing	5.79	5.79	5.51	5.78	5.56	5.89	5.23	6.59
Personnel marketing	5.16	6.72	6.89	6.33	5.94	6.38	6.23	6.91
Marketing of innovations	6.20	5.33	5.18	5.69	5.25	5.46	6.17	5.37
Marketing of interrelations	5.60	5.88	6.51	6.75	5.39	6.11	6.08	6.73
On average (AMMEQ)	6.07	6.93	6.37	5.93	5.43	5.96	6.28	6.19

Source: developed and compiled by the authors.

In Nizhny Novgorod State Technical University, effectiveness of product marketing constituted 5.16 points, effectiveness of international marketing – 6.49 points, effectiveness of investment marketing – 5.78 points, effectiveness of personnel marketing – 6.33 points, effectiveness of marketing innovations – 5.69 points, and effectiveness of marketing of interrelations – 6.75 points. In Samara State Technical University, effectiveness of product marketing constituted 6.72 points, effectiveness of international marketing – 5.29 points, effectiveness of investment marketing – 5.56 points, effectiveness of personnel marketing – 5.94 points, effectiveness of marketing innovations – 5.25 points, and effectiveness of marketing of interrelations – 5.39 points.

In Tolyatti State University, effectiveness of product marketing constituted 6.03 points, effectiveness of international marketing – 6.15 points, effectiveness of investment marketing – 5.89 points, effectiveness of personnel marketing – 6.38 points,

effectiveness of marketing innovations – 5.46 points, and effectiveness of marketing of interrelations – 6.11 points. In Saratov State Technical University, effectiveness of product marketing constituted 5.88 points, effectiveness of international marketing – 6.46 points, effectiveness of investment marketing – 5.23 points, effectiveness of personnel marketing – 6.23 points, effectiveness of marketing innovations – 6.17 points, and effectiveness of marketing of interrelations – 6.08 points.

In Ulyanovsk State University, effectiveness of product marketing constituted 6.04 points, effectiveness of international marketing – 5.77 points, effectiveness of investment marketing – 6.59 points, effectiveness of personnel marketing – 6.91 points, effectiveness of marketing innovations – 5.37 points, and effectiveness of marketing of interrelations – 6.73 points. Efficiency of implementing various directions of marketing management of education quality in reorganized universities of the Volga Federal District in 2018 is shown in Figure 2.

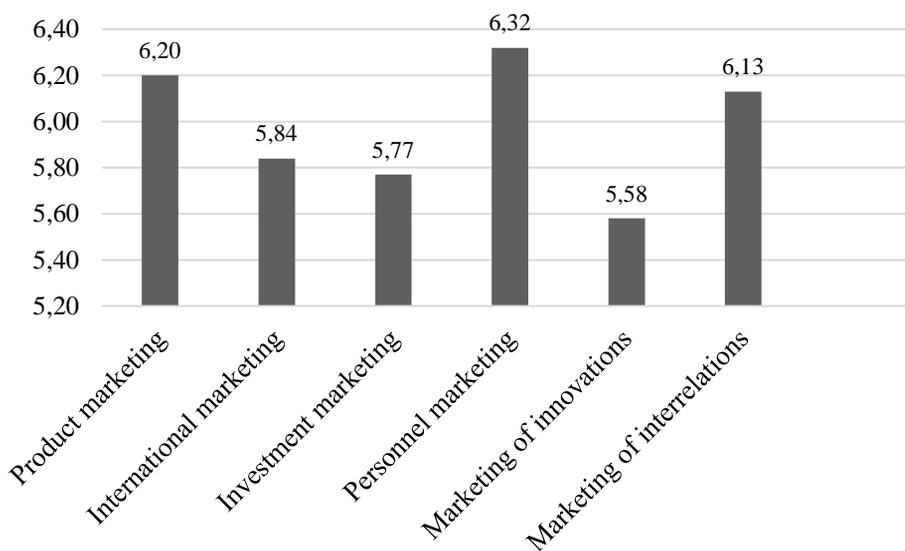


Figure 2. Efficiency of implementing various directions of marketing management of education quality in reorganized universities of the Volga Federal District in 2018.

Source: calculated and compiled by the authors.

As shown in Figure 2, the highest average results among the reorganized universities of the Volga Federal District in 2018 were achieved in personnel marketing (6.32 points), followed by product marketing (6.20 points), marketing of interrelations (6.13 points), international marketing (5.84 points), and investment marketing (5.77 points). The last position belongs to marketing of innovations (5.58 points). The obtained coefficients allow calculating the coefficients of marketing management of education quality in each reorganized university of the Volga Federal District of the Russian Federation in 2018 (x):

- Ufa State Oil Technological University $MMEQ=6.07/3.73=1.63$;
- Vyatka State University $MMEQ=6.93/4.21=1.65$;
- Mari State University $MMEQ=6.37/4.61=1.38$;
- Nizhny Novgorod State Technical University $MMEQ=5.93/3.12=1.90$;

- Samara State Technical University $MMEQ=5.43/3.72=1.46$;
- Tolyatti State University $MMEQ=5.96/3.85=1.55$;
- Saratov State Technical University $MMEQ=6.28/3.84=1.64$;
- Ulyanovsk State University $MMEQ= 6.19/3.37=1.84$.

The results of the performed regression analysis are shown in Figure 3.

As shown in Figure 1, increase of the average value of the coefficient of marketing management of education quality in 8 reorganized universities of the Volga Federal District of the Russian Federation in 2018 by 1 leads to increase of effectiveness of activities of these universities by 13.437%. Correlation of the indicators is moderate (15.99%). The obtained results confirm the working hypothesis of the research and show that marketing management of quality stimulates the increase of effectiveness of universities' activities.

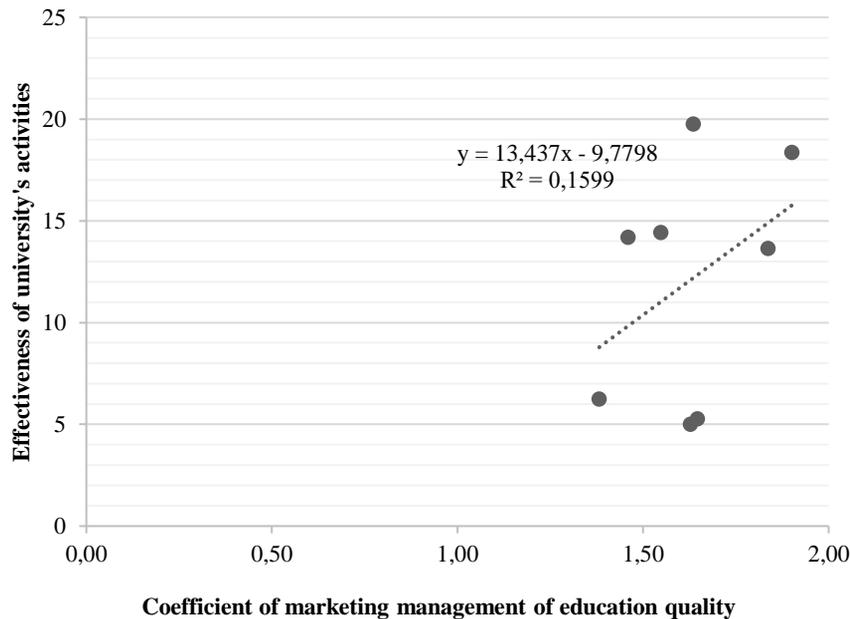


Figure 3. Regression curve of the dependence of effectiveness of universities' activities on the coefficients of marketing management of education quality.

Source: calculated and compiled by the authors.

4.3. Recommendations for increase of activity of marketing management of education quality based on new tools that are accessible in the conditions of Industry 4.0.

Based on the indicators of effectiveness of universities (Ministry of Education and Science of the Russian Federation, 2019a) and experience of reorganization of regional flagship universities in modern Russia (Ministry of Education and Science of the Russian Federation, 2019a), we determined the goals of marketing management of education quality in the process of reorganization of university, the corresponding directions of marketing and applied tools, as well as new tools that are accessible in the conditions of Industry 4.0 (Table 7).

As shown in Table 7, the goals of marketing management of education quality are formulated according to the interests of increase of the values of the indicators of

effectiveness. Attraction of new students (for increasing the value of indicator E.1) envisages product marketing. Attraction of foreign students (for increasing the value of indicator E.2) envisages international marketing. At present, such marketing tools as advertising and PR are used for this. The new tool in the conditions of Industry 4.0 is marketing in social networks based on AI.

Maximization of revenues (for increasing the value of indicator E.3) envisages investment marketing. Interpersonal marketing communications are used for this. The new tool in the conditions of Industry 4.0 is digital marketing communications. Attraction of employees and growth of labor efficiency (for increasing the value of indicator E.4) envisages personnel marketing. At present, such tools as motivation and stimulation of labor are used for this. The new tool in the conditions of Industry 4.0 for achievement of this goal is automatization of non-production processes based on the Internet of Things.

Table 7. Ratio of the goals of marketing management of education quality, directions of marketing, and applied tools.

Goals of marketing management of quality	Directions of marketing	Applied tools	New tools in the conditions of Industry 4.0
Attraction of new students (E.1)	product marketing	advertising, PR	marketing in social networks based on AI
Attraction of foreign students (E.2)	international marketing		
Maximization of revenues (E.3)	investment marketing	inter-personal marketing communications	digital marketing communications
Attraction of employees, growth of labor efficiency (E.4)	personnel marketing	motivation and stimulation of labor	automatization of non-production processes based on the Internet of Things
Commercialization of innovations (E.5)	marketing of innovations	conclusion of agreements on creation and supply of innovations	application of blockchain technologies for protection and development of contractual relations with business
Cooperation with business for employment of graduates (E.6)	marketing of interrelations		

Source: compiled by the authors.

Commercialization of innovations (for increasing the value of indicator E.5) envisages marketing of innovations. Cooperation with business for employment of graduates (for increasing the value of indicator E.6) envisages marketing of interrelations. At present, contracts on creation and supply of innovations are concluded for this. The new tool in the conditions of Industry 4.0 for achievement of these goals is application of blockchain technologies for protection and development of contractual relations with business.

5. Conclusion

Thus, as a result of the research the hypothesis is proved. It is shown (by the example of universities of the Volga Federal District of the Russian Federation) that the processes of reorganization of universities during creation of regional flagship universities in modern Russia are accompanied by moderate activity and efficiency of marketing management of education quality, which does not allow achieving significant growth of the values of the indicators of effectiveness (educational activities, research activities, international

activities, financial & economic activities, and wages of academic staff and employment) – average growth for all indicators and universities constituted 12.11% in 2018, as compared to 2017.

An important reason of this problem is low effectiveness of the applied marketing tools (advertising, PR, interpersonal marketing communications, motivation and stimulation of labor, and conclusion of contracts on creation and supply of innovations), which does not allow achieving the set goals of marketing management of education quality (connected to increase of effectiveness of the university’s activities): attraction of new students, attraction of foreign students, maximization of revenues, attraction of employees, growth of labor efficiency, commercialization of innovations and cooperation with business for employment of graduates.

The effectiveness of universities’ activities in the process of their reorganization during creation of regional flagship universities in modern Russia could be increased by the offered new tools of marketing management of education quality in the conditions of

Industry 4.0 based on digital marketing: marketing in social networks based on AI, digital marketing communications, automatization of non-production processes based on the Internet of Things, and application of blockchain technologies for protection and development of contractual relations with business.

It should be noted that though improvement of the indicators of effectiveness is, in most

cases, a goal for the university's management, and marketing management of education quality is treated as a tool for achieving this goal, for academic staff students, and employers of the region the increase of quality of education is a goal in itself. That's why the offered authors' recommendations conform to the interests of all interested parties and allow balancing them based on marketing management of education quality.

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