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The problem of ensuring entrepreneurship protectionism in the context of financial investments was considered. The need for state entrepreneurship protectionism in order to rehabilitate the transport sector was proved. The conditions for including the sectors of the economy in the category of the most affected by the pandemic in the context of state protectionism were determined. Based on statistics and using the indicators of riskiness and priority of the economic sector, the sectors of the economy for allocation of financial investments were determined. The problem of determining the rate of financial capital investments was stated and solved. A comprehensive procedure for ensuring entrepreneurship protectionism in the context of financial investments for rehabilitation of the transport sector, taking into consideration the riskiness and priority of the economic sector, was proposed.

Since the problem of state protectionism of entrepreneurship during the COVID-19 pandemic challenges is relevant for a number of countries, this procedure was tested on the example of the transport sector of the economy. According to the obtained results, the sectors of the economy that were recognized as the most affected by COVID-19 fall under state protectionism, and the problem of supporting the latter can only be solved through state intervention.

The results of calculations show that the funds at the available amount of public finances $S=1$ allocated for support are distributed proportionally. The comprehensive approach made it possible to identify three sectors of the economy for financial investments, in this case, those that were most affected by COVID-19 receive the largest share of financial investments.

From the practical point of view, this study is interesting for state administrations during the allocation of funds by the vector of support for the sectors of the economy that were most affected by pandemic challenges, and theoretically – to researchers dealing with financial support, protectionism, and state administration

Keywords: State financing, financial capital investments, state support, rehabilitation of the transport sector, entrepreneurship protectionism

DEVISING A PROCEDURE FOR ENSURING ENTREPRENEURSHIP PROTECTIONISM IN THE CONTEXT OF FINANCIAL CAPITAL INVESTMENTS FOR THE PURPOSE OF REHABILITATION OF THE TRANSPORT SECTOR

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1. Introduction

During its historical existence, humanity faced many crises, which subsequently became “start-ups” for the development of society in general, since such crises stimulate working by the development vector. The COVID-19 pandemic, which affected all sectors of the economy of the countries, the usual way of life, social and cultural interaction, became such testing nowadays. The pandemic also affected the activities of private business enterprises and forced them to develop new methods of doing business [1]. There is a theory that the rapid pace of development of new technologies will lead to an increase in entrepreneurship around the world [2]. From the beginning of 2020 to the present time, entrepreneurs have experienced significant difficulties in doing individual business. The exacerbation of the coronavirus pandemic in 2021 made a significant impact on the

world economy and continues to affect all activities [3, 4]. The overall and zonal cessation of activity prevents entrepreneurs from accessing products, which is an obstacle to their capabilities to meet the needs of consumers [5]. That is why all countries of the world take various precautions to prevent the spread of the virus. The most common ones include the introduction of the policy of social distance, the closure of many organizations, and restrictions on labor. However, such precautions lead to a significant impact on business, which is considered an important element in ensuring the recovery of states after the consequences of coronavirus [6]. Due to the economic impact, some businesses, such as restaurants, tour operators, and cinemas, were forced to cease operations completely. In addition, there is a significant decrease in demand for consumer goods due to the inability of buyers to visit stores or the shortage of cash necessary for purchase [7, 8]. The transport sector also belongs to the most affected ones,

the stopping of which will lead to huge losses for the state, and catastrophic losses for regions, in particular. Implementation of rehabilitation measures is a strategic vector. This is proved by the study [9], which highlighted and proved the impact of entrepreneurship on the development of the state in general and transport entrepreneurship, in particular. However, in an era of pandemic challenges, entrepreneurship needs support, and some researchers see a solution to this problem only through state intervention, emphasizing the need for significant capital investments [10].

That is why the studies addressing not only the demonstration of the current state of entrepreneurship but also offering urgent measures of state protectionism of the latter, in the context of financial investments in the development of entrepreneurship for rehabilitation of the transport sector, should be considered relevant.

2. Literature review and problem statement

The transport sector of the economy in general and its entrepreneurship is very important for all the countries of the European Union, without exception. As stated in the report of the Institute of Automotive Transport “The impact of the motor transport sector: provisions on entrepreneurship and economic growth in the European Union” [11], the common transport policy is one of the main elements of the EU policy. The EU transport sector provides about 11 mln. jobs and is estimated at 14 % of the EU GDP, which proves its significance and strategic importance [12]. In particular, the road freight transport sector in the EU covers more than 563.6 thousand companies. Pandemic challenges adjusted all sectors of economies of states, so a number of states introduced measures to support entrepreneurship in various sectors of economies of the states in general and transport entrepreneurship in particular. According to the existing support procedures, the preference in financing is given to those with high priority and potential [13]. However, during pandemic challenges, this approach has raised some doubts. Following India’s experience on the way to overcome the imbalance in the country [14, 15], it is proposed to implement protectionism of the sectors of the economy that were most affected by COVID-19.

In study [16], the authors’ team analyzed and discussed some modern procedures of financing. They include inter-governmental financing, loan guarantees, etc. The study emphasized that financing major infrastructure or other measures should be provided not only by the state but also by the regions, in which these measures are supported by the state. However, this study does not say anything about how exactly the measures are distributed to include them in the “supported” group.

Study [17] focuses on devising a procedure that substantiated the structure and mechanisms of financial flows. However, the study is characterized by certain specificity, it focuses on ensuring financing in the housing stock. At the same time, analysis of the impact of such a component as the COVID-19 pandemic and, accordingly, its impact on decision-making on funding was also completely ignored.

Paper [18] deals with the problem of protectionism of cities, where the authors proposed a financing model based on the investment attractiveness of the latter. This indicator is recognized as a key factor when it comes to money. The complexity of this procedure has a practical interest and

indicates an extensive approach to assessment. However, nothing was said about the fair distribution of protectionism funds by the state: To whom? Why? How much? In other words, paper [18] is theoretical, which is why it does not answer the above questions.

The procedure of state protectionism of business was proposed in paper [19]. It also proved the dependence of financing on the attractiveness of an object. The reasonably healthy competition of the latter for investments was substantiated. However, the results of research [18, 19] boil down to the fact that the higher the level of investment attractiveness, the more attractive an object is in terms of financing. If we talk about attractiveness from the position “for an investor”, everything is logical and understandable. However, when it comes to state protectionism, everything should be the other way around. Under complicated conditions of the COVID-19 pandemic challenges, states are obliged to support the sectors that were most affected by the pandemic in order to quickly restore the economies of the states in general.

All the above studies can be grouped according to the principle of unanimousness that funding should be carried out based on a preliminary assessment with the need for an integrated approach to such assessment [20].

Such a comprehensive procedure was proposed in article [13], in which the procedure of financial support, based on selective regional financing, was proposed. However, it does not specify how protectionism in the sector of the economy is implemented. The idea of providing selective financing is explored in research [21], where state support and selective funding are interpreted as the basis for the development of the economies of the latter. Study [21], where the authors proposed an interesting method for financial protectionism, which is based on a combination of private and public funds, is interesting in this respect. However, here we are talking about public-private partnerships and attention is paid to the procedure of determining the share participation of private funds. The problem of the fair distribution of public funds based on mathematical calculations remained unresolved.

After analyzing papers [13–21], it can be argued that the problem of state protectionism of entrepreneurship in the context of financial investments from the position of rehabilitation of the transport sector has not been considered by other researchers. This indicates the need to conduct relevant research and devise a procedure for ensuring entrepreneurship protectionism in the context of financial investments for rehabilitation of the transport sector.

3. The aim and objectives of the study

The aim of this research is to devise a procedure for ensuring entrepreneurship protectionism in the context of financial investments in order to rehabilitate the transport sector. This will provide an opportunity to give financial state support to the most pandemic-affected sectors of the economy in order to rehabilitate their economies in general.

To achieve this aim, the following tasks were set:

- to choose the conditions for including the sectors of the economy to the category of the most pandemic-affected in the context of state protectionism;
- to determine the sectors of the economy for distribution of financial investments based on indicators of riskiness and priority of the sector of the economy;

– to state and solve the problem of determining the rate of financial capital investments.

4. Materials and methods for devising a procedure of ensuring entrepreneurship protectionism in the context of financial capital investments in order to rehabilitate the economies of countries

The object of research is entrepreneurship in different sectors of the economy, and the subject is the existing methods of state protectionism. In order to solve the problem of entrepreneurship protectionism in the context of financial investments for rehabilitation of the state economy, it is proposed to use modern computing equipment with the application of mathematical models [22].

To obtain reliable information, the whole set of statistical data included in the procedure should consist of a small amount of data and be informative [23].

To model entrepreneurship protectionism in the context of financial capital investments, two most important indicators will be needed, namely:

- the indicator of the rating of the riskiness of the economy sector (COVID-19 Impact) – the most important indicator in financing [24, 25], which is taken into consideration during determining financial capital investments when ensuring entrepreneurship protectionism;
- the indicator of priority of an economic sector for the state.

To calculate the indicator of the rating of the riskiness of the economy sector, the results of the Euler Hermes study were taken as the basis. The Euler Hermes database includes more than 84 million companies from different sectors of the economy. Euler Hermes regularly monitors risky companies that account for 92 % of the global GDP. The Center for Economic Research makes up a rating of state risks, analyzing the economic and political environment of 245 countries. In 2020, after analyzing 126 sectors, Euler Hermes experts identified a record number of cases of deterioration in the risk rating by sectors of the economy. All cases of a decrease in ratings are associated with the direct and indirect impact of the COVID-19 coronavirus pandemic [26]. Based on the values of indices [27, 28], specifically the indicator of the Covid-19 effect, we accepted the value derived from the comprehensive research reported in [29].

Table 1 represents the risk rating [29].

A detailed procedure for calculating the Index of COVID-19 Impact on sectors of economies of states is presented in study [30]. The value of 0 means that the sector is considered insignificantly sensitive to the effects of COVID-19. Values from 0 to 1 indicate that the sector is considered sensitive [31].

Transport, automotive industry, electronic industry, and retail sale are the most affected sectors of the world economy. Quarantine measures strike airlines: the volume of commercial passenger air transportation has fallen by 40 %. A sharp drop in prices for shares also threatens air carriers. The pandemic also actualizes the problem for the automotive industry – the market is threatened by a 10 % drop in activity. Retail, wholesale companies, and suppliers are not protected from risks in interstate supply chains. The electronic industry is facing a deterioration in demand in Europe, where a significant decline in electronics sales was recorded. In general, the strongest blow was inflicted on Western Europe and Asia.

Table 1

Rating of the riskiness of the economy sectors based on the COVID-19 Impact Index (developed by the author based on [29, 30])

Risk rating	Economy sector
1	Production of computers and telecommunication facilities
2	Textile industry
3	Production of household appliances
4	Construction
5	Suppliers of car nodes and parts
6	Electronic industry
7	Retail sale
8	Software Development, IT services
9	Chemical industry
10	Mechanical engineering
11	Paper manufacturing
12	Automotive industry
13	Vehicle production
14	Power industry
15	Agricultural industry
16	Transport

To determine the priority of the economic sector, we use open statistical information on the indicator of capital investments for the types of economic activity [32]. The results are summarized in Table 2.

Table 2

Capital investments for the type of economic activity (summarized by the author based on [32])

Risk rating	Economy sector	Capital investments	
		c.u.	%
1	Production of computers and telecommunication facilities	22,516.22	0.1196
2	Textile industry	14,477.56	0.0769
3	Production of household appliances	9,631.59	0.0512
4	Construction	1,467,218.00	7.7949
5	Suppliers of car nodes and parts	93,576.59	0.4971
6	Electronic industry	828,948.26	4.4039
7	Retail sale	438,350.70	2.3288
8	Software development, IT services	984.85	0.0052
9	Chemical industry	92,436.26	0.4911
10	Mechanical engineering	340,874.19	1.8110
11	Paper production	229,281.07	1.2181
12	Automotive industry	6,789.30	0.0361
13	Vehicle production	117,687.07	0.6252
14	Power industry	1,560,434.37	8.2901
15	Agricultural industry	99,243.63	0.5273
16	Transport	1,292,023.44	6.8642
...
Total		18,822,853.41	100

Note: The data are presented in c.u. at the NBU rate as of 25.07.2021

As it can be seen from the results of generalization, transport belongs to the priority sector of the economy, which suf-

fers greatly from the pandemic and needs support from the state in order to rehabilitate the state economy in general. The same can be said about the power industry, mechanical engineering, and other industries.

The procedure for ensuring entrepreneurship protectionism in the context of financial capital investments in order to rehabilitate the economy of countries, which is based on the obtained indicators of rating of the riskiness of the economy sector and priority of the economic sector for the state.

5. Results of devising a procedure for entrepreneurship protectionism in the context of financial capital investments in order to rehabilitate the economy of states

5.1. Proposals for choosing the conditions for categorizing sectors of the economy as the most pandemic-affected in the context of state protectionism

To support entrepreneurship in order to rehabilitate the state economy, it is proposed to introduce financial capital investments in sectors. In this study, it is proposed to consider financial infusions that are directed to the corresponding sector of the economy in order to support it in terms of economic risk indicators and the priority of the economic sector for the state as financial capital investments in the sectors

To do this, we hypothesize that the program of entrepreneurship protectionism in sectors of the economy consists of n number of sectors that require financial capital investment. The index of the sector of the economy, involved in financing processes, will be marked as $i = \overline{1, n}$. Assume that return on investments in the sector of the economy per unit of spent financial resources is a_i (a_i cannot be < 1).

We proposed a formalized description of the model of effective cooperation between the economic sector and the investor (state, financial donor, etc.), which can be represented as follows:

$$Z_i(S_i, x_i) = \varphi_i(S_i) - y_i = \varphi_i(S_i) - (S_i - x_i), \quad i = \overline{1, n}, \tag{1}$$

where S_i is the total sum of financing for entrepreneurship support;

$\varphi_i(S_i)$ is the income of the i -th sector of the economy;

x_i is the financial resources of the sector of the economy for entrepreneurship support – borrowed funds;

y_i is own financial resources of the sector of the economy for entrepreneurship support;

z_i is the investments (of a state, financial donor, etc.), where the volume of financing the economic sector is taken into account;

Z_i is the net profit of the economy sector as part of its own financial resources (as part of y_i).

On condition that $\varphi_i(S_i) > x_i + y_i + z_i$ or

$$\frac{\varphi_i(S_i)}{x_i + y_i + z_i} > 1,$$

the model of cooperation of the economic sector and an investor (a state, a financial donor, etc.) is considered to be effective. The use of financing the economic sectors in the context of entrepreneurship support optimizes the process of financing and contributes to enhancing effectiveness.

In addition, calculations according to the proposed author's procedure will require a synthetic (artificial) indicator q_i , which is calculated from formula (3):

$$(1 - a_i) / l_i = q_i, \tag{2}$$

where a_i is effectiveness, which is estimated by the return from the sector of the economy per unit of financial resources spent to support entrepreneurship; l_i is the priority.

After substituting in formula (2) the effectiveness indicator with the indicator of priority of the economic sector for the state – r , and the priority indicator with the indicator of the riskiness of the economy sector (COVID-19 Impact Index) – R , the artificial (synthetic) q_i indicator is calculated from formula (3):

$$(1 - r_i) / R_i = q_i, \tag{3}$$

where r_i is the indicator of priority of the i -th sector for the economy of the state, c. u.;

R_i is the indicator of the riskiness of the i -th sector of the economy, c. u.

To determine the number of sectors of the state economy that can qualify for financing in order to rehabilitate the economies of states, the following maximum value of n , which would satisfy the following inequality, is determined:

$$q_i < Q_n / (n - 1), \tag{4}$$

where Q_n is the total of synthetic indicators q_i of the corresponding sectors of economy n .

When condition (4) is not met, the calculation finishes and the following sectors of the economy are excluded from the list of candidates for financing in order to rehabilitate the economies of the states.

5.2. Determining the sectors of the economy for allocating financial capital investments based on the indicators of riskiness and priority of the economic sector

Based on statistics on the indicators of the riskiness of the economy sector and priority of the economic sector for the state, the riskiness of the economy sector (COVID-19 Impact Index) was calculated (Table 1) and the results were shown in Table 3.

Table 3

Rating table (formed by the author based on [30])

Economy sector	The riskiness of the sector (COVID-19 Impact Index), R
Production of computers and telecommunication facilities	0.03
Textile industry	0.07
Production of household appliances	0.07
Construction	0.22
Suppliers of car nodes and parts	0.5
Electronic industry	0.5
Retail sale	0.5
Software development, IT services	0.5
Chemical industry	0.58
Mechanical engineering	0.58
Paper production	0.6
Automotive industry	0.7
Vehicle production	0.7
Power industry	0.97
Agricultural industry	1
Transport	1

Further, the indicator of priority of the economic sector for the state was calculated based on their classification according to the results presented in Table 2.

Table 4 gives the calculation information.

Table 4

Indicator of priority of the economic sector for the state

Risk rating	Sector of economy	Indicator of priority of the economic sector for the state, r
1	Production of computers and telecommunication facilities	0.0034
2	Textile industry	0.0022
3	Production of household appliances	0.0015
4	Construction	0.2218
5	Suppliers of car nodes and parts	0.0141
6	Electronic industry	0.1253
7	Retail sale	0.0663
8	Software development, IT services	0.0001
9	Chemical industry	0.0140
10	Mechanical engineering	0.0515
11	Paper production	0.0347
12	Automotive industry	0.0010
13	Vehicle production	0.0178
14	Power industry	0.2359
15	Agricultural industry	0.0150
16	Transport	0.1953

Note: Calculated and generated by the author based on data [19]

Calculations shown in Table 4 reveal the following: the indicator of priority of the economic sector for the state does not depend on the riskiness of the sector (COVID-19 Impact Index) or vice versa. This is the basis for determining the rate of financial capital investments for sectors of the economy in the context of state protectionism based on a comprehensive approach.

5. 3. Stating and solving the problem of determining the rate of financial capital investments

To determine the rate of financial capital investments, the calculation procedure of which is represented by formulas (1) to (4), it is necessary to calculate synthetic indicator q_i . The source data for the calculation are presented in Tables 3, 4.

The calculation of q_i is performed according to formula (3). When determining the share of financial capital investments in sectors of the economy, according to the procedure proposed by the author, it is necessary to sort the economy sectors from the smallest to the largest by the q_i value. The results of calculations in ascending order are given in Table 5.

According to the results of the performed calculations, it can be stated that the most affected by COVID-19 and those that require protectionism by the state are the following sectors of the economy: Power Industry, Transport, Agricultural industry, Vehicle production, Automotive industry, Paper production, Mechanical engineering, Chemical industry, Electronic industry, Retail Sale, etc.

The entire algorithm of the procedure for determining the number of sectors of the economy – candidates for obtaining capital financial investments, can be represented by inequality (4).

Table 5

Values of intermediate indicator q_i in ascending order

Risk rating	Economy sector	The riskiness of the sector (COVID-19 Impact Index), R	Indicator of priority of the economic sector for the state, r	Value q_i
14	Power industry	0.97	0.2359	0.7877
16	Transport	1	0.1953	0.8047
15	Agricultural industry	1	0.015	0.9850
13	Vehicle production	0.7	0.0178	1.4031
12	Automotive industry	0.7	0.001	1.4271
11	Paper production	0.6	0.0347	1.6088
10	Mechanical engineering	0.58	0.0515	1.6353
9	Chemical industry	0.58	0.014	1.7000
6	Electronic industry	0.5	0.1253	1.7494
7	Retail sale	0.5	0.0663	1.8674
5	Suppliers of automobile nodes and parts	0.5	0.0141	1.9718
8	Software development, IT services	0.5	0.0001	1.9998
4	Construction	0.22	0.2218	3.5373
2	Textile industry	0.07	0.0022	14.2543
3	Production of household appliances	0.07	0.0015	14.2643
1	Production of computers and telecommunication facilities	0.03	0.0034	33.2200

Check if this condition is met for the infinity of resulting values of q_i . Verification will be performed until condition (4) is met. If the condition is not met, the calculations will be terminated, and the following sectors of economy will be excluded from the list of applicants for financial investments.

The results of the calculations are given in Table 6.

Table 6

Determining the economic sectors to obtain financial capital investments

The number of economic sectors, n	q_i	$\sum q_i$ that corresponds to n, Q_n	$Q_n/(n-1)$	Verification if condition (4) is met
2	0.8047	1.5924	1.5924	$1.5924 > q_2$
3	0.9850	2.5774	1.2887	$1.2887 > q_3$
4	1.4031	3.9805	1.3268	$1.3268 < q_4$

Since condition (4) is not met at $n=4$, calculations are terminated and all subsequent sectors of the economy are excluded from further calculations. Economy sectors to obtain financial capital investments were identified. These are Power Industry, Transport, Agricultural Industry with pre-rated values of 14, 15, and 16 places in the riskiness table or, in other words, the COVID-19 Impact Index. This proves its significant influence and the need for financial capital investment in entrepreneurship of these economic sectors as a way of state protectionism.

The calculated values of the shares of financial capital investment with the allocated funds equal to 1 in proportion to obtained $Q_n/(n-1)$ are presented below. The results are given in Table 7.

Table 7

Financial capital investment in sectors of the economy with funds allocated for entrepreneurship protectionism ($S=1$)

Economy sector	Financial capital investments at $S=1$
Power industry	0.5024
Transport	0.4621
Agricultural industry	0.0355

As the calculations showed, 3 economic sectors (namely: Power Industry, Transport, Agricultural Industry) will receive financial capital investments to support entrepreneurship, the value of which will be 50.24 %, 46.21 %, and 3.55 %, respectively, from 100 % of S .

6. Discussion of results of devising a procedure for ensuring entrepreneurship protectionism in the context of financial capital investments in order to rehabilitate the transport sector

A large number of financing procedures were proposed by researchers of our time [13–21]. All of them are integrated and comprehensive: some of them contain a significant number of components for calculation, the others, on the contrary, only a few. In contrast, the proposed author’s procedure for ensuring entrepreneurship protectionism in the context of financial capital investments in order to rehabilitate the transport sector, which is also comprehensive, contains an essential component – targeted financing of the most pandemic-affected sectors of the economy.

The author’s procedure makes it possible to identify the economic sectors for distribution of financial capital investments based on indicators of riskiness and priority of the economic sector and to solve the problem of determining the rate of financial capital investments.

Unlike existing procedures, the author’s procedure is aimed at supporting the economic sectors in particular, and the state in general. The existence of the mathematical substantiation for targeted financing of the most pandemic-affected sectors of the economy is also the innovative vector of the proposed procedure compared to the existing ones.

In order to ensure support of entrepreneurship protectionism in the most pandemic-affected sectors of the economy, it

was proposed to introduce targeted financing, the entire calculation procedure of which is represented by formulas (1) to (4), and the calculation of which was carried out.

The problem of determining the rate of financial capital investments based on a comprehensive approach by the indicators of riskiness and priority of the economic sector was solved for 3 economic sectors (Power Industry, Transport, Agricultural Industry). The results are given in Table 7.

It is possible to consider that the main limitation of the research is the fact that the procedure was not tested in sectors of the economy of other countries, except for the state of Ukraine, that is, the level of socio-economic development of the state was not taken into consideration.

The practical aspect of this study is interesting for state administrations in the allocation of funds by the vector of support for the economic sectors most affected by pandemic challenges, while its theoretical aspect – for researchers dealing with financial support, protectionism, and state administration.

The subsequent research should be carried out taking into consideration the level of socio-economic development of states.

7. Conclusions

1. The conditions for including the economic sectors in the category of most pandemic-affected in the context of state protectionism were proposed. In the process of calculation according to the proposed procedure, the values of indicators of priority of the i -th sector of the economy for the state and the risk of the i -th sector of the economy were taken into consideration. The model of effective interaction that takes into consideration targeted financing was proposed.

2. The sectors of the economy for the distribution of financial capital investments were determined based on the indicators of riskiness and priority of the economic sector. The riskiness of the economy sector (COVID-19 Impact Index) and the priority of the economic sector for the state were calculated. Calculations show that the indicator of priority of the economic sector for the state does not depend on the riskiness of the sector (COVID-19 Impact Index) or vice versa.

3. The problem of a quantitative assessment of the rate of financial capital investments in the economic sectors most affected by COVID-19 and those requiring state protectionism was solved. Rating of the latter was carried out. The economic sectors to obtain financial investments were identified. They include Power Industry, Transport, Agricultural Industry with pre-rated values of 14, 15, and 16 places in the risk table or, in other words, the COVID-19 Impact Index. This proves its significant influence and the need for financial investment in the entrepreneurship of these sectors of the economy as a way of state protectionism. The rates of financial capital investments for entrepreneurship support, the value of which will be 50.24 %, 46.21 %, and 3.55 % for the sectors of Power Industry, Transport, Agricultural Industry, respectively, from 100 % of S , were calculated.

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