

# Improving the Efficiency of Industrial Enterprises by Ensuring Economic Security in the Context of the COVID-19 Epidemic

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**Abstract:** This article discusses the issues of industrial management with regard to economic security in the context of the spread of the COVID-19 epidemic. The article considers the impact of the spread of coronavirus infection on previously identified and defined criteria for economic security. The article considers possible definitions of economic security of an industrial enterprise. The relationship between the economic security of the enterprise and its economic efficiency is determined. The criteria of economic security of an industrial enterprise are formulated and the main directions, methods, features, and mechanisms of influence of the spread of the COVID-19 epidemic are indicated. A mathematical model was proposed that determines the possibility of implementing production and achieving maximum efficiency in industry, as well as the ability to assess the level of concentration of industrial production at the enterprise. The scientific goal is to substantiate theoretical and methodological provisions and practical recommendations for improving the efficiency of economic security in industry in the context of the spread of COVID-19. The scientific results and conclusions obtained in this work can be used in the management of industrial enterprises, industrial clusters and industries, including in the development of economic security strategies at the regional and interregional levels.

**Keywords:** Economic Security, Industry, Industrial Enterprises, Coronavirus Infection, COVID-19, Efficiency Improvement, Enterprise Management

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## 1. Introduction

In addition to the positive aspects, the competitive struggle of enterprises can also bring harm. So, if the company is not competitive, it simply ceases to exist, phasing, firing employees, etc. [1] This is reflected in the country's economy: on the one hand, the national economy is getting rid of unprofitable production, and on the other, growing unemployment, species of plants and essential types of goods of domestic production that reduces our level of technological independence etc.

These processes are exacerbated especially in times of

crisis. The current situation can be considered as a crisis. The COVID-19 epidemic or coronavirus infection continues to have a powerful impact on the economy of the whole world, including Russia. According to the world health organization, as of the end of October 2020, the number of people infected with coronavirus in the world was 43.9 million. [2], with prospects for an increase in the number of cases in the foreseeable period, which indicates the long-term impact of coronavirus infection both on individual industrial enterprises and on macroeconomic processes around the world. The consequences of the impact will be felt for many years, including in the form of unexpected, mostly negative, effects

in the General economic sense of the world, but at the same time it can also have positive consequences for individual enterprises, industries, and States that will be able to respond in a timely and effective manner to the changing shutdown.

As Vladimir Putin rightly pointed out at the Valdai forum, there are no purely market and purely planned macroeconomics in the modern world: "Today there is no purely planned economy. Take China – is it a purely planned economy? And there is no purely market economy. All the same, the regulatory functions of the state are certainly important" [3].

At the same time, it has been noted that in difficult times of crisis, the role of the state as an institutional regulator of economic processes increases, and one of the main functions of the state is to ensure security in the broad sense of the word.

In the future, this article will provide parameters that determine economic security in industry. And many of them are provided by the state itself through its organs.

The scientific novelty consists in the development of criteria for economic security, taking into account the impact of the COVID-19 epidemic on them. The parameters of economic security of an industrial enterprise are formulated, and a method for calculating the economic security of an industrial enterprise is proposed. For the first time, the principle and methodology for diagnosing the state of economic security of an industrial enterprise was developed, which is based on the principle of their elimination in order to avoid incompatibility of indicators.

The practical importance of research consists that in this article, the authors defined directions, forms, methods, mechanisms of the negative impact of the epidemic Kovid-19 on a number of criteria of economic security of industrial enterprises that will allow to minimize risks for industrial companies and provide the possibility of detailed consideration in planning and management of industrial enterprises, industrial clusters, industries in micro, macro and meso levels.

## 2. Literature Review

The management of industrial enterprises is based on such an important component as economic security, which consists of a set of measures to ensure protection from all types of threats, taking into account reliability and consistency.

Economic security is an extremely important characteristic of any industrial enterprise and consists of the States of economic security of each division of the enterprise that is part of it.

Kleiner G. B. under the economic security of the enterprise understands a certain state of the subject, which implies a more effective use of corporate resources and prevention, weakening or protection from existing dangers and threats, which is necessary to achieve the goals of entrepreneurship [4].

According to Muratova N. K., the economic security of an

enterprise is a stable state of its protection from the influence of negative and destabilizing factors, external and internal threats, while ensuring stable implementation of the main goals of the enterprise [5].

Shashlo N. V. interprets the economic security of an enterprise as the state of its development, guarantees and ensuring the most effective use and development of all available types of resources to ensure "stability of economic and financial development, effective neutralization, prevention and counteraction to internal and external factors in order to achieve the strategic mission of the enterprise" [6].

Lizina O. M. and Guseva S. V. understand the economic security of an enterprise as "the state of its protection from the negative influence of external and internal threats, destabilizing factors, which ensures the sustainable implementation of the main commercial interests and goals of the statutory activity" [7].

The presence of many definitions and interpretations for the concept of economic security of an enterprise indicates its popularity in research. In our opinion, the economic security of an enterprise should be considered as the security of business activity in General, taking into account not only the economic component, but also other equally important aspects, namely: legal, industrial, material, intellectual, and informational.

## 3. Methodology

An important fact is that the economic security of an industrial enterprise depends on the efficiency of its activities, and therefore, it is necessary to develop approaches to the study of the efficiency of an industrial enterprise, taking into account such phenomena as intensification and concentration, which fully corresponds to the situational approach to management.

It is necessary to consider separately the phenomena of intensification and concentration in industrial enterprises. This is due to the fact that these processes contribute to a significant reduction in resource costs in the production process, and this circumstance significantly affects the degree of efficiency of any production. Taking into account the current situation associated with the spread of the COVID-19 epidemic, we can say that enterprises are experiencing a decrease in quantitative and deterioration in qualitative indicators of intensification and efficiency of activities.

Consideration of the problems of intensification reserves in industrial production should begin with the fact that this definition includes many components. The decision to use these capabilities allows you to increase the efficiency of production and economic activities of an industrial enterprise, taking into account the current economic situation. [8]

Efficiency improvement reserves can be divided into the following types based on the following characteristics:

- 1) at the place of identification: intra-production and non-production reserves, which include national economic, industrial, regional;
- 2) according to the available potential: labor, material,

technical and technological, financial reserves;

3) according to the directions of use (purpose of use): reserves for improving the production apparatus and ensuring increased efficiency of application, reducing the labor intensity of work, as well as reducing the material intensity, fuel intensity and energy intensity of industrial products, together with improving the quality and increasing the volume of products and eliminating losses and non-production costs;

4) by period of use: current and prospective reserves.

To ensure effective management of in-production reserves, it is necessary to classify them to ensure their proper identification, study, mobilization, as well as to monitor and analyze the effect achieved on the basis of their use. When evaluating the possibility of using reserves to increase efficiency in industrial production to increase the competitiveness of products, it is necessary to consider the issues of delegation of authority. To do this, we suggest creating an interactive platform where you can post technical tasks. The creation of such a platform is an economic measure that takes into account the relationship of indicators available at the enterprise with indicators of production intensification and, above all, with indicators of disposal and renewal of fixed assets, the introduction of more advanced equipment, and so on [9].

As for the concentration of industrial production, it is worth using the General economic laws of concentration to determine it. The process of concentration of industrial production affects the manifestation of other economic laws in real economic turnover. Thus, according to the law of concentration, the scale of industrial production in a certain period can provide the highest level of organization of industrial production, achieving a high level of economic efficiency. It follows that there is a certain relationship between the level of economic efficiency of industrial production and its concentration. This relationship is called the law of concentration. When investigating the size of production concentrations, their variability should be taken into account. This is due to the development of industrial technologies and the organization of industrial production, due to which there is a change in the permissible and optimal values of concentrations of industrial production factors in a single process.

Thus, a number of factors may limit the growth opportunities of industrial enterprises. These include:

- 1) feature of manufacture;
- 2) transport and communication expenses;
- 3) costs for the protection and renewal of the natural environment, etc.

Ensuring the concentration of industrial production is most often carried out by creating new or rebuilding existing production facilities to increase the total production capacity. [8]

It can be assumed with great confidence that the higher the share of the impact of intensification on the process of concentration of industrial production, the more progressive production will become at a particular industrial enterprise, and, conversely, the expansion will only increase the size of

industrial production without corresponding economic benefits.

In industry, the nature of production should be taken into account when choosing a concentration meter. As a measure of the concentration of industrial production, you can use natural, conditional-natural and cost, that is, monetary indicators. These meters may not always be easily compared and may not always provide visibility.

To avoid the disparity of various indicators, it is possible to measure the level of concentration of industrial production, including in industrial clusters, as a value ( $K$ ) that determines the possibility of production and achieving efficiency on this basis:

$$K_i = \frac{\mathfrak{I}_i^\phi}{\mathfrak{I}_i^o} \leq 1 \quad (1)$$

$\mathfrak{I}_i^\phi$  - effect of the  $i$ -th factor of production concentration;

$\mathfrak{I}_i^o$  - the maximum effect possible when exposed to the  $i$ -th factor;

$i$  - the index factor,  $i = 1, n$ .

To estimate the level of concentration of industrial production in an enterprise, you can use the formula:

$$Y = \frac{\sum K_i}{n} \leq 1 \quad (2)$$

$n$  - the number of factors taken into account for the concentration of industrial production in the enterprise.

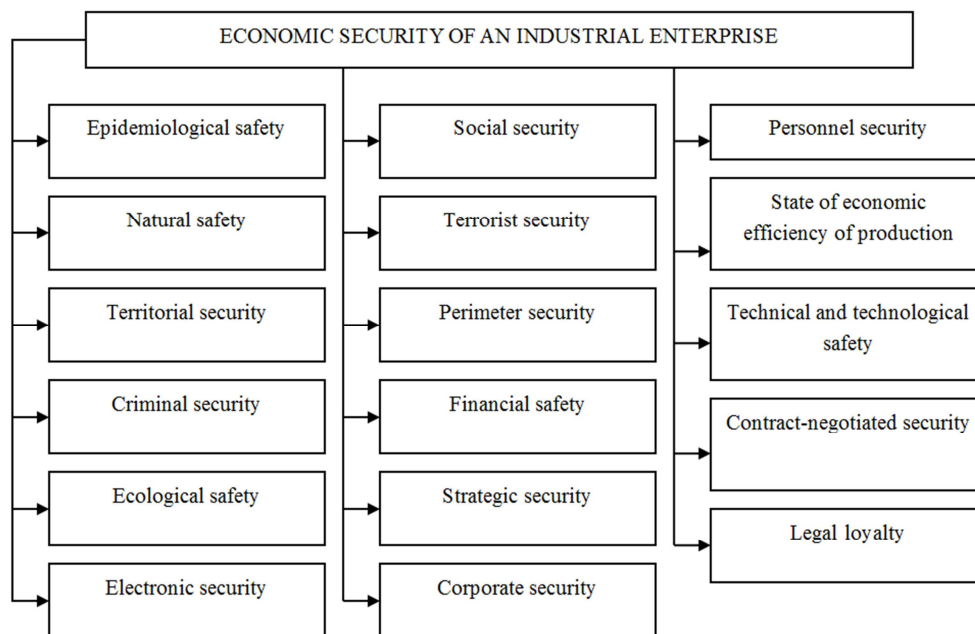
The task of optimizing production concentration processes is to distribute production processes at the enterprise in accordance with the criterion of minimizing total costs [10]. The development of tools for optimizing the processes of production concentration in industrial enterprises in the context of production diversification is one of the challenges facing economic science today [11].

Consideration of issues related to optimization of industrial enterprises' activities makes it necessary to restructure their management activities taking into account modern realities. The current year 2020 has shown the weakness of the management system in terms of ensuring economic security.

Therefore, in our opinion, it is worth considering economic security by its constituent elements, which will allow us to take into account the most vulnerable components that previously did not require special attention or were least exposed to risks.

## 4. Results

The economic security of an industrial enterprise is a set of criteria (Figure 1), the state of which characterizes certain areas of its activity, as well as the possibility of implementing threats to the economic security of the enterprise [12].



Source: developed by the authors on the basis [8, 12]

**Figure 1.** Elements of economic security of an industrial enterprise.

Let's analyze these criteria already taking into account the impact of the COVID-19 epidemic:

- 1) Epidemiological safety – (fEp) is the probability of occurrence and spread of epidemics and dangerous diseases. Until 2020, this criterion was fairly predictable, since science and health have accumulated enough information about possible diseases and ways to counter them. In General, epidemiological safety in the Russian Federation was fairly predictable and controlled. In addition, who also stated that the epidemiological situation around the world was predictable and controlled. The very possibility of mass epidemics on an international scale seemed unlikely. Events over the past year have pointed to the fallacy of existing opinions and forecasts.
- 2) The past year also indicated that the criterion of epidemiological safety should be applied not only to industrial enterprises located on the territory of the Russian Federation, but also take it into account when forming contractual obligations for the mutual supply of products and/ or components to them, since if a General quarantine is declared in any country from which components are delivered and production is stopped, then accordingly, Russian industrial enterprises will also be forced to stop without receiving the corresponding components from abroad.
- 3) Social security (fS) – this is the risk of spontaneous popular unrest due to high social tensions. The COVID-19 epidemic, a complex foreign policy environment, an overabundance of information in the age of digitalization, and digital illiteracy have exacerbated social tensions. The spread of COVID-19 has greatly affected the habitual way of life of citizens, increased nervousness in society, which has had a negative impact in the form of increased social tension, including due to the fact that the incomes of a number of categories of citizens were at risk of decreasing, and in some cases actually decreased.
- 4) Personnel security (fP) – provision of the company with personnel of the necessary qualifications and the availability of opportunities for their training and retraining. The spread of the COVID-19 epidemic has created an additional problem with personnel. So, enterprises had to transfer employees to remote work, send them on vacation and EN masse on sick leave, while production suffered. In addition, the training of new personnel is faced with the problem of distance education, the positive and negative aspects of which are still being discussed [13, 14]. COVID-19 in General made it difficult to train and retrain personnel, made it difficult to communicate, including within corporate groups of specialists, which negatively affects the speed of timely dissemination of corporate knowledge.
- 5) State of economic efficiency of production (fE), that is, the profitability of the enterprise and the availability of reserves to improve the efficiency of its operation, as mentioned above. The COVID-19 epidemic affected production efficiency, reducing it due to the unidirectional influence of many heterogeneous factors, which include:
  - a) mass diseases of employees;
  - b) stopping production lines inside the enterprise in order to ensure self-isolation and prevent the spread of the COVID-19 epidemic;
  - c) stopping production at related enterprises, which leads to a break in technological chains (the reason is the same);

- d) reduction of markets for finished products both in Russia and abroad;
  - e) restrictions on the movement of people between countries, which negatively affects the ability to attract repairers, Adjusters, consultants for the maintenance of industrial equipment, which are often attracted not only from neighboring regions, but also from other States;
  - f) difficulties in transporting goods both within the country and abroad, which can disrupt the timely delivery of raw materials and components and make it difficult to sell finished products.
- 6) Natural safety (fN) – the probability of occurrence of natural disasters that pose a danger to a given enterprise, taking into account its adaptation to a given area during construction.
  - 7) Terrorist security (f ter) – the probability of carrying out terrorist acts, based on the overall terrorist activity in the region. The spread of COVID-19 indirectly affects terrorist activity, as it increases the radicalization of the population and the level of their discontent.
  - 8) Territorial security (f s. ter) - the probability of territorial claims to the territory on which the enterprise is located in other States. The spread of COVID-19, if the epidemic persists for a long time, may exacerbate territorial disputes between different States, as new economic challenges will arise, which one of the options for solving them may be the seizure and annexation of territory.
  - 9) Perimeter security (fper) - ensuring the security of the perimeter and territory of the enterprise. With the spread of COVID-19, there are risks in ensuring the security of the enterprise's perimeter, first of all, this may be due to the mass morbidity of personnel and security.
  - 10) Criminal security (fCrim) – the degree of probability of committing criminally punishable crimes of a property nature in relation to the property of the enterprise. When distributing Kovid-19 may increase the level of criminalization of the population due to falling incomes and overall growth of social tension, which may lead to higher risk of crimes against property companies.
  - 11) Technical and technological safety (fT) – use of hazardous production facilities in the production process.
  - 12) Financial security (ffin) – the degree of financial stability to the risk of bankruptcy based on the ratio of equity and debt capital. With the spread of COVID-19, due to possible disruptions in the rhythm of industrial enterprises, changes in the characteristics of the market for goods and markets for the purchase of raw materials and components, the risk of a cash gap increases.
  - 13) Ecological safety (fEco) – the possibility of environmental disasters that are dangerous to human life and health.
  - 14) Contract-negotiated security (fcon) – the presence of a legal service at an industrial enterprise and the corresponding division or person whose duties include the study of contractors in contractual relations in the context of their reliability. When spreading COVID-19, there may be risks in ensuring contractual security, mainly due to the incidence of employees.
  - 15) Electronic security (fEl) - the use of special licensed software and electronic computing equipment in the operation of the enterprise, which excludes unauthorized access to significant information and process management.
  - 16) Strategic security (fStr) – the presence of an industrial enterprise of the relevant division or person whose duties include the implementation of intelligence activities in relation to competitors and counterintelligence activities in their enterprise. When COVID-19 is spread, there may be risks in ensuring strategic security, mainly due to the incidence of employees.
  - 17) Corporate security (fCorp) is characterized by the organizational and legal form inherent in this enterprise and / or the degree of state participation in its capital.
  - 18) Legal loyalty (fLo) it is characterized by the relationship of business owners, top management of business, business beneficiaries with state legal institutions and the fiscal system in terms of compliance by the above-mentioned persons with legal acts regulating economic turnover and living in the state.
- By analyzing all 17 parameters, you can build a model of the economic security system of an industrial enterprise. Entering specific parameters for a specific company creates a model in numerical terms. Subsequently, we work with a model of the system that examines the objective components under which economic activity occurs and identifies the available reserves for improving efficiency.
- Taking into account 17 parameters, taking into account the provisions of the theory of system reliability, we can offer a mathematical model describing the impact of economic security on an industrial enterprise. In a situation where all the parameters of economic security are equal to one, that is, there are no threats at all. If there are certain threats, the value will be characterized by the formula (ES):
- $$ES = f_{Ep} \cdot f_S \cdot f_P \cdot f_E \cdot f_N \cdot f_{ter} \cdot f_{s,ter} \cdot f_{per} \cdot f_{Crim} \cdot f_T \cdot f_{fin} \cdot f_{Eco} \cdot f_{con} \cdot f_{El} \cdot f_{Str} \cdot f_{Corp} \cdot f_{Lo} \quad (3)$$
- For each of the 17 parameters of economic security of an industrial enterprise, there is a method for determining it, taking into account its features [8, 12].

## 5. Conclusion

Economic security is a complex phenomenon that takes into account the influence of a large number of both external and internal factors on the operation of industrial enterprises and their aggregate groups. To make it easier to identify and

take into account the influence of a large number of factors, it is advisable to identify a number of criteria that characterize certain areas of economic security. Currently, it is highly relevant to study the consequences of the impact on these criteria of the spread of the COVID-19 epidemic, in order to minimize the occurrence of negative processes and identify reserves for ensuring economic stability, and on its basis, economic growth.

The scientific results and conclusions obtained in this work can be used in the management of industrial enterprises, industrial clusters and industries, including in the development of economic security strategies at the regional and interregional levels.

The main results of this study are:

1. In the context of the spread of the COVID-19 epidemic, ensuring economic security becomes more urgent and begins to become of paramount importance, since it is economic security that is the real basis for economic and political stability.
2. Economic security can be defined and described by a number of criteria, each of which has its own determinative basis, which is influenced, among other things, by the spread of the COVID-19 epidemic.
3. Possible directions, methods, mechanisms, ways of occurrence and implementation of threats to economic security in industry in the situation of the COVID-19 pandemic are Deciphered.

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