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# Exploring Factors Affecting on the Pharmaceutical Distribution Industry: the Case of Kazakhstan*

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## Abstract

**Purpose:** This research is aimed to explore factors affecting on Kazakhstan's pharmaceutical distribution industry, selection of various factors and assessment of the level of their influence. Based on the literature review it was defined that there is a great variety of scientific works relating to pharmaceutical distribution industry competitiveness and management improvement. **Research design, data and methodology**: There is very little research, which to determine the issues of pharmaceutical industry distribution in developing countries, in particular EAEU countries. The algorithm was chosen for research provision: statistical and comparative analysis, correlation, and regression analysis. The data of 1993-2020 obtained from the World Bank, Bureau of National Statistics, National Bank of Kazakhstan, which is expressed by 19 factors as macroeconomic indicators. **Results**: The chosen variables were selected non-randomly, these economic indicators had the most reliable, unique, and utmost for the whole research period complete information. **Conclusions**: There could be made adequate conclusions of the research, there is a strong positive relationship for six factors: population, GDP per capita, average annual US dollar exchange rate, the minimum pension, average assigned monthly pension, minimum wage. Pension and wage are the most significant factors affecting on the pharmaceutical distribution industry in Kazakhstan.

**Keywords:** Distribution, Pharmaceutical Distribution, Correlation Analysis, Regression, Kazakhstan

**JEL Classification Code**: I3, M11, O50

## 1. Introduction

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International competition and innovation-driven growth cover considerable part in terms of economy as pharm industry. The implementation of the idea of transition to the economic growth will not occur if pharmaceutical distribution sector of the economy remains immune to new technologies. Moreover, there are prerequisites to pharmaceutical industry become one of the engines of innovative economic development in many countries.

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Determining the growth prospects of the economy of any country must consider the objectives of all components of pharmaceutical distribution complex modernization. At the same time dynamic development strategy of pharmaceutical market is determined by its important priority, as humanity since its very establishment is in the need of constant consumption of medical products and devices for healthcare activities at the level necessary for a full life.

Pharmaceutical distribution market represents an important sector of the economy of any country is a criterion of its economic and social development, the level of wellbeing of the population. Developed pharmaceutical distribution industry of a country is considered as an indicator of its high economy. In the modern context, pharmacy has become the most profitable industry, which attracts investors.

At present, pharmaceutical industry of Kazakhstan is one of the most important elements of the health system, stands on the verge of radical changes. To the greatest extent, these changes are associated with the impact of the COVID-19 pandemic and the increase in labor productivity, as well as the implementation of institutional modernization.

Pharmaceutical distribution industry of Kazakhstan represents a population of persons concerned with production, sales, and consumption of pharmaceutical products: manufacturing companies, distributors, pharmacy staff, doctors and management of clinics and hospitals and, directly, the patients themselves. Given division of pharmaceutical distribution market participants contributes to the differentiation of their needs in relation to the offered goods.

The practical foundations of the functioning and distribution of the pharmaceutical industry and market, as well as health problems in several foreign countries, are considered by many scientists (Kimmel, 2009; Shabaninejad, Mehralian, Rashidian, Baratimarnani, & Rasekh, 2013; Harrington, 2014; Tyagi & Nauriyal, 2017). A significant number of works are devoted to the pharmaceutical distribution industry and the identification of their specifics (Sheldon, 1993; Armstrong, Gillespie, Leeder, Rubin, & Russell, 2007; Coughlan, Ryan, & Cronin, 2013; Hristova, Stevcevska-Srbinoska, Mileva, & Zafirova, 2019).

In spite of the insignificant number of works discussing the issues of pharmaceutical distribution. Scarce scientific development of pharmaceutical distribution problems leads to that in practice it is often conducted without proper justification and does not result in the achievement of the expected performance of the process.

Commitment with buyers was essential for the sustainability and improvement of pharmaceutical companies. In other words, pharmaceutical companies should strive to form a relationship with buyers to improve their economic sustainability and social sustainability (Kim & Kim, 2020).

Under these conditions, an analytical review of the theory and methods of analysis pharmaceutical distribution is an urgent problem, insufficiently developed from a scientific perspective. This study explores factors affecting Kazakhstan's pharmaceutical distribution industry in the context of the creation of a single drug market within the Eurasian Economic Union (EAEU).

In pharmaceutical industry regression analysis has quickly proved to be as a tool that can be used at every stage of the pharmaceutical industry, from product distribution and beyond: from early development to commercialization. This set of methods of correlation and regression analysis allows to extract information, contained in large, complex datasets, thereby contributing to a deeper understanding of the influence of factors. In this research there was used a single-factor analysis of pharmaceutical industry distribution to show the application of alternative modeling and novelty of the study in this context. The advantage of multi-factor modeling was applied in other studies. Due to this, a single-factor analysis as chosen. There were chosen independently 19 parameters with high accuracy for assessment of the impact of dynamics Kazakhstani pharmaceutical industry development. Based on a panel dataset for 27 years, from 1993 to 2020, we performed a regression of the random effects. Empirical part of the research is devoted to the analysis of pharmaceutical distribution in Kazakhstan.

## 2. Literature Review

Currently, pharmaceutical sector is still at the initial stage of development, to try creating their own independent pharmaceutical industry. In the scientific literature, it is shown that for economic growth there is needed provision of full and adequate social healthcare, which is a severe problem for pharmaceutical industry and the government in any country (Armstrong et al., 2007; Kimmel, 2009; Harrington, 2014). These problems appear due to demographic changes and population morbidity growth rate. Pharmaceutical devices make a valuable contribution to the healthcare system, which has influence on the results in healthcare for population (Fidler & Msisha, 2008). Increase in the volume of scientific and research works, related to the development of medical products requires financial and technical assistance, and assessment of healthcare technologies (Grabowski & Vernon, 2000; Plumb,2005; Coughlan et al., 2013; Lee & Choi, 2015).

It can be noted that ensuring sustainability is among

chief problems of different industries (Sheldon, 1993; Amran & Ooi, 2014; Nurlanova Satybaldin, Brimbetova, & Kireyeva, 2019). Due to the use of pharmaceuticals, there is a corresponding increase in the generation of pharmaceutical waste (Castensson, 2008). Management of hazardous wastes is an integral part of pharmaceutical industries (Jaseem, Kumar, & John, 2017). Obviously, that ever-increasing usage of pharmaceuticals in medicine can have adverse impact on the environment. Thus, researchers showed bigger impact of the pharmaceutical products manufacturing on the environment, which also results in the waste increase (Wernet, Conradt, Isenring, Gonzalez, & Hungerbuhler, 2010; Vaz, Freitas, & Cirqueira, 2011).

Next, some researchers in the medical scientific press often use correlation analysis with the presentation of certain correlation coefficients without sufficient explanation of their meaning (Hristova et al., 2019). Studies on pharmaceutical industry are focused on the assessment of the impact of such directions as healthcare sector and pharmaceutical companies' compliance with competition rules. Additionally, there were provided studies on assessing the impact of digitalization on drug sales (Abha, 2018). Next, in scientific works there was provided assessment of the impact on organizational resources on the share price, based on the share price of pharmaceutical companies (Kim, Lee, Wi, & Lee, 2017). Some research considered the analysis of factors, which affected the profitability of the pharmaceutical industry and the prices of medical products (Jiang, Yang, Yan, Liu, Zhao & Fang, 2013; Tyagi & Nauriyal, 2017; Islam & Khan, 2019). As follows from theoretical frameworks, profitability is the difference between the income and expenses of an enterprise and the greater the difference is, the higher is the profitability of the company. The profitability of the company depends on the payments of dividends to employees, which is one of the expenses types (Yong & Mustapha, 2016). Involvement of employees – this is a new theme, which is studied through different concepts and is becoming a considerable problem in the wake of employee turnover rising in the pharmaceutical industry (Anand, Banu, Rengarajan, & Sarayu, 2017). Information asymmetry is a problematic issue that occurs frequently in the medical industry (Lee, Ha, & Lim, 2020).

The aspects of various factors which affect pharmaceutical industry were widely analyzed and the results are available in many sources (Miller & Rasmussen, 2010; Hajli, 2014; Hanson, West, Thackeray, Barnes & Downey, 2014). The main factors of impact on the competitiveness and management of the pharmaceutical distribution industry are those, which have impact on the capacity of a country to develop and supply new medicinal products or create new chemical compounds, especially those that are successfully marketed. So, important

indicators of medicine supply chain management are coordination, customer relationship management, distribution management with impact factor, enterprise resource planning, financial management, globalization, IT management, knowledge management, logistics management, medical insurance system, pharmaceutical structure programming, pharmaceutical structure, and risk management (Esmaeillou, Asl, Tabibi, & Cheraghali, 2017; Grujić, Morača & Fajsi, 2020).

Moreover, some studies highlight that there are key factors of competitiveness and management of pharmaceutical distribution market: human capital; macro-level policy; management strategy and operational efficiency of pharmaceutical companies; development of auxiliary and related industries and clusters; administrative infrastructure; potential for innovation; organizational practice; capital market infrastructure; internationalization of companies and the competitive environment (Shabaninejad et al., 2013). Some studies consider transport outsourcing, relations with government and donors, financial capacity and information technology as the main factors affecting distribution performance for pharmaceutical products (Achuora, Arasa, Nzioki, Ochiri & Muangangi, 2012).

Today the Eurasian Economic Union (EAEU) is alliance, which is designed to deepening of cooperation between some countries (figure 1).

Initially, Russia, Kazakhstan and Belarus joined the EAEU, later Armenia and Kyrgyzstan. It is supposed that regional integration will facilitate the development of cooperation between them and increase the competitiveness and management of industries, including the pharmaceutical industry. There are some studies that analyze this issue in European Union (Boldeanu & Pugna, 2014). It should be mentioned that, despite the significant number of scientific literatures on exploring factors affecting on the pharmaceutical distribution industry, there are few scientific research aimed at careful analysis of pharmaceutical distribution market and strategy of management in developing the EAEU countries.

Against this background, the substantiation of the assessment of the level of pharmaceutical distribution industry is an urgent, insufficiently developed scientific problem from the conceptual-methodological and theoretical-methodological points of view. Current article is devoted to the solution of this problem, summarizing the results of many studies, and using quantitative research methods based on official statistical data, which indicates the objectivity of the results obtained. The article focuses on the study of macroeconomic factors affecting on the pharmaceutical distribution industry, considering both indicators that determine the demand and supply for pharmaceutical products.

Insufficient scientific degree of development of problems of sustainable development strategy of the pharmaceutical distribution industry leads to the fact that in practice it is often without systemic and clear measures.

This results in the loss of the expected effectiveness of the strategic management process and ensuring the continuity of the process of progressive changes in the industry.



Source: Russia Briefing (2020)

**Figure 1**: The map of the EAEU countries

## 3. Research Methodology

Methodological basis for the development of the model of impact on the development of economic sectors is a regression model. In addition, modeling is a useful tool for transforming of detailed and compound complex systems. Although models make no pretense to creation of a perfect copy, they reflect relationships and interactions between various factors. Moreover, models allow researchers, who make decision, to combine information from various resources and, in some cases, to extrapolate conclusions to the future after a short probation period (Arnold, 2009).

The algorithm of scientific research consists of the following stages:

1) analysis of the development strategy of the pharmaceutical industry in Kazakhstan;

2) assessment of factors affecting the development strategy of the pharmaceutical industry in Kazakhstan;

3) assessment of the degree of influence of these factors on the output of the pharmaceutical industry.

For each stage there were applied various methods. For the 1 - statistical and comparative analysis; for 2 - deterministic sensitivity analysis, for 3 - factor analysis.

The fundamental of any industry development are based on its production and we chose the production of pharmaceutical products and defined it as a dependent variable "Y" (Production of basic pharmaceutical products in million US dollars), since it is necessary to check which of the 19 macroeconomic parameters most affects the competitiveness and management of the pharmaceutical distribution industry (Appendix 1).

The purpose of this research is to determine the relationship and statistical significance of correlational relationship between selected factors. It is possible to measure and evaluate the statistical validity of this relationship only with the help of the correlation coefficient. In some studies, there have been analyzed the level of correlation between observations by indicators of the pharmaceutical industry (Prajapati & Singh, 2016; Pal & Nandy, 2019). Thus, analysis will allow to define the strength and direction of correlation a set of underlying variables called factors. The Pearson correlation coefficient r for the X and Y values is found by the formula (1):

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$$r_{xy} = \frac{n*\sum X_i \cdot Y_i - \sum X_i \cdot \sum Y_i}{\sqrt{(n \cdot \sum X_i^2 - (\sum X_i)^2) \cdot (n \cdot \sum Y_i^2 - (\sum Y_i)^2)}} \quad (1)$$

x is the value of the independent variable;
y is the value of the dependent variable.

The positive value of the correlation coefficient shows to a direct correlation between the investigated values, and negative - on the opposite ones. Based on the correlation field, it can be hypothesized (for the general population) that the relationship between all possible values of X and Y is linear.

The value of Pearson correlation coefficient is interpreted based on its absolute values. Possible values of the coefficient correlation vary 0 and $\pm1$. The larger is the $r_{xy}$ value, the higher is the bond strength between the two values; $r_{xy}= 0$ - no relationship; $r_{xy}= 1$ - the presence of an absolute relationship. We considered the fact that if the value of the Pearson correlation criterion is greater than 1 or less than -1, then errors were made in the calculations.

A regression analysis was carried out for each independent factors, and special attention was paid to the assessment of the correlation. Sample correlation coefficient is obtained from derived bivariate normal distribution of pairs of observations $(x1, y1),\ldots,(xn, y)$. Regression analysis is a statistical method that quantifies the dependence of two random variables between the existing correlation. Using the regression coefficient, you can determine the value of one quantity without special measurements, knowing the value of another. For these, purposes, the following formula is used (2):

$$y = bx + a + \varepsilon \quad (2)$$

$\varepsilon$ is a random error (deviation, perturbation).

Equation parameters a and b are found using the least squares method. The idea of analysis of variance, like the term "variance" itself, belongs to the English statistician R. Fisher. The method was developed in the 1920s. It is used to determine the degree of influence on the studied indicator of some factors, including those that cannot be quantified, among which there are such factors in this study. Thus, univariate analysis is the most accurate analysis for our study.

Factor analysis was based on secondary data for 1993-2020: World Bank, Bureau of National Statistics, National Bank of Kazakhstan, official statistics, reporting indicators and expert analytical publications. Data comparability is provided through the usage of unique units of measurement and methods of quantitative indexes calculating.

In our research, before making decision on the application of Pearson correlation coefficient the variables were divided into data types, to check the distribution of both variables in the sample. Selected methods were applied in conjunction, which contributed to the achievement of comprehensiveness, reliability and objectivity of scientific research, specificity, validity, and consistency of the conclusions formulated in the article.

## 4. Results

### 4.1 Assessment of the pharmaceutical distribution industry in Kazakhstan

Pharmaceutical distribution market of Kazakhstan is one of the most developed ones in the EAEU. To some extent, the deficit has been overcome and saturation with various types of finished pharmaceutical products and medical devices has been ensured. The service culture has improved. In Kazakhstan there are observed main global trends in the development strategy of pharmaceutical distribution markets- consolidation and development of vertically integrated companies. Changes are in progress in distribution, manufacturing, and retail sectors. The number of pharmacy chains is increasing. Modern marketing technologies and control management strategies of this industry development are being introduced. Meanwhile, globally the production of medicine in Kazakhstanis still developing slowly. Moreover, it must be noted that Kazakhstani pharmaceutical industry is far below in gross profitability than foreign companies. The analysis shows manufacturing of pharmaceutical products in Kazakhstan during 1993-2020 (in 1993 was put into circulation and the accounts were held in KZT) showed positive dynamics, having increased over 27 years by 279 times in monetary terms in million USD of pharmaceutical industry production. For visual clarity, we are providing production dynamics in Kazakhstan in figures for 1993-2020 in figure 2.

According to the provided data for 1993-2020, pharmaceutical production is growing. Thus, for the last 10 years pharmaceutical products indicators have increased dramatically. This, first, is associated with the creation of a single market for medical products between the EAEU countries. However, the situation became more complicated after the transition of Kazakhstan to a free exchange rate regime in 2015. Foremost, such situation pushed the prices up both for domestic and foreign medical products, which is demonstrated in the diagram, which shows the increase in money terms. The prices for foreign medical products increased for 35-40%, that in proportion to the increase in the foreign exchange rate
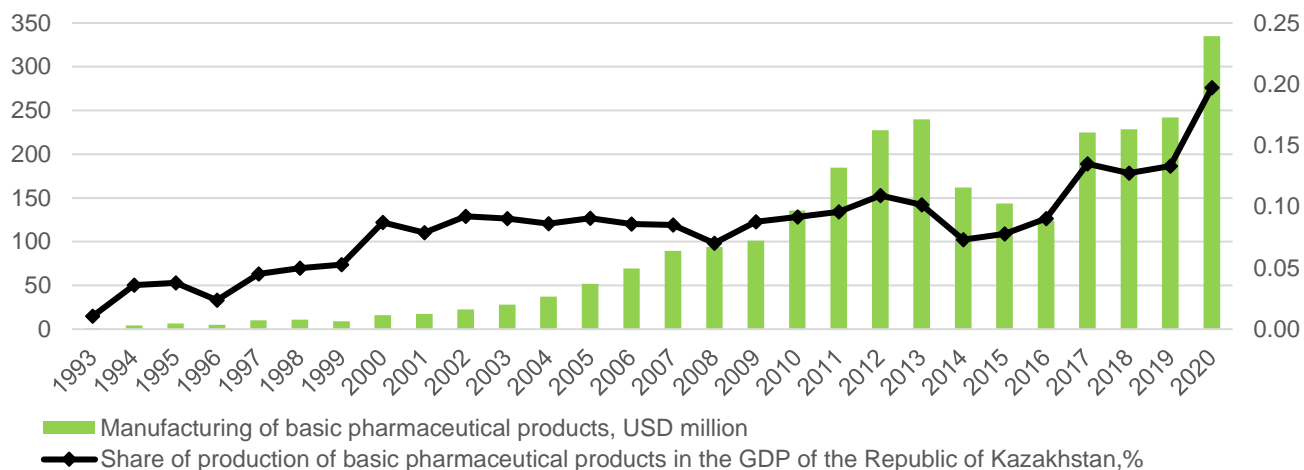
Source: Bureau of National Statistics (2020), rearrangement

**Figure 2:** Manufacturing of basic pharmaceutical products, in USD million

Although pharmaceutical industry in the broad picture of industrial manufacturing in 0.32% in 2019, and in 2020, the share increased by 40% and amounted to 0.52% of the total volume of the industry of Kazakhstan. This economic sector is essential for government development, being one of the proxy indicators of population standard of living. Amid the pandemic prices for medical products have changed, but marketing research suggests that demand for them has remained the same as in the pre-crisis time because pharmaceutical products belong to the essential product group.

Nevertheless, in the context of COVID-19, the share of the pharmaceutical industry has increased, which is shown in table 1.

**Table 1**: Share of basic pharmaceutical products production for 1993-2020

| Year | For the production of basic pharmaceutical products in the industrial production, % | For the production of basic pharmaceutical products in the manufacturing industry, % | Year | For the production of basic pharmaceutical products in the industrial production, % | For the production of basic pharmaceutical products in the manufacturing industry, % |
|------|------|------|------|------|------|
| 1993 | 0,03 | 0,04 | 2007 | 0,14 | 0,37 |
| 1994 | 0,04 | 0,08 | 2008 | 0,11 | 0,34 |
| 1995 | 0,06 | 0,11 | 2009 | 0,16 | 0,51 |
| 1996 | 0,05 | 0,09 | 2010 | 0,17 | 0,52 |
| 1997 | 0,10 | 0,19 | 2011 | 0,17 | 0,56 |
| 1998 | 0,11 | 0,20 | 2012 | 0,20 | 0,62 |
| 1999 | 0,09 | 0,19 | 2013 | 0,20 | 0,62 |
| 2000 | 0,13 | 0,28 | 2014 | 0,16 | 0,48 |
| 2001 | 0,13 | 0,28 | 2015 | 0,21 | 0,53 |
| 2002 | 0,15 | 0,34 | 2016 | 0,22 | 0,53 |
| 2003 | 0,15 | 0,34 | 2017 | 0,32 | 0,78 |
| 2004 | 0,13 | 0,33 | 2018 | 0,29 | 0,76 |
| 2005 | 0,13 | 0,37 | 2019 | 0,32 | 0,80 |
| 2006 | 0,13 | 0,36 | 2020 | 0,52 | 1,18 |

Source: Organized by authors

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According to the data for 1993-2020, contrasted with the volume of GDP growth and industry of the country, there is evidenced increase in the production of pharmaceutical products, which annually made up 16%–20%. Against the positive dynamics of production volume, pharmaceutical industry contribution to the GDP volume of Kazakhstan remains rather low, for the entire period the indicator did not exceed 0.1%, except for 2020, when it

was as much as 0.2. In 2020< the share of the pharmaceutical industry in the GDP of the country was only 0.2% while it accounted for 0.52% of the total industry, and 1.18% in the manufacturing industry.

Nevertheless, the share of the pharmaceutical industry in the manufacturing industry is constantly growing.

As of 2020, there are 89 enterprises in pharmaceuticals production operating in Kazakhstan (Figure 3).
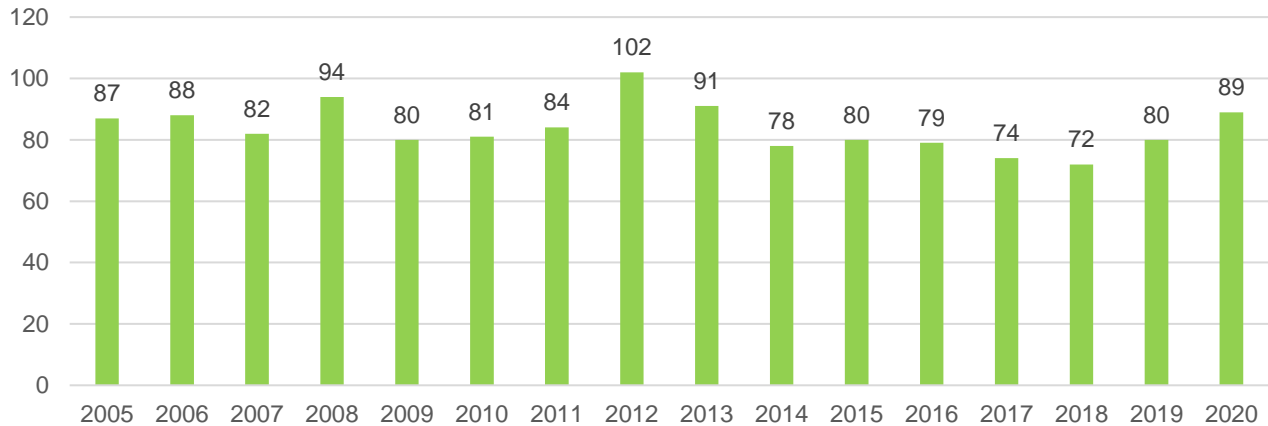


Source: Bureau of National Statistics (2020), rearrangement

**Figure 3:** Number of enterprises producing drugs and medical devices for 2005-2020

The number of enterprises is declining after the peak in 2012, because Kazakhstan in 2013 switched to using a mechanism for pegging the national currency to a multicurrency basket. That subsequently gradually reduced the role of the US dollar in the domestic foreign exchange market and foreign economic activity. This measure had a negative impact on pharmaceutical companies since the main pharmaceutical substances and materials in Kazakhstan are purchased abroad and the main share of pharmaceutical enterprises in Kazakhstan is not engaged in production but in distribution. Then, since 2016, Kazakhstan has adopted international GMP standards. As a result, many pharmaceutical companies that did not comply with GMP requirements had to close.

According to the provided data for 2005-2020 the number of functioning organizations almost has not changed. Accordingly, in 2020, there were 89 enterprises in Kazakhstan. They are foreign and local manufacturers of pharmaceutical products, including small-scale manufacturers of medical devices. It should be noted that of all the EAEU countries Kazakhstan has the leas share of manufacturers in the market and hence the export volumes of products are low. Based on the data the International analytical agency of the IQVIA, the growth of the total pharmaceutical distribution market in Kazakhstan is forecasted until 2024 by 10%.

## 4.2 Analysis factors affecting on the pharmaceutical distribution industry in Kazakhstan

Examining the developed correlation matrix, it follows that presented set of variables the following six factors have the greatest influence: X1 (0,88); X3 (0,88); X5 (0,78), X6 (0,89); X7 (0,92); X8(0,85). The following factors have moderate and low influence X12 (0,41) and X17(0,3), X18 (0,29) respectively. Their correlation coefficients are statistically significant.

Pensioners are the main consumers of pharmaceutical products in Kazakhstan. Undoubtedly, the average assigned monthly pension in the Republic of Kazakhstan is a high estimated indicator, which gives an understanding that the production of pharmaceutical products is closely related to the growth of this indicator. This means that when developing a pharmaceutical industry development plan, the strategy for managing the above indicator should be given the utmost attention.

As it was analyzed above, the rest of the correlation coefficient showed the lack of connection, and the results were statistically insignificant for creating the model. Therefore, we excluded them from the regression model (Appendix 2). Let us look at the following indicators of

this table, this is the P-value. P-value: X1 (1,33); X3 (0,430); X5 (0,37), X6 (0,012); X7 (0,08); X8 (0,019). P-value coefficients also prove that the observed differences are statistically significant (significance level p <0.05), except for X6 and X8. This means that the hypotheses regarding the remaining factors are incorrect. This means that the p-values of X6 and X8 are statistically significant, which increases the "strength" of rejecting the null hypothesis and increases the expected significance of the result. As a result, we can get the following regression models for X6 and X8:

1) X6: y = -52,595+2,439x

The regression coefficient shows that an increase in the minimum pension in Kazakhstan by one US dollar increases production of pharmaceutical products per year by 2.439 million US dollars.

2) X8: y = -34,783+2,140x

The regression coefficient shows that an increase in the minimum wage of the Republic of Kazakhstan by one US dollar leads to an increase in the production of pharmaceutical products per year by 2.140 million US dollars.

However, it should be considered in the above that the free coefficient does not make economic sense, since production cannot be a negative number.

This suggests that to develop the production of the pharmaceutical industry, it is necessary to maintain the growth and increase of these indicators: the minimum pension and the minimum wage in the Republic of Kazakhstan. Based on this, it is possible to determine the main lever for developing the Kazakhstani pharmaceutical market in the person of consumers. In general terms, they can be defined as pensioners and workers. However, these groups of people are quickly exposed to external factors, and therefore are an unstable lever for the development of pharmaceutical production. This, in turn, can be dangerous for developing the pharmaceutical industry in Kazakhstan, as it can lead to its collapse or, after reaching saturation of the market, go into a phase of stagnation.

## 5. Conclusions

In this research, we have identified the main factors that influence pharmaceutical distribution industry in Kazakhstan. It should be given the utmost attention to them when developing a pharmaceutical industry development plan.

During the research, we came to the following conclusions.

Firstly, pharmaceutical distribution market of Kazakhstan is one of the most developed ones in the EAEU. manufacturing of pharmaceutical products in Kazakhstan during 1993-2020 showed fast positive dynamics. For the last decade pharmaceutical products indicators have increased dramatically because of the creation of a single market for medical products between the EAEU countries. In 2020 in Kazakhstan, there were 89 enterprises in pharmaceutical production that operating according to international GMP standards; the share of pharmaceutical industry in the GDP of the country was only 0.2% while it accounted for 0.52% of the total industry, and 1.18% in the manufacturing industry. But pharmaceutical industry is essential and is one of the proxy indicators of population standard of living. And it is forecasted that the growth of the total pharmaceutical distribution market in Kazakhstan will be 10% until 2024.

Secondly, a statistically significant positive (direct) link has been observed between production of basic pharmaceutical products and following six indicators: population, GDP per capita, average annual US dollar exchange rate, the minimum pension, average assigned monthly pension, and minimum wage. All of them have high estimates. Link between production of basic pharmaceutical products and import of basic pharmaceutical products from third countries to the Republic of Kazakhstan is statistically significant positive (direct) and moderate. The rest of the correlation coefficient showed the low or lack of connection.

Thirdly, pension and wage (indicators that determine the demand of pharmaceuticals products) are the most significant factors affecting on the pharmaceutical distribution industry in Kazakhstan. An increase in the minimum pension in Kazakhstan by one US dollar leads to an increase in the production of pharmaceutical products per year by 2.439 million US dollars, an increase in the minimum wage of the Republic of Kazakhstan by one US dollar leads to an increase in the production of pharmaceutical products per year by 2.14 million US dollars. So, to develop the production of the pharmaceutical industry, it is necessary to maintain the growth and increase of these indicators: the minimum pension and the minimum wage in the Republic of Kazakhstan.

The results of the study allow us to conclude that in recent years, the competitiveness of the pharmaceutical industry in Kazakhstan has significantly strengthened due to the creation of a single drug market. This has been noticeable in the last 5 years. This means that it is necessary to further develop the pharmaceutical industry in the same direction within the EAEU.

To further strengthen the common pharmaceutical

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market and increase the competitiveness of pharmaceutical products in Kazakhstan, it is necessary to continue research work regarding price regulation and ensuring the quality and safety of products through the introduction of uniform GMP rules of the EAEU, to build up scientific and human potential and increase the export potential of domestic pharmaceutical products.

# References

Abha, W. (2018). Evaluating the Effect of Digitalization on the Sales Force of Pharmaceutical Industry. *Economics and Applied Informatics, 2*, 21-29. https://doi.org/10.26397/eai158404093

Achuora, J., Arasa, R. M., Nzioki, W., Ochiri, G., & Muangangi, P. (2012). Factors Affecting Distribution Performance for Pharmaceutical Products in Kenya's Public Sector. *The Journal of Innovations, 7*(2), 55-61. http://erepo.usiu.ac.ke/11732/1359

Amran, A., & Ooi, S. K. (2014). Sustainability reporting: meeting stakeholder demands. *Strategic Direction*, *30*(7), 38–41. https://doi.org/10.1108/SD-03-2014-0035

Anand, V., Banu, C., Rengarajan, V., & Sarayu, R. (2017). Employee Engagement – A Pragmatic Study with Reference to Pharmaceutical Industry, Tamil Nadu. *Research Journal of Pharmacy and Technology*, *10*(6), 1583-1588. https://doi.org/10.5958/0974-360X.2017.00278.5

Arnold, R. (2009). *Pharmacoeconomics: From Theory to Practice* (1st ed.). Boca Raton, Florida, USA: CRC Press.

Armstrong, B. K., Gillespie, J. A., Leeder, S. R., Rubin, G. L. & Russell, L. M. (2007). Challenges in health and health care for Australia. *Medical Journal of Australia*, *187*(9), 485-489. https://doi.org/10.5694/j.1326-5377.2007.tb01383.x

Bureau of National Statistics (2020). Annual statistical collections of the Republic of Kazakhstan. Retrieved from BNC https://stat.gov.kz/official/industry/11/statistic/6

Boldeanu, D, & Pugna, I. (2014). The Analysis of the Influence Factors Affecting the Performance of Pharmaceutical Companies. *Theoretical and Applied Economics, 7*(596), 23-42.

Castensson, S. (2008). *Pharmaceutical Waste*. In: Kümmerer K. (Eds.), Pharmaceuticals in the Environment (pp.488-499). Berlin: Springer, Heidelberg.

Coughlan, M., Ryan, F., & Cronin, P. (2013). *Doing a Literature Review in Nursing, Health and Social Care* (1st ed.). Los Angeles, USA: SAGE Publications Ltd.

Esmaeillou, Y., Asl, I. M., Tabibi, S. J., & Cheraghali, A. M. (2017). Identifying Factors Affecting the Pharmaceutical Supply Chain Management in Iran. *Galen Medical Journal, 6*(4), 346-355. https://doi.org/10.22086/gmj.v6i4.869

Fidler, A. & Msisha, W. (2008). Governance in the pharmaceutical sector. *EuroHealth*, *14*(1), 25-29. https://www.euro.who.int/__data/assets/pdf_file/0018/80451/Eurohealth14_1.pdf

Grabowski, H. G., & Vernon, J. M. (2000). The determinants of pharmaceutical research and development expenditures. *Journal of Evolutionary Economics*, *10*(1), 201-215. http://dx.doi.org/10.1007/s001910050012

Grujić, J., Morača, S., & Fajsi, A. (2020). Analysis of Risk Factors in the Channels of Drug Distribution: Professional Perspectives. *Sustainability, 12* (11), 4787. https://doi.org/10.3390/su12114787

Harrington, N. G. (2014). *Health Communication: Theory, Method, and Application* (1st ed.). NY: Routledge.

Hajli, M. N. (2014). A study of the impact of social media on consumers. *International Journal of Market Research*, *56*(3), 387-404. https://doi.org/10.2501/IJMR-2014-025

Hanson, C. L., West, J., Thackeray, R., Barnes, M. D. & Downey, J. (2014). Understanding and Predicting Social Media Use Among Community Health Centre Patients: A Cross-Sectional Survey. *Journal of Medical Internet Research*, *16*(11), e270. https://doi.org/10.2196/jmir.3373

Hristova, S., Stevcevska-Srbinoska, D., Mileva, I., & Zafirova, A. (2019). Trade-Off Between Liquidity and Profitability: An Empirical Study of Pharmaceutical Sector in the Republic of North Macedonia. *Timisoara Journal of Economics and Business, 12*(2), 127 - 148. https://doi.org/10.2478/tjeb-2019-0007

Islam, M. N., & Khan, M. S. (2019). The Determinants of Profitability of the Pharmaceutical Industry of Bangladesh: A Random Effect Analysis. *International Journal of Financial Research, 10*(2), 68-74. https://doi.org/10.5430/ijfr.v10n2p68

Jaseem, M., Kumar, P., & John, R. (2017). An overview of waste management in pharmaceutical industry. *The Pharma Innovation Journal, 6*(3), 158-161.

Jiang, M., Yang, S., Yan, K., Liu, J., Zhao, J., & Fang, Y. (2013). Measuring Access to Medicines: A Survey of Prices, Availability and Affordability in Shaanxi Province of China. *PLoS ONE, 8(*8), e70836. https://doi.org/10.1371/journal.pone.0070836

Kimmel, A. J. (2009). *Ethical Issues in Behavioral Research: Basic and Applied Perspectives.* New Jersey, USA: John Wiley & Sons.

Kim, B., Lee, N. S., Wi, J., & Lee, J. (2017). The effects of slack resources on firm performance and innovation in the Korean pharmaceutical industry. *Asian Journal of Technology Innovation, 25*(3), 387 - 406. https://doi.org/10.1080/19761597.2018.1434007

Kim, Y.-H., & Kim, Y.-T. (2020). Determinants of Sustainability Performance in Pharmaceutical Distribution Industry. *Journal of Distribution Science, 18*(12), 91–100. https://doi.org/10.15722/JDS.18.12.202012.91

Lee, M., & Choi, M. (2015). Analysis on Time-Lag Effect of Research and Development Investment in the Pharmaceutical Industry in Korea. *Osong Public Health and Research Perspectives, 6*(4), 241 - 248. https://doi.org/10.1016/j.phrp.2015.07.001

Lee, C., Ha, B., & Lim, S. (2020). Impact of Informational Justice on Pharmaceutical Enterprises. *Journal of Distribution Science, 18*(8), 55-64. https://doi.org/10.15722/JDS.18.8.202008.55

Miller, K., & Rasmussen, A. (2010). War exposure, daily stressors, and mental health in conflict and post-conflict settings: bridging the divide between trauma-focused and psychosocial frameworks. *Social science & medicine, 70*(1), 7-16. https://doi.org/10.1016/j.socscimed.2009.09.029

Nurlanova, N., Satybaldin, A., Brimbetova, N., & Kireyeva, A. A. (2019). Reduction of Economic Disparities in the Regions of Kazakhstan Based on Inclusive Development. *Journal of Asian Finance, Economics and Business*, 6(2), 299-307. https://doi.org/10.13106/JAFEB.2019.VOL6.NO2.299

Pal, B., & Nandy, M. (2019). Innovation and business sustainability (IBS): empirical evidence from Indian pharmaceutical industry (IPI). *Artificial Intelligence for Engineering Design, Analysis and Manufacturing*, 33(2), 117 - 128. https://doi.org/10.1017/S0890060419000040

Plumb, K. (2005). Continuous processing in the pharmaceutical industry: changing the mind set. *Chemical Engineering Research and Design*, 83(6), 730-738. https://doi.org/10.1205/cherd.04359

Prajapati, D., & Singh, S. (2016). Determination of level of correlation for products of pharmaceutical industry by using modified X-bar chart. *International Journal of Quality & Reliability Management*, 33(6), 724-746. https://doi.org/10.1108/IJQRM-05-2014-0053

Russia Briefing (2020). China-EAEU Trade Share Increases By 20% In 2020. Retrieved from RB https://www.russia-briefing.com/news/china-eaeu-trade-share-increases-by-20-in-2020.html/

Shabaninejad, H., Mehralian, G., Rashidian, A., Baratimarnani, A., & Rasekh, H. (2013). Identifying and prioritizing industry-level competitiveness factors: evidence from pharmaceutical market. *DARU Journal of Pharmaceutical Sciences*, 22(35), 35-45. https://doi.org/10.1186/2008-2231-22-35

Sheldon, R. (1993). *Chirotechnology: Industrial Synthesis of Optically Active Compounds (1st ed.)*. Boca Raton, Florida, USA: CRC Press.

Tyagi, S., & Nauriyal, D. K. (2017). Firm level profitability determinants in Indian drugs and pharmaceutical industry. *International Journal of Pharmaceutical and Healthcare Marketing*, 11(3), 271-290. https://doi.org/10.1108/IJPHM-03-2016-0016

Yong, T. M., & Mustapha, M. (2016). Determinants of dividend payout ratio: evidence from Malaysian public listed firms. *Journal of Applied Environmental and Biological Sciences*, 6(15), 48-54. http://psasir.upm.edu.my/id/eprint/55465

Vaz, K. V, Freitas, M. M, & Cirqueira, J. Z. (2011). Investigação sobre a forma de descarte de medicamentos vencidos. *Cenarium Pharmacêutico*, 4(4), 3-27. http://www.unieuro.edu.br/sitenovo/downloads/cenarium_04_14.pdf

Wernet, G, Conradt, S, Isenring, H. P, Gonzalez, C. J, & Hungerbuhler, K (2010). Life cycle assessment of fine chemical production: a case study of pharmaceutical synthesis. *The International Journal of Life Cycle Assessment*, 15(3), 294–303. https://doi.org/10.1007/s11367-010-0151-z

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# Appendixes

**Appendix 1:** Indicators of independent variables and correlation coefficients

| # | Independent variable | Correlation coefficient | Statistical significance level |
|---|---|---|---|
| 1 | X1 - Population, thousand people | 0,88* | $t_{critical\ v.}$ 3,4686< $t_{obs.\ v.}$ 9,2613 |
| 2 | X2 – GDP, USD million | 0,91 | $t_{critical\ v.}$ 3,1932> $t_{obs.\ v.}$ 1,0983 |
| 3 | X3 - GDP per capita, USD | 0,88* | $t_{critical\ v.}$ 1,4523< $t_{obs.\ v.}$ 9,4449 |
| 4 | X4 – Inflation, % | -0,28 | $t_{critical\ v.}$ 7,6298> $t_{obs.v.}$ -1,4734 |
| 5 | X5 - Average annual US dollar exchange rate, USD/tenge | 0,78* | $t_{critical\ v.}$ 2,2162< $t_{obs.\ v.}$ 6,2687 |
| 6 | X6 - Minimum pension, USD | 0,89* | $t_{critical\ v.}$ 2,0392< $t_{obs.\ v.}$ 9,2742 |
| 7 | X7 - Average assigned monthly pension, USD | 0,92** | $t_{critical\ v.}$ 4,2054< $t_{obs.\ v.}$ 9,8738 |
| 8 | X8 - Minimum wage, USD | 0,85* | $t_{critical\ v.}$ 5,1553< $t_{obs.\ v.}$ 8,3076 |
| 9 | X9 - Average monthly salary of pharmaceutical personnel, USD | 0,70 | $t_{critical\ v.}$ 4,3609> $t_{obs.\ v.}$ 3,2877 |
| 10 | X10 - Number of manufacturing plants, qty | 0,02 | $t_{critical\ v.}$ 8,1678> $t_{obs.\ v.}$ 7,8407 |
| 11 | X11 - Exports of basic pharmaceutical products with third countries, USD million | 0,71 | $t_{critical\ v.}$ 7,6488> $t_{obs.\ v.}$ 2,4979 |
| 12 | X12 - Import of basic pharmaceutical products from third countries to the Republic of Kazakhstan, USD million | 0,41* | $t_{critical\ v.}$ 1,0919< $t_{obs.\ v.}$ 1,1098 |
| 13 | X13 - Indices of consumer prices for medicines in the Republic of Kazakhstan, per cent | -0,56 | $t_{critical\ v.}$ 2,7187> $t_{obs.\ v.}$ -2,1633 |
| 14 | X14 - Investments in fixed assets of pharmaceuticals. prom, USD million | 0,38 | $t_{critical\ v.}$ 3,4564> $t_{obs.\ v.}$ 1,5574 |
| 15 | X15 - Energy intensity of GDP, tonne of oil equivalent per thousand USD | 0,51 | $t_{critical\ v.}$ 1,0791> $t_{obs.\ v.}$ -1,9979 |
| 16 | X16 - Number of deaths, total people | -0,41 | $t_{critical\ v.}$ 2,2563> $t_{obs.\ v.}$ -1,9346 |
| 17 | X17 - Per capita spending on pharmaceuticals, USD | 0,30** | $t_{critical\ v.}$ 3,8082< $t_{obs.\ v.}$ 8,3575 |
| 18 | X18 - Household expenditure on pharmaceuticals, USD | 0,29* | $t_{critical\ v.}$ 1,0926< $t_{obs.\ v.}$ 7,9694 |
| 19 | X19 - Expenditures on medicines and medical dressings of health care organizations, USD million | 0,91 | $t_{critical\ v.}$ 3,4564> $t_{obs.\ v.}$ 1,5574 |

*. Correlation is significant at the 0.05 level (2-tailed)
**. Correlation is significant at the 0.01 level (2-tailed)

Note: Organized by the authors

**Appendix 2:** One-factor regression model estimates calculated in EViews10

| Independent variable | Multiple R | R-square | Normalized R-square |
|---|---|---|---|
| X1 - Population, thousand people | 0,90 | 0,81 | 0,80 |
| X3 - GDP per capita, USD | 0,87 | 0,77 | 0,76 |
| X5 - Average annual US dollar exchange rate, USD/tenge | 0,77 | 0,60 | 0,57 |
| X6 - Minimum pension, USD | 0,88 | 0,80 | 0,78 |
| X7 - Average assigned monthly pension, USD | 0,91 | 0,83 | 0,82 |
| X8 - Minimum wage, USD | 0,85 | 0,72 | 0,71 |

Note: Organized by the authors