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STUDY OF THE GENERAL SITUATION OF IT IN UKRAINE IN DETERMINING THE FACTORS INFLUENCING THE ECONOMIC PERFORMANCE OF THE SEGMENT

Summary

The article is devoted to analyzing and researching Ukraine's technology segment. This study was conducted due to the importance of the segment for developing countries and the importance of understanding the main factors of influence that allow for improving the economic performance of the segment's entities. The article analyzes the general situation of the technology sector in Ukraine. Various methods of analysis were used. One was the comparison method, which included indicators for the technology and information segments since these segments form the country's ITC sector. The article reflects trends and analyzes specific segment indicators. Hence, an upward trend was analyzed and derived to indicate the number of units involved in the technology segment. The predominance of micro and mini entities in the segment was confirmed, which confirms the previously conducted tests for Central and Eastern Europe when reviewing certain countries. It is noted that the central economic units representing Ukraine's IT segment are individual entrepreneurs. The study demonstrates the dynamics and analysis of economic performance indicators of the segment. Three main groups of factors of possible impact on the performance of economic entities were presented. Hence, the tax burden on the basic taxes in the form of income, profit, and social tax was analyzed. Since individual entrepreneurs represent most entities in the IT segment, the tax base was studied at the general rates and when deriving separate data for the IT segment. The educational component was demonstrated to familiarize and understand the growth trend in the number of students majoring in IT. The third group of factors was represented by the costs of specialists involved in the segment's work, such as the total segment's personnel costs and the average monthly salary. In general, the trend in the indicators in the article is demonstrated as an upward trend. The general analysis presented in the article allowed to derive a model of dependence of the net profit of IT segment entities in Ukraine on the factors of influence when determining only specific indicators of influence using the methods of static base analysis. The final model was obtained by conducting a panel least squares modeling with the test for omitted variables.

Keywords: IT sector, ICT sector, influencing factors, business model, digitalization, profit, IT specialists, tax policy, ecosystem IT, education.

Statement of the problem. The information technology sector is a rather important link in the development of modern states, both from the point of view of the whole country's economy and individual units included in this sector. This sector is currently quite crucial for the countries of Central and Eastern Europe, which at the same time opens up space for researching this sector of the economy in Ukraine due to the possibility of adopting foreign experience or generally understanding the situation with the sector and its indicators in the country. The information technology sector consists of two main components: the technology segment and the information segment. Over the past twenty years, there has been a reorientation of effectiveness and influence between these segments. The technology segment has come to the forefront, which requires a greater understanding and analysis of the general situation of indicators in the segment and the study of factors that may impact the segment.

Analysis of recent research and publications. Researchers have studied the impact of economic and financial crises on company performance and how companies manage their costs to stimulate growth. For example, Cruz Castro et al. observed that not all companies cut spending on growth factors, such as R&D expenditures, during a crisis. Similarly, Bollen et al. and Barney found a link between economic performance and human capital and education factors. Some studies have demonstrated

a correlation between companies' revenues and R&D expenditures. Tax policy has become one of the most studied factors affecting the development of companies, with Sabbar and Sabri focusing on its impact on profitability. Katz, Jung examined how specific tax rates influenced telecommunications companies' investment decisions. While most studies did not directly address IT/ITC, they predominantly focused on influence factors [1–8].

Highlighting previously unresolved parts of the overall problem. Analysis of recent studies shows that most of them do not focus on the IT/ITC sector as a whole or/and the influencing factors are not considered in the example of the relationship between external and internal factors. Recognizing the unique characteristics of the IT/ITC industry in different regions and countries, it should be acknowledged that in order to improve the performance of companies in this sector it is necessary to create an optimal external environment, which stimulates further research in Ukraine.

Objectives of the article are to investigate the general situation of Ukraine's technology segment and identify and derive the main factors influencing the development and efficiency of the segment's economic performance.

Summary of the main material. The ITC sector has been essential to the Ukrainian economy in the last decade. Hence, it is necessary to understand the extent to which ITC can create GDP and expand its

influence. The indicator of the ITC sector in GDP creation experienced quite fluctuating values during the period from 2010 to 2022. However, since 2019, the value exceeds the size of 4%. The extreme maximum value was obtained in 2020, reaching a mark close to 5%. This value is quite weighty and confirms the hypotheses about the sector's importance for the country's economy. In 2010, the value was 3.06%.

The period of growth of the indicator of the share of the ITC sector in the creation of GDP was the years from 2012 to 2016. 2017, there was a stagnant decline in the indicator's value, with recovery and growth in 2018. During the period under study, the value of ITC share in GDP was near 3%, which is quite weighty. In addition, the value reached in 2020 also allows the state of the advanced country among certain representatives of CEE that was studied since these countries only in the perspective of 5 years in the creation of the development strategy of the segment aim to obtain 5% of ITC participation in GDP [4–6; 11].

At the same time, significant values are reflected in the export of computer services during the study period from 2015 to 2021. In 2015, this value was 13.4%, and in 2022, it was 37.8% [9]. There was an increase of 24.4 percentage points, which indicates not only GDP creation and the growth of the sector's influence but also the sector's export orientation. In this context, Ukraine has been presented as an outsourcing country in recent years, which confirms this statement.

As a standard, the research and analysis of the IT/ITC sector are based on the main categories that have been demonstrated in the example of CEE countries, i.e., the main components according to the standardized numbering of Central and Eastern European countries by the NACE code, Rev.2 edition are the following codes: 58.2, 62, 63.1, and 95.1 (for IT) [4–6; 10].

An essential indicator for studying the IT/ITC sector is the number of units in the segment and their analysis. The research period for this indicator is from 2010 to 2022.

The number of business entities in the ITC sector grew by a significant amount in the period from 2010 to 2022. In 2010, the share of companies belonging to the ITC was 2.56%, compared to 17.98% in 2022. The average annual growth for ITC companies as a share of all business entities in the country was an increase of 1.21 percentage points.

The share of IT companies in the total number of entities in the country in 2022 amounted to 15.82%, compared to 2.07% in 2010. It is worth

noting that units in the technology segment accounted for a larger share over the years, while telecommunications entities lagged far behind. In addition, the telecommunications segment, unlike the technology segment, experienced a slight growth rate over the years [11].

Overall, the share of IT companies in the ITC increased by 11.87 percentage points over the twelve years. In 2010, the share of IT entities in the ITC was 80.74%, and in 2022 the value was 92.62%. The number of units in the technology segment amounted to 45,198 entities; in 2016, this value was 116,140 units; in 2022, it was 274,068. The growth in absolute terms amounted to 228,870 units [11].

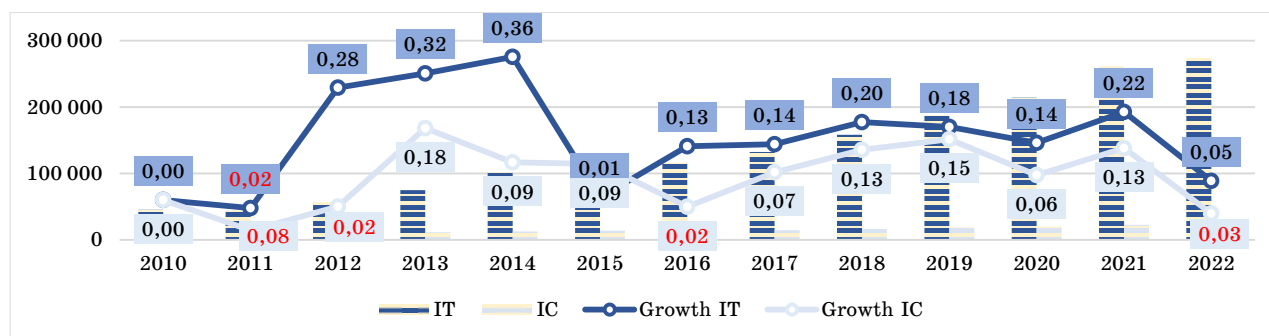
When studying the number of companies representing both the overall ITC sector and its sub-segment groups in European countries [4–6], it was appropriate to study the understanding of segmentation only by micro, small, medium, and large enterprises, while in Ukraine, in addition to the standard follow-up review, it is also essential to separate and understand the share of individual entrepreneurs in the total number of business entities.

In 2010, the number of business entities in the form of individual entrepreneurs in the technology sector was 39,753; in 2022, this value was 266,914. In 2020, this amounted to 97.4% of all technology entities; 2010 this value was 88%. With this volume of entities in the form of individual entrepreneurs, they represent mainly micro and small enterprises, mainly justified by several main aspects [11].

Over the past decade, the country has been characterized by a flourishing tech industry, improving performance, and outsourcing. Usually, the understanding of outsourcing involves the cooperation of workers not based on a permanent contract as an employee and employer but based on cooperation on a project-contract basis. In a particular case, individual developers can register as entrepreneurs and continue cooperating with large companies or work on a project basis.

In this case, the large number of statistical units is also confirmed by the fact that the opening of sole proprietorships for this type of cooperation usually occurs based on economic activity codes NACE 62 and 63.1. This provokes the appearance of the presented value of the entities involved. The indicator for the telecommunications sector is somewhat lower compared to IT, and in 2022, it is 79%, but there is a significant increase since 2010, when the value was 28% [11].

The second reason is the lower costs, both in terms of money and time, for registering a sole



* IT –Technology segment; IC – Information segment.

Figure 1. Dynamics of the number of units in the IT vs. IC sector and growth rates, units, and %

Source: compiled by the author based on data [11]

proprietorship. Opening a sole proprietorship is more accessible than opening a legal entity.

The study of the understanding and reasons for using individual entrepreneurs in this system allows to continue the study of small and micro business entities. The total share of individual entrepreneurs in small and micro enterprises is 98%. This value is significant and represents almost all companies represented, not only in the technology sector but also in the ITC in general. It is worth noting that micro-enterprises represent the number of employees up to 10 people, i.e., up to 9 people inclusive, while small businesses are represented by values from 10 to 49. This justifies the base of sole proprietors in these categories. Sole proprietors registered in Group 2 can have up to 10 employees officially employed, while sole proprietors in Group 3 have the right to have an unlimited number of officially employed workers. This also allows to indicate the reason for using sole proprietorships as a more extensive option than registering a legal entity [12; 13].

Two financial indicators of the IT sector were selected as possible dependent variables for further research: financial results and net profit of companies. The data of annual performance indicators of IT companies are presented from 2010 to 2022.

Performance indicators of IT sector companies in the form of financial results or turnover and net profit allow to note a rather noticeable increase in the value of each of the indicators.

From 2010 to 2022, the financial result was a 39-fold increase, or 3.8 percentage points, while the net profit value increased 65-fold or 6.4 percentage points. Net profit growth is higher during the analyzed period than companies' turnover in the technology segment. This is explained by the net profit margin on companies' turnover, which was 48% in 2010 and 80% in 2022.

This suggests that companies have improved the efficiency of their costs during this period, as the profits generated cover the companies' expenses. This is also due to the prevalence of sole proprietorships and the possibility of using them. When a sole proprietorship is formed and has no employees, the costs of specific categories are almost ignored.

Since 2014, the growth rate of the companies' performance indicators has been parallel, with a similar situation with net profit when the financial result rises or falls. However, before 2014, the trend was only sometimes linear, as more companies made a loss than a profit. Also, the positive value of the financial result does not guarantee the profitability of companies, as the financial result represents the funds received for the products of companies, i.e., the annual turnover of companies in the segment. Net profit is the amount after all the expenses that the company needs, including non-operating expenses.

The average growth rate of financial results between 2010 and 2022 was 184 percentage points, and 477 percentage points were for company profit. For both performance indicators, the maximum growth rate was demonstrated in 2016, mainly due to overcoming dependence on external factors.

The worst value of the segment companies in terms of net profit was demonstrated in 2015. However, the financial result of that year was higher. This year's low net profit was due to external factors that forced to increase its non-operating expenses from the additional category. However, the lowest value of the financial result was achieved in 2011.

The analysis of the performance indicators of the technology segment companies should also be studied in comparison with the indicators of the telecommunications segment as a whole ITC sector. In 2022, the technology segment's profit share in the ITC amounted to 105%. The illogicality of the indicator is that telecommunications companies suffered losses in 2022, offset by the profitability of IT companies. In 2010, the share of profit of IT companies included in the ITC was 9%, which indicates a rapid growth over ten years.

IT companies' annual turnover or financial results have also increased in share, from 9% in 2010 to 88% in 2022. These analysis results may lead to false conclusions since, at first glance, the analyzed results show a significant increase in the share of IT companies' income in the ITC. However, at the same time, there is a specific limitation to these results. While the companies of the technology segment gradually accumulated a linear share of revenue and profit, the companies of the telecommunications

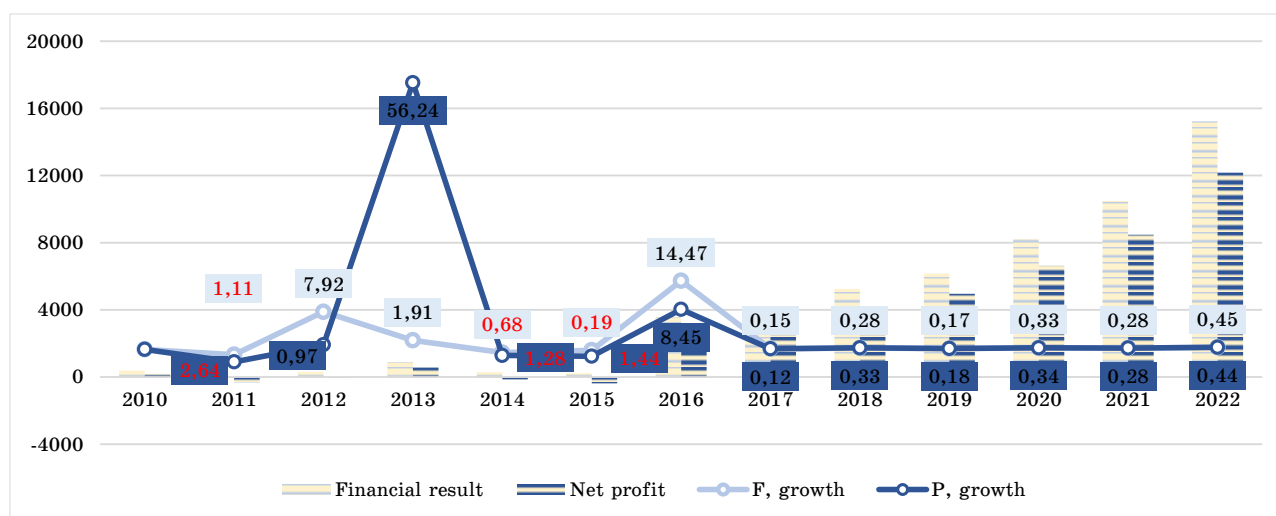


Figure 2. Dynamics of the financial result and net profit of the IT segment, growth indices to the previous period in 2010–2022 in Ukraine, UAH million and %

Source: compiled by the author based on data [11]

sector had a somewhat fluctuating trend: for specific periods in the studied period, the companies of the technology segment showed significantly better results than the technology companies, but various recessions allows to note their significant dependence on external factors, which makes them more sensitive and less reliable when making a forecast of the impact on the country's economy as a whole.

The analyzed general indicators of the IT segment indicate an increase in economic entities. In addition, there has been a significant increase in economic efficiency indicators over the period under study. As for the size of companies, Ukraine confirms the dynamics studied in the CEE countries: many units are micro and small. The overall analysis demonstrates an improvement in all indicators of the IT segment, which directly proves the need to study the technology segment more deeply, as the indicator of participation in GDP creation by IT objects has also been growing over the period and confirms the importance of the segment for the country's economy.

Several types of taxes were studied and presented in Ukraine, and their changes over the years are considered. The main taxes considered are: corporate tax; personal income tax (payroll tax); social contributions.

Corporate income tax rates or corporate profits vary. In 2023, the rate varies from 0% to 30% of income. The rate depends on the economic activity of the business entity [12]. The basic corporate income tax rate for legal entities in Ukraine in 2023 is 18%. This type of taxation has undergone significant changes over twenty years. From 1992 to the end of 2010, the basic corporate tax rate was 30% [12]. Since December 2010, the rate has been changed by ten percentage points. Thus, the reduction of the basic rate has become an essential aspect for supporting legal entities.

The rates of social contributions were also of great importance. In 2023, the paramount rates paid in the country are the unified social tax rate and the military fee. The military tax rate in 2023 is 1.8%. This value is not further investigated for impact calculations, but it should be noted that this rate is equal for most categories, which allows for neutralization of its impact.

The rate paid for the unified social contribution has undergone significant changes over the twenty years of the study. This contribution was formed in 2011 by combining four other contributions with their respective amounts for companies to pay [12].

The overall decline in paying social contributions under the social tax over the years decreased by 12.7 percentage points. Until 2015, the average rate of the unified social contribution was 34.7%; starting in 2016, this value was reduced to 22%.

The personal income tax rate is the only tax studied that has undergone reverse changes. The rate has been increasing throughout the twenty-year analysis of the rate. From 2000 to 2017, the tax rate was 15%. Since 2018, the tax rate of this type has increased.

A general study of the introductory tax rates for these taxes since 2000 shows an improvement in the taxation system for legal entities operating in the country. There was an overall reduction in the tax rate by 21.7 percentage points. However, the personal income tax rate increase may be pretty significant, as it taxes employees. Although it is considered a burden on the employee, it generally places an additional burden on companies. This is

because these amounts of taxation are considered by legal entities when calculating the maximum allowable amounts of payments to employees.

A rather important point that was investigated earlier is that the vast majority of economic entities in IT are individual entrepreneurs. Such a large number of IE indicates a difference in the tax base and the amount of the taxation coefficient itself. This provokes the problem of studying tax policy on the economic performance of units. Therefore, the ratio of the share of IE in the total number of companies should also consider the amount of taxes paid by IE.

Individual entrepreneurs are subject to a simplified taxation system. The standard presentation of taxes for IE in Ukraine is based on the division into taxation groups. The main groups considered in the context of individual entrepreneurs in the technology sector are the 2nd and 3d taxation groups. The main difference from the standard taxation is the application of the ST (single tax) and the payment of the unified social contribution of 22%, a fixed amount of UAH 1474 in 2023 [12]. The primary payment amounts for the single tax groups are given below:

- Group 2: UAH 1340. When calculating and determining the average value for Group 2, the rate is usually no more than 1.5% of income;

- Group 3: 3% and VAT payment or 5% of income.

In addition to the previously mentioned amount of the unified social tax payable by individual entrepreneurs in 2023 of UAH 1,474, it is worth noting that this amount is usually the standard minimum on which the unified social tax of 22% is paid. In this context, it is a simplified payment aspect for individual entrepreneurs. Over the decade, this amount has constantly changed due to the increase in the minimum taxation rate [12].

A scheme was created for companies to calculate the average amount of social security contributions for the technology segment during these years, as some companies still belonged to legal entities without simplified payment amounts. In addition, the average amount of social security contributions for companies in the technology segment that were individual entrepreneurs was also calculated according to a weighted average.

A study of European countries has shown the importance of factors related to education [5; 6]. That is why this aspect is being studied. Using the available data, it is possible to understand the number of specialists at the university level. In this case, the number of applicants, students, and graduates in information technology specialties is an important indicator. Data for several academic periods are analyzed. The figure below shows the number of students at all levels of education for 4 academic years.

Based on the above data, there is a noticeable increase in the number of applicants and graduates and the total number of students during the above academic years. The number of applicants in the 2018/2019 academic year was 25,185 people, and in the 2021/2022 academic year, the number was 41,171. There was an increase in the number of people admitted to study information technology by 63.47 percentage points. In terms of the number of students, the overall value was an increase of 82.68 percentage points, and the number of graduates in this specialty increased by 58.09 percentage points. These growth rates are significant.

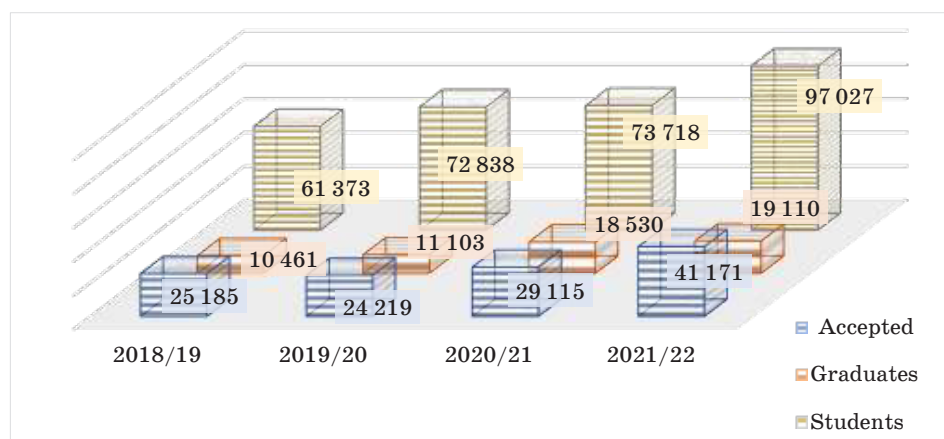


Figure 3. Dynamics of the number of students, graduates, and applicants in the period from 2018 to 2022, persons

Source: compiled by the author based on data [11]

In the statistical analysis of the indicators, it is worth noting the levels of education at which training takes place. There are three main categories of higher education in Ukraine: bachelor's, specialist's, and master's degrees. It is worth noting that a specialist's education level was abolished, so the data for this category is close to 0. At the same time, only the main areas of education in higher education institutions will be revealed, without considering the junior bachelor's degree, etc.

The most significant number of students is in the bachelor's degree category. In 2021/2022, the number of bachelor's degree students was 78,328 in information technology. The number of master's students was only 18,684. The annual growth in the number of students for the bachelor's degree category was 1.21 times, and for the master's degree, it was 1.13 times. Both the bachelor's and master's degrees showed significant growth in the last year under study.

However, the dynamics of graduates are pretty exciting and opposite to the previous period. For the bachelor's category, the annual growth rate decreased, while the indicator for masters, on the contrary, experienced a significant increase. However, in contrast to the pretty standard values obtained for the European countries previously studied, there is an increase in the number of new students in both bachelor's and master's programs not only in absolute terms (actual numbers) but also in terms of the growth rate compared to the previous period.

The indicators that are shown below are the indicators of personnel costs for ITC and IT. In general, the costs of technology companies have experienced a significant increase between 2010 and 2022. The cost of companies in the information technology sector amounted to UAH 10,618.1 million; in 2022, this value amounted to UAH 48,120 million [11]. In general, there is an increase of 353.19%. It is worth noting that during the years studied, this growth value is quite significant for the country as a whole compared to other industries in Ukraine.

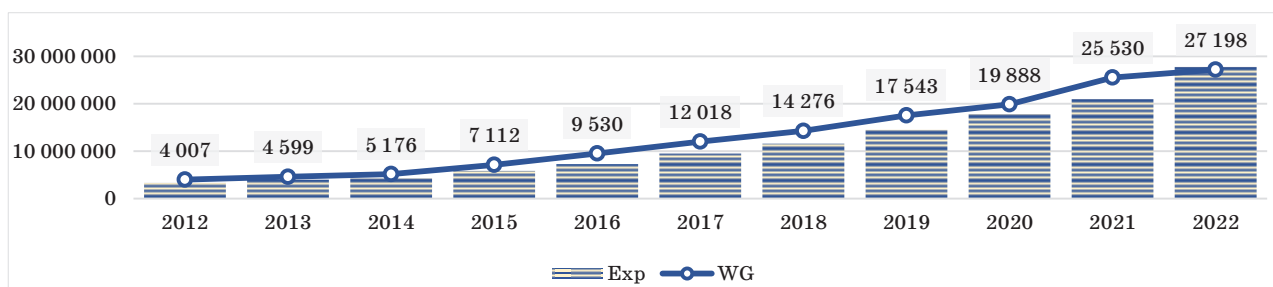
The analysis of subgroups of the information technology sector allowed to note again the previous trend of reorientation between sector segments. In 2010, the share of total personnel costs represented by all ITC companies was mainly comprised of the costs of companies in the information segment.

Technology companies' share in this type of expenditure was 16.83% of the sector's total. In 2022, the share of personnel costs for technology companies amounted to 57.72%. The share increased by 40.89 percentage points over the twelve years.

The average annual growth rate of personnel costs in technology companies is 26.04 percentage points, compared to the average annual growth rate of 7.58 percentage points in information companies. This trend is entirely justified by previous analyses conducted across the country, as the reorientation and growth of the number of employees in companies or labor for individual entrepreneurs in the technology sector has increased their costs. In this context, it is worth noting not only the growth in terms of proportionality to the growth of people but also the growth in the costs associated with taxation of the industry. Personal income tax increased by 3 percentage points relative to the tax rate during the period under study since 2010.

In order to determine the most influential factor on the efficiency of companies and to derive the most rational and accurate model, the average monthly wage in the sector and the employment rate in the country in this segment are also studied. Due to the need for more data, the analysis is performed at the sector rather than the segment level. Hence, the data analyzed in this article is reflected in the information technology sector.

The annualized average monthly wage is shown in the figure above. The data clearly shows the growth of IT employees' remuneration over the decade. The average annual growth of the salary level in 2012–2022 amounted to 21.47 percentage points. 2012, the average monthly salary in ITC was UAH 4,007; in 2022, this value was UAH 27,198. In absolute terms, there was an increase of UAH 23,191 [11]. This value is quite significant, reflecting not only the assertion that the increase in personnel costs was due to the growth in the number of employees in companies and the impact of the tax burden and The preliminary analysis of possible influence indicators on the IT segment allows to determine the main dependence model. From here, the study of the possible impact of factors on net profit in the technology segment continues. The modeling was performed in two independent stages. In the first stage, the modeling is based on annual data for the previously studied



* WG – average wage in ITC; Exp – corporate spending on personnel

Figure 4. Dynamics of indicators of companies' personnel costs and average monthly salary, UAH

Source: compiled by the author based on data [11]

indicators. The second type of modeling is based on regional data.

Turning directly to the construction of the first type of model and the study of its correspondence to reality, it should be noted that the factors of education were not taken into account since the amount of available complete data is relatively small and does not allow to make a complete assumption and create a hypothesis. Hence, the main factors influencing the net profit of technology companies are labor force factors and tax policy factors.

Several models were built to determine the optimal one by the criteria. The models were analyzed by determining the most optimally acceptable values for pairs of groups in terms of adequacy and logicity of the models. Hence, with subsequent verification, a Granger Causality test was conducted for each pair or group of influence factors.

Hence, the optimal values in terms of model adequacy are obtained by the impact indicators such as the average monthly wage in the ITC, social taxes, and taxes on employee income. The results of the Granger causality test are shown below.

It leads to the identification of a trend of influence, which allows to reflect the coefficient model of dependence of net profit of technology units on this basis:

$$\begin{aligned} Profit = & 1.14e_{+06} + 545.865WG - \\ & -2.23e_{+07}TSOC_2 - 3.03532e_{+07}TS_2. \end{aligned} \quad (1)$$

The final model of the first type for the IT segment of Ukraine shows that the annual net profit of a company depends on the tax rate on social benefits and employee income tax and the size of the average monthly salary. The tax factor shows an inverse relationship with the dependent variable: a decrease in the tax rate will improve the economic performance of companies in the segment. However, it is interesting to note that companies' economic performance will improve when wages increase at the annual average level.

In addition, this indicator is the most influential in terms of p-value. It is due to the motivational system, i.e., with an increase in employee motivation in the form of remuneration, there is an improvement in employee productivity and a direct impact on the growth of net profit. According to the indicators of adequacy and plausibility (R^2 , p-statistics for the model and log-likelihood), the model has the right to exist. However, even though, in general, the model has the right to exist and reflects a reasonably correct reality and logical understanding, there is a particular problem. Since one of the roots of this polynomial is outside the unit circle, the hypothesis of the model's stationarity is rejected.

In general, based on the time series, the basic model of dependence of the net profit of the technology segment on groups of influence factors was demonstrated. Since there are certain limitations and insufficiencies of data for research, comparison, and a clear understanding of the dependence, a panel analysis of data is conducted, taking into account the period from 2014 to 2021, taking into account 24 regions and the city of Kyiv. Thus, the number of observations is 200.

The primary data used in this modeling are income tax, payroll tax, social contributions, the number of employees as individual entrepreneurs, the number of employees, and company expenses, including personnel costs. The above factors apply only to the IT segment. The dependent variable is net profit. Initially, based on the previously presented models and analyses of the dependence of net profit, a model is built with the influence factors in the form of the number of employees as individual entrepreneurs and the actual expenses by entity. The indicator for individual entrepreneurs was chosen due to a logical understanding of their importance and influence in this sector of the economy.

The model allows to note that the selected factors for the model are very significant. In addition, the calculated Durbin-Watson statistic is higher than R^2 , indicating no autocorrelation in the data.

Table 1

Results of the Granger test for Ukraine

Dependent variable: Profit

Excluded	Chi-sq	df	Prob.
WG	24.45211	1	0.0000
TSOC ₂	1.396244	1	0.2737
TS ₂	2.299092	1	0.1294
All	24.49381	3	0.0015

* WG – average wage in ITC; TSOC₂ – social contributions for the IT segment; TS₂ – payroll tax for the IT segment; Profit – net profit IT.

Source: obtained and compiled by the author

Table 2

Results of the Omitted Variables Test

Omitted Variables Test

Omitted Variables: TP_2 TS_2 $TSOC_2$

Specification: profit c expe ie

Null hypothesis: TP_2 TS_2 $TSOC_2$ are jointly insignificant

	Value	df	Probability
F-statistic	2.771180	(3, 194)	0.0428
Likelihood ratio	8.392104	3	0.0386
Null: Two series do not belong to the equation			
Alt: Two series belong to the equation			

* C – coefficient; expe – corporate spending (non-operating), including personnel costs; IE – number of individual entrepreneurs in IT, $TSOC_2$ – social contributions for the IT segment; TP_2 – corporate tax for the IT segment; TS_2 – payroll tax for the IT segment; Profit – net profit IT

Source: obtained and compiled by the author

However, as noted earlier, other influencing factors were not added to the model, so an omitted variable test was performed. Tax influencing factors are the main variables tested for inclusion in the model. The results of the test are presented below.

Hence, since the p-value of the F-statistic is 0.0428, which is less than 5% of the significance level, the null hypothesis is rejected, indicating that the model needs to be refined, as specific indicators may be influential. As a result of the coefficient estimation, a new factor is added in the form of social contributions. The model is then re-tested with the tax factor included.

Thus, including the factor in the model is sufficient and reflects good results for deciding on the model's existence. According to this model, the selected factors are significant. The least significant only in terms of probability is the tax group factor. However, this value is significant when examined at the 5% level. The Durbin-Watson coefficient also allows to confirm the adequacy of the data and the model as a whole: the coefficient is higher than R^2 , which indicates the absence of autocorrelation in the data. In addition, the omitted variable test proved the relevance of the selected factors for the model, since the previous null hypothesis that other

taxation factors were not included in the model was confirmed and rational. Thus, when creating the model, taking into account the coefficients, the value will take the following form:

$$\text{Profit} = -57.299 + 0.025\text{Expe} + 91.272\text{IE} - 124.856\text{TSOC}_2. \quad (2)$$

Conclusions from the study. It was demonstrated and analyzed both the general situation with IT in Ukraine, which is characterized by the improvement of most of the indicators and obtained the basic model of dependence of the IT segment. The dependence is demonstrated as a search of influential variables on companies' net profit. Hence, based on panel analysis of the least squares method, the following general form of dependence on companies' net profit was obtained:

$$\text{Profit} = C_{(1)} + C_{(2)}\text{Expe} + C_{(3)}\text{IE} + C_{(4)}\text{TSOC}_2. \quad (3)$$

It can be seen from this that as the cost factor of companies increases and the number of individual entrepreneurs in the technology segment grows, the net profit in the segment will increase. At the same time, an inverse relationship is observed with the social contributions indicator: their growth will lead to a decrease in net profit.

Table 3

Results of modeling and tests performed

Dependent variable: Profit

Method: Panel Least Squares

Sample: 2014 2021

Periods included: 8

Cross-section included: 25

Total panel observation: 200

Variable	Coefficient	Std. Error	Prob.
C	-57.29933	96.16890	0.0000
EXPE	0.025132	0.005529	0.0000
IE	91.27277	3.978245	0.0000
$TSOC_2$	-124.85626	566.3216	0.0286
R-squared	0.757105	Durbin-Watson stat	1.954564

Omitted Variables Test

Omitted Variables: TP_2 TS_2 Specification: profit c expe ie $tsoc_2$ Null hypothesis: TP_2 TS_2 are jointly insignificant

	Value	df	Probability
F-statistic	1.708866	(2, 194)	0.1838
Likelihood ratio	3.492758	2	0.1744
Null: Two series do not belong to the equation			
Alt: Two series belong to the equation			

* C – coefficient; EXPE – corporate spending (non-operating), including personnel costs; IE – number of individual entrepreneurs in IT, $TSOC_2$ – social contributions for the IT segment; TP_2 – corporate tax for the IT segment; TS_2 – payroll tax for the IT segment; Profit – net profit IT

Source: obtained and compiled by the author

In general, it allows for improved conditions of tax policy and by searching for new optimal solutions for introducing new factors of influence into the above model.

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ДОСЛІДЖЕННЯ ЗАГАЛЬНОЇ СИТУАЦІЇ ІТ В УКРАЇНІ ПРИ ВИЗНАЧЕННІ ЧИННИКІВ ВПЛИВУ НА ЕКОНОМІЧНИЙ ПОКАЗНИК ЕФЕКТИВНОСТІ СЕГМЕНТА

Анотація

Статтю присвячено розгляду та дослідженню технологічного сегмента України. Дане дослідження проводилось внаслідок зазначеної важливості сегмента для розвитку країн та важливості розуміння основних чинників впливу, що дозволяють покращувати економічні показники ефективності діяльності суб'єктів сегмента. У статті проаналізовано загальну ситуацію щодо технологічного сегмента в Україні. При цьому використовувались різноманітні методи аналізу. Одним з них було обрано метод порівняння, при якому зазначалися показники як для технологічного сегмента, так і для інформаційного сегмента, оскільки дані два сегменти й утворюють ІТК сектор країни. У статті відбито тенденції та проаналізовано певні показники сегмента. Звідси було проаналізовано та виведено висхідну тенденцію для показника кількості одиниць залучених в технологічний сегмент. Було підтверджено переважання мікро та міні суб'єктів в сегменті, що підтверджує раніше проведені тести для Центральної та Східної Європи при огляді певних країн. Зазначено, що основними економічними одиницями, що репрезентують ІТ сегмент України є ФОПи. В дослідженні продемонстровано динаміку та аналіз економічних показників ефективності сегмента. Було представлено три основні групи чинників можливого впливу на результативність економічних суб'єктів. Звідси, досліджено податкове навантаження за основними податками в вигляді податку на дохід, прибуток та ЄСВ. Оскільки більша частина суб'єктів, що презентує сегмент ІТ відбито ФОПами, то було досліджено податкову базу не лише за загальними ставками, а при виведенні окремих даних для ІТ сегмента. Освітня складова була продемонстрована для знайомства та розуміння тенденції зростання кількості студентів за спеціалізацією ІТ. Третя група чинників була представлена витратами на спеціалістів, що залучені до роботи в сегменті, як загальні втрати сегмента на персонал, середньомісячна заробітна плата по сегменту. Загалом тенденція за показниками в статті продемонстрована як динаміка із висхідною тенденцією. Загальний аналіз представлений в статті дозволив при використанні методів аналізу статичної бази вивести модель залежності чистого прибутку суб'єктів ІТ сегмента в Україні від чинників впливу при визначенні лише конкретних показників впливу. Остаточна модель отримана при проведенні моделювання на основі панельного методу найменших квадратів при врахуванні тесту на пропущені зміни.

Ключові слова: ІТ-сектор, сектор ІКТ, фактори впливу, бізнес-модель, цифровізація, прибуток, ІТ-спеціалісти, податкова політика, екосистема ІТ, освіта.