DETERMINANTS OF PAY IN THE UKRAINIAN IT INDUSTRY

by

Marharyta Dubrova

A thesis submitted in partial fulfillment of the
requirements for the degree of

MA in Business and Financial Economics

Kyiv School of Economics

2021

Thesis Supervisor: _____ Professor Olga Kupets

Approved by _____
Head of the KSE Defense Committee, Professor [Type surname, name]

_____

_____

_____

Date _____

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AI Artificial intelligence

DOU (DOU.UA) The largest IT sector workers community in Ukraine, previously known as developers.org.ua

IT Information technology

Outsourcing (Offshore software R&D) Outsourcing in IT is defined as developing software in countries, geographically remote from client company.

PHP Professional Housing Provider (education based certification program).

KPI Key performance indicators

QA Quality analyst

CHAPTER 1. INTRODUCTION

With the development of artificial intelligence, Information Technology has become the most prestigious and highest paid field in the world. Mankind is trying to automate every process. The performance of this sector of the economy is growing rapidly in Ukraine and brings in about $5 billion a year. Compared to 2013, the share of the IT sector has increased 5 times and accounts for 8.3% of total exports as of 2020. It brings the IT industry closer to the key engines of the Ukrainian economy, such as agriculture and metallurgy.

According to Outsourcing Journal, the number of IT companies in Ukraine should double by 2025. As for 2020, Ukraine became the 4th country in the world to provide technical services (after the United States, Russia and India). Ukrainian outsourcing provides a wide range of services from individual to large-scale software development companies. Thanks to many years of experience and proven practices, outsourcing companies offer developers of the senior level. It creates a trust in world-renowned brands, which increases the number of orders and, accordingly, the IT teams in Ukraine.

The number of employees in the IT industry of Ukraine grows by 20% annually, including not only technical specialties. As of 2020, more than 200, 000 Ukrainians work with technological resources, 67% of which are located in Kyiv, Lviv and Kharkiv. Wages in this area range from $2, 000 to $5, 000 per month and are much higher than the market average. High salary rates attract pupils and directly affect on the choice of future profession. The share of entrants to STEM faculties is increasing to 130,000 professionals graduates annually.

There are several objectives in doing this research. One of the goals of the thesis is to analyze how wage levels differ in outsourcing companies from product IT companies. The author hypothesizes that outsourcing companies in Ukraine offer higher wages to

workers than product companies. This is due to the fact that outsourcing is aimed at the international market, so the level of wages is directly proportional to the standard of living of the customer country.

The second goal is to understand how the size of the company affects the change in wage rates in similar positions. As the company's valuation in the market increases, the responsibility and qualification of each employee increases. The author predicts that the level of salaries in the same positions will differ, according to the responsibilities and scale of the projects.

This study will help to understand the main factors influencing high wages in the IT industry and improve the education system based on these results. The study contains information on the programming languages of the position candidate. Depending on the number, complexity, and frequency of use, the programming language is a major factor in wage growth. The author singles out a list of languages that encourage wage changes in the IT industry. Based on the results obtained, we can say about the basic set of programming languages that must be taught in universities.

The demand exceeds the supply in the field of IT, because the university education system does not take into account the dynamics of industry growth. As a result, students need to take courses, engage in self-education and gain practical work experience. That is why universities need to review their curriculum to meet market needs. The technology market is expanding and evolving on a daily basis. New gadgets, programming languages and companies are appearing, competition is intensifying.

Salary statistics were taken from the official DOU website, which provides information related to IT industry. The site provides detailed information on responsibilities at each level of work in IT and KPIs for each employee. DOU creates a separate ranking of leading employer companies, as well as publishes current news and blogs on innovation.

Using the methodology of Mincer's wage regression, the author estimates how wages in the industry are influenced by different factors including hard skills. The following technical skills were taken for this research: relevant work experience, technical education, knowledge of programming languages, and the level of English. Assessment of technical factors will help to understand the basic needs of the market.

Along with hard skills, soft skills are becoming also important during the hiring process. This paper does not present the results of the influence of soft skills on the salary changes due to the lack of relevant data. These usually include confidential information such as the personal qualities of employees, teamwork, and communication skills.

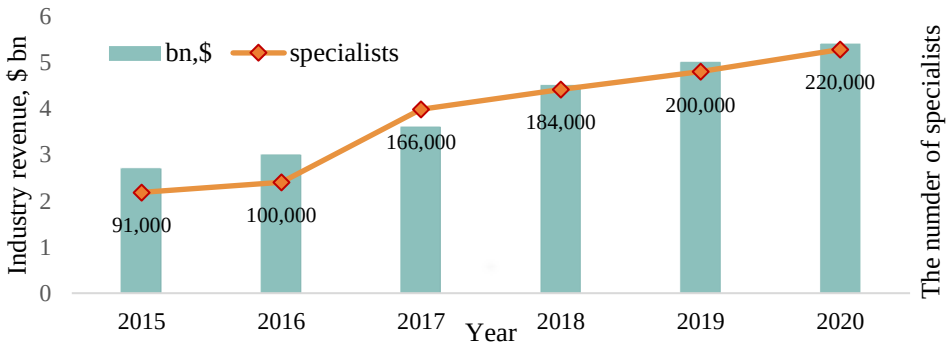
The information base of the paper is the reports of Ukrainian IT companies, outsourcing companies and job search platforms. The structure of the paper is the following. The author proceeds with the chapter on literature review and looks through industry trends. The next chapters contain data description, empirical model, discussion of the results, and conclusions.

CHAPTER 2. INDUSTRY OVERVIEW AND RELATED STUDIES

2.1 Industry overview

Over the past 2 years, Information and Communication Technologies entered the Top-2 industries, which includes 20% of all Ukrainian exports of services. The industry began to grow rapidly since the 2014 crisis due to inflation and has become attractive to investors. According to the PwC analysis, the volume of exports in 2020 of software development and IT services in Ukraine increased to $5.7 billion. As a result, 420,000 vacancies are created annually in the technical and related industries (Figure 1).

Figure 1. Market growth VS Number of IT specialists in Ukraine

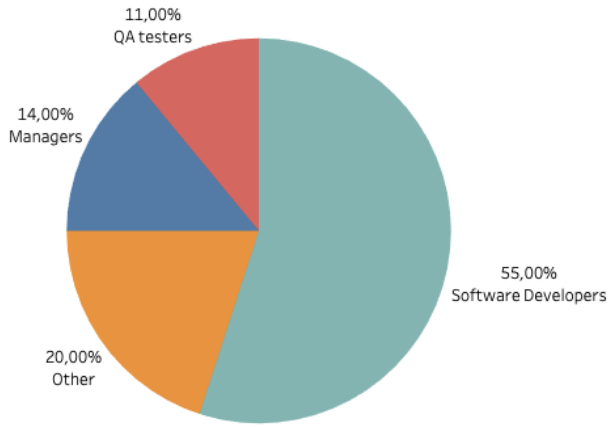


Source: Ukrainian IT industry in 2020, Lvivity reports

Software developer outsourcing accounts for 75% of all IT services provided, primarily to the US and the EU. Foreign technology corporations have seen a strong potential in Ukraine and began to transfer to Ukrainian developers not only some of their functions, but also the development of innovative technologies with integrated solutions. This has led to "service consulting", in which Ukrainian specialists provide a comprehensive solution to business problems to the client. Thanks to this model, there is a demand in the IT industry for other professions, such as finance, HR, lawyers and

marketers. The most in-demand IT professionals are Front-end, QA and PHP specialists, as these categories represent 31% of all vacancies (Figure 2).

Figure 2. Target markets of the Ukrainian IT service companies



Source: Ukrainian Tech Market Overview 2021, Beetroot

The technological sphere provides long-term development and a high salary, which is why it is attractive for young people. The average age of an employee in the IT industry in Ukraine is 25-27 years, including 3-4 years of experience. According to Stack Overflow, in the USA and UK the average age of a developer is 29-30 years. This situation is explained by the following factors:

- interest in technologies (78%);
- hight salaries (63%);
- professional growth prospects (54%);
- flexible work schedule (42%).

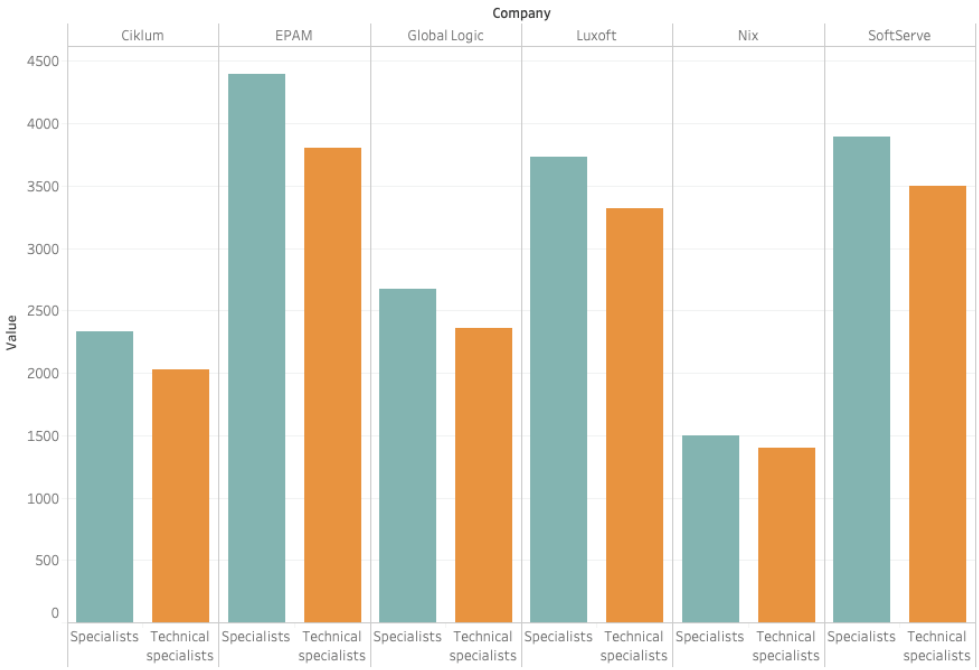
Based on years of experience, in Ukraine qualification levels lead from the junior position (0-2 working years) to middle (2-5 years), and then senior (with 5+ years). The trend shows an increase in the number of women to 24% of the Ukrainian IT workforce.

The most popular professions among women are quality assurance and software developme

Surveys of the Ukrainian IT professionals demonstrate that Kyiv, Lviv and Kharkiv are the biggest technology areas. Talking about the foreign market, as of 2020, Ukrainian companies have opened offices in Berlin, Krakow, Toronto, London, Chicago and even in Tokyo and Seoul.

43 of the 50 largest Ukrainian IT companies have offices in the capital and employ 42,000 people. The largest outsourcing companies are EPAM, SoftServe, Luxoft, Global Logic, etc (Figure 3).

Figure 3. Number of specialists in the largest outsourcing companies in Ukraine



Source: IT Outsourcing review 2020, Blog and Playbook

Over the past six months, the market leader EPAM has hired 1,300 professionals, which has increased the total number of employees to 11.6 thousand. The most popular destinations are Cloud, DevOps, Big Data and JavaScript.

The income of the largest IT companies is five times less than the volume of exports of IT services from Ukraine. Despite such volumes, none of the 20 largest IT companies in Ukraine was included in the list of the 200 largest taxpayers compiled by the State Tax Service.

Employees work according to the model of private enterpreneur; thus, they sign agreements with the company. Every month, technicians pay the following types of taxes:

- Single Social Contribution of 22% of the minimum wage in Ukraine (6,000 UAH as of October 17);
- A single tax of 5% of revenue.

Unlike an outsourcing company that provides services, product IT companies develop their own idea in the form of an application, device, service, etc. Profits depend solely on the sale of the application and are the direct property of the company. The ranking of the largest and most successful product IT companies in Ukraine includes the following:

1. Grammarly - the company has created an application that helps to communicate more effectively and improve the content of official correspondence. In its 9 years of existence, the company has received more than $ 200 million in investments.

2. MacPaw - the company develops software for macOS and iOS. The team was created by students of Kyiv Polytechnic University 13 years ago, and now the office is located in Kyiv and California.

3. Playtika - the company has created more than 20 free casino games. The company currently has 3.7 thousand employees in 19 locations. The number of new active users is 35 million per month.

When choosing a profession, young people are increasingly choosing technical specialties due to the development of the IT sector and the job prospects it offers. The best-ranked DOU product company Genesis conducted a survey among students. The study has shown that more than 70% of students want to work in the IT industry. 15% of students want to start their own startup while studying at university. Among the respondents, 97% are dissatisfied with the level of knowledge of the university and are engaged in self-education. This encourages students to work from the first year of study and gain experience separately from the university program.

More than 130,000 engineers graduate from Ukrainian universities annually, exceeding the share in France and Germany. About 34% of IT professionals have a bachelor's degree from STEM faculties at the National Technical University of Ukraine "Igor Sikorsky Kyiv Polytechnic Institute".

2.2 Related studies

The author decided to divide this section into 3 sectors:

- the scientific basis for model building and analysis of results;
- the importance of hard and soft skills in a specific and new field of IT;
- articles and reports provided by modern IT companies in Ukraine.

The empirical basis of this study is the scientific achievements of the American economist Mincer. Mincer (1958) argued that wages directly depend on the number of

years of study and work. The world-famous Mincer age regression helps to understand how experience affects wage change. Mincer (1974) draws on the over-taking period. The book explains that the employee focuses on the long-term material perspective. That is, a person agrees to receive a lower salary today, instead of earning more in the future. This level is directly influenced by work experience.

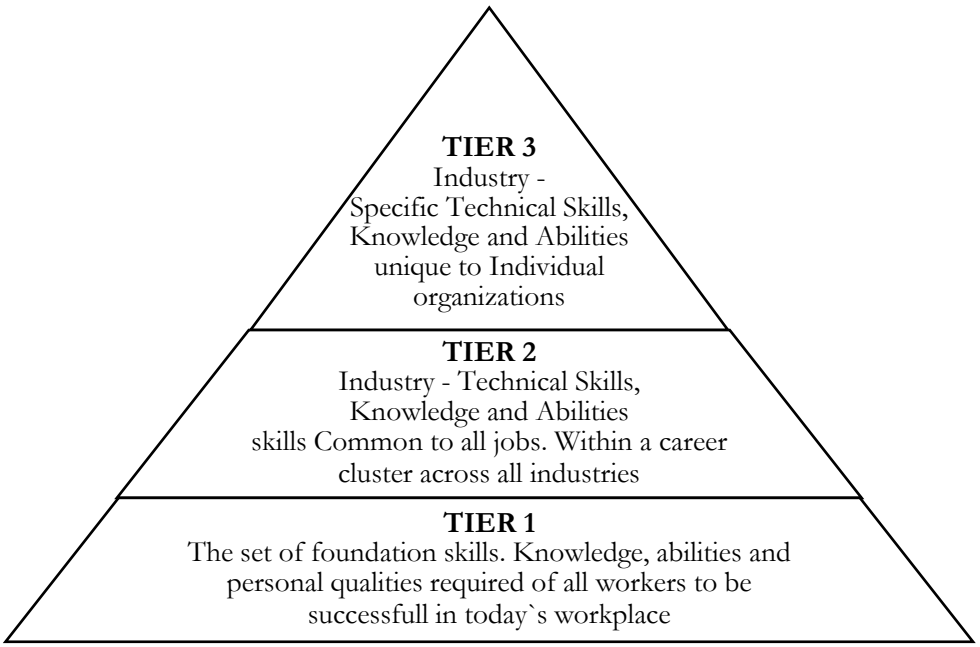
A study of Oi and Idson (1999) emphasizes that the size of the company directly affects the level of wages. The authors claim that larger firms pay higher wages due to lower interest rates on borrowed funds and quantitative discounts on purchased resources. Large companies offer greater benefits for workers: a safe work environment, a quality range of training, an experienced level of management, and access to the latest technologies. Large companies offer a wide variety of services and a rapid flow of customers. The study outlines that a high customer arrival rate means that employees have less downtime. Accordingly, they are more productive and receive a higher salary.

With the evolution of labor relations, soft skills have appeared, which occupy 50% of the attention during the hiring process. First of all, the employee is contacted by a recruiter and/or HR-specialist, who checks how the personal qualities of the candidate are subject to the values of the hiring company. The work of Patacsil and Tablatin (2017) also helps to reveal the personal characteristics of a technical person. The research work proposes a methodology for the disclosure of soft and hard skills, based on student internships in the IT industry. The findings of this study revealed that teamwork and communication skills are very important soft skills to be possessed by IT graduates. The authors argued that the university should begin to enrich soft skills, while hard skills are already a component of the curriculum.

National Workforce Center for Emerging Technologies (NWCET) identified IT career clusters which are widely used in the IT industry worldwide and as a standard basis for IT careers and employee quantification (Figure 4). The study proves that at the level of hiring workers, important skills are sections Tire 1 and Tier 2. To change the salary for the

position it is necessary to have the skills Tire 3, which is at the top of the pyramid. These are hard skills that are specific to each industry and organization.

Figure 4. The IT Skills Pyramid



Source: National Workforce Center for Emerging Technologies

Finally, considerable attention should be paid to the annual reports of outsourcing companies in Ukraine, such as N-iX. It is an Eastern European software development outsourcing company helping software companies and develop innovative tech. Their report "Ukraine. The country that codes" (2019) is the statistical and information base of this paper. This research provides a complete description of the IT industry in Ukraine, averages and development results. The company provides a clear horizontal and vertical career, as well as a detailed description of the main IT cities of Ukraine.

CHAPTER 3. METHODOLOGY

To determine the impact of each variable on salary, the author uses the Mincerian earnings function. The function will help to understand what factors are statistically significant and what degree of influence they have. Following Mincerian earning function the salary as a dependent variable were taken in logarithmic form

$$\ln(\text{salary}) \sim \beta_0 + \beta_1 * [\text{gender}] + \beta_2 * [\text{type of the company}] + \beta_3 * [\text{specialization}]$$

$$+ \sum_4^i \vartheta * [\text{education}] + \sum_4^i \mu * [\text{experience}] + \sum_4^i \delta * [\text{level of English}]$$

$$+ \sum_7^i \gamma * [\text{programming language}] + \sum_4^i \eta * [\text{size of the company}] + \varepsilon_i,$$

where ε_i represents the error term.

Additionally, the author decided to analyze the variable type of university depending on the specialization. Therefore, was taken a separate subsample of employees who have completed secondary education. The regression equation has the following form:

$$\ln(\text{salary}) \sim \beta_0 + \beta_1 * [\text{gender}] + \beta_2 * [\text{type of the company}] + \beta_3 * [\text{specialization}] + \sum_4^i \mu * [\text{experience}] + \sum_4^i \delta * [\text{level of English}] + \sum_7^i \gamma * [\text{programming language}] + \sum_4^i \eta * [\text{size of the company}] + \sum_{10}^i \rho * [\text{type of university}] + \varepsilon_i,$$

where ε_i represents the error term.

The typical Mincer earnings function is a single-equation model that explains wage income as a function of schooling (education) and experience. In addition, independent variable experience is often added squared. The coefficient before this variable is exected to be negative. This is due to the fact that at a certain stage of development work experience is no longer important, and only relevant skills play a role. Then the function takes the form of an inverted parabola, where after the peak it is descending.

However, this cannot be done with this dataset, as the experience data does not have clear boundaries. Therefore, this variable was divided into cohorts.

The author also combined additional explanatory variables that include gender, level of English, knowledge of the programming language, university, and company size. Type of university and specialization are dummy variables with non-technical as the basic category. Type of the company is a dummy variable where the basic category is a product company. It was created to test the hypothesis of the influence of the type of company on the change in wages.

The expected results are as follows:

1. The coefficient before gender (β_1) variable is expected to be above zero with the basic category of women. This is because on average women get lower than men.

2. The coefficient before the dummy variable called type of the company (β_2) is expected to be above zero according to the hypothesis. That is, the probability of working in a product company, which is the basic category, underestimates the level of wages.

3. The coefficient before the dummy variable specialization (β_3) is expected to be above zero with non-technical as basic category. Technical specialists are in short supply in Ukraine, so the market is not as competitive as non-technical ones. Therefore, employers support technical workers with high salaries, because it will be more expensive to find a replacement for a person quickly.

4. The coefficient before variable education ($\sum_4^i \vartheta$) is expected to be above zero. Since the basic category is the presence of a bachelor's degree, with the growth of the worker's qualification, the level of salary will increase.

Therefore, employees with 2 higher educations and a PhD are likely to receive a higher salary.

5. The coefficient before the independent experience variable ($\sum_4^i \mu$) will be higher than zero. After all, with the growth of work experience, productivity increases, and therefore the level of wages increases too. The basic category for this variable is work experience of up to 3 years. This range corresponds to the position of junior specialist, which is a starting point for any position in the IT industry. The following categories were also divided according to the level of qualification: middle - 3-5 years of experience, senior - 6-10 years, and more than 10 years for managers.

6. The coefficients before the variable level of English ($\sum_4^i \delta$) are expected to be positive. Since the basic category is the lowest level («elementary» and «pre-intermediate»), with the growth of language skills will increase the versatility of the worker, which will help to integrate into foreign projects. Accordingly, in the international market of the IT industry, average wages are higher.

7. The coefficient before the variable of programming languages ($\sum_7^i \gamma$) is likely to be above zero. The more complex and common the programming skills, the higher the coefficient of influence on the level of wages. The basic category for this variable is knowledge of the Java language, which is studied at technical universities of Ukraine. The other 6 languages are the most used among the respondents in this dataset.

8. The ratio before the variable size of the company ($\sum_4^i \eta$) is expected to be above zero. The basic category is the types of companies with up to 50 employees, usual startups in the Ukrainian IT industry. Further, the categories grow and reach corporations of up to 1,000 employees. With the

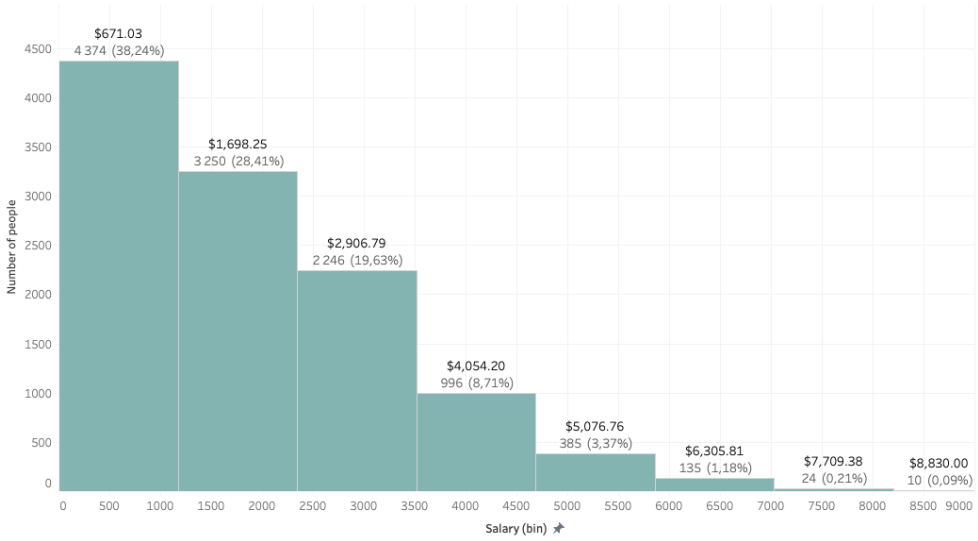
development of the company, the number of services offered by the business increases, so the number of specialists is also growing. Accordingly, investments are growing. Therefore, the larger the size of the company in the equivalent of workers, the higher the salary.

9. The coefficient before the type of university variable ($\sum_{10}^{i} \rho$) is expected to be positive. This is a dummy variable, the basic category of which is classical education as opposed to technical. Obviously, it also depends on the level of preparation of the university, authority, graduates, and location. It is probable that technical universities will have coefficients above zero, and will encourage an increase in the level of qualification of graduates and follow to growth in salaries at the initial levels.

CHAPTER 4. DATA

Data for this work was taken from dou.ua, which annually conducts surveys among people working in the IT sector. The total number of surveyed employees is 11,440 for the period of 2020. The salary ranges between $300 and $9,000. The largest number of people belong to the first rank and receive no more than $1000. This is due to the fact that a large number of respondents are students or recent graduates. They are just starting their careers in IT field, thus, they work in junior positions mostly. While only 604 people receive a salary of more than $5,000 (Figure 5). This suggests that the industry in Ukraine has recently begun to grow rapidly and there are fewer people in senior positions with sufficient work experience. It may also indicate the emigration of our specialists with increased professional experience.

Figure 5. Distribution of the salary rates, per month



Source: Based on data from dou.ua.

The average age of respondents is 25-27 years. The minimum age is 19 with a salary of $320 and the maximum age is 51 with a salary of $6,300.

The gender distribution in the dataset includes 20,3% of women and 79,7% of men answered the questions. This suggests that women are less likely to work in technology. Men receive higher salaries in identical positions compared to women. The top-15 highest paid positions include 60% of technical specialties and 40% of non-technical ones, respectively. The highest salary among men is received by the director of engineering. While a woman receives the highest salary in the Ukrainian IT industry as a project manager according to the 2020 version (Figure 6).

Table 1. The highest salary rates by gender, per month

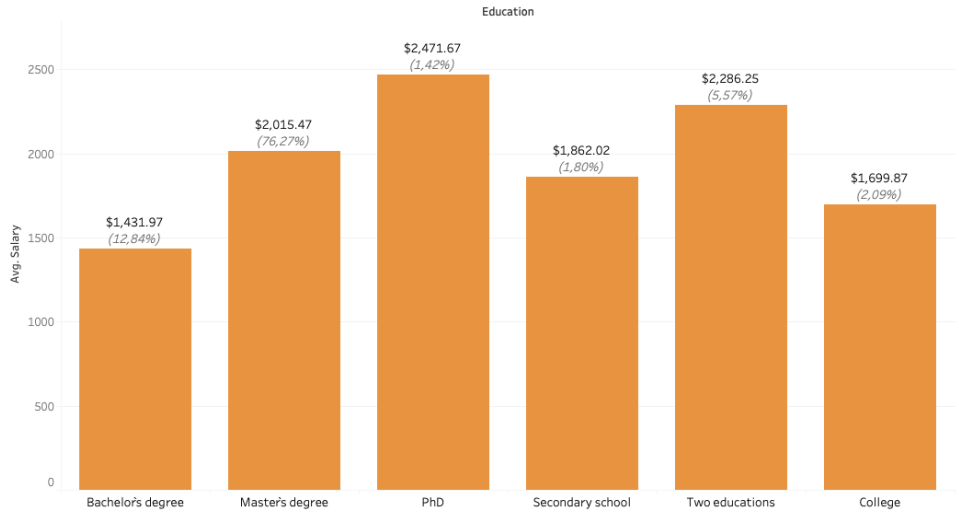
	Gender	
Position	female	male
Director of Engineering /..	$2,200.00	$6,305.09
Senior Project Manager ..	$3,595.83	$4,440.80
Technical Lead	$3,392.00	$4,217.01
Senior Software Engineer	$3,266.77	$3,709.09
Team lead	$2,249.89	$3,666.45
QA Tech Lead	$2,364.14	$3,416.67
Senior QA engineer	$2,403.10	$2,744.55
Product Manager	$2,175.35	$2,855.83
DevOps	$1,928.57	$2,619.30
Data Scientist	$1,638.00	$2,271.30
Software Engineer	$1,870.35	$1,992.49
Scrum Master	$1,178.70	$2,206.82
Business analyst	$1,518.13	$1,881.23
Project manager	$1,290.42	$1,814.88
Designer	$989.75	$1,588.00

Source: Based on data from dou.ua

After all, only 17% of non-technical specialties are present in the survey. Non-technological professions are presented by financiers, analysts, designers, HR-department and office managers. Non-technical specialties are more common in outsourcing companies, because product companies in Ukraine are at the stage of creation, so first of all there is a high need for programmers.

The level and quality of education play an important role in the Ukrainian labor market. The IT industry hires only the best professionals and has more than 3 stages of interviews. 76.27% of surveyed workers have a master's degree and 12.84% have a bachelor's degree (Figure 6). Among the list of universities, most workers were educated at the National Technical University of Ukraine "Kyiv Polytechnic Institute named after Igor Sikorsky (12.20%).

Figure 6. Dynamics of the average salary according to the level of education



Source: Based on data from dou.ua

The dataset presents graduates of more than 40 higher education institutions of Ukraine. The top-20 universities in the ranking of the highest average wages included 45% of Kyiv universities. Based on the distribution of the level of education of the respondents, the highest salary is received by Ph.D. (2 471$ per month). This is because, in the senior stage of development and the transition to a higher position, the employer requires to improve knowledge and pass the Ph.D. or MBA program. Therefore, mostly at the management level, employees have this certification.

The main stage in hiring an IT company is to perform a test (technical) task. That is why for each position there is a list of technical skills, which includes knowledge of certain programming languages (Table 2). The most common programming languages among the respondents are Java and C # / .NET. However, the highest-paid language is Haskell, which is used by full-stack developers and is used by only 0.03% of respondents. This language is not included in the educational program of any university in Ukraine. Platforms such as Coursera, GoPractice, and Udemy offer language courses ranging from $ 90 for a 3.5-hour course.

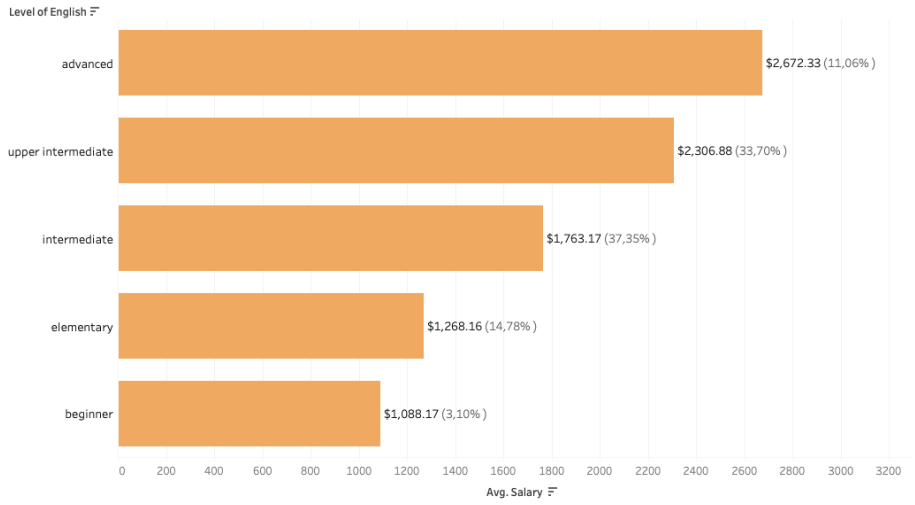
Table 2. Dynamics of the average salaries according to the programming language

Programming language	Salary(avg,$)	% of total respondents
Haskell	4800	0.03%
Clojure	3766	0.15%
Scala	3453	1.14%
Objective-C	3089	0.50%
Perl	3025	0.07%
Golang	2772	1.46%
Erlang	2718	0.27%
Ruby/Rails	2579	2.60%
C++	2392	4.15%
Java	2389	16.67%
SQL	2386	1.09%
Swift	2372	3.93%
C#/.NET	2279	15.26%
Delphi	2220	0.34%

Source: Based on data from dou.ua

One of the criteria for hiring in the IT industry is the level of English. Both outsourcing and product companies operate in the international market, thus attracting foreign investors. Documentation and codes of developers of Ukrainian IT companies are in English. In the sample, 45% of respondents are fluent (advanced and upper-intermediate level) in the language (Figure 7). At the beginner level, only 3.1% with an average age of 21. However, university education is conducted in Ukrainian. This creates difficulties in the first years of work among English IT terms that are not commonly used.

Figure 7. Dynamics of the average salary according to the level of English



Source: Based on data from dou.ua

The study presents companies from 10 employees to more than 1000 (Table 3). The largest percentage of respondents falls into the category of up to 50 employees in the company. And this is not surprising, because Ukrainian startups and product companies are usually small. At each stage of increasing the number of employees in the company, the average salary also increases. With this variable, the author confirms the hypothesis of increasing the level of salary rate with the growth of the size of the company.

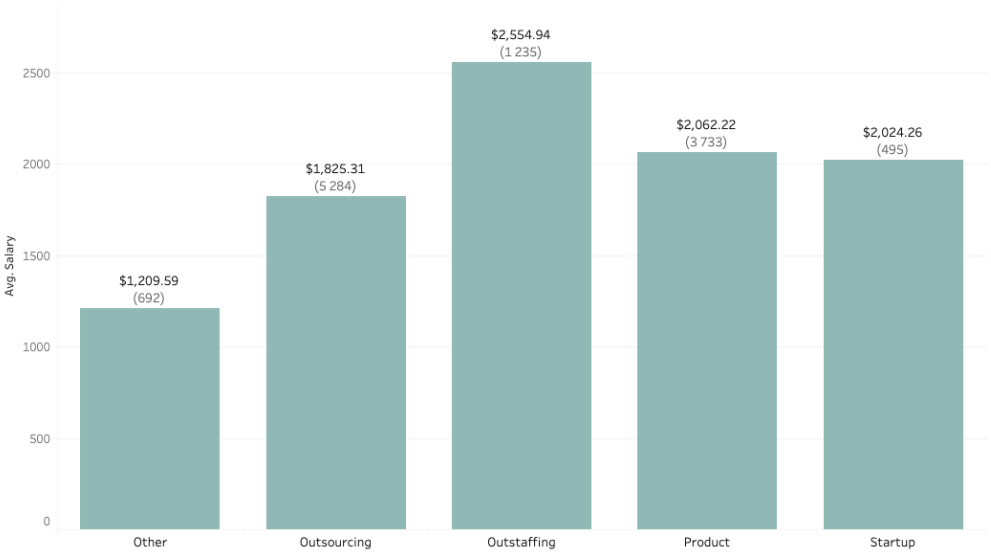
Table 3. Dynamics of the average salary according to size of the company

Number of workers	Salary(avg,$)	% of total respondents
up to 10	1674	14.37%
up to 50	1745	27.35%
up to 200	1938	24.06%
up to 1000	2206	16.32%
more than 1000	2279	17.89%

Source: Based on data from dou.ua

Employees of different types of companies took part in this survey: outsourcing, outstaffing, startup and product (Figure 8). Outsourcing and outstaffing companies lease services and their employees for a certain period of time or a separate project. These firms have the highest wages because the customer is mostly foreign. Also, the largest number of respondents are these types of companies. While product companies are developing their own product in the form of an application, device, service, etc. The product market is just beginning to expand quantitatively, but the level of wages can not yet compete with outsourcing.

Figure 8. Dynamics of the average salary in terms of company type



Source: Based on data from dou.ua

CHAPTER 5. RESULTS

The model presented in Chapter 3 was tested. The estimation results are provided in Table 4 for individual characteristics, Table 5 for company characteristics and Figure 9 for programming languages.

Table 4. Regression coefficients

ln(salary)		OLS
Gender = male		0.255***
	s.e.	(0.011)
Specialization = Technical		0.291***
	s.e.	(0.012)
Education = Master`s degree		0.058***
	s.e.	(0.021)
Education = Two educations		0.030*
	s.e.	(0.026)
Education = PhD		0.090**
	s.e.	(0.041)
Level of English = Intermediate		0.080**
	s.e.	(0.013)
Level of English = Upper-Intermediate		0.298**
	s.e.	(0.015)
Level of English = Advanced		0.546*
	s.e.	(0.018)
Working experience = 3-5		0.173**
	s.e.	(0.012)
Working experience = 6-10		0.242***
	s.e.	(0.014)
Working experience >10		0.343**
	s.e.	(0.014)
Type of university = Technical		0.421**
	s.e.	(0.023)

Source: Model results based on data from dou.ua

Note: *p<0.1; **p<0.05; ***p<0.01. R = 74%. This model also includes results on programming languages and company characteristics.

The study showed that the main factors influencing the salary in the IT industry in Ukraine are: gender, specialization, education, level of English and working experience.

A sample of the survey showed that technical positions receive on average by 29.1% higher than non-technical ones. Men receive a higher salary on average by 25.5% higher. This is due to the fact that women mostly choose non-technical specialties, such as analytics, HR, sales management, design and support. Accordingly, the level of wages for women is lower.

To determine the impact of education level, incomplete education (the person was a student at the time of the survey), and the presence of a bachelor's degree were taken as a basic category. The results of the model showed that the most optimal level of education in the IT industry is the completion of a master's degree in the relevant specialty. Having a master's degree increases the salary by an average of 5.8% compared to having a bachelor's degree. If a person has two levels of educations, it increases the wages by 3%. The largest percentage of salary changes in the Ukrainian IT sector, depending on the level of education, belongs to personalities who have received a Ph.D. This degree guarantees a salary increase of 9% compared to a bachelor's degree. As noted in Chapter 4, this is because people with a Ph.D. work in senior positions and move to the rank of "Lead" or "Head of the department".

The next statistically significant factor in assessing the impact on the salary and IT industry was the level of knowledge of English. The results of the research showed that the higher the level of English in the employee, the higher the percentage of salary increase. Workers who have an English "intermediate" level receive an average of 8% higher salary than workers with a basic level (“pre-intermediate” and “elementary”). The most professional levels of English in this sample are Upper-Intermediate and Advanced.

Knowledge of English at the Upper-Intermediate level increases the salary level by 29.8%, and at the Advanced level increases by 54.6%.

The results of the model showed that work experience is also a statistically significant factor influencing the level of wages in the Ukrainian IT industry. With the increase in the years of work experience in similar positions, the salary increases. The base category for variable work experience is less than 3 years. Employees with 3 to 5 years of work experience receive an average of 17.3% higher salary. Employees with 6 to 10 years of work experience gain an average of 24.2%. The highest percentage of change falls on the cohort of workers who have been working in the field for more than 10 years. On average, they receive a salary 34.4% higher.

A statistically significant factor influencing wages is also the type of university graduation. On average, employees with a technical education received a salary 42.1% higher than employees with a non-technical university. This is due to strong mathematical training, the ability to think critically and find solutions faster, which helps to develop speedy professionally.

The results of the hypotheses offered in Chapter 1 are presented in Table 5. The results are statistically significant for the type of company (outsourcing and outstaffing) and for different categories of company size.

Table 5. The results of the model according to the hypotheses

ln(salary)	OLS
Type of the company = Outsourcing	0.251***
s.e.	(0.022)
Type of the company = Outstaffing	0.310***
s.e.	(0.024)
Size of the company = 200-600	0.044*
s.e.	(0.032)
Size of the company = 601-1000	0.063**
s.e.	(0.034)
Size of the company >1000	0.068**
s.e.	(0.034)

Source: Model results based on data from dou.ua

Note: *p<0.1; **p<0.05; ***p<0.01. R = 74%. This model also includes results on programming languages and individual characteristics.

To test the hypothesis of higher wages in the IT industry, depending on the type of company, the product type of the firm was taken as the basic category. The model showed that an employee of an outsourcing company will earn on average 25.1% higher than an employee of a product IT company in Ukraine. At the same time, an employee of an outstaffing company will receive 31% more than in a product company.

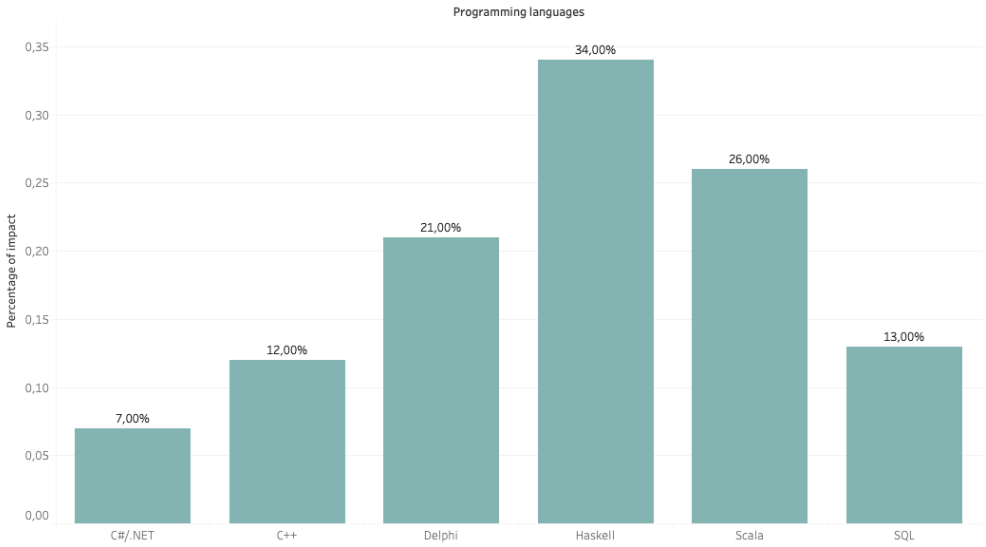
The market of outsourcing companies appeared earlier and is wider in Ukraine, accordingly the competition of companies is growing. Employers are fighting for employees, where one of the proposed advantages is a higher salary than a competitor. Outsourcing companies have foreign clients, so rates are already quoted in the international market, where the average standard of living is higher than in Ukraine. Product IT business is very risky and needs more profit than outsourcing companies. Therefore, 65% of the

technology market in Ukraine is occupied by outsourcing companies. It is worth taking into account the bias of this survey, as 46.2% of respondents are outsourced.

Continue with the second hypothesis of salary growth with the increase in the size of the company depending on the number of employees, the company up to 200 people was taken as the basic category. The results of the model showed that as the number of employees in an IT company increases, the level of salaries also increases. Companies with 200 to 600 employees offer a salary 4.4% higher than businesses with fewer employees. The next category includes companies with a number of employees from 601 to 1000. The probability of working in such companies increases wages by 6.3%. The highest percentage of change falls in the category of companies with more than 1,000 employees. Working in these corporations increases the salary level by 6.8%. This is probably due to an increase in the level of responsibility in large companies and the amount of investment.

Figure 9 presents the results of the influence of programming languages on the salary, which are statistically significant with $p < 0.01$. The study showed that when recognizing the programming language Haskell, wages are on average 34% higher than when knowing the programming language Java. Knowledge of Scala and Delphi on average increases salaries in the IT industry by 26% and 21% respectively. SQL, C++ and C#/.NET increase on average the dependent variable by 13%, 12% and 7%.

Figure 9. Influence of programming language on salary according to model results



Source: Model results based on data from dou.ua

Note: *p<0.1; **p<0.05; ***p<0.01. R = 74%. This model also includes results on company and individual characteristics.

CHAPTER 6. CONCLUSIONS AND RECOMMENDATIONS

In this study, the author examines the factors influencing wages in the Ukrainian IT industry. In particular, the author considers such factors as gender, company type, education, work experience, level of English, programming language, university and company size. To do this, the author uses a dataset survey, which is conducted every six months by the largest IT community in Ukraine DOU. During the study period, data from 2020 were taken and more than 11,000 unique responses were received. This period was chosen due to the rapid boom in vacancies in the IT sector, which was based on lockdown and the transition to remote work for a long time. The IT sector has begun to attract people with stability and high income, which is higher than the market average.

The results of the study showed that technical specialization, English level and work experience have the statistically significant impact on salary changes in the IT industry of Ukraine. First of all, technical specialties are more in short supply at the moment in Ukraine. The IT market has started to grow rapidly over the last 5 years, so the number of skilled workers is limited. To get to the technical position it is necessary to pass from 3 to 5 interviews, among which the technical test task is the most difficult. However, the market is not very competitive. Therefore, often the employer agrees to hire an employee and invest in his training internally already in position.

The next statement was that with the increase in the level of English in the candidate, respectively, will increase the level of salary. At the Advanced level, a worker has the opportunity to receive 54.6% more salary than a worker who speaks English at the basic level. 65% of respondents work in outsourcing companies, ie those that provide services abroad. Accordingly, knowledge of English is critical to business success and employee performance. Companies offer free language improvement courses all the time, thus targeting employees not only with work but also with training.

Although the IT industry is quite young, work experience is still one of the main factors in a worker's high salary. However, this is mostly due to managerial positions, which require not only the skills provided by courses and the university but also experience in solving work problems. It is also influenced by the senior level of employees, which is the last among the assessment of the technical base of the workers. Each level (junior and middle) requires not only skills but also use in work on average for 1-2 years.

The hypothesis, which was based on the fact that in outsourcing companies employees receive higher salaries than in product firms, was confirmed by the Mincerian earning function. Due to the higher level of qualification and numerous investments, the outsourcing market remains more attractive for employees of the IT industry. The development of venture funds and the entry of product companies into a foreign competitive market will allow equalizing wage levels. According to the results of the model as of 2020, this gap reaches 25.1%.

Another hypothesis based on the fact that with the increase in the number of employees in the company, the amount of salary will also increase was also confirmed. In Chapter 2, the author analyzes the largest IT companies in Ukraine according to the number of employees. The data showed that the absolute leader for the last 3 years is the outsourcing company EPAM, which as of 2020 employs about 4,500 people. The probability of working in such a company increases the probability of receiving a salary by 6.8% higher than in small companies of up to 200 people.

Based on the results of a study on programming languages coded by employees, 6 of them increase the average salary level in contrast to the language taught in universities. Therefore, one of the recommendations arising from this thesis is to review the educational program for technical specialties in accordance with market demand. Universities, for their part, can rely on the needs of the hard skills market and add extracurricular activities, creating internal communities that are appropriate for the development and higher education of students. IT companies in Ukraine create internal schools for students, where

they provide the necessary training for starting positions. On the example of the product IT company Genesis, which has already graduated students from 10 schools with special 2-month training.

This thesis is an introduction to future business expansion ideas. Among the possible options is the development and attraction of foreign investment in product IT companies of Ukraine. While outsourcing companies, already having a large amount of investment, can create their products internally because they already have good expertise in the niche. Outsourcing is very volatile and depends on the foreign market and its shocks. In the case of service diversification, outsourcing companies will become more attractive to employees due to stability.

Based on the size of the company, employees should understand that the amount of investment is minimal with a small number of employees because the supply of services is inelastic. Companies need to spend more on wages and more skilled workers, which will lead to better services and thus attract investment.

REFERENCES

Ain Blogs. Ukrainian Tech Market Overview 2021. News and Blogs. https://ain.ua/en/tag/news/

Daxx. 2020. What Is the Actual Average Software Developer Salary in Ukraine? https://www.daxx.com/blog/outsourcing-ukraine/what-average-salaries-for-developers-in-ukraine

DOU.ua blogs. 2019-2020. https://dou.ua/

EkkEhart Schlicht. 2016. Efficiency wages: Variants and Implications. *IZA World of Labor*

Frederick F. Patacsil, Christine Lourrine S. Tablatin. 2017. Exploring the importance of soft and hard skills in IT

IT Outsourcing Review Ukraine. 2020. https://outsourcingreview.org/outsourcing-p laybook/it-industry-overview/

Jacob Mincer. 1958. Investment in Human Capital and Personal Income Distribution. *The Journal of Political Economy*

Jacob Mincer. 1974. Education, experience and income. *The Journal of Political Economy*

Lvivity. Ukrainian IT industry in 2020: Figures, Facts, and Interesting Statistics. https://lvivity.com/ukrainian-it-industry-in-2020

N-iX Report. The country that codes. *IT Industry in Ukraine. 2019-2020 Market Report*

Oi, W., and T. Idson. Firm size and wages. *Handbook of Labor Economics 3* (1999): 2165–2214.

Peter Dickinson. February 2020. Ukraine's booming IT sector defies the coronavirus crisis. https://www.atlanticcouncil.org/blogs/ukrainealert/ukraines-booming-it-sector-defies-the-coronavirus-crisis/

Stackoverflow. *2019 Global Developer Insights Report.* https://insights.stackoverflow.com/developer-insights/landing/2019

Spitz-Oener, A. Technical change, job tasks, and rising educational demands: Looking outside the wage structure. *Journal of Labor Economics 24*:2 (2006): 235–270.

Walter Y.OI. Todd L. Idson. Firm size and Wages. *Handbook of Labor Economics, Volume 3* (1999). 2165-2214