

## DETERMINANTS OF THE PROFESSION OF IT SPECIALIST. CASE OF SELECTED POLISH UNIVERSITIES

Witold CHMIELARZ<sup>1</sup>, Dorota JELONEK<sup>2</sup>, Anna SOŁTYSIK-PIORUNKIEWICZ<sup>3</sup>,  
Marek ZBOROWSKI<sup>4\*</sup>, Łukasz WIECHETEK<sup>5</sup>

<sup>1</sup> Faculty of Management, University of Warsaw; witek@wz.uw.edu.pl, ORCID: 0000-0002-9189-1675

<sup>2</sup> Faculty of Management, Czestochowa University of Technology; dorota.jelonek@pcz.pl,  
ORCID: 0000-0001-7487-5975

<sup>3</sup> Department of Informatics, University of Economics in Katowice;  
anna.soltysik-piorunkiewicz@ue.katowice.pl, ORCID: 0000-0002-7935-1377

<sup>4</sup> Faculty of Management, University of Warsaw; mzbowski@wz.uw.edu.pl, ORCID: 0000-0003-4762-127X

<sup>5</sup> Faculty of Economics at Maria Curie-Skłodowska University, Lublin; lukasz.wiechetek@umcs.pl,  
ORCID: 0000-0001-7755-2282

\* Correspondence author

**Purpose:** The objective of the article is to provide insights into students' awareness, preferences, and expectations regarding their future employment in the IT profession, with a focus on the challenges, hopes, and fears they face, as well as the barriers and determinants influencing their career choices, particularly within selected universities in Poland.

**Design/methodology/approach:** The research was conducted through a cross-sectional study involving students from selected faculties at four universities in Poland: the University of Warsaw (UW), the Maria Curie-Skłodowska University in Lublin (UMCS), the Czestochowa University of Technology (PCz), and the University of Economics in Katowice (UE Kat.). The study employed the Computer-Assisted Web Interviewing (CAWI) method to gather data from over 800 students. The survey focused on students' perceptions of the IT job market, including current conditions, development trends, and the challenges, hopes, and fears they associate with pursuing a career in this field. Additionally, the research explored the barriers and determinants influencing students' career choices, as well as the shortcomings in the curricula of the analysed universities.

**Findings:** The study found that while students are generally aware of the opportunities and challenges in the IT profession, they identified significant gaps in their university curricula that fail to adequately prepare them for the industry's demands. Despite these concerns, students remain optimistic about their future in IT but emphasize the need for more practical, hands-on experience in their education.

**Research limitations/implications:** If research is reported on in the paper, this section must be completed and should include suggestions for future research and any identified limitations in the research process.

**Practical implications:** The implications of the study suggest that universities need to revamp their IT curricula to better align with industry demands, focusing on providing more practical, hands-on training. This adjustment is crucial for enhancing students' readiness for the

IT profession, ultimately benefiting both the students and the employers who seek well-prepared IT professionals.

**Originality/value:** The novelty of this article lies in its regional focus, providing a cross-sectional analysis of students' perceptions across multiple universities in Poland, which highlights the specific gaps in IT education within this context. Additionally, the study offers unique insights into how these educational shortcomings affect students' readiness for a career in IT, contributing valuable recommendations for curriculum improvement.

**Keywords:** career in IT, determinants of the profession of IT specialist, advantages of a career in IT, factors affecting IT career, educational programs in IT.

**Category of the paper:** Research paper.

## 1. Introduction

The main aim of this article is to discuss students' perspectives, interests, and expectations concerning potential future employment in IT and their subsequent careers in this industry. The article provides a comprehensive view of the IT profession, which includes individuals who undertake tasks related to the analysis of needs, design, development, implementation, and maintenance of various management information systems. The study focuses on management information systems to avoid limiting the research discourse solely to programmers, who are often the only individuals associated with computer science and informatics. The research problem is not straightforward since the profession of an IT specialist is surrounded by many myths, which frequently get media coverage (Palombini, 2024; Sweeney, 2022; Willcoxson, Chatham, 2006). These myths are challenging to disprove except through scientific research. A new topic discussed is the role and position of women in the IT industry (Dumonceaux, 2023). Although these commonly held opinions are often repeated, they have some truth, as with all myths. The most prevalent myths (Chapman, 2020; Bradford, 2024) include:

- every IT specialist will always and quickly find a job,
- all IT specialists earn a high salary,
- work in IT is only computer-based,
- one needs to study and preferably graduate in computer science or informatics to work in IT,
- computer science and informatics graduates occupy managerial positions and earn the best salaries,
- work in IT is boring and repetitive, it does not involve business trips and training,
- a career in IT requires continuous learning,
- IT specialist knows computers and only serves the user,
- computer science and informatics are difficult to learn, and IT specialists are uncommunicative,

- work in IT requires special psychophysical competencies,
- computer science and informatics are the domain of males.

There are various myths surrounding the IT industry, some of which are backed by statistical data or limited studies, while others are propagated by HR professionals to increase the pool of job candidates. Some of these myths persist in society despite being untrue. Although the market for IT specialists in Poland is not yet saturated, it is crucial to consider the rapid and unpredictable changes in the industry when planning a career (Eurostat, 2024). The emergence of innovative tools like ChatGPT necessitates changes in the way professionals prepare for their roles in IT. Based on expert opinions and data analysis, high remuneration in IT is achieved through intensive work in a well-functioning team, after a minimum of two years. Factors that determine earnings include experience, region, specialization, knowledge of specific technologies, type of cooperation, and work environment (such as a startup or corporation) (Wilczek, 2021). It is worth noting that working in IT rarely involves just sitting in front of a computer (Parris, 2024; Kaatib, 2022).

This primarily applies to individuals in fields such as programming, database administration, and numerics, among others. Various functions related to organizational management, including customer service, marketing, pre-project analysis, data analysis, implementation, and training in new technologies, may also be required. Training for the use of implemented systems is often conducted on-site. IT studies are essential for programming, network configuration, and numerical problems. However, the application of knowledge acquired during these studies also depends on an individual's predisposition, enthusiasm, commitment, and experience. Graduates who specialize purely in IT often lack knowledge of management and soft skills such as teamwork and team management (Rudder, 2019). As a result, they usually do not occupy managerial positions unless they gain practical experience. Some people may find working in IT tedious, repetitive, and unsatisfying, especially if they do not wish to undergo constant training, which is a requirement in the rapidly developing industry. It is worth noting that there are different computer science and informatics specializations; for instance, not every IT specialist is expected to configure software on a PC. Informatics is not limited to just service work, such as helpdesk. The basic concepts of informatics can be learned, but success depends on individual predispositions and natural abilities. Some may find it challenging while others may find it easy and enjoyable. The use of these skills is influenced by the experiences gained through project implementation. While IT specialists may be perceived as uncommunicative due to their need for concentration, communication is crucial for analysts, designers, implementation specialists, and business analysts.

Many young individuals from Generation Z who are interested in pursuing a career in IT may be discouraged by common myths and misconceptions about the industry. Despite the potential opportunities offered by education and training in this field, they are often overlooked. This article aims to address these issues and raise awareness of the diverse career prospects

available in IT, not just in major cities like Warsaw, but also in smaller ones like Katowice, Lublin, and Czestochowa.

To accomplish this goal, the article is divided into several sections. The second section provides a theoretical background on the subject, while the third section outlines the methodology of the survey research conducted, including the questionnaire structure, research procedure, and research sample obtained from various universities. The study results are then analysed and discussed, focusing on identifying differences between academic centres. Finally, the article concludes with recommendations, limitations, and potential areas for future research in this field.

## 2. Literature review

The constant, dynamic evolution of information and communication technologies with digital transformation (Vial, 2019) and their integration with the knowledge-based economy (Godin, 2006) are mutually dependent on each other. To achieve maximum success, both industries must coexist harmoniously, creating synergy.

Today, digitization and digital transformation trends affect almost all economic activity and personal life aspects. Many IT employees are responsible for creating, implementing, and improving these technologies. However, it is essential to remember that IT specialists are not a homogenous group but rather a diverse group of professionals, from hardware and software specialists to system implementation experts and business analysts. Therefore, the IT sector requires employees with various professional education backgrounds and specialist and social competencies.

The idea that IT professionals, along with other employees in the IT industry, are considered knowledge workers has been confirmed by trends in the knowledge-based economy and scientific research. Knowledge workers are highly motivated to continuously improve and develop their skills. They possess exceptional abilities in gathering, analysing, and utilizing information, allowing them to quickly adapt to changing circumstances and make informed decisions in their respective fields (Davenport, 2011; Kianto et al., 2019; Maruta, 2012). An increasing number of knowledge workers, including IT specialists, are now working remotely, which requires them to possess self-discipline, time management skills, and emotional intelligence, such as avoiding confrontations, striving for clear and respectful communication, establishing and maintaining relationships online (Charalampous et al., 2019; Grant et al., 2013).

Today, we see that many of these characteristics are no longer relevant as the focus has shifted toward soft skills. According to Boyatzis (2008) and Ngayo Fotso (2021) competencies can be divided into two categories: threshold competencies, which are necessary for a particular

job, and differentiating competencies, which are related to emotional and social intelligence. Willcoxson and Chatham (2006) emphasized that social competencies are essential for effective communication, teamwork, and building relationships with colleagues or clients, particularly for those looking to advance their managerial career in the IT industry (Deming, 2017).

The ICT increasing development is transforming the labour market, creating new job opportunities that require new professionals and high digital competencies. The broad scope of this undertaking is also emphasized by Berger and Frey (2016) who defined digital skills as an amorphous concept, encompassing a wide range of abilities from basic computer knowledge to advanced programming and block-chain development. Research has shown the growing importance of digital competencies as an asset in the labour market, particularly in the IT industry (Lloy, Payne, 2022; Berger, Frey, 2016).

The new generation of workers, known as Generation Z, are entering the workforce. They are individuals with high digital competencies who appreciate change, value innovation, and seek a balance between work and personal life (Barak, 2018; Dolot, 2018). As “digital natives” they regard technology as a natural part of their daily lives, influencing their work approach and expectations toward employers (Schroth, 2019; Chillakuri, 2020). Many of them may already be familiar with the possibilities of working as an IT specialist, therefore they will not be surprised by the topic of the presented research.

Diversity of IT specializations require different desirable characteristics of a good IT employee. Consequently, universities should strive to continuously improve education quality to meet the knowledge-based economy’s requirements. This includes providing timely and flexible education pro-grams and developing external partnerships with local industry, government, and community (Grebski, Grebski, 2018). This should be enhanced by selecting modern teaching methods (Jelonek, Chomiak-Orsa, 2018), such as e-learning (Tirziu, Vrabie, 2015), virtual technologies (Martín-Gutiérrez et al., 2017), and even artificial intelligence (Zhang, Aslan, 2021).

Academic researchers often delve into important questions regarding university education and employment. For example, do universities adequately prepare students for jobs that align with the labor market’s needs (Jelonek et al., 2020; Valberg, 2020)? Are PhD graduates prepared to develop careers beyond academia (Skakni et al., 2025)? Are students adequately prepared for careers in STEM (Liu, Kirk, Oseguera 2024)? Additionally, they examine whether graduates possess the necessary specialist skills and soft competencies (Gruzdev et al., 2018; Kulej-Dudek et al., 2018), sufficient competencies in digital fields (Falck et al., 2021), and if they can solve real-business problems (Lima et al., 2017), or are capable of abstract thinking (Jelonek, Stepniak, 2014).

However, there is a lack of research on whether students are adequately prepared for new and emerging professions in the IT industry, such as Real-time Data Analyst, Digital Transformation Engineer, Mobile UX Designer, Robotic Process Automation Engineer,

eSports Specialist, User Behaviour Analyst, Autonomous Systems Engineer, Extended Reality Architect, and many others.

Similarly, there is little data on whether graduates are willing to pursue jobs connected to their education, but they are largely new and did not exist a few years ago (e.g., listed above). The latter may be why universities did not prepare an education offer for such fields of study. There is also no research on students' attitudes, whether they are open to working in a different profession than indicated by the completed field of study, their self-assessment of their knowledge and competence resources, and whether they want to further their education. Are students aware that the potential of their knowledge may be sufficient as the first step on the path in the broadly understood IT profession, and that the willingness and ability to learn will allow them to take the next steps? Overall, it is essential to explore the attitudes and self-assessments of students to ensure that they are well-equipped for the ever-changing job market in the IT profession. The above formulations indicate a research gap resulting from the available literature, which this article hopes to fill. There is a lack of comprehensive opinions and assessments of students of economics and management studies on their knowledge of the IT profession and factors that would encourage them to do so, the necessary skills and sources of acquiring them, and the scope of work they could perform. In connection with this, the following research questions arise:

RQ1: What are the respondent's IT competencies and skills?

RQ2: What factors influence taking up work in IT?

RQ3: What scope of work in IT would an economics and management graduate prefer?

RQ4: What subjects are or will be needed as part of their current studies to be a specialist?

The structure of the survey was adapted to the answers to the above questions.

### **3. Research methodology**

#### **3.1. Research procedure**

Based on the previously conducted research (Chmielarz, Zborowski, 2019) a research procedure was adopted, consisting of the following stages:

1. conducting a thorough analysis of the literature and seeking expert opinions on the IT sector's work-ing conditions and how society perceives them, particularly students,
2. taking into account the results of previous stage queries, our experience, and observations gained from years of working in IT teams,
3. testing the questionnaire's comprehensibility and relevance to the researched issue on a random group of respondents,

4. creating the final survey form and sampling student groups for the study, finalizing the survey form and selecting student groups to participate in the study,
5. providing a link to the survey form using the CAWI (Computer-Associated Web Interview) method to previously sampled student groups,
6. collecting research results, presenting them, measuring any cross-regional differences using the Euclidean distance, and finally analysing and discussing findings,
7. concluding the study and identifying potential avenues for future research.

The process used for this study is similar to that used in other comparative studies. The difference is that it involved standardizing and coordinating research. Compared to international research, the steps for agreeing on the questionnaire content and collecting data were quicker and more efficient without any unnecessary disruptions.

### **3.2. Questionnaire construction/design**

The analysis of online and theoretical materials, supported by expert opinions, allowed us to specify requirements for the survey on students' expectations related to IT specialist work and their views on the educational needs accompanying this phenomenon.

First and most importantly – as stated – such a survey, in addition to its informative function (source of information), should also have an educational process dispelling doubts and some of the myths listed in the Introduction. Second, it combines the students' idea of the IT profession with their idea of the possibilities and necessity of education in this field. Third, it shows the factors that may attract or discourage them from starting an IT career. Four, the survey is addressed to students – not only IT studies (if anything, at universities of economics), but mainly students of economics studies, focused on management. Five, the survey was addressed to all students, regardless of gender and age.

Given the above requirements, the original questionnaire consisted of the subsequent parts, describing the following:

- respondent's IT competencies and skills,
- motivating and demotivating factors as well as limitations for taking up a job in IT,
- the graduate's preferred scope of work in IT in the future,
- students preferred necessary study courses to learn in a future IT specialist profession.

After consulting a pilot group of 30 randomly selected students whenever the questions are relevant, clarity presented, without any unambiguity of answering, five questions were abandoned, one was added, the answer options to four questions were extended, and several previously used terms were changed to achieve a complete understanding of their wording. Ultimately, the survey included twenty one extensive, detailed substantive questions and a data sheet on the sample demographics.

### 3.3. Sample characteristics

The research sample characteristics from four Polish universities are presented below: Czestochowa University of Technology (CUT), the Maria Curie-Skłodowska University in Lublin (MCSU Lub.), the University of Warsaw (UW), and the University of Economics in Katowice (UE Kat.). It was limited to organizational units related to the field of economics and management as well as business informatics. The study was conveniently conducted at the university level by restricting it to the faculties associated with management, economics, and business informatics. The survey was carried out at individual year-of-study levels at random by asking student groups available at the time to complete the questionnaire.

The data were collected and broken down by gender, age, education and major, place of residence, and financial status.

In general, based on the collected data, it can be stated that:

- women dominate the management faculties of the selected universities – on average they constitute over 60% of the population (men almost 40%), which is typical for this type of study; only UE Kat. differs from this pattern as this university conducts the IT majors (63% of men, 37% of women),
- the largest difference calculated by the Euclidean distance (nearly 30%) occurs between UW, and a slightly smaller one (29%) between (MS) and UE Kat.,
- most respondents (nearly 90%) are aged 19-24, which is also typical for this population, only over 10% are aged 25-34 and above, and the largest (3.68%) difference calculated by the Euclidean distance occurs between CUT and UW,
- according to declarations about studying in a given year of study, almost 56% of respondents have secondary or basic vocational education (most at UW - 78%), and a bachelor's degree - over 34% (most at CUT - almost 53% - the surveys were carried out at the second cycle). For this reason, the greatest variation (30%), calculated by the Euclidean distance, occurred between UW and UE Kat.,
- as expected, the dominant field of education was social sciences – almost 54%, and exact and technical sciences – almost 36% on average (most at UE Kat., nearly 74%, due to surveying students of econometrics and business informatics),
- on average, most individuals (34%) come from cities with more than 200,000 inhabitants (mainly UW - 60% - due to Warsaw) and the rural areas - on average over 34% (mainly due to CUT - 58%). In these two categories, the most significant difference measured by the Euclidean distance occurs between CUT and UW.

The conclusions indicate, the research sample was characterized by quite a large diversity as in mass studies.

The statistical analysis of the input data was limited to calculating the variance and standard deviation for the sub-criteria in each criterion at the selected universities. The variance indicates the difference in the results in a given set. The standard deviation determines the degree of concentration of the variable value around the arithmetic mean.

Significant differences in the data collected from individual universities were measured by the Euclidean distance. These cases were previously observed in the respondent's year of study (45% on average, with as much as 117% difference between UW and MCSU Lub.) and the intention to pursue a career in IT (17%, mainly due to the 36% difference between CUT and UE Kat.). These differences seem justified in the case of a randomly selected sample.

In the survey, participants chose from a list of possible options to answer questions. This means that the variables were nominal, and each observation could only belong to one category for each variable. To compare respondents from different universities, we used the Chi2 test, which is a commonly used statistical tool to determine if there is a significant dependence between variables. We put forward the null hypothesis (H0) in the Chi2 test, which assumes that the variables are independent. However, in the alternative hypothesis (H1), we assumed that the variables are dependent. If the significance level ( $p$ ) is less than 0.05, we reject the null hypothesis and conclude that there is a statistically significant dependence between the variables. The Chi2 test helped us identify significant differences between respondents' universities and the answers they gave. Additionally, we used adjusted residuals to identify outliers, which were answers from respondents at a particular university that significantly differed from the expected value. We performed these calculations using the IBM SPSS 28 application. We analysed differences in factors that motivate people to work in IT, factors that discourage them, IT competencies, and academic topics that students interested in working for an IT company want to study at their university.

#### **4. Results and discussion**

In March and April 2024, a survey was conducted using the CAWI method in four well-known academic centres. The survey included several sections, such as:

- identifying respondents who work in the labour market,
- their opinions on the benefits and drawbacks of starting a career as an IT specialist, their preferences for working in this field,
- necessary competencies required to perform the job and how to acquire them,
- students' ideas about the beginnings of a career and the areas of duties of a future IT specialist,
- competencies acquired at the university and those that should be supplemented there,
- social, economic, and technological reasons for career changes of an IT specialist,
- professional changes in IT specialist work and degree of the current basic development trends will prevail in future enterprises.

The initial section of the survey focused on the respondents' year of study. Most respondents (over 41%) were in their second year of studies. This was mainly due to the high number of respondents from UW (95%). In second place (27%) were first-year students, with most of them (53%) registered at MCSU Lub. The percentage of students participating in the third year of studies or the second Master's or Bachelor's studies was minimal. UE Kat had the most even distribution, with 33% of students completing the survey from the second year of studies, and slightly fewer (26%) from the first and fourth years (22%). Therefore, UE Kat had the lowest values for both variance (1.88%) and standard deviation (13.17%).

The Euclidean distance showed the highest variation (117%) between UW and MCSU Lub. Similarly, a high variation (50-60%) was observed between UW and other universities due to the lack of respondents from the third year of studies at UW. The smallest variation (5%) was identified between CUT and UE Kat.

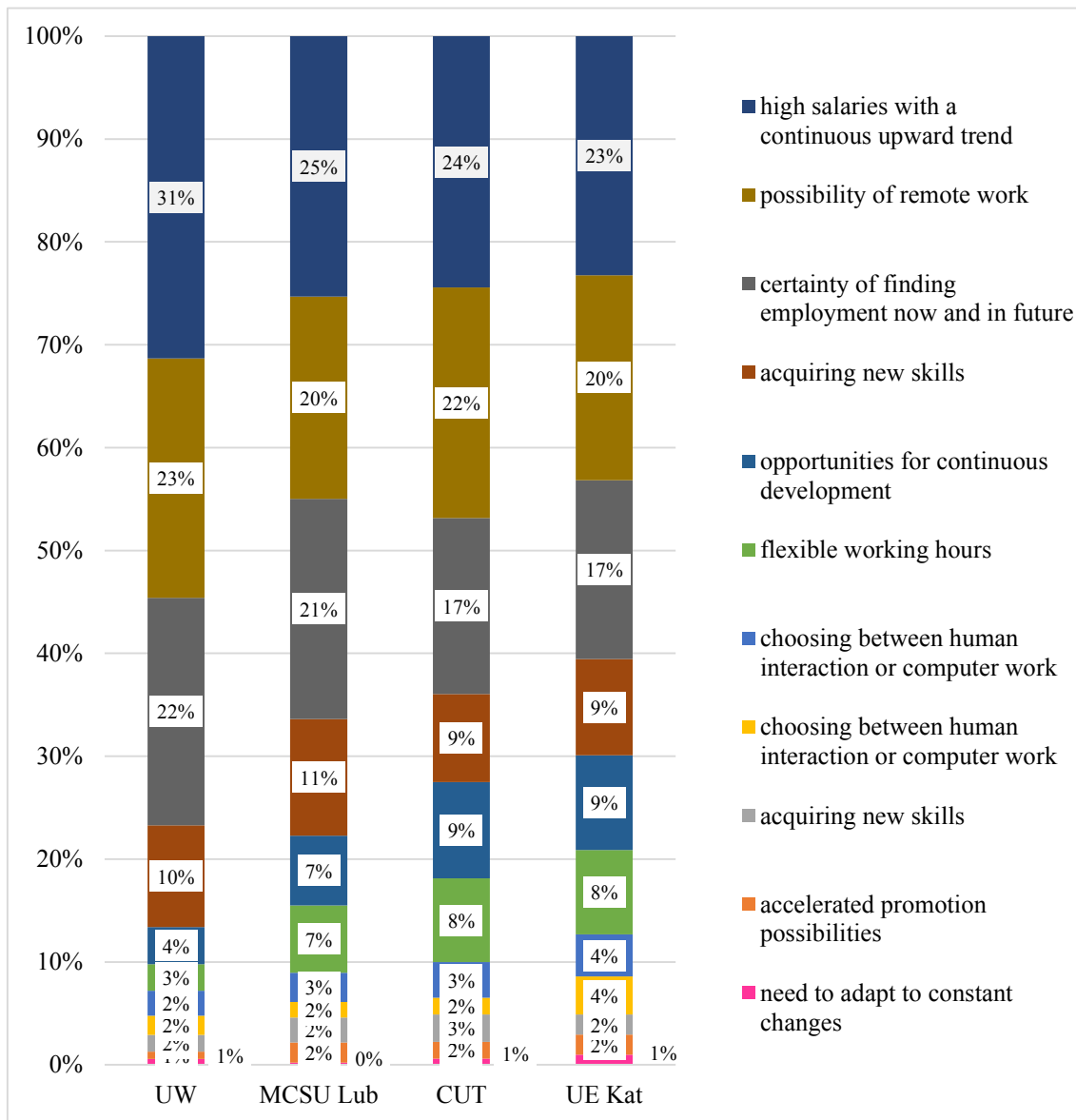
The next question in the survey was about the respondents' professional status. On average, 44% of individuals answered that they were students and did not work. Most of these individuals were from MCSU Lub. (64%), followed by CUT (43%), UW (32%), and UE Kat. (36%). The second most common response (29%) was from individuals working casually under a commission or employment contract. Due to the sizeable labour market in Warsaw and its vicinity, UW students had the highest percentage (40%) in this category. However, they now have to compete with workers from Ukraine for remuneration.

The most significant variation in terms of the Euclidean distance (18%) was found between MCSU Lub. and UE Kat. and a similar variation was observed (15%) between UW and MCSU Lub. Other differences were two-three times smaller.

The second part of the survey focused on identifying the requirements for pursuing a career as an IT specialist. The results showed a significant emphasis (averaging at 28%) on high salaries, which showed a continuous upward trend. Interestingly, the responses in this category were almost identical across all universities analysed, ranging from 23-24% at UE Kat. and CUT to 31% at UW. The second most important factor was the certainty of finding employment both now and in the future, with an average of 22% (ranging from 17% at UE Kat. to 23% at UW). The possibility of remote work came in third place with 21% (17% at CUT to 22% at UW). However, with recent changes to labour laws, it remains to be seen if remote work will stay so popular. These were the top three categories, with other factors such as flexible working hours (10%), opportunities for continuous development (6%), or acquiring new skills (5%) being of less importance during these times of economic uncertainty.

When it comes to job preferences, certain factors like working with a great team, accelerated promotion possibilities unless it is connected with a pay increase, and choosing between human interaction or computer work are no longer the top priorities. UW had the most diverse data on this topic, with the highest variance (1.23%) and standard deviation (11.11%). The biggest differences in opinions were between respondents from UW and UE Kat.

The variation in attitudes toward high salaries, employment opportunities, and continuous development caused a 1.96% difference in Euclidean distance. The results are shown in Figure 1.



**Figure 1.** Requirements for pursuing a career as an IT specialist.

Source: own study.

Respondents had varying opinions on employment security, salary levels, remote work, skill acquisition, and continuous development. UW students prioritized employment security the most, while UE Katowice students did not find it as crucial. High salaries with a rapid upward trend were the most important for UW students, with nearly 90% of them agreeing. A significant percentage of UW students (63%) were also interested in remote work, while only 47.2% of the CUT students found it appealing. Statistical analysis using the Chi2 test confirmed previous observations obtained with the Euclidean distance. The University of Warsaw respondents were least interest-ed in acquiring new skills and continuous development, as shown in Table 1.

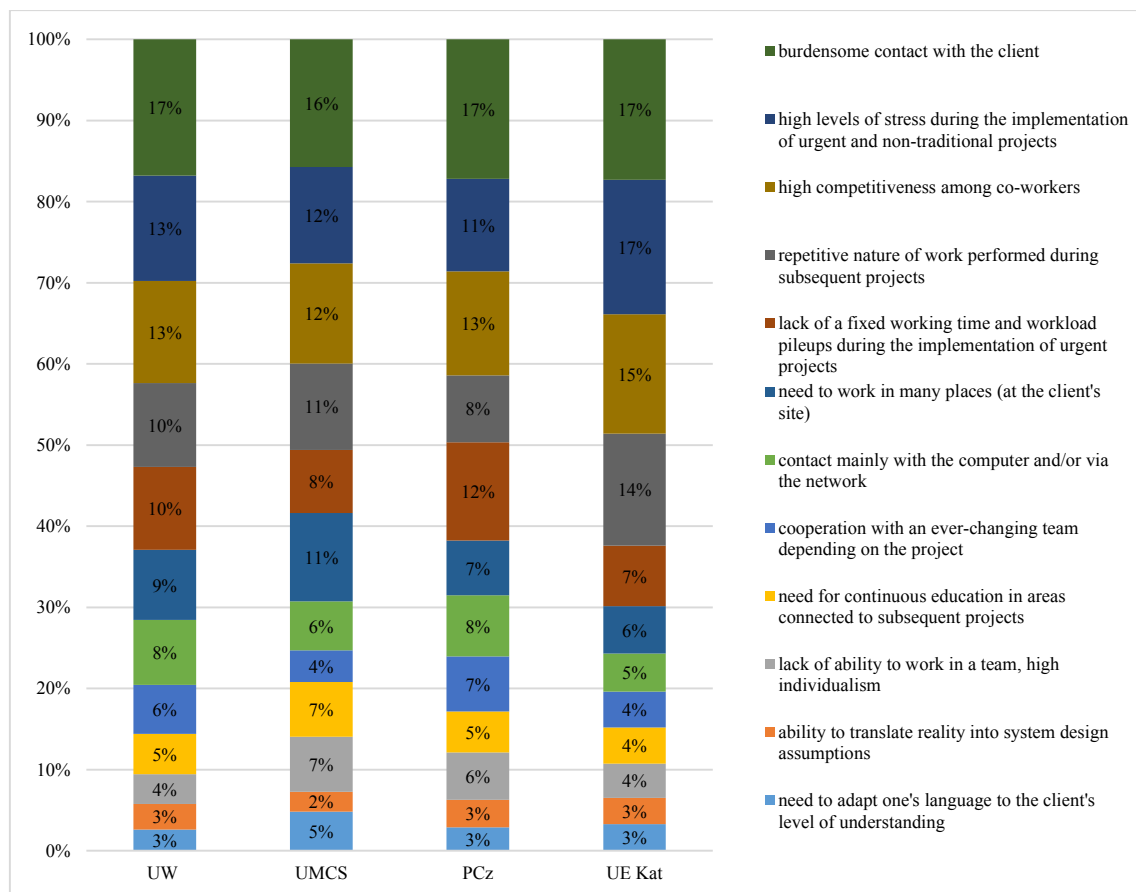
**Table 1.***Differences in requirements for pursuing a career in an IT profession*

What would incline you to work in the IT specialist profession?	UW		MCSU Lub.		CUT		UE Kat.		Chi2	p
	n	%	n	%	n	%	n	%		
Employment security	200	66.7%(+)	90	54.50%	110	61.80%	89	49.4%(-)	16.01	0.001
High salaries with a rapid upward trend	269	89.7%(+)	116	70.3%(-)	120	67.4%(-)	119	66.1%(-)	50.23	0.001
Flexible working hours	85	28.30%	52	31.50%	42	23.60%	42	23.30%	4.257	0.235
Possibility of remote work	190	63.3%(+)	98	59.40%	84	47.2%(-)	102	56.70%	12.22	0.007
Acquiring new competencies	22	7.3%(-)	30	18.20%	40	22.50%	48	26.70%	35.71	0.001
Cooperation with a great team	14	4.70%	11	6.70%	13	7.30%	19	10.60%	6.111	0.106
Accelerated promotion possibilities	21	7.00%	13	7.90%	17	9.60%	10	5.60%	2.217	0.529
Choosing between human interaction or computer work	16	5.30%	7	4.20%	8	4.50%	21	11.7%(+)	11.39	0.010
Opportunities for continuous development	31	10.3%(-)	31	18.80%	47	25.8%(+)	47	26.1%(+)	26.14	0.001
Need for improvement of competencies	6	2.00%	9	5.50%	8	4.50%	10	5.60%	5.269	0.153
Need for change adaptation	5	1.70%	1	0.60%	3	1.70%	5	2.80%	2.433	0.487

n – number of respondents who gave an affirmative answer, % – the percentage of respondents who gave an affirmative answer, Chi2 – the value of chi-square statistics, p – significance level (when  $p < 0.05$  there is a statistically significant relationship), (-) – negative adjusted residual value  $Z < -1.96$  (downward outlier); (+) – the positive value of the adjusted residual  $Z > 1.96$  (upward outlier).

Source: own study.

Such unanimity of opinion cannot be observed in the case of factors dissuading from taking up a career as an IT specialist. The distribution of responses is more even in this case (Fig. 2). Nevertheless, in all universities, attention is drawn to high levels of stress during the implementation of urgent and non-traditional projects (at the level of 17%), contact mainly with the computer and/or via the network (from 6% at UE Kat. to 13% in the others) and high competitiveness among co-workers (11-15% most in UE Kat.). Equally minor differences occur concerning the following categories: burdensome contacts with the client, lack of a fixed working time, and workload pileups during the implementation of urgent projects (10% each). The least cumbersome (3% UE Kat.) seems to be adapting one's language to the client's level (5%), resulting in errors in the implementation or adaptation of the software to the client's needs. The variance in the data collected from each university was relatively small (0.31%), as was the standard deviation (5.51%).



Other: inability to work in a team, high individualism, ability to translate reality into system design assumptions.

**Figure 2.** Factors discouraging students from starting a career as an IT specialist.

Source: own study

According to the respondents, the main reasons for avoiding a career as an IT specialist are high levels of stress, the need to work mostly with computers, and the lack of a fixed work schedule. However, opinions vary on other factors such as the repetitive nature of the work, the need for continuous education, the lack of a permanent workplace, dealing with clients, and adapting language to their needs. UW students find continuous education and computer work particularly discouraging, while MCSU Lub. students struggle more with adjusting their language to clients. Interestingly, the CUT students are less averse to repetitive work and dealing with clients. UE Katowice respondents find constant education and computer work less problematic compared to other universities.

According to the survey, more than 40% of respondents expressed interest in pursuing a career as an IT specialist – response option: *that's what I wanted: sometimes, always*. This was the most popular choice among respondents, with over 40% (mostly 87% from UE Kat. given analysed fields of studies) selecting it as their desired career path. However, the least amount of interest came from CUT, which may come as a surprise as it is a university with a polytechnic profile. When considering those who were undecided or unsure based on the response options: *sometimes I wanted and I don't know*, an average of 67% of respondents were considering a career in IT (ranging from 65% at CUT to 88% at UE Kat.). The largest variation

in data was found at UE Kat., with a variance of 5.09% and a standard deviation of 22%, followed by UW.

The biggest variation in responses from individual universities was observed between CUT and UE Kat., with a Euclidean distance of 36.42%. This was mainly due to opposite answers regarding interest in pursuing a career as an IT specialist, with some respondents selecting *No, I never thought of being an IT specialist* and others selecting *I always thought so*.

Other questions in the survey asked about the necessary competencies for an IT specialist, ways to acquire them, and the role of universities in the process. The survey also addressed the need to supplement competencies to start a career as an IT specialist.

Based on the feedback received, the main requirement for IT specialists is their ability to analyse business data, which was cited by 15% of respondents on average. At MCSU Lub., this proportion was even higher at 19%. Application Development was the second most important skill, with an average of 11%. UE Kat had the highest share of respondents at 16%. Unfortunately, the Use of Office Applications ranked third at 10%. This misconception has persisted for several years and results from the belief, in-stilled by economics and management faculties, economics and polytechnics scientists, other academic subjects, and even university management, that knowledge of applications like MS Office is a basic skill for IT specialists. This shows a lack of awareness of what the IT specialist profession entails among many university students. Other important skills were Database Service and Designing E-business Applications. However, competencies such as IT project management, system architecture design and development, or traditional management systems were not highly valued by respondents, receiving only 1-5% of responses. The UW data had the largest dispersion among the data, with a variance of 0.29% and a standard deviation of 5.43%. The most considerable differences between universities, as measured by Euclidean distance, were observed between UW and UE Kat, with a difference of 5.75%.

When asked about their experience with computer science and informatics education, most respondents (36% on average, with 45% from CUT) reported having taken courses in these fields during their primary and secondary school years. The next most common source of education was higher education at the Bachelor's and Master's levels (21% on average). Self-education (19% on average, with 22% from UE Kat.) and peer support through friends (9% on average) were also significant sources of education. Interestingly, despite many respondents expressing interest in IT as a profession, only a small percentage (1-7%) sought additional training through short courses, specialized university pro-grams, or internships in IT projects.

When considering a career as an IT specialist, many management students believe that proficiency in office software is crucial. 32% of respondents who were asked about the competencies acquired during their studies in existing IT systems and related activities during their studies indicated proficiency in software such as editors, spreadsheets, and databases. The second most common competency was in programming languages such as C\*, Java, and

VBA (14%), with a higher percentage (21%) among students at UE Kat. The third most common competency was in subsystems of integrated systems (financial accounting, HRM, warehouse, procurement, and sales) at 12%. Additionally, around 10% of respondents had competencies in network services and business intelligence systems for reporting and analysis. However, many respondents lacked competencies that are essential for IT specialists, such as system analysis and design tools, project management tools, business process optimization tools, IT service management, and database and data warehouse management. These essential competencies have either been removed from curricula due to cost efficiencies at universities. This lack of targeted competencies may hinder students' career prospects in the early years of their studies.

The data show significant variations in competencies among different universities, with the highest differentiation of 10.15% observed between UW and UE Kat. (variance 1.29%, standard deviation 11.37%) and CUT and UE Kat. (10.11%). This variation is mainly due to differences in attitudes toward the ability to use office software, integrated systems, and programming knowledge.

**Table 2.**

*Differences in competencies in the existing, most popular IT systems and activities related to their creation and operation*

Student's competencies in existing IT systems	UW		MCSU Lub.		CUT		UE Kat.		Chi2	p
	n	%	n	%	n	%	n	%		
Integrated system's subsystems	89	29.70%	36	21.80%	83	46.6%(+)	19	10.6%(-)	61.852	0.001
Business Intelligence	53	17.70%	30	18.20%	30	16.90%	46	25.60%	5.848	0.119
Business process optimization tools	12	4.0%(-)	15	9.10%	13	7.30%	19	10.6%(+)	8.55	0.036
System analysis and design tools	12	4.0%(-)	17	10.30%	6	3.4%(-)	25	13.9%(+)	22.663	0.001
Project management tools	11	3.7%(-)	12	7.30%	9	5.10%	25	13.9%(+)	19.478	0.001
Programming	71	23.7%(-)	54	32.70%	26	14.6%(-)	120	66.7%(+)	131.48	0.001
Application modification and development	8	2.7%(-)	10	6.10%	5	2.8%(-)	59	32.8%(+)	135.201	0.001
Database application programming	9	3.0%(-)	8	4.8%(-)	5	2.8%(-)	56	31.1%(+)	126.212	0.001
IT services management	6	2.0%(-)	12	7.30%	10	5.60%	21	11.7%(+)	19.416	0.001
Database and data warehouse management	18	6.0%(-)	14	8.50%	8	4.5%(-)	47	26.1%(+)	60.324	0.001
Office Software	271	90.3%(+)	107	64.8%(-)	126	70.80%	110	61.1%(-)	66.131	0.001
Cloud application implementation and integration	14	4.70%	8	4.80%	22	12.4%(+)	10	5.60%	12.604	0.006
Network services	64	21.3%(+)	20	12.10%	32	18%	10	10.0%(-)	13.298	0.004

n – number of respondents who gave an affirmative answer, % – the percentage of respondents who gave an affirmative answer, Chi2 – the value of chi-square statistics, p – significance level (when  $p < 0.05$  there is a statistically significant relationship), (-) – negative adjusted residual value  $Z < -1.96$  (downward outlier); (+) – the positive value of the adjusted residual  $Z > 1.96$  (upward outlier).

Source: own study.

Table 2 analysis reveals significant differences in IT competencies among respondents from various universities, particularly UE in Katowice. Eight out of thirteen competencies were found to be significantly higher in respondents from UE in Katowice compared to other universities. Interestingly, UW students showed lower competencies in IT management, specifically in process optimization, system design, project management tools, programming, IT service management, and data warehouse and service management. However, UW students showed a significantly higher level of competence in office software and network services. In contrast, MCSU Lub. respondents displayed a well-balanced set of competencies, not significantly different from the average catalogue of competencies of all respondents, except for office software and database programming skills.

As a result, the question arises: if students have a low opinion of their universities' role in acquiring IT competencies, what specific competencies do they desire? Among all competencies, Business Intelligence systems were the most desired (15%) (with UW having a slight advantage at 19%), followed by learning programming languages (13%). The highest proportion of answers came from MCSU Lub. (16%), followed by analysis and system design tools (9%) (mostly MCSU Lub. at 11%). Additionally, nearly 8% of respondents expressed an interest in application modification and development (programming).

In the common perception, making a career is reflected in the acquisition of successive, increasingly higher positions that prove the status in a specific activity, in this instance in the broadly understood profession of an IT specialist. In this case, it is about the expectations of future graduates after potential training and gaining additional competencies. According to the findings of this part of the survey, 14% of students are interested in beginning their IT careers as business contact consultants or managers, based on acquired competencies beyond just IT. Out of all the surveyed students from UW, 20% felt the most confident pursuing this type of position, while 13% were interested in project team leadership or consulting in sales and marketing. However, the position of helpdesk service manager was the least popular, with only 3% expressing interest. Jobs that require direct interaction with users, such as implementation consultant, system start-up, and maintenance manager, were considered difficult and only 5-7% of students were interested in them.

The responses to the question about a future IT professional's possible interests and responsibilities yielded similar results. The top choice, at 18%, was the role of a business data analyst (with the highest percentage at UW being 22% and MCSU Lub. being 18%). The second choice, at 10%, was an IT security analyst (with the highest percentage at MCSU Lub. being 12%), and the third choice was a data architect (with the highest percentage at UE Kat. being 13%).

**Table 3.***Areas of a future IT specialist's possible interests and responsibilities*

<b>Future position/University</b>	<b>UW WZ</b>	<b>MCSU Lub.</b>	<b>CUT</b>	<b>UE Kat</b>	<b>Mean</b>
IT Security Analyst	8%	12%	10%	11%	10%
IT Security Adviser	4%	4%	8%	6%	5%
Chief Security Officer	6%	4%	11%	7%	7%
Network Analyst	7%	8%	6%	4%	6%
IT Profitability Analyst	6%	5%	6%	4%	6%
Business Intelligence Analyst	22%	19%	17%	13%	18%
Data Scientist	6%	7%	4%	13%	7%
Library Scientist	1%	3%	3%	2%	2%
Data Architect	6%	8%	6%	13%	8%
Director of Analytics	11%	7%	6%	5%	7%
IoT Network Architect	3%	4%	2%	2%	3%
Digital Business Architect	2%	3%	3%	5%	3%
Enterprise Business Architect	6%	5%	4%	4%	5%
Knowledge Analytics	6%	8%	5%	7%	6%
Knowledge Manager	5%	5%	8%	4%	6%
Total	100%	100%	100%	100%	100%
Variance	0.23%	0.16%	0.15%	0.16%	5.57%
Standard deviation	4.85%	4.03%	3.89%	3.97%	23.60%

Source: own study.

However, all scientific and conceptual positions, such as knowledge analyst, business enterprise architect, data scientist, application profitability analyst, etc., do not appeal to the respondents.

We determined the significance of substantive and psychophysical competencies for a future IT specialist from the previous questions. The most important competency was the ability to rapidly acquire new information and IT knowledge, with over double the number of responses compared to the other competencies (averaging 26%). The other five competencies had an average of 11%: openness to non-standard methods, the ability to work in a project team, mental resilience to real or perceived shortcomings, the ability to recognize key tasks and focus on them, and intelligence and independence of action. Other characteristics, such as business knowledge or concern for the project's success, were not deemed as important, with an average of 5% of responses. Interestingly, the ability to defend one's views had the lowest position, with only 1% of responses, while intelligence and independence of action were valued at 10%. With these findings, it appears that the future IT professional may be considered a conformist, but this may also be due to logical errors in the survey responses.

Responses from the analysed universities had similar diversity. However, the differences between the surveyed universities were negligible, with the largest variance between UW and CUT at 0.66%.

According to the respondents, the requirements for employment in the IT profession are slightly different. Technical skills, which refer to the ability to operate IT equipment and application software, were considered the most important (19%) and this was consistent across all universities surveyed. Length of service in the profession and experience in the IT industry were ranked second (less than 19% on average), as they impact the specific routine and work

flexibility. Additionally, more than 11% of the respondents highlighted the importance of logical thinking, independent problem-solving, language skills, education, and the ability to learn and acquire knowledge. Ambition and the desire for a high salary were not considered significant factors (and may even contradict the employment conditions). However, knowledge of economic issues, enthusiasm for the profession, and mental predispositions were not valued. So where does this leave a person's desire to pursue a career in IT?

The most varied answers were given at UW, with a variance of 0.55% and a standard deviation of 7.43%. Interestingly, responses at other universities were quite similar. Therefore, the Euclidean distance in all cases was minimal, with the highest value of 0.79% between MCSU Lub. and UW.

When asked about skills they would like to acquire for a career in IT, respondents emphasized skills they would like to learn at universities with an average of 16%. The most requested skill was application programming, with the ability to design IT systems following closely behind (12% on average with the highest percentage at UW of 16%). These practical skills are crucial for employment but have sadly been neglected at universities in recent years. They should be reintroduced into the curricula of universities of economics, along with courses on database management and design (10% on average and 14% at UW). Theoretical knowledge of IT systems and their applications (almost 12% on average) and systems analysis and design (almost 11% on average and 15% at UW) were also important to respondents. Additionally, understanding the latest IT products and their development was requested at 10% on average and 15% at UE Kat. This content seems to have been included in course materials for years, but either the content is outdated or insufficient. On the other hand, non-specialist practical knowledge, such as time management of designated and performed tasks and awareness of incomplete knowledge, was undervalued (3-8% on average). Respondents expressed that they had adequate knowledge of organizational and legal issues and how the economy operates.

## 5. Conclusions

This research explored the awareness of Generation Z about pursuing a career as an IT specialist. We aimed to prepare this generation for embarking on the IT profession at universities, departments, or faculties of economics, management, econometrics, or business informatics. We focused on examining cross-regional differences in this analysis. However, we recognize that other factors impact the diversity of approaches to this topic. Higher education institutions in Poland have various organizational structures, which include institutes, faculties, specialties, and majors. They offer different types of studies, such as full-time, evening, and extramural studies, which can be conducted in either Polish or foreign languages. Additionally, they run various study programs after introducing a new division of

specializations that cut down subjects that the university authorities do not perceive as closely related to a given specialization for economic reasons. Universities' perception plays a vital role in determining what is essential for graduates to get a job. They consider what is modern and necessary for the country's future development, not just economically. However, this perception is often biased by a particular approach to science, in which the university authority's field of research seems to be the most important.

This analysis does not cover all those matters. We are also aware that although we have been in this profession for years, our imagination may not have covered all the problems of this market and the conditions for entering this market for our students. Nevertheless, it seems that it may be interesting both for students looking for a job and career paths, for their potential employers, as well as university authorities involved in modernizing study programs and plugging a knowledge gap necessary for a career in IT.

The research carried out so far in this area allows us to draw the following conclusions:

- the survey results show that the most essential IT competencies appear to be the complete basics of IT, often reduced to the knowledge of the MS Office package, supported to a limited extent by the basics of business analytics, which is the answer to the research question RQ1,
- the quoted data resulting from the research mostly confirm the existence of myths about the profession of an IT specialist and their impact on the answers given. This applies in particular, this applies to the expected level of salaries for a specific job position and employment security, (which answers research question RQ2),
- knowledge of the broadly understood profession of an IT specialist and the related competency needs among students is low. Few individuals realize that competencies related to process and project management (sometimes learned at universities without any supporting software) are more critical and better paid than software development. Few individuals know what implementing IT systems is all about and how necessary knowledge of economics and finance is in it, (which answers RQ3),
- learning about IT use in economics and management should not rely on the already mentioned issues and most of the respondents are well aware of it, paying attention to academic courses that, in their understanding, would open the possibility of a career in the profession of IT specialist and to the fact that learning broadly understood IT cannot rely on lectures and presentations, but on laboratories, workshops, and projects. evidently, this is at odds with the policy of the university authorities because these study programs are relatively "expensive" compared to lectures, for example. it seems that this matter is reasonably balanced at those universities that accounted for the teams dealing with business informatics in their organizational units (institutes, faculties) though to a limited extent (e.g., UE Kat.) – which gives the answer to RQ4.

Detailed conclusions and related discussion are included in the previous section.

There were some limitations in the study mentioned above. First, the survey only included four universities, but they were diverse enough to draw some general conclusions. Second, the survey only looked at location diversity. Third, the study did not consider the opinions of foreign students and potential foreign partners. Fourth, the results were not broken down by demographics such as gender, place of residence, employment status, etc. Lastly, the research did not determine the type and year of studies of respondents.

These limitations suggest possible areas for future research. To carry out this research, data collection would need to be extended to other universities, the survey structure would need to be adjusted, and research partnerships would need to be established with universities outside of Poland.

The authors plan to pursue these avenues in a step-by-step manner, hoping to contribute to the improvement of the IT job market in Poland.

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