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**Interdisciplinary Aspects of Multivariate  
Models of Human Capital among IT  
Professionals.**

**Compilation Analysis**

**Monograph**

**by**

**Jolanta Kowal**

Wrocław 2021

**UNIVERSITY OF WROCLAW**

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MODELS OF HUMAN CAPITAL AMONG IT  
PROFESSIONALS**

**COMPILATION ANALYSIS**

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Editorial secretary

**Ewa Pańska**, College of Management "EDUKACJA", Wrocław, Poland

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## **ABOUT THIS MONOGRAPH**

The publications concern business competencies, organizational ethics, job, and life satisfaction among IT professionals, as well as models of relations between these factors in information and IT systems. The results contributed to the development of science in the field of psycho-social aspects of innovation, organizational potential, and organizational ethics. It focused on micro and small enterprises. The Author studied these selected issues on the example of Polish, German and Indian companies. The Author's contribution is part of a stream of research on human capital, as well as non-material dimensions of motivation systems, such as job satisfaction, belief in the quality of life, work-life balance. Important dimensions of the conducted research were also considerations in the field of intellectual capital, in particular on the predispositions to make innovations, ethical competences, or the ability to communicate and theory of mind. These aspects were examined taking into account the IT dimension and competence to use IT systems.

The series of publications contribute to the development of research methods, because Jolanta presented her approach based on passive experiments, proposing methods for selecting the sample and verifying its representativeness. The concepts developed were included in the work, which also resulted in computer software. They also make a very useful contribution to the development of those qualitative methods where the concept of representativeness is used and applied.

Jolanta Kowal

University of Wrocław, Institute of Psychology, Poland

[jolanta.kowal@uwr.edu.pl](mailto:jolanta.kowal@uwr.edu.pl)

<https://orcid.org/0000-0002-6241-9603>

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## **PREFACE**

My scientific achievement is a series of 13 major publications (see Table 1), with 44 thematically related, concerning methodological, economic, and social aspects of models relating such variables as business competency, organizational ethics, job satisfaction, and life satisfaction among IT professionals in the context of levels of socioeconomic development (Roztocki, & Weistroffer, 2008, 2016).

The main purpose of this work is to develop models of relations between the variables mentioned, in information systems (SI) (Kuraś, 2004, Petter, DeLone, McLean, 2013), in the context of selected socio-demographic features and levels of socio-economic development.

The intermediate goal enabling the implementation of research is the development and adaptation of research tools that enable measurements of variables for the aforementioned models. The goal formulated in this way makes it possible to measure these variables and build models that can serve socio-economic development in various groups of countries. At the same time, in the current work, I adopted the definition of socioeconomic development as a process of changing or improving social and economic conditions related to an individual, organization, or the whole country (Roztocki and Weistroffer, 2015, 2016).

I assumed that these relations could be stated on the basis of theoretical foundations, through a critical analysis of the scientific literature of the subject, but also through the verification of research models, based on representative samples, in countries with different levels of economic development. The assumption of the literature review was based mainly on indexed positions in global databases, such as Web of Science or Scopus, which also concerned the development of information systems management (MIS) because I am interested in global trends in this field.

I believe that these issues are particularly important, because according to futurologists, in the coming years, the global market will be dominated by small businesses and self-employment, providing services via the Internet, and a small percentage of employees in large corporations will be able to count on a permanent job (Kowal, 2011). This type of work is a challenge both for employees and employers, due to the pressure and pace of work that can lead to a lack of job satisfaction and personal life. That is why "hard" and "soft" competencies are important,

and the role of IT competences is particularly important (Kowal, Makio, & Jasińska-Biliczak, 2017).

Both qualitative and quantitative research was conducted in Poland - a country representing the economy in the transformation process from a centrally planned system to a market economy (transition economy), in Germany - a country with a developed economy, and in India, representing the so-called emerging economy (Roztocki, & Weistroffer, 2008-2016). Conducting studies in these countries made it possible to analyze the context of the socio-economic level. The socio-demographic context is primarily related to the gender issue of SI employees, in the organizational and cultural context.

The result of the research was 13 articles, in which several models of considered dependencies are presented, and in the current self-presentation I also presented a global model that reflects the purpose of my work.

The results of the research described in the mentioned articles confirmed the relationship between the level of business competences, ethics, and job satisfaction, and the life of SI employees. They also indicated the diversity of relations due to the level of socio-economic development as well as the gender and age of employees.

The presented articles touch on the methodological aspects of these models, which could be considered models of human capital development among knowledge workers (Drucker, 1999; Elliman, Eatock, & Spencer, 2005) in information systems (SI), in the conditions of the economy in the transformation process, also in comparison to other groups of countries (Kowal, & Roztocki, 2013; Kowal, & Paliwoda-Pękosz, 2017).

The motivation to undertake research in the work described by me were gaps in the world literature on the relationship between the competences of IT specialists, ethics and job satisfaction and quality of life in transition economies in relation to other countries, also in the context of some sociodemographic phenomena, such as gender (Roztocki, & Weistroffer, 2008-2016). On the other hand, the motivation was the results of my previous research on the deficits on the Polish labor market of highly qualified engineering staff and the clear emigration of IT specialists to other economically advanced countries with a different organizational culture, which is a clear barrier in socio-economic development (Kowal, Kwiatkowska, Patro, 2010, Kowal, 2011).

The current work contains the results of research, in which the novelty was also:



cultural adaptation and the use of new own research tools (questionnaires, computer software based on my theoretical concept).

In the mentioned papers I presented original (and co-authored) conceptual and empirical models regarding business, innovative, social and ethical competences, in relation to job satisfaction, among knowledge workers in information systems. The subject matter and results fill the research gap both in economic sciences, as well as in economic psychology and business psychology, in relation to the development of human capital and improvements in human capital management in IS.

A novelty was business research, innovative and social aspects of innovation (Kowal, Mäkiö, & Jasinska-Biliczak, 2017), human potentiality (Kowal, & Keplinger, 2015), and organizational ethics (Kowal, & Roztocki, 2015b) in the regional aspect, among small enterprises, with particular reference to micro enterprises in Poland, Germany (Kowal, Mäkiö, & Jasinska-Biliczak, 2017) and in India (Kowal, Mäkiö, & Gochhait, 2017).

I have put particular emphasis on models related to human capital development factors - such as incentive systems, taking into account job satisfaction, employees' quality of life, competences, in particular business (Kowal, & Roztocki, 2015a), innovation, communicative and ethical competences (Kowal, & Roztocki, 2015b), and the potentiality and sensitivity of employees (Kowal, & Keplinger, 2015), related to the ability to use management information systems (Kowal, Mäkiö, & Gochhait, 2017; Kowal, Keplinger, & Mäkiö, 2018).

A novelty in the methodological aspect was also the application in the considered fields of methods for the selection and verification of the representativeness of the trials, based on my own theoretical concept, using elements of passive experiments (Wawrzynek 1997; Taguchi, Wu 1979, Taguchi 1981), on the basis of which computer software was developed (Kowal, 2002, 2009).

**Table 1.** Scientific achievement is a series of 13 major publications

<b>1. Kowal, J., &amp; Roztocki, N. (2013).</b> Information and communication technology management for global competitiveness and economic growth in emerging economies. <i>The Electronic Journal of Information Systems in Developing Countries</i> , 57, 1–12.
<b>2. Kowal, J., &amp; Roztocki, N. (2015a).</b> Job satisfaction of IT professionals in Poland: does business competence matter? <i>Journal of Business Economics and Management</i> , Volume 16
<b>3. Kowal, J., &amp; Roztocki, N. (2015b).</b> Do organizational ethics improve IT job satisfaction in the Visegrád Group countries? Insights from Poland. <i>Journal of Global Information Technology Management</i> , Vol.18 (iss. 2 (2015)), 127–145.

**Table 1.** Scientific achievement is a series of 13 major publications

<p><b>4. Kowal, J., &amp; Roztocki, N. (2016).</b> Gender and Job Satisfaction of Information Technology Professionals in Poland. 2016 49th Hawaii International Conference on System Sciences (HICSS), 3625-3634.</p>
<p><b>5. Kowal, J., Keplinger, A. (2015).</b> Characteristics of human potentiality and organizational behavior among IT users in Poland : an exploratory study. <i>Ekonometria : zastosowania metod ilościowych.</i> - 2015, 3 (49), 98-114,</p>
<p><b>6. Kowal, J., Keplinger, A., &amp; Mäkiö, J. (2019).</b> Organizational citizenship behavior of IT professionals: Lessons from Poland and Germany. <i>Information Technology for Development</i>, 25(2), 227-249.</p>
<p><b>7. Kowal, J., Mäkiö, J., &amp; Jasinska-Biliczak, A. (2017).</b> Business competencies and innovation capability in cross-border small regional enterprises. <i>Proceedings - 2017 IEEE 15th International Conference on Industrial Informatics, INDIN 2017.</i></p>
<p><b>8. Kowal, J., Mäkiö, J., &amp; Gochhait, S. (2017).</b> Does Business Competency Affect Information System (IS) Knowledge Workers' Life Satisfaction? A Comparative Multicultural Study. <i>Journal of American Academic Research</i>, 5(4), 77-89.</p>
<p><b>9. Kowal, J., &amp; Paliwoda-Pękosz, G. (2017).</b> ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies, <i>Information Systems Management</i> 34 (4), 304-307.</p>
<p><b>10. Mäkiö-Mrusik, E., &amp; Mäkiö, J., &amp; Kowal, J. (2017).</b> Validation of task-centric holistic agile approach on teaching cyber physical systems engineering. (December 30, 2017). <i>GOSPODARKA RYNEK EDUKACJA = ECONOMY MARKET EDUCATION</i>, 18(4), 2017, 5-17.</p>
<p><b>11. Kowal, J. (2002).</b> Selected issues of verification of the representativeness of samples in socio-economic qualitative research. In: Kowal, J. (Eds.) <i>Selected issues of verifying the representativeness of samples in socio-economic qualitative research. Computer methods and software.</i> Wrocław: College of Management "Edukacja". <i>Scientific Journals</i>, 12 (2002).</p> <p>/ In Polish: Wybrane zagadnienia weryfikacji reprezentatywności prób w społecznoekonomicznych badaniach jakościowych. In: Kowal, J. (Eds.) <i>Wybrane zagadnienia weryfikacji reprezentatywności prób w społeczno-ekonomicznych badaniach jakościowych. Metody i oprogramowanie komputerowe.</i> Wrocław: Wyższa Szkoła Zarządzania „Edukacja”. <i>Zeszyty Naukowe</i>, 12(2002)</p>
<p><b>12. Kowal, J. (2009).</b> Wybrane teoretyczne i praktyczne aspekty metodologii badań jakościowych. IN: Dziechciarz, J. (red.) <i>Projektowanie, ocena i wykorzystanie danych rynkowych.</i> <i>Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu</i> 51(2009), 46-76.</p>
<p><b>13. Kowal, J. (2018).</b> How Can We Objectify a Study on Analytical Psychology? The Sense of Applying Statistical Methods in Qualitative Research. In: Kuzmicki, A. (Eds.), Błocian, I. (Eds.), <i>Contemporary Influences of C. G. Jung's Thought</i>, 318–352. Rodopi: Brill.</p>

## 1. INTRODUCTION

The subject of my scientific interests is broadly understood competences, organizational ethics, and job and life satisfaction of specialists using information systems (SI). The theoretical basis of my research were concepts of competence according to Woodruffe (1993), Bassellier, Benbasat, Reich (2001, 2004), related concepts of organizational ethics according to Greenberg (1987), Koh and Boo (2001), and organizational citizenship behavior according to such authors such as Konovsky and Organ (1996) and Williams and Anderson (1991). I am particularly interested in the issue of the impact of business competencies and organizational ethics on the job and life satisfaction of specialists and IT users, in relation to the level of socio-economic development, as well as some socio-demographic variables, such as the sex of employees. I am particularly interested in these phenomena in countries undergoing the process of economic and political transformation (emerging or transition economies) in comparison to developed economies, both in the economic and psycho-social context, and thus not only with global and organizational perspectives but also from the perspective of the quality of life of employees - specialists or IT or IS users. In other words, I have been looking for answers to questions for years:

Q1) Is the self-assessment of the level of business competences of IT specialists related to the level of their job and life satisfaction?

Q2) Does the assessment of organizational ethics correlate and have an impact on the level of job satisfaction and life?

Q3) Do men and women similarly assess their level of competence, organizational ethics, and are they satisfied with work and life to a similar degree?

Q4) Does the assessment of the level of own competences, organizational ethics, job satisfaction, and life may differ depending on the socio-economic level of the country?

These questions formed the basis of my theoretical analysis and research, the results of which I presented in a series of 12 publications, which filled the research gap on issues of business and innovation competencies, organizational ethics and their impact on life satisfaction of IT professionals in countries of economic transformation in relation to countries economically developed.

The statistical approach to these relations and methodology of research is of particular importance in my research, including the possibility of conducting representative qualitative

and quantitative research on small and large samples, using the theory of optimal experiments, according to the concepts of Taguchi (1979, 1981), Wu (1980), and Wawrzynek (1977, 1973).

The results of my own research, I precede a short theoretical introduction to the issues mentioned above and in relation to the results of previous research, pointing to the importance of self-assessment of business competencies and ethics for job satisfaction and life, especially knowledge workers in the context of socio-economic development.

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## **2. THE THEORETICAL BASIS, IMPORTANCE OF THE PROJECT THE CURRENT STATE OF KNOWLEDGE**

The current research relates to economic models in information systems management and IT professionals who work with information technology (IT) as an essential part of their work. This group will include IT experts in computer software and hardware industries, data transmission and storage companies, and other telecom workers. Because of the current knowledge-based society, the demand for the IT experts will grow as further development of services take place, including teleworking and biotechnology industries (one of the EU objectives) (Kowal, & Roztocki, 2015a, 2015b). As a result, a shortage of software engineers and technical staff in industry and construction is expected. This shortage of IT specialists may also trigger the need for retraining, high mobility, flexible working hours, and telework combined with lifelong learning (Kowal 2011). Therefore, understanding the job satisfaction of IT professionals and their perceived quality of life is important for organizations and economies (Kowal, & Roztocki, 2015a, 2015b).

In both global and Polish literature, general competencies in the field of "soft" and "hard" competencies, as well as personal and social skills as well as managerial skills, were presented (Kowal, Kwiatkowska, Patro, 2010; Kowal, Kwiatkowska, Kowal, 2011). Professional competences and qualifications are usually understood as intrapersonal traits of an employee, his dispositions (psychological characteristics and knowledge), and revealed behaviors in maintaining skills) (Kowal 2011). Bassellier and Benbasat (2004) and Kowal (2007, 2011), Kowal and Roztocki (2012, 2013) conducted research on the assessment of business competencies in information systems referring to specific organizational, interpersonal, and communication skills as well as leadership skills in management.

It was taken into consideration in studies mentioned above that the organization requires specific knowledge and experience related to the organization as a whole, its objectives, basic

capabilities, customers, and competitors. Significant was also the self- understanding of the function of individual organizational units and their role in achieving the goals of the organization, the responsibility of IT in the organization of business processes, and their results. There was also analyzed the individual evaluation of the ability to use information technology to solve various problems of the organization (Bassellier, & Benbasat 2004, Kowal, & Roztocki 2012).

In previous studies in information systems, such aspects of organizational ethics and ethical dimensions of optimism, social responsibility, and scale of ethical action of top management were taken into consideration (Koh, & Boo 2001, Kowal, & Roztocki 2013b). The ethical dimension of optimism shows if in the opinion of the staff the organization allows achieving professional success through ethical employees. According to the idea of corporate social responsibility, it is expected that organizations undertake activities related to charity, environmental protection, and fair trade (Wood 1991, Peloza, & Shang 2011). The top management ethical action scale refers to the reduction of unethical behavior and generates a climate of trust to the company (Kowal, & Roztocki 2013b).

Organizational ethics is derived from the theory of organizational justice, dealing with the attitudes and behaviors of employees in the organization (Greenberg, 1987). According to the basic assumption of this theory - the perception of justice affects employees' attitudes and organizations that promote ethical behavior, the overall level of job satisfaction will be higher than in organizations where employees must often act contrary to their ethical values (Koh, & Boo 2001, Szostek 2002). Conducted earlier in the management information systems (MIS) studies have confirmed a model that a positive ethical climate in the company influences on job satisfaction. In organizations that allow employees to ethical professional success - the level of job satisfaction is high (Vitell, & Davis 1990b, Kowal, & Roztocki 2013a, 2013b).

Research on job satisfaction conducted among others Spector (1985), who defined it as an emotional-affective reaction of employees in the workplace. The importance of job satisfaction as an important dimension of the organization, explaining the motivation of employees, their productivity, absenteeism, and turnover was emphasized by Koh and Boo

(2001). The results of many studies indicate that a good motivation for staff has a positive effect on labor productivity in the company. On job satisfaction may consist of many aspects, among others the level of pay, job security, the possibility of independent decisionmaking method and the chances of promotion, good relationships with co-workers - with colleagues

and superiors, as well as satisfaction with the work itself (Vitell, & Davis 1990, Lange 2008, Kowal, & Roztocki 2012, 2013a, 2013b). Research shows that job satisfaction is related to the material side of life and can affect the general sense of the quality of life of employees (Anke, Fugl-Meyer, 2003). However, social and demographic characteristics, such as gender or age, may also affect job satisfaction.

In the current study, I define gender (Oxford Dictionary, 2016) as a state of being a man or woman, in relation to social and cultural differences, not biological ones. In this sense, the definition of gender refers to behavioral, cultural, or psychological characteristics, because society creates gender stereotypes and cultural patterns of behavior that can also affect the quality of life (Bem, 1981).

There are many definitions and shots of "quality of life", whose purpose is to answer the question, what is the basis for a satisfactory existence (Hofstede 1984, Ferrans and Powers, 1992, Heszen - Niedojek 1996, Stras - Romanowska 2005, Kowal 2007). Overall rating human experience is commonly expressed by the concept of quality of life (QL) taking into account a number of fields, including psychology, economics, medicine, environmental protection, technology and sociology. Quality of life (QL) is the interaction of human needs, and subjective perception of their fulfilment (Constanza et al. 2007).

Czapiński (2011) as indicators of the quality and style of life of individual respondents gives among others general well-being, satisfaction with various areas and aspects of life, subjective evaluation of the material standard of living, different types of stress in life, system of values, attitudes and social behavior, the situation on the market work, career and aspects of social exclusion. In our research, we decided to use the psychosocial approach, according to which in the literature "the quality of life" is most often equated with life satisfaction, psychological wellbeing, perceived satisfaction, a sense of happiness, joy drawn from life (Frąckowiak 2012).

I assumed that the sense of the quality of human life may depend on the fulfillment of the needs in four areas of life: psycho-physical, psycho-social, the personal, and metaphysical (Straś - Romanowska et al., 2004, Frąckowiak 2012). Now I will briefly present particular issues, taken up in subsequent articles of the presented work, as well as their more detailed characteristics. These aspects measures the life satisfaction questionnaire of Anke and Fugl-Meyer (2003)..

### 3. METHODOLOGY OF RESEARCH

On the basis on the review of the issues described in the literature and results of my previous studies, I as the co-author of published papers believe that it is likely that the three constructs (organizational ethics including organizational citizenship behavior, possessing business competencies and job satisfaction) will have substantial effects on the perceived quality of life of IT professionals in countries representing different types of economies as transition economy (Poland), developed economy (Germany), and emerging economy (India). The proposed research model is depicted in the following Figure 1.

In summary, the objective of our research project is to test seven hypotheses under the Polish, and Indian labor markets and economies, which are de facto in the transformation process (Kowal, Roztocki 2012, 2013b), while German economy is considered as developed economy.

On the basis of the critical analysis of the scientific literature of the subject and previous own research, research hypotheses were formulated in relation to the aforementioned questions:

*GH1: Organizational ethics has an impact on the quality of life of IT professionals*

*GH2: Organizational ethics has an impact on job satisfaction of IT professionals*

*GH3: The perceived level of business competency has an impact on job satisfaction of IT professionals*

*GH4: The perceived level of business competency has an impact on the quality of life of IT professionals*

*GH5: The level of job satisfaction has an impact on the quality of life of IT professionals*

*GH6: The type of economy representing the level of socio-economic development has an impact on the professional aspects as organizational ethics and business competencies, job satisfaction, as well as on the quality of life of IT professionals*

*GH7: Gender of IT professionals has an impact on the professional aspects as organizational ethics and business competencies, job satisfaction, as well as on the quality of life of IT professionals*

Research in the whole work was carried out using qualitative and quantitative methods, depending on the assumptions of the given stage. Qualitative research included a critical review and analysis of literature, in-depth individual interviews and focus groups, qualitative analysis of results. Quantitative research was based on surveys or on created databases on the basis of

secondary sources and included methods of statistical description and mathematical induction methods, eg point estimation, analysis of confidence intervals or statistical tests. The multivariable methods were dominated by regression models, analysis of structural models, confirmatory factor analysis and other necessary for the purpose of the study (Bartosiewicz, Dziechciarz, 2986, Kowal, 1998). The applied research methods are described in more detail in individual articles.

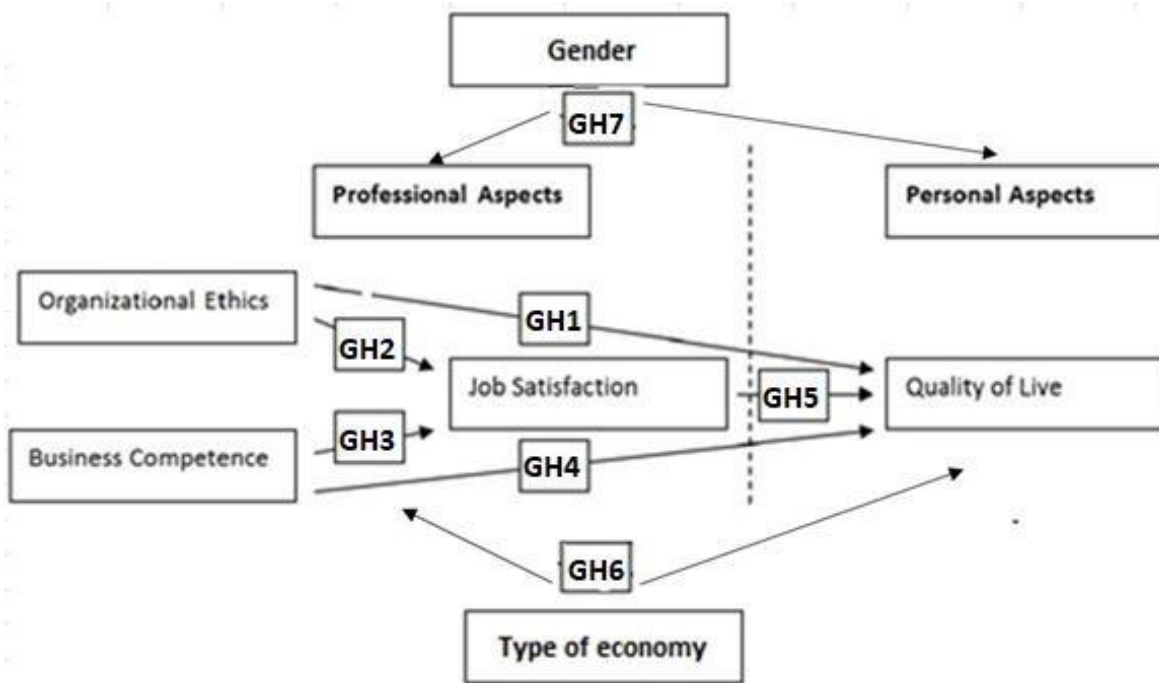


Figure 1. Research framework and hypotheses

## 4. RESEARCH RESULTS

### 4.1. Exploratory study of the diversity of the socio-economic level of countries and its impact on the level of competence and quality of life (GH4, GH6)

Analyzing the results of research on the relationship between the level of services in the field of communication and information technologies and the level of socioeconomic development among economically developed countries (Kuraś, 2006; Roztocki, Weistroffer, 2011, 2013), I observed the lack of similar analyzes in the transition economies, as well as on an individual level. In particular, I observed the lack of studies and models related to the relationship between competencies, both hard and soft, and job satisfaction and the quality of life of knowledge workers in IS in relation to an enterprise productivity and socio-economic development in the



so-called transition countries (Roztocki, Weistroffer, 2008, 2015). There were also no comparisons in the abovementioned areas with developed economies, such as Germany, or countries representing the emerging markets like India.

I decided to find answers to the questions, based on the exploratory analysis of world and Polish databases:

- Whether such relationships can occur? and
- Whether there are differences in this regard in different types of countries?

The results of research on these questions are presented in the article:

[1] *Kowal, J., & Roztocki, N. (2013c). Information and communication technology management for global competitiveness and economic growth in emerging economies. The Electronic Journal of Information Systems in Developing Countries, 57, 1–12.*

The aim of this article was, on the one hand, exploratory analysis, diagnosis, and discussion of differences between four types of countries, based on our original taxonomic classification, based on the k-means method (Xumin, & Yong, 2010), and on my original taxonomic method based on nonparametric tests (Kowal, 2009, 2018), based on global databases, such as EUROSTAT, OECD, UNDP, or WIPO (Kowal, & Roztocki, 2013c).

On the other hand, the article was based on our critical analysis of literature in the latest trends, which resulted in the selection of five articles pointing to the latest trends in the use of ICT in socio-economic development. In the articles, we pointed out the innovative approaches that fill the gap in the world's scientific literature, economies in the transformation process.

*The strong point* of the article and our innovative contribution was the development of a proprietary global database, based on global results provided by individual countries for reports of organizations such as EUROSTAT, OECD, and UNDP. Based on the created database, we grouped countries on the basis of multidimensional comparisons, using as indicators such variables, as the level of socio-economic development, the average time of education, the average number of working hours a year, self-employment rate, innovation rate, national income per head capita.

Taking into account the theoretical basis of socio-economic development of countries around the world (Roztocki, & Weistroffer, 2008, 2015), based on (Kowal, 2011), taxonomic k-means and my own method based on ranking objects, chi-square test and S Friedman test (Kowal, 2009) we distinguished four groups of significantly different economies: developed, transitions

(in the process of transformation), emerging and developing economies. In addition to the classification, the aim was to examine the possibility of forecasting the level of socio-economic development based on the indicators of computer ownership in households, access to the Internet, education, and duration of education. In addition, the intention of the analysis was to demonstrate the need, and even the necessity of lifelong learning, as well as the continuous development of competencies related to the ability to use information technologies.

The results of our research have confirmed the fact that high living standards in the countries positively correlate with competencies related to the use of computers and the Internet, the level and length of education of the population, as well as the ability to innovate. It was a surprise that despite a comparable level of education with developed countries, transition economies such as Poland, Slovakia, the Czech Republic, and Hungary generate lower national income per capita. Our conclusions indicated that in the analyzed period, as a result of political and economic changes, the transition economy became complementary and dependent on developed economies, which resulted in, among others, low supply of attractive job offers for people with a high level of competences, including university graduates who emigrated to highly developed countries due to the lack of proper work or job satisfaction (Kowal, Kwiatkowska and Patro 2010).

The conclusions from our research and analyses indicated that the difference in the overall productivity can also be explained by insufficient training in workplaces, because many middle-level managers did not see or did not understand the need for continuing education by employees (Kowal 2011), and thus saw no need for innovative potentiality employees as a driver of global competitiveness.

My co-authoring contribution was also the review of specific phenomena, implying the necessity to develop competences related to the implementation of ICT, characteristics of the so-called transition countries, developing countries and the so-called "emerging economies". We chose also five articles that were published in a special edition of the journal that touched upon these problems *The Electronic Journal of Information Systems in Developing Countries*, 57.

In the review part of our article, which is the result of our critical literature analysis and introduction to these issues, we put emphasis on psycho-social aspects in the implementation of modern communication technologies, in particular on problems related to workers resistance

when innovating, with lack of support at the highest management level , with the instability of human capital (Soja, Paliwoda Pękosz, 2013).

Our review and critical quality analysis of the literature show that in emerging economies, such as China, many users innovate without taking further steps to take full profit of their advantages (Jie, Seedorf, & Lowry, 2013). This means that most information technologies show an "assimilation gap", that is, their widespread use has a tendency to delay in relation to their introduction. The problems result from the maladjustment of employees who are characterized by a too low level of skills and know-how knowledge in the field of change management (Jie, Seedorf, & Lowry, 2013).

The results of our research have shown that in China, as in many emerging economies, e-government services were still at an early stage in comparison to developed, mature economies. The most important conclusions were that to reduce this gap, e-government services must provide more opportunities for interaction between citizens and state agencies, better to meet the needs of society (Tan, Xiaoai, Qiushi, & Chen, 2013).

We were thinking about guidelines, indications for educators, school teachers, and curriculum creators, and how to use, for example, computer games in teaching for the increase of the so-called key competencies in developing countries. Our review shows that in emerging economies, such as, for example, Bahrain, concepts and learning objectives were better understood when manual games rather than computer games were introduced first. Computer versions of didactic games were not an important substitute for the manual version and even led to worse results in science (Ali, & Al Hinai 2013). This is in some way contradictory with the results promoted by highly developed countries in which general positive responses of students to role-playing simulations were recorded (DeNeve, & Heppner 1997).

On the other hand, we emphasized the necessity and the possibility of improving the quality of life through health care in the so-called "Emerging economies", such as China, through new information and communication technologies, process reengineering and pharmaceutical supply chain security monitoring systems, to reduce the risk of drug counterfeiting (Sultanow, & Brockmann, 2013).

*Contribution of the results.* The five articles selected by us were the source of many later described research related to the management of ICT in emerging economies and in the transformation process, enabled simultaneous understanding of, among others, unique

economic, legal and psychosocial aspects both in emerging economies and in the transformation process.

The strong point of the article was also the support of research on global databases, as well as an indication of the specificity of the so-called transition countries characterized by high competences of employees and, nevertheless, low level of generated national income per capita.

The concept of the article, the results of qualitative and quantitative research partially confirmed the hypotheses H4 and H6, that the type of economy and the level of socio-economic development affects occupational aspects, such as IT competencies, as well as the quality of life of residents, including IT specialists.

*Limitations of research.* Some limitation of the article was the selection limit of chattering trends of articles only to five, which, however, resulted from the requirements of the publishing house.

Our comparative research, and the qualitative analysis of the selected articles implicate the extraordinary role of IT professionals. The conclusions from the mentioned articles, as well as from the entire special issue, prompted me to look for business competences of IT professionals, but also for ethical support of the organization, thanks to which they could achieve professional success and job satisfaction, and their professional activities could help their organization in achieving greater productivity, which in turn favor the socio-economic development of the country.

#### **4.2. Research on the impact of business competences on job satisfaction of IT professionals (GH3)**

Hence the next article [2] was created :

[2] Kowal, J., & Roztocki, N. (2015a). *Job satisfaction of IT professionals in Poland: does business competence matter? Journal of Business Economics and Management, Volume 16 (Issue 5), 995–1012.*

The purpose of this article was to build the model of the dependency of business competencies and job satisfaction of IT professionals in Poland. We based our research on the theoretical concept of business competencies from Bassellier, Horner, Reich, and Benbasat (2001) and on the concept of work satisfaction from Spector (1985) and Vitell and Davis (1990).

For the purpose of the study, we identified a dependent variable - job satisfaction (co-author's adaptation of the Vitell and Davis questionnaire, 1990), and an independent variable - business competencies (co-authored the questionnaire of Bassellier and Benbasat, 2004). We decided to adopt these research tools, because they were previously used and recognized in other cultural conditions, in countries with a different level of socioeconomic development, and this fact allowed for better comparisons to Polish cultural and organizational conditions.

The dependent variable (job satisfaction) contained five subscales: satisfaction with remuneration, with professional promotion, with colleagues, with superiors, on with the job itself.

Independent variable - business competence, was characterized by dimensions such as:

- competence in business knowledge about the organization (review knowledge about the organization, its departments, organizational responsibility, IT business integration)
- interpersonal and managerial knowledge (knowledge networks, interpersonal communication, leadership).

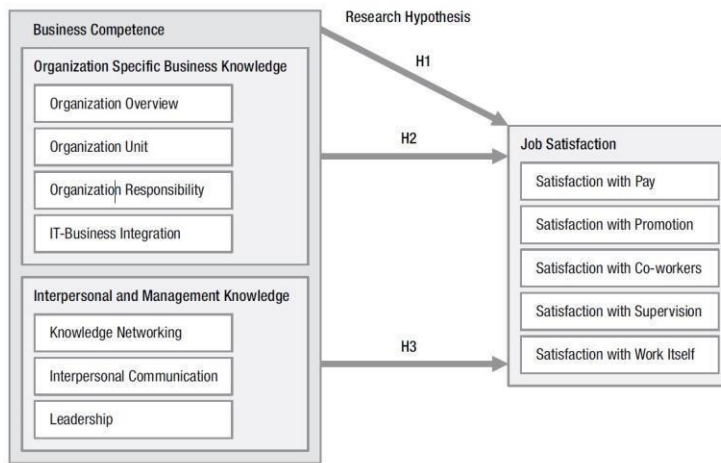
Our research model is shown in Figure 2.

To achieve the goal, we have set the following research hypotheses, which have been verified in the course of the research proceedings:

*H1: The business competences of IT professionals have a significant impact on their job satisfaction.*

*H2: Organization-specific business knowledge of IT professionals has a significant impact on their job satisfaction.*

*H3: Competence in interpersonal and managerial knowledge of IT professionals has a significant impact on their job satisfaction.*



**Figure 2** Research framework and hypotheses

Empirical data was obtained on the basis of a survey conducted among 391 random IT professionals working in various companies in Poland.

The results of the research confirmed the truth of the three formulated hypotheses. The results of the analysis indicate that overall business competences positively affect the job satisfaction of IT professionals in Poland - a country in the process of transformation, from a centrally planned economy to a market economy.

We have noticed, however, that business competencies have a varied impact on particular aspects of job satisfaction. Although business competencies affect the satisfaction of working with employees, supervising and working alone, the surveyed IT specialists believe that business competencies have no significant impact on their level of remuneration and professional promotion.

The theoretical implications of this study indicate that the systematic development of human capital through building business competencies can have a positive impact on the job satisfaction of IT professionals in transition countries. The research results also have practical implications for managers in transition economies, as they can help to develop a remuneration and promotion system that better reflects the competence of employees. So the global hypothesis **GH3** of the fool work seems to be partially confirmed.

*Contribution of the results.* The results of the analysis have filled the gap in research on the relationship between business competences and job satisfaction among IT professionals, in Poland, in the country representing the transition economy. The strong point of the article were theoretical and methodological assumptions. The research is based on a broad review of world literature, as well as on a large random sample of IT professionals from Poland. We used two

new research tools on the Polish labor market in the form of a business competency questionnaire and a job satisfaction questionnaire, our proprietary adaptation to Polish cultural and organizational conditions. Our research presented in this article inspired other researchers.

*Limitations of research.* First of all, we conducted the survey only in one country, in Poland. Conducting research in several similar countries would allow comparison and generalization of conclusions in relation to other countries undergoing a transformation. Secondly, the business competency questionnaire is a subjective self-evaluation. The test, which would allow assessing the business competencies of other employees, and not only themselves, would give a more realistic picture. Thirdly, in our analysis, we abstracted from the demographic diversity of participants, such as gender and age. This type of analysis could yield additional interesting results.

#### **4.3. Analyzing dependencies and constructing a model regarding the impact of organizational ethics on job satisfaction of IT professionals (GH2).**

The results of the previous article [2], in particular fairly low levels of satisfaction with wages and relations with colleagues, as well as analysis of the growing emigration of highly qualified IT professionals to economically developed countries, inspired us to conduct research on the level of organizational ethics in Polish enterprises. Based on the analysis of the literature and the situation in Polish enterprises, we assumed that the lack of satisfaction with remuneration or cooperation with colleagues may result from the unsatisfactory level of organizational ethics, including ethical optimism, the scale of corporate social responsibility or the scale of managers' attitudes. The adopted assumption became the basis for the next research, which was described in the article [3]:

[3] *Kowal, J., & Roztocki, N. (2015b). Do organizational ethics improve IT job satisfaction in the Visegrád Group countries? Insights from Poland. Journal of Global Information Technology Management, Vol.18 (iss. 2 (2015)), 127–145.*

The purpose of this article was to examine the impact of organizational ethics on the professional satisfaction of people professionally involved in information technology in Poland, representing the transition economy from the Visegrad Group.

The basis of the research was the theoretical concepts of organizational ethics according to Vitell and Davis (1990b), and job satisfaction according to Spector (1985).

We analyzed three dimensions of organizational ethics - ethical optimism, corporate social responsibility, and top management action scale

To measure independent variables related to organizational ethics and its three dimensions, we adapted the questionnaire used in a similar study by Vitell and Davis (1990b). We also measured the dependent variable in the form of job satisfaction using the adopted job satisfaction questionnaire according to Vitell and Davis (1990b). We formulated two questions:

1. Can the level of organizational ethics lead to job satisfaction among IT professionals in the Visegrad Group countries?
2. What are the most and least important dimensions of organizational ethics leading to an increase in the level of job satisfaction among people working in the Visegrad Group countries?

We put the following hypotheses to the questions posed and developed the research scheme presented in Figure 3.

- *Null hypothesis H01: The ethical optimism of IT professionals does not have a significant impact on job satisfaction.*

- *Alternative hypothesis HA1: The ethical optimism of IT professionals has a significant impact on job satisfaction.*

- *Null hypothesis H02: Corporate social responsibility has no significant impact on the professional satisfaction of IT specialists.*
- *Alternative hypotheses HA2: Corporate social responsibility has a significant impact on job satisfaction of IT professionals.*
- *Null hypothesis H03: Activities at the highest management level do not have a significant impact on the professional satisfaction of IT professionals.*

- *Alternative HA3 hypotheses: The most important management activities have a significant impact on job satisfaction of IT professionals.*

The data was obtained on the basis of an online survey conducted among 391 randomly selected respondents - IT professionals from various regions of Poland.

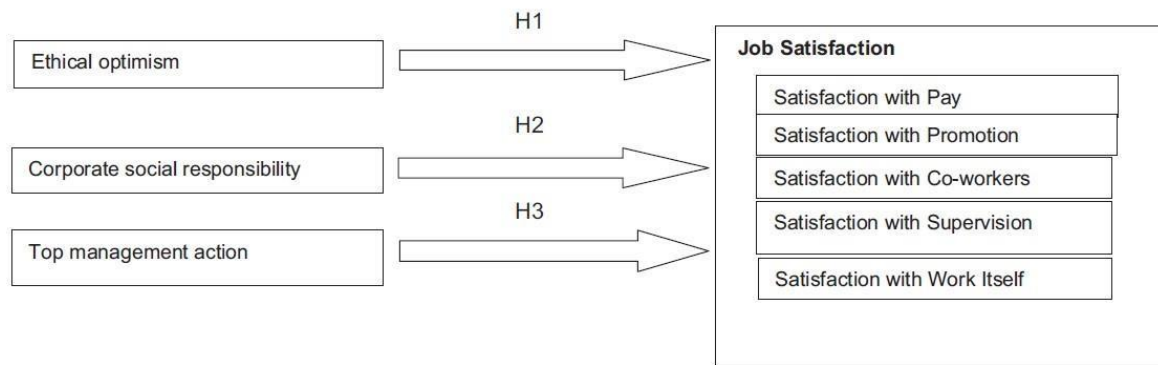
Verification of hypotheses led to the adoption of alternative hypotheses because the analysis of regression coefficients and partial correlation coefficients indicated that all three dimensions of organizational ethics, ethical optimism, corporate social responsibility, and top management influence the professional satisfaction of professionals in the field of information technology:



*HA1. Corporate social responsibility has a significant impact on job satisfaction of IT professionals.*

*HA2: Corporate social responsibility has a significant impact on job satisfaction of IT professionals.*

*HA3: The most important management activities have a significant impact on job satisfaction of IT professionals.*



**Figure 3.** Research framework and hypotheses

We have observed the highest level of job satisfaction in organizations where top management promotes and enforces high ethical standards.

We believe that the application of the proposed ethical standards and treating them as professional competences will help to create an incentive system for professionals in the field of information technology. Such an incentive system may lead to improved work efficiency and the quality of IT systems in the Visegrad Group.

Thus, this article confirmed the **GH2** hypothesis of the whole work: organizational ethics have an impact on the satisfaction of the work of IT specialists

*Contribution of the results.* This study makes an important contribution to the existing knowledge related to economics, and management psychology in transition economies, in the years 2015-2019 this study was indicated in the scientific literature as source material 36 times. This was one of the first studies to study ethics, job satisfaction and the relationship between them in the transition economy. We observed that over half of the IT professionals surveyed in Poland were dissatisfied with the perspective of pay and promotion, which contributes to emigration to neighboring developed countries. In comparison to developed economies, the ethical optimism of IT employees seems low and they are less optimistic about corporate social responsibility. We have also observed relationships between different dimensions of

organizational ethics and job satisfaction. The study described as a contribution to the practice of management in transition economies, which are a less researched topic in world literature (Roztocki and Weistroffer, 2008, 2015). Our research shows that top management can improve job satisfaction for IT professionals by actively supporting high ethical standards. In addition, top managers should clearly inform employees about the importance of business ethics and why ethical behavior can in the long run benefit the company and its stakeholders.

*Limitations of research.* Our research had some limitations. First of all, IT specialists were only tested in Poland. Some arrangements may possibly be generalized to other similar economies of the Visegrad Group countries, such as the Czech Republic, Hungary and Slovakia. However, the results may be less useful for transition economies that are not part of the European Union, such as Russia and Ukraine. To validate the results, similar studies could be carried out in other countries undergoing transformation. Secondly, the data was collected from February 2012 to February 2013. It is quite possible that satisfaction with the work of IT professionals changes over time, for example as economic conditions improve or worsen. This issue could be examined as part of longitudinal studies that can last several years. Thirdly, the current analysis does not take into account other control variables, such as gender, age or type of company. These issues are included in some of the next studies, including the article described below.

#### **4.4. Model of the level of job satisfaction in relation to the variable gender (GH7)**

The article [4] concerns the diversity of levels of job satisfaction in relation to the demographic and psychological variable, such as gender.

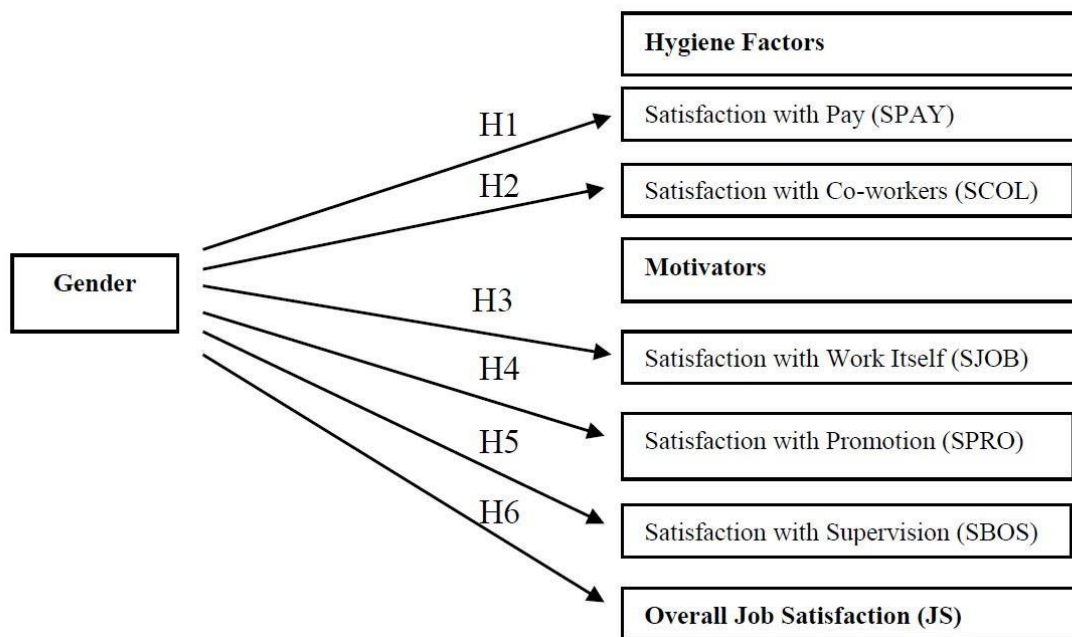
[4] *Kowal, J., & Roztocki, N. (2016). Gender and Job Satisfaction of Information Technology Professionals in Poland. 2016 49th Hawaii International Conference on System Sciences (HICSS), 3625-3634.*

The purpose of the presented article was to examine the diversity of job satisfaction by gender among people professionally involved in information technology in Poland, representing the transition economy. The data was obtained randomly using an online survey involving 391 information technology professionals working in various regions of Poland. We examined, in relation to gender several dimensions of job satisfaction: satisfaction from salary, promotion, cooperation with colleagues, from overseers, and from the job itself.

We formulated six research hypotheses.

- *H1: Gender of IT professionals influences their satisfaction with remuneration.*
- *H2: Gender of IT professionals influences their satisfaction with cooperation with colleagues.*
- *H3: Gender of IT professionals influences their satisfaction with the work itself.*
- *H4: Gender of IT professionals influences their satisfaction with promotion.*
- *H5: Gender of IT professionals influences their satisfaction with supervision.* The general and summary hypothesis was:
- *H6: Gender of IT professionals has an impact on job satisfaction.*

Our research model is presented in the following Figure 4.



**Figure 4.** Research framework and hypotheses

Based on the theory of Herzberg (1965), Spector (1985) and Gazzawi (2010) aspects of job satisfaction were grouped into two main dimensions:

1. Hygiene factors, including satisfaction with remuneration and satisfaction with working with colleagues
2. Motivators, including satisfaction from the job, from the job and from the superiors.

Also in these studies for individual job satisfaction dimensions, we used our own adaptation of the job satisfaction questionnaire according to Vitella and Davis (1990).

The results confirmed the main hypothesis that gender differentiates job satisfaction, but not all of its dimensions. Three confirmed hypotheses indicated that women who work as IT specialists in Poland are less satisfied than their colleagues - men from their remuneration and promotion opportunities. However, they have greater satisfaction than men from working with colleagues. Based on these findings, several promising research options have been discussed.

Thus, the study presented in the article [4] partially confirms the **GH7** hypothesis of the global work.

*Contribution of the results.* The study presented in this article is an important contribution to the existing system of information systems research, including psychological aspects. This was probably the first study described until 2016 in the world literature (Web of Science, SCOPUS), which examined the gender difference in relation to the professional satisfaction of IT professionals in the transition countries. In addition, the results showed that women in the profession of IT specialists in Poland are much less satisfied with salary and promotional opportunities. This differs from most applications from developed economies. Most studies have shown that gender does not play a role in job satisfaction among IT professionals (Gazzavi, 2010; Sumner, & Niederman, 2003). The article was also an inspiration for other researchers who used it as source material (8 citations in scientific world literature).

*Limitation of the research.* In our project, we did not study in detail the reasons for dissatisfaction with work among female IT professionals in the transition countries, which, however, can be checked in the future on the basis of in-depth interviews. We have also not analyzed how to improve job satisfaction. We assumed that future research in this direction could help to fill the existing research gap between developed and transforming economies (Kowal, & Roztocki, 2013)

#### **4.5. Correlation model: human potential and civic organizational behavior in Poland as a transition economy (GH2, GH7)**

The idea of improving job satisfaction was related to the interests of organizational ethics, which is in fact the result of civic organizational behavior. That is why another article was created

[5] **Kowal, J., Keplinger, A. (2015).** *Characteristics of human potentiality and organizational behavior among IT users in Poland : an exploratory study. Ekonometria: zastosowania metod ilościowych. - 2015, 3 (49), 98-114.*

The idea of improving job satisfaction was related to the interests of organizational ethics, which is, in fact, the result of civic organizational behavior. That is why another article was created. The article concerns the model of ethical aspects of competences in the context of the development of human capital in information systems (IS), in the economy in the transformation process, on the Polish labor market. The aim of the study was to verify the model of the relationship between human potential (HP) and organizational citizenship behaviors (OCB) among 263 Polish IT users in relation to their professional position, expressed through their job position. We assumed that the application and popularization of the ideas of HP and OCB could have an impact on the development of ethical attitudes in the labor market and on the level of commitment and efficiency of performing tasks and professional roles, which in turn strengthens the real chances of economic growth.

We have developed two new adaptations of questionnaires in Polish research: the Human Potentiality Inventory (HPI) in achieving professional goals and the adaptation of the Employee Behavior Questionnaire (EBQ).

*H1. The professional position (supervisor or subordinate) of IT users has a significant impact on civil organizational behavior (OCB) and its dimensions.*

*H2. The professional position (supervisor or subordinate) of IT users has a significant impact on the organizational dimension of citizenship behavior (OCB-O).*

*H2.1. The professional position (supervisor or subordinate) of IT users has a significant impact on the individual dimension of citizenship behaviour individually oriented (OCB-I).*

*H2.2. Employee's potential (HP) has a significant impact on the organizational dimension of citizenship behaviour organizationally oriented (OCB-O) in relation to the professional position (supervisor or subordinate) of IT users.*

The research scheme based on the theory and practice of structural modeling is presented below (Sagan, 2002).

In the analysis, we examined the HP level and the level of OCB manifestations in relation to the professional position of IT users. In the case of HP, we observed that IT users in Poland present a fairly high level of HP, and the variability of the evaluation was rather moderately



The influence of the position on citizenship behaviour in the individual aspect indicated similar tendencies of low, rather negative assessments. The bosses judged their subordinates significantly worse than those of their last bosses. The hypothesis 2.2 has been confirmed, as well as the global hypotheses (**GH2, GH7**) were confirmed too.

The impact of employee potential on citizenship behavior was examined by correlation analysis and modeling of structural equations. Based on the analysis of the data, we have shown that there is a fairly strong influence of professional position on HP and OCB, and partly the impact of HP on OCB. Analysis of the structural model confirmed the relationship between occupational position, OCB (and its all dimensions) and the potentiality of employees (through holism and harmony HH), as well as only three relationships between HP and OCB. Holism and harmony (HH) correlated positively, but rather poorly with the perception of subordinates' OCB by their superiors. Thus, subordinates with a higher HH level were more likely to perceive positive OCB in their superiors.

Among superiors, no such trends were observed. Generally, H1-H3 hypotheses have been confirmed.

*Contribution of the results.* In our article, we wanted to examine how these phenomena are shaped in Poland, a country in the process of economic transformation. We have proved that there are dependencies between professional position, employee potentiality (HP) and organizational civic behaviors (OCB). We have also adapted two research tools.

The results of our research supplemented the gap in the world scientific literature regarding the psychosocial features of IT users, as well as the potential of the individual in achieving professional goals and ethical attitudes. The obtained results indicate significant differences between superiors and subordinates as well as interesting relationships between HP and OCB components. For the first time in such a context in Poland, the analysis was carried out on the basis of data obtained by network interpersonal and sequential network draws, using the methods of designing the optimal passive experiment carried out among IT users.

Application and popularization of the OCB and HP ideas can support the development of users and employees, increase information systems because positive ethical attitudes and behavior increase engagement, productivity and lead to economic growth (Kowal and Roztock, 2015a, 2015b, Keplinger et al. 2014a, 2014b). The beneficiaries of our research may be other researchers, teachers and educators, politicians, by introducing legal and social regulations that

may increase the competitiveness of the labor market (Kowal and Roztocki, 2015a, 2015b). Thus, this study partially confirmed the hypotheses **GH2** and **GH7** of the whole work.

*Limitations of research.* Our research was conducted only in Poland, variables such as gender, age and economic sector were not analyzed. They have become an inspiration for further research.

#### **4.6. Research on similarities and differences in ethical competences, especially organizational civil behaviors (OCB) among IT professionals, in two different types of economies in relation to the gender phenomenon (GH2, GH6, GH7)**

As a result of previous research, an article was created:

[6] *Kowal, J., Keplinger, A., & Mäkiö, J. (2018). Organizational citizenship behavior of IT professionals: Lessons from Poland and Germany. Information Technology for Development, 1-23.*

The aim of the article was to examine the similarities and differences in ethical competences, especially in organizational civil behavior (OCB) among IT professionals, in two different types of economies in relation to the phenomenon of gender. The research was carried out in Poland (economy of transition, in the transformation process) and in Germany (in the developed economy). We assumed that the differences in OCB between the IT professional representing different types of countries are specific in relation to the levels of socio-economic development (Kincheloe, 1999).

New research studies have systematically explored the role of gender in the profession of IT professionals, however, little is known about the diversity of OCB due to the phenomenon of gender among specialists working in transition economies, compared to developed economies (Keplinger, Kowal, & Makio, 2016; Kowal & Roztocki, 2015; Roztocki & Weistroffer, 2016). We assumed that a deeper understanding of these aspects could allow for better economic and socio-cultural cooperation between countries.

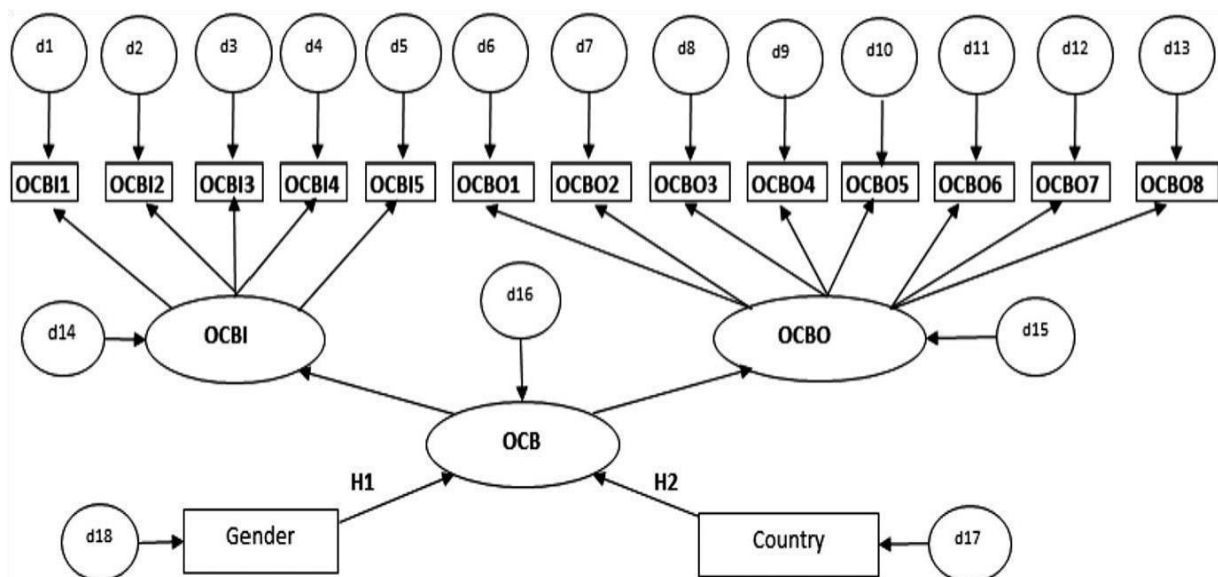
That is why we have formulated a general question: 'What are the dependencies between phenomena related to gender, the country of work and OCB between IT professionals?'. Specific two questions were:



*Q1. Does the gender of IT professionals have a significant impact on how OCB is assessed in others? Q2. Are there significant differences between the OCB between German and Polish IT specialists?*

The research scheme is presented below in Figure 6. A dependent variable - OCB, including its two dimensions, was measured using the author's adaptation of the OCB questionnaire, based on some dimensions of the organizational behavior questionnaire according to Organ (1997); Keplinger, Kowal, and Makio, (2016).

We conducted our research with the use of an online survey, among 282 IT specialists in Poland and 80 in Germany, which were selected using the random method in combination with the snowball sampling method (Kowal, 2002). We based our research scheme on the modeling of structural equations (SEM) (Anderson and Gerbing, 1988, Moore and Benbasat, 1991) and on the analysis of variance.



**Figure 6.** Research framework – conceptual model and hypotheses. Where: OCB11, ... OCB15, OCBO1, ..., OCBO8, Gender, Country – observed measurable variables; OCB, OCBI, OCBO, - latent variables; d1, ..., d18 - residuals.

The analysis of results in the Polish group indicated that subordinate women rated their superiors better than men, both on the global OCB scale and in individual OCBI and OCBO dimensions. Women-subordinates rated their superiors more positively when they fulfilled more duties than they were obliged to do. They also expressed greater gratitude to the

supervisor or subordinates for suggestions on possible ways to improve the company's operations.

Men-subordinates more often stated that their supervisor usually looks for reasons for failure in the company's activities. In turn men - superiors more than women noticed and valued subordinates helping other employees, even if it was not their responsibility. Men - superiors more often than women perceive and appreciate the respect shown by subordinates for the rights and privileges of other employees, not creating problems for others and punctuality. In the German group, very similar tendencies were observed, although with a slightly different intensity.

Thus, these results partially support the second part of the H1 hypothesis: the gender of IT specialists in Poland and Germany has a significant impact on their OCB assessment.

Our analyses have shown that IT specialists in Poland are assessed more negatively by their superiors than IT specialists in Germany. The same trends can be observed in both dimensions: OCBI and OCBO, and in the latter dimension in Germany, the superiors assessed the charges more positively with regard to performing more duties than their formal scope required.

Women - superiors in Germany rated OCB's subordinates more positively than women supervising in Poland, in particular, OCBO. However, the grades in both groups were lower than the middle - the average point on the scale. Women superiors in the German group more often noticed that their subordinates performed more duties than was required in the regulations. In both groups, women - subordinates appreciated their superiors, above the average level of scale.

Subordinates in Poland gave worse grades to their superiors than male subordinates in Germany when assessing the following positions:

1. the activities and decisions of the supervisors,
2. helping other employees, although this is not within the scope of duties
3. respecting the rights and privileges of subordinates, not causing problems for others. suggesting improvements at work.

In general, Polish subordinates assessed OCBI, as well as OCBO of their superiors much less positively than German subordinates.

Men - superiors from Germany gave worse grades than Polish specialists only in one subject, related to respecting the rights and privileges of other subordinates and not creating problems

for others. The general conclusion is that Polish superiors (as well as subordinates) are probably more focused on the individual, not on the organization. Therefore, the H1 and H2 hypotheses are partially confirmed.

In conclusion, based on our data on IT specialists from Poland, as a transition economy and Germany as a developed economy, it is clear that both gender and the country of employees have a significant differentiating effect on their organizational citizenship behavior, and thus on organizational ethics. This conclusion is also confirmed by the global hypotheses of the current work: (**GH2, GH6, GH7**).

*Contribution of the results.* Our research touches on five important aspects. First of all, our research has filled the gap in the flow of research on the gender relationship, the country of work and OCB IT professionals in transition countries compared to developed economies in Europe. Secondly, to the best of our knowledge, this study is the first of its kind that clearly focuses on the Polish-German differences regarding OCB in the context of gender, in the context of changes in Europe compared to developed economies. Thirdly, our research has developed an intercultural model approach in the field of OCB in Central and Eastern Europe and Western Europe. Of particular importance is the description of IT professionals as specific professional groups in these countries. Fourthly, our contribution is a set of newly adopted research instruments in both English, Polish and German languages, with high discriminatory power, validity and reliability indicators.

Finally, from a methodological point of view, the novelty was the so-called methodological mixed approach, combining not only qualitative in-depth interviews and quantitative research, but also a specific combination of random samples and the "snowball" method (snowball sampling). The representativeness of the sample was verified using the developed optimization criteria, based on the methods of optimal experiment planning (Kowal, 2002).

*Limitations of research.* Variables such as age or economic sector have not yet been included in our research. Both samples were statistically large, but the German sample was smaller and therefore we plan to enlarge the German sample in the future, to increase the certainty of results. We intend to analyze the age impact on OCB results, especially since the Polish group is clearly younger than the German group, which reflects the real trend in both labor markets (www.brainjobs.pl, 2016; Zillmann, 2013, p.66). We also plan to develop a theoretical model of psychosocial mechanisms responsible for organizational behavior in multicultural and longitudinal studies.

Analysis of the results of my research in the field of self-evaluation of business competencies and job satisfaction led me to the idea of linking business competencies and innovative employee potential in the international, cross-border aspect with regard to cooperation between different types of countries and parallel social learning. I wondered if a higher level of business competence combined with innovation potential could lead to better organizational productivity, but also to greater job satisfaction, also in international cooperation among small cross-border enterprises. My previous research showed that in Poland, 90% of enterprises are small companies, often founded by good specialists in their field, eg by IT specialists. Statistics of the Central Statistical Office show that usually two years after founding, 50% of companies are inactive. In particular, these trends were observable in cross-border regions. I wondered if the reason is not the lack of correlation between specialist knowledge and business knowledge.

#### **4.7. The model of dependence of business competencies and innovative potential of IT users in small cross-border enterprises (GH3, GH4)**

As a result, research was conducted under my direction and an article was created paper

[7] Kowal, J., Mäkiö, J., & Jasinska-Biliczak, A. (2017). *Business competencies and innovation capability in cross-border small regional enterprises. Proceedings - 2017 IEEE 15th International Conference on Industrial Informatics, INDIN 2017.*

The describes the socio-economic aspects, including psychological aspects of human capital in the context of economic psychology in regional, cross-border small and medium enterprises in Poland and Germany. In particular, the dependencies of business competencies and the innovative potential of IT users were analyzed. These were pilot studies, both qualitative (focus groups, in-depth interviews) and quantitative (online questionnaire survey, using the diagnostic tools of my co-authorship) conducted on two randomly selected groups of 60 Polish and 20 German managers - entrepreneurs, IT users, in small enterprises cross-border using optimal planning methods (Kowal, 2002).

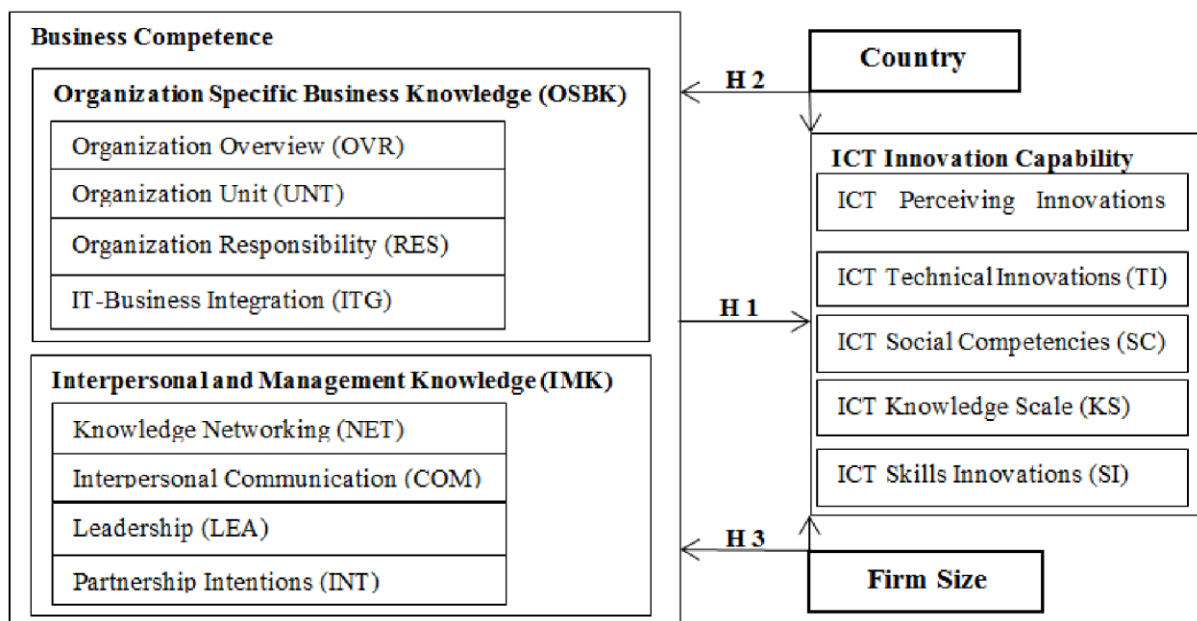
In the article, we assumed that the socio-economic aspects of human capital are of key importance for socio-economic development, which can be achieved through virtual access to online educational tools and by diagnosing the innovative capabilities of IT users and their business competences in relation to information and communication technologies. Our analyses also took into account the diversity of these variables due to the size of companies

and the country in which they were located and the nationality of respondents. We formulated three hypotheses:

*Hypothesis 1 (H1): IT users in small regional enterprises (SMEs) in Poland and Germany - with particular emphasis on micro enterprises - demonstrate BC business competences and the correlated innovation potential (perception of innovation, social competences, knowledge and skills).*

*Hypothesis 2 (H2): The country of work has an impact on the level of business competences and the innovative capacity of IT users.*

*Hypothesis 3 (H3): The size of the enterprise has an impact on the level of business competences and innovation of IT users.*



**Figure 8.** Research scheme and hypotheses

The results of the research indicated that all three hypotheses were confirmed. It turned out that a group of IT specialists from Poland better assessed their own competences than the German group.

In addition, we have observed that in entrepreneurs - IT specialists in SMEs in Poland there is a positive but poor correlation between business competencies and innovation potential, in particular in the perception of technological innovation. On the other hand, business competencies clearly negatively correlated with social competences, and they did not correlate with the scale of specialist knowledge.

This suggests the possibility of the collapse of those companies in which highly qualified IT specialists do not have knowledge and business and marketing insights, as well as relevant social competences. Very high assessment of own business competencies in Poland was a mysterious result in the context of a clear organizational pessimism and relatively low level of organizational ethics in Polish small and medium enterprises, as indicated by qualitative research during the described research, and results of previous analyses (Kowal, Roztocki, 2015b ; Kowal, Keplinger, 2015).

In the Polish group of IT specialists, the results indicated a negative motivation of supervisors' work, as well as manifestations of psychological aggression at work and even mobbing, which confirmed the results of my previous research (Kowal, Gurba, 2016). From a psychological point of view, a high assessment of one's competencies can be a form of defense or a form of positive self-assessment in order to be able to function in the workplace. It can be a way to strengthen the motivation of work.

We assumed that the results will help us design the information system (IS) - an electronic internet platform, a virtual market that will enable, among others. diagnosing business competencies and individual innovation potential, distance education, exchange of services and enabling contacts between entrepreneurs of cross-border micro enterprises. In our assumption, the platform was supposed to help bridge the differences between countries in the aforementioned scope and to serve the socio-economic development of the cross-border regions of both countries. Thus, the article [7] partially confirmed the global hypotheses of the project **(GH3, GH4)**.

*Contribution of the results.* The conclusions and results of these works actually contribute to the socio-economic development of cross-border regions in both countries, because they created an electronic platform - a server with software, including tools developed by me, as described in previous articles questionnaires of business competencies, organizational ethics, organizational civic behavior, innovation, job satisfaction. The research described in this article fills in the gap in combining three aspects - research, social learning and practice in the socio-economic development of both countries. On the other hand, the use of the platform - a virtual market allows for balancing the differences between entrepreneurs working in different countries, as well as in enterprises of all sizes. The article received recommendations among readers and users of the global research portal: Researchgate.com.

*Limitations of research.* The German sample in the statistical sense was still a bit too small, but the research was also qualitative and gave valuable indications for future analyses. In addition, both samples were verified in terms of representativeness using methods for optimizing passive experiments, which gives a certain guarantee of the accuracy of results (Kowal, 2002). In our research, we did not control variables such as gender, age, economic sector, a situation in other countries. We assumed that these aspects will be considered in future studies.

#### **4.8. The model of dependence of business competencies, satisfaction with areas of life and socioeconomic level (GH3, GH4, GH6, GH7)**

The assumed research has been carried out, and the results are described in the article:

[8] **Kowal, J., Mäkiö, J., & Gochhait, S. (2017).** *Does Business Competency Affect Information System (IS) Knowledge Workers' Life Satisfaction? A Comparative Multicultural Study.* *Journal of American Academic Research*, 5(4), 77-89.

The aim of the study described in the article [8] was to find an answer to the question whether business competencies (BC) affect the life satisfaction (LS) of knowledge workers employed in information systems (IS) in relation to various types of economies (COUNTRY): economy in transition (Poland PL), developed economy (Germany GER) and 'emerging' economy (India IND). From our analysis of international databases, such as WOS, SCOPUS, EBSCO, or Cabell, it appears that they were probably one of the first studies in the scientific literature in the mentioned scope.

An online questionnaire was carried out for the purposes of the survey, based on the adaptation of two questionnaires: of business competencies BC (adaptation: Kowal, & Roztocki, 2015a, based on: Bassellier, & Benbasat, 2004) and life satisfaction LS according to original adaptation (adaptation: Kowal, 2017, based on Anke, & Fugl-Meyer, 2003). Two dimensions of business competencies have been examined and compared in these countries:

- competence in the field of business knowledge about the organization OSK (review knowledge about organization ORV, its departments UNT, organizational responsibility RES, business integration of information technology ITG,
- interpersonal and managerial knowledge of IMK (NET: knowledge networks, COM: interpersonal communication, LEA: leadership),

- as well as eight aspects of life satisfaction: LS: general life satisfaction; SAT1: satisfaction with the physical environment at work; SAT2: work, career; SAT3: finance; SAT4: family and friends (community); SAT5: relationships, love, intimacy; SAT6: health, taking care of yourself; SAT7: personal / spiritual development; SAT8: social life, fun, free time.

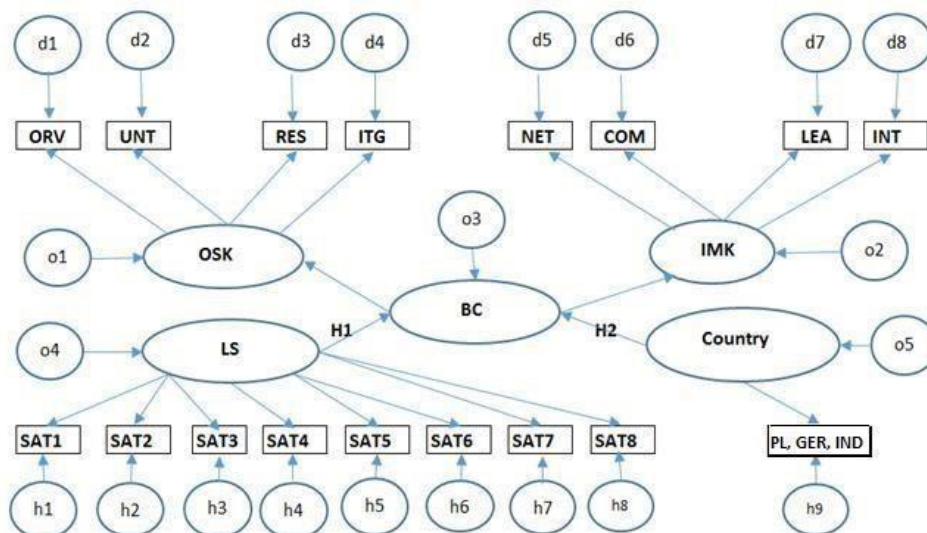
The necessary data was collected using the interpersonal network draw in conjunction with sequential sampling as part of the passive experiment project (Kowal, 2002). The study was conducted among knowledge workers in information systems in Poland, Germany, and India.

The research scheme is presented in the modeling convention of structural equations (Sagan, 2002; Bagozzi, 2012) in the following figure, where unobservable latent variables are included in ellipses, observable and measurable variables in rectangles, and so-called residuals or variables representing the influence of other unknown factors in the circles (Figure 8):

Two main hypotheses have been formulated:

*H1: Self-evaluation of business competences BC has a significant impact on life satisfaction LS of knowledge workers in information systems.*

*H2: The country of work of knowledge workers in information systems has a significant impact on their satisfaction with life LS.*



Where: variables in ellipses mean latent variables, directly unnoticeable, variables in a square - variables observable, measurable, variables in circles - so-called rest, i.e. the possible influence of other factors introduced into the model

**Figure 9.** Research framework and hypotheses



The most important results confirmed the hypotheses formulated by us that groups of IT professionals from different types of economies differ in levels of business competencies, life satisfaction, and in correlations between aforementioned variables. Knowledge workers rated themselves quite high in all groups. However, Polish and Indian knowledge workers rated themselves better on all scales than German specialists. There were no significant differences in the selfassessment of the knowledge network and IT business integration.

In the case of life satisfaction, all groups showed quite positive results, although the German group was more diversified than the other two. Similar tendencies concerned satisfaction with the physical environment at work (SAT1) and relationship, love, intimacy (SAT5). Polish and Indian knowledge workers showed higher scores than German ones in the case of satisfaction with family and friends (community, (SAT4), health, taking care of themselves (SAT6) and personal/ spiritual development (SAT7). SAT7 was the only aspect of LS that was assessed rather negatively in the German group. Employees from the German group were more satisfied than the two other groups in work, career (SAT2), finances (SAT3), family and friends (SAT4), social life, fun, free time (SAT8). The Polish and the Indian group represented the same community of employees of "emerging" economies, despite the transformation process related to Poland.

Thus, empirical data confirmed the model of the dependence of evaluation of business competences, job and life satisfaction, as well as the e-economic level.

*Contribution of the results.* The innovation of the research was the intercultural approach, the analysis of correlations between business competencies and life satisfaction among knowledge workers, as well as the use of the passive experimental method to verify the correctness of inference. Analyzing the pages of global databases, such as Web of Science and Scopus, we noticed that our research was probably one of the first to analyze the relationship between self-evaluation of knowledge workers' competencies and life satisfaction in the context of three types of economies. The results of analyzes can be addressed to knowledge workers, managers or HR employees. The theory and practice of concepts of business competencies and life satisfaction can be factors of education and social development of knowledge workers learning in the context of globalization and cooperation. They can serve productivity and support engagement and positive relationships in international cooperation and socio-economic development.

*Limitations of research.* The limitations of our research concerned the size, as well as the fact of examining only three regions: Poland, Germany and India. Although the Indian group was on the verge of a large statistical sample, it was smaller than the Polish and German group. We also did not take into account socio-economic and demographic characteristics such as age, sex, position or sector of the economy. These issues are addressed to future research.

#### **4.9. Using the results of previous research to create a model of a new educational method that takes into account knowledge, skills, social and ethical competences, and participants' satisfaction (GH2-GH7)**

In the next article [9] we described the use of previous research results for the development of a new educational method that takes into account the education of various competences among future IT engineers so that they can run their businesses effectively and develop them. The article is titled:

[9] *Mäkiö-Mrusik, E., & Mäkiö, J., & Kowal, J. (2017). Validation of task-centric holistic agile approach on teaching cyber physical systems engineering. (December 30, 2017). GOSPODARKA RYNEK EDUKACJA = ECONOMY MARKET EDUCATION, Vol. 18, Nr 4, 2017, 5-1.*

Modern engineers employed in information cyber-physical systems (CPS) often need to possess both technical and business skills as well as social skills to successfully run CPS engineering projects. Having technical skills is not enough because the implementation of engineering projects fails, mainly due to the lack of knowledge, skills and social competencies of project members. Effective holistic teaching methods can help solve this problem. The aim of this study was to develop, apply and evaluate an innovative, task-oriented holistic, interdisciplinary teaching approach (TCHAT) in a CPS engineering course with a realistic, current industrial scenario. The authors conducted a four-month educational experiment with a group of fifteen volunteers - international students at technical universities in Germany and Russia, during which they used an innovative teaching method. Participants of the course assessed the effects of education using the original questionnaire, assessing knowledge, skills and social competencies, as well as satisfaction both from the project and the personal participants, at the beginning and at the end of the course. The test results were positive for the method we developed. The most important result of our study was the innovative approach to

teaching and the satisfaction of the participants. Based on theoretical as well as practical and educational approaches, we have formulated the following hypotheses:

- *Hypothesis 1: T-CHAT has a significant impact on gaining technical knowledge and skills in CPS engineering.*
- *Hypothesis 2: T-CHAT has a significant impact on gaining the social competences required in CPS engineering.*
- *Hypothesis 3: Organization of a course based on T-CHAT gives students a sense of selfmanagement and self-confidence.*
- *Hypothesis 4: Generally T-CHAT gives students the feeling that the course is beneficial for them.*

We used the original concept of combining five didactic methods:

1. The perceptual method according to (Kurki - Suonio, 2011), which is based on an intuitive understanding of complex topics, as well as on the possibility of creating conceptual structures through the perception of empirical meanings. It is, therefore:

- A project-oriented method according to Mills, (Mills et al., 2003), which enables course participants to: ensure the application of knowledge; independent learning, developing practical engineering skills that allow learning through action; ensuring the acquisition of teamwork skills and experience; providing a realistic work environment (Mills et al., 2003).
- A problem method that should provide learning participants with learning (Mills et al., 2003), student-centered learning (Ertmer, 2015), skills and experience in teamwork (Mills et al., 2003), reference to theory, models and practice (De Graaf and Kolmos, 2003), providing students with job satisfaction (De Graaf and Kolmos, 2003).

2. Method-oriented to the research process, which is characterized by:

- Enabling acquisition and development of disciplinary and interdisciplinary knowledge and competencies.
- Ensuring the ability to ask questions and find solutions using scientific methods.
- An attitude towards the introduction of key competencies and the research process.

3. The method Face-to-face to the problem, consisting in the introduction of complex theoretical topics, but also on providing a general vision of the objectives and design tasks, also based on joint discussions in focus groups.

On the basis of literature review and previous research, we have assumed that the method should help to develop the following engineering skills: participation and conducting the engineering process; design, development, testing, verification and validation of systems; interdisciplinary thinking; modeling of ideas, projects; design of control systems; understanding of network information systems, algorithm design; time management and delays; ensuring security as well as knowledge and ability to use communication and sensory technologies.

Our method assumes the training of the following social competences (Kowal, & Jasińska Biliczak, 2016; Kowal, & Roztocki, 2015a): cooperation in a team, communication, technical writing and the ability to self-present, or project present.

We have also assumed the need to train business competencies (Kowal, & Roztocki, 2015a) related to entrepreneurship (Kowal, Jasińska-Biliczak, 2016, Kowal, Maekioe, & Jasińska-Biliczak, 2017) and to educate such features as flexibility of managing fastgrowing technologies; formulating, defining and solving problems; entrepreneurship in action, knowledge of issues related to economic entrepreneurship; implications of employees' competencies for public policy and socio-economic development (Kowal, & Roztocki, 2013).

According to our method, a curriculum was designed and implemented in the field of teaching and engineering of cyber-physical systems among an experimental group of students in Germany and Russia.

Classes were evaluated by students using the qualitative methods (in-depth interviews, focus groups) and quantitative (original evaluation questionnaire) after one month from the beginning of the course, and at the end of the semester, after the end of the course. We have set up and implemented the measurement and valuation of knowledge, skills and competences as necessary elements of the educational process (Dziechciarz, 2005).

In comparison to the control group in the experimental group they were better and higher than in the control groups. The experiment initially confirmed our hypotheses that the T-CHAT educational method has a significant impact on gaining technical knowledge, skills and social competences in CPS engineering. It also gives students a sense of self-management, self-confidence and the conviction that the course is beneficial for them and greater satisfaction with learning than in control groups.

*The contribution of the paper* was to present a new, own educational method based on scientific theoretical foundations, in an international group of students. The method has aroused interest

and is now being introduced in technical universities in Germany, Denmark, Greece, Poland and Belarus, and further developed using the European Commission grant, which our research team won as ERASMUS+ Project MaCICT. Project number: 598330-EPP-1-2018-1-DE-EPPKA2-CBHE-JP (2018 – 2575 / 001 – 001). Education, Audivisual, And Culture Executive Agency: Erasmus+: Higher Education – International Capacity Building.

*Limitation of the project.* A small group of students was a limited constraint of the project, but according to the criteria for conducting educational experiments, including qualitative research and enabling synergy in the group - the experiment met the necessary scientific conditions. Currently, experiments are carried out in larger groups and with comparison of control groups.

#### **4.10. Economic, Cultural, and Social Innovations for Human Capital in Transition Economies (GH6)**

The framework of my research was actually two articles that characterize global trends in the field of the level of use of information technologies for competence, innovation, and socio-economic development in the context of various types of economies: the first of 2013, described earlier (Kowal, & Roztocki, 2013), and the second one:

[10] **Kowal, J., & Paliwoda-Pękosz, G. (2017).** *ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies, Information Systems Management 34 (4), 304-307.*

On the one hand, the article is an introduction to the publication of a scientific journal *Information Systems Management 34(4)* on the role of ICT (information and communication technologies) in global competitiveness and economic growth in the so-called emerging economies, and in particular for economic, cultural and social innovations for human capital in transition countries. The article presents a short review and interpretation of the most important indicators for innovation, innovative concepts and their implementation based on selected articles on ICT (information and communication technologies).

The review focuses on economic, cultural and social innovations for human capital in emerging economies. In this context, the division of European countries was made due to the level of innovation based on our original multidimensional taxonomic concept. Our analysis was of exploratory nature and was based on the k -averages method (Na, Xumin, & Yong, 2010) and my own taxonomic method based on ranking objects using chi-square statistics and Friedman's S test (Kowal, 2009). Both methods gave similar results. The countries are divided into clusters

on the basis of our original own database, created on the basis of global information resources, such as World Economic Forum 2017, INSEAD 2017, ITU 2017, including such taxonomic variables as global indicators: • development of ICT organizational and technical infrastructure (ICTDI),

- development of human capital, including professional and psychosocial competences, taking into account knowledge, skills and psycho-social competences (HCI),
- economic factors of innovation (GII, GII efficiency),
- economic growth (DBN gross national income),
- competitiveness (GCI),
- the level of socio-economic development of individual countries (HDI), including demographic indicators (average life expectancy in years, LE) and educational (average length of education in MSCH years).

In this paper we have made a new division of European countries into highly developed countries in terms of innovation, developed countries, emerging economies in the process of transformation from a centrally planned system to market economies, and emerging economies (see Kowal, Roztocki, 2013). Our classification differed from the other ones presented by World Economic Forum 2017, INSEAD 2017, or ITU 2017. For example, in our classification, based on objective data, taking into account professional and psycho-social competences, Poland was qualified as a country highly developed in terms of innovation based on ICTDI, HDI, LE, MSCH, GNI in per capita, GII, GII Efficiency, HCI and GCI.

The critical analysis of literature allowed us to choose 6 articles, pointing to the latest innovative trends in ICT development in the socio-cultural aspect, including pedagogy, which in fact complement the gap in world scientific literature related to transition economies and emerging economies. The analysis of indications on the innovativeness of psycho-social aspects in the development of management information systems began with a manuscript on the impact of attitudes towards globalization on human functioning (Senejko, Łoś, Żurko, Chmielewska-Łuczak, 2017). We drew attention to the innovative image of the relationship between the current challenge of the humanities - globalization and its psychological consequences. The novel approach to these interpersonal relationships has filled the gap in research on attitudes towards the globalized world and their links to the management of the information system. We also pointed to another innovative article on the latest issue of today's

world: an aging population (Soja, 2017), in which the demographic, social and health consequences of ICT applications in supporting older people were examined.

In the next problem study, we emphasized the innovative aspects of discovering source problems in the adaptation of IT corporate systems (Soja, & Soja, 2017). As related, we have indicated more detailed aspects of the mentioned issue in the area of business management on the example of the process of transforming data into information, and information into knowledge. In the innovative approach of Gawin and Marcinkowski (2017), it can be used to increase business competitiveness in real estate management through appropriately selected determinants and benchmarking scenarios, for example for improving energy efficiency (Gawin, & Marcinkowski, 2017). The analysis of literature has also enabled us to catch an innovative problem of modeling the organizational and location structure in the Enterprise Content Management Adoptions system (Trąbka, 2017). On the basis of his experience, the author described ways of creating innovative methods for enterprises, on the example of a large Polish medical company. Innovation in teaching was perfectly visible in the proposal (Engela, Heinza, & Sonntag, 2017) to make education more flexible and updated through an innovative "inverted Classroom Model" that can develop opportunities for human capital development.

*Contribution of the results.* Recognition of innovation factors, as well as their economic, educational, cultural and psychosocial aspects is crucial for understanding economic growth, competitiveness and the level of socio-economic development. Knowledge, skills, social competences, innovations and their implementation in the practice of information system management are important issues that require more attention from researchers. Six articles in this special edition can provide an innovative basis for future ICT-related research in an economic, educational and psychosocial context, both in emerging and developed countries. It seems that both our new country classification and the special issue itself has inspired other researchers to conduct research on these issues (28 citations in Google Scholar, by the date). Our analyses described in this paper confirmed the **GH6**.

## **5. SPECIFIC METHODOLOGICAL ASPECTS OF RESEARCH**

An important and original part of my articles were methodological aspects, in particular the idea of the representativeness of the tests on the basis of which the research was carried out and the idea of predictability in conditions where the number of cases was close to the number of variables.

It can be said that these two ideas accompanied all the previously presented works in which the methods described in the two following articles were used.

Below is an article in my theoretical study [article 11]):

[11] **Kowal, J.** (2002). *Selected issues of verification of the representativeness of samples in socio-economic qualitative research. In: Kowal, J. (ed.) Selected issues of verifying the representativeness of samples in socio-economic qualitative research. Computer methods and software. Wrocław: Wyższa Szkoła Zarządzania "Edukacja". Zeszyty Naukowe, 12 (2002)*

In the theoretical study of my authorship (article [11]), I explained how to solve some problems related to qualitative research, with the use of modern methods of experimental statistics - based on the theory of optimal experiment planning (Kowal 2002; Wawrzynek 1997; Taguchi, Wu 1979, Taguchi 1981), commonly with the sociological theory of network interpersonal drawing combined with sequential randomization (Kalton, 1983, 2003, Sudman, 1976). At that time, it was an innovative approach to these issues, and the result was a computer program that found application in practice, among others in marketing research at AIG Credit S.A. or in the Expert Monitor surveys (2002), in Poland. The theoretical study and the program were the result of a three-year financial research project implemented under my supervision as a result of the competition of the Scientific Research Committee in the years 2000-2002, No. 1H02D 004 18, titled "Saturated Regression Model in Consumer Research", in Poland. After completion, the project was further honored for innovation. I used this methodological approach to verify the representativeness of the samples in all the previously described papers. On the basis of my theoretical elaboration the program was constructed, that has two parts:

1. Sample structure verification.
2. Sample representativeness verification.

The first part of the program enables the researcher to prepare the sample according to the needed structure of control variables. The second part of the program checks if sample is optimal for prediction of dependent variable in regression model.

According to the idea proposed by me, the researcher, instead of conducting costly tests on a large random sample, can successfully apply, under certain conditions, an active or passive experiment on a small sample, using the theory of optimal experimental plans that can be applied in two specific cases :



1) the number of  $n$  experiments in the experiment is statistically small ( $n < 30$ ), 2) we are dealing with a saturated or almost saturated experiment when the number of experiments  $n$  in the experiment is statistically large ( $n > 30$ ), but the number of parameters to be estimated is equal to or slightly less than the planned number of experiments  $n$ .

I pointed out that in the conducted qualitative studies, planning experiments is of the greatest importance in the case of a small sample. I paid particular attention to the importance of some kind of discrete plans, when the frequency of occurrence in the sample of various objects is discrete, and the properties of objects are measured on discrete scales (eg consumer attitudes towards advertised products or services, types of product assortments, certain types of unit behavior, style of being, various symbols, etc.), mainly on qualitative and ordering scales.

I proposed that the research methods can be selected for situations in which the researcher already has a small, often specific trial population, and is not always able to significantly expand it, and the aim of the study is, among others, determination of causal relationships between dependent variables (eg effectiveness of advertising, its positive reception by consumers) and a group of independent variables (market segment, types of props and symbols used, color etc.). I proposed the use of the theory of optimal experiments, which makes it possible to check how valuable this test is in terms of its results and structure, and to how large, random sample it can be compared to. I proposed a research procedure based on the fact that if the appropriate conditions are not yet met, several units can be selected for the sample, preferably the interpersonal network sampling method combined with the sequential sampling, and again check the structure of the analysed population. Next, I proposed repeating the procedure until the desired values of the selected function of the optimality criterion are obtained and (or) until the sample is representative due to the structure and dependence of some control characteristics (eg due to age and gender). Next, I suggested that for a selected set of variables, to calculate the value of the criterion function, which informs the researcher if the population has the features of optimality, or whether the sample should be increased by new objects. As a criterion function, I proposed, for example, the functions of A- or D-optimality according to Taguchi (1979, 1981), described, among others by Wawrzynek (1993): the sample is ideally optimal if A- or D-efficiency reaches the value of 1, and is not optimal at values close to zero. If the appropriate mathematical conditions are met, one can begin predicting the dependent variable by regression methods. It is important for the research that the objects in the sample should represent a good (adequate) representation of a problem of a social, psychological or economic nature (Kowal 2000).

### **5.1. The question of verification of the representativeness of the sample**

In the papers and studies I described above, I used to employ algorithms and software (Kowal 2002, WRP - Verification of Sample Representativeness) in the selection of samples and their verification in terms of representativeness. I used the developed application in the case of small and statistically large samples in the discussed articles.

During the tests, there was a situation where the sample could not be too large due to the nature of the research (eg. in the case of long-term psychological tests of OCB (Kowal et al. 2019) or due to the difficult access to the general population, eg. in the case of the German group, with 20 people (Kowal, Maekioe, & Jasińska-Biliczak, 2017) or Indian group with 30 people (Kowal, Maekioe, Gochhait, 2017) Researchers usually fear generalizing the conclusions on the general population in such circumstances. However, the program developed according to my theoretical concept: WRP - Verification of sample representativeness (Kowal,2002), assisted us in making research decisions and formulating conclusions, not only in my research presented above but also in the past, in the research practice of companies and institutions, such as AIG Credit or Expert Monitor, from 2002. The program "Verification of the sample structure" takes into account not only the methodological but also the ethical aspects of the sample representativeness tests (Kowal, 1997, Kowal, 1997, Kowal, ed. 2002). I based the program on concepts of representativeness of trials (Nowak, 1975, Gostkowski, 1975, Otte, 1992, Kalton, 19832003, Sudman, 1976), according to which the sample does not have to be an ideal structural representation of the general population, but all the possible ranges will suffice. values of a given variable or combination of variables and in this sense the sample may be representative. I proposed combined methods of constructing research trials combining simple sampling combined with sequential randomization or "snowball" drawing, but using the ideas and procedures used to plan passive optimal experiments, according to Taguchi 1979, 1981 and Wu, Hamada, 2002 and Wawrzynek ( 1977).

Additionally, the WRP can be used in the case of the study of causal relationships, for example in the case of regression equations and in the case of saturated models, when the number of cases is slightly greater or even equal to the number of variables in the model. Based on the quality research theories of Taguchi and Wu (Wawrzynek, 1977, 1993), I indicated the possibility of examining the adequacy of the data for the prediction by calculating the functions

of the so-called A and D optimality, which take values from 0 to 1. The closer to the value of 1, the test is better prognostically (Taguchi, & Wu, 1971; Taguchi, 1981).

In addition, the WRP program allows eliminating cases with missing data from analyzes, to compare the structure of a sample (due to several control features and relationships between them) for analysis with an ideal or desirable known structure, for example, from the professional literature or from GUS's annual reports and reports. The program user can prepare such a set in a separate file and randomly prepare several smaller samples with an ideal structure due to specific control variables, such as age and gender of the subjects, which are usually used in social surveys for the so-called overweighing the sample. The researcher may then search for causal relations on several independent trial populations and compare the obtained results. The program can be used for large and small random samples.

The "Planning of optimal experiments" program, using elements of optimal experimental planning theory, allows to study the optimality of research populations when a researcher looks for a cause and effect relationship between a dependent variable (eg the effectiveness of managerial actions) and a group of independent variables (eg number of completed courses , type and level of education, professional experience, some psychological features, such as extraversion, intelligence quotient, etc.), predicts linear dependence and decides to use multiple regression methods for this purpose. The program contains options enabling appropriate coding of variables measured on scales of various types (ie nominal, order, interval and quotient scales) in such a way that all variables can be entered into the regression equation and check how valuable the data set is in terms of optimal use them for prognostic purposes. The program is applicable both to large and small trials, with particular emphasis on so-called saturated plans of the experiment, when the number of research objects is equal to or fewer than the estimated regression parameters (eg marketing research of AIG Credit S.A. or expert surveys Expert Monitor, 2002). I used this program when verifying the representativeness in all articles constituting the work, in particular in cases of constructing regression models, confirmatory factor analysis, or modeling of structural equations.

## 5.2. Possibilities of application in qualitative research of selected methods of classical statistics and planning of optimal experiments

The next two articles:

[12] **Kowal, J.** (2009). *Wybrane teoretyczne i praktyczne aspekty metodologii badań jakościowych*. IN: Dziechciarz, J. (red.) *Projektowanie, ocena i wykorzystanie danych rynkowych. Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu* 51(2009), 46-76.

and

[13] **Kowal, J.** (2018). *How Can We Objectify a Study on Analytical Psychology? The Sense of Applying Statistical Methods in Qualitative Research*. In: Kuzmicki, A. (Eds.), Błocian, I. (Eds.), *Contemporary Influences of C. G. Jung's Thought*, 318–352,

were the methodological basis for many of my research, described in the current selfreview. The article [13] is an extended version of the article [12] from 2009 in terms of the possibility of using the proposed methods in qualitative research, also in analytical psychology. In these articles, I proposed how classical statistics methods can be used in qualitative research I characterized, forming the basis for making hypotheses, formulating items in a questionnaire or preparing a projection method. I also presented my author's "algorithm for eliminating ambiguous objects" based on statistical methods, which allows us to select from a set of questions, descriptions of different situations or illustrations of those which should not raise doubts on the basis of previous qualitative analyzes. While describing examples of my research using the mentioned algorithm, I proposed my taxonomic method, based on ranking objects and the Friedman S test. I used the methods described in the studies that the current work deals with, in particular at the stage of creating new or adaptation of questionnaires from other organizational cultures, such as job satisfaction questionnaires, competencies or organizational ethics. The methods proposed by me, as well as the method of their use, have also been applied in other, not only qualitative psychological tests, in Poland and abroad, but also in marketing management. Methods proposed by me - both the algorithm and the new taxonomic method have been verified and considered in terms of statistics and econometrics, and the extended application versions of the described article have been presented in the scientific papers of the University of Economics and translated into English and profounded in depth psychology research, as well as during the retest of the projection method in research related to marketing management.

## 6. SUMMARY

The proposed models are already used in various organizations, in Poland and abroad, among others under the European Commission projects to improve management in the creation of work motivation systems, in the creation of new educational methods and programs for schools, higher education curricula and educational units outside education (Kowal, Mäkiö, & Jasińska-Biliczak, 2017; Kowal, Keplinger & Mäkiö, 2018; Mäkiö, & Mäkiö, & Kowal 2017). Taking into account the results of my research and with my coauthorial participation, among others holistic educational method TCHAT (task-centric holistic agile approach on teaching cyber-physical systems engineering, holistic, task-oriented, efficient approach to teaching engineering of cyber-physical systems), which was described most fully in the article being part of the work, and earlier ideas have been presented at international conferences, including in Poland and in the United States (Mäkiö, & Mäkiö, & Kowal, 2017). The TCHAT method has already been introduced, among others at the University of Wrocław, in Hochschule Emden / Leer in Germany, and is currently implemented in six Belarusian technical universities, as well as in Denmark and Greece. The method also attracted interest in the United States. It is a method of interdisciplinary and holistic, task-oriented educational approach in teaching, among others in the teaching of cyber-physical systems engineering. It is based on the method of project teaching, including not only engineering education, but also psycho-social competences, innovative potential, organizational ethics and business competences in relation to the results of joint international research (Kowal, Mäkiö, & Jasinska-Biliczak, 2017).

The proposed models and analyzed aspects of human capital have aroused interest in universities in Polish and foreign (over 300 Citations in total in Google Scholar since 2014, of which 46 in Web of Science and 85 in Scopus), and based on a co-authored concept in Germany (Hochschule Emden / Leer) is an international computer platform whose aim is, among others, diagnosis and support for the development of human capital, including innovation, through elearning in small, especially in microenterprises in the cross-border area. Me, as a co-author, was invited to manage the project from the Polish side in the scope of development of the abovementioned aspects (Kowal, Mäkiö, & Jasinska-Biliczak, 2017). The subject matter is still being developed in international projects, with my participation as a project coordinator on the Polish side (Table 2).

**Table 2.** International projects related to aforementioned papers and research.

1	Project Title Science Technology Innovation Mathematics Engineering for the Young. STIMEY. Project No 709515. Research and Innovation Action. <a href="http://www.stimey.eu">http://www.stimey.eu</a> (2016-2019) – review for methodological aspects of the project.
2	Project as part of statutory research UW number 57 (2016-218). Psychosocial and economic aspects of the development of information systems. Intercultural research (In Polish: Psycho-społeczne i ekonomiczne aspekty rozwoju systemów informacyjnych. Badania międzykulturowe ) – chair of the project..
3	ERASMUS+ Project MaCICT. Project number: 598330-EPP-1-2018-1DE-EPPKA2CBHE-JP (2018 – 2575 / 001 – 001). Education, Audivisual, And Culture Executive Agency: Erasmus+: Higher Education – International Capacity Building – chair of the project, from Polish side. The achievement was also inspired by earlier projects in which I was a participant or research director:
4	2009-2011 - „Obserwator rynku pracy regionu jeleniogórsko - legnickiego"/ " Watcher of the labor market region of Jelenia Góra - Legnica " ; Participation in the project Dr. Jolanta Kowal ( IPsUWr ). The project is implemented under the Operational Programme Human Capital Priority IX .Development of skills and competences in the regions, Measure 9.2 Improving the attractiveness and quality of vocational education . Collaboration with the Lower Silesian Regional Development Agency Wałbrzych. Number ZP/PN/SZP/25/2009 , UDA-POKL.09.02.00-02-032/08.
5	Project 4. 2006-2008 - „Regionalne badanie rynku pracy”, dla Dolnośląskiej Agencji Rozwoju Regionalnego S.A/ "Regional labor market research " for the Lower Silesian Regional Development Agency. Studies concerning possibility of employment, competencies and situation on labour market. Director Dr. Dorota Kwiatkowska - Ciotucha. Project Number Z/2.02/II/2.1/24/05
6	2000-2002 – chair of the project "Saturated regression model in consumer research"/ Nasycone model regresji w badaniach konsumenckich. The award of a research project No. 1H02D 004 18 financed by KBN entitled "Saturated regression model in consumer research" carried out in the years 2000-2002 idea by copyright J.Kowal (project manager): Review of EUREKA No. 12 (24) / 2002, 2 Science Social, Economic, Legal. 2.4. Organization and Management. Committee for Scientific Research KBN, Warsaw 2002, <a href="http://eris.kbn.gov.pl/pub/kbn/eureka/0224/index.html">http://eris.kbn.gov.pl/pub/kbn/eureka/0224/index.html</a> (Access 2012.10.01 )
7	P2006-2008 - „Rodzic-Pracownik – rozwój zawodowy rodziców podczas urlopu wychowawczego”/ "Parent - Employee - Professional Development parents during parental leave " performed based on the EQUAL Community Initiative Programme". Studies concerning parents situation on labour market. NUMBER G0620. Director Dr. Krystyna Wegłowska – Rzepa
8	2010-2012 - Project Title: Wortal KNOWLEDGE TRANSFER. the Human Capital Operational Programme , sub 8.2.1 Support for cooperation between science and business implementation. WROCLAW FEDERATION COUNCIL OF SCIENTIFIC AND TECHNICAL ASSOCIATIONS NOT. Priority VIII Regional human resources. Measure 8.2 Transfer of knowledge. Sub-measure 8.2.1

## REFERENCES

This list contains most important references included in the description of the achievement and inside of the articles constituting the achievement:

- 1 De Graaf, E., & Kolmos, A. (2003). Characteristics of problem-based learning. *International Journal of Engineering Education*, 19(5), 657–662.
- 2 Ali, M., & AlHinai, Y. S. (2013). Assessing the Use of Computer Role-play Games in Classrooms. *ICT Management for Global Competitiveness and Economic Growth in Emerging Economies (ICTM)*, 121.
- 3 Anke, A. G., & Fugl-Meyer, A. R. (2003). Life satisfaction several years after severe multiple trauma—a retrospective investigation. *Clinical Rehabilitation*, 17(4), 431-442.
- 4 Bagozzi, R. P., & Yi, Y. (2012). Specification, evaluation, and interpretation of structural equation models. *Journal of The Academy of Marketing Science*, 40(1), 8-34.
- 5 Bartosiewicz, S., & Dziechciarz, J. Z. (1986). *Ekonometria Z Elementami Programowania Matematycznego I Analizy Porównawczej (Front Matter for: Econometrics with Elements of Mathematical Programming and Multivariate Statistical Analysis)*. AE Wrocław.
- 6 Bassellier, G., & Benbasat, I. (2004). Business competence of information technology professionals: Conceptual development and influence on IT-business partnerships. *MIS Quarterly*, 673-694.
- 7 Bassellier, G., Reich, B. H., & Benbasat, I. (2001). Information technology competence of business managers: A definition and research model. *Journal of Management Information Systems*, 17(4), 159-182.
- 8 Becker, G. S. (2009). *Human capital: A theoretical and empirical analysis, with special reference to education*. University of Chicago press..
- 9 Brelade, S., & Harman, C. (2007). Understanding the modern knowledge worker. *Knowledge Management Review*, 10(3), 24.
- 10 Brinkley, I. (2006). *Defining the knowledge economy*. The Work Foundation, London.
- 11 Brockmann, C., & Roztocki, N. (2015, January). Topics on knowledge management: an empirical insight into articles published in the *International Journal of Knowledge Management*. In *2015 48th Hawaii International Conference on System Sciences* (pp. 3834-3840). IEEE.
- 12 Cambridge Dictionary. (2017). Available at:

- 13 Costanza, R., Fisher, B., Ali, S., Beer, C., Bond, L., Boumans, R., ... & Snapp, R. (2007). Quality of life: An approach integrating opportunities, human needs, and subjective well-being. *Ecological Economics*, 61(2-3), 267-276.
- 14 Cropanzano, R., James, K., & Konovsky, M. A. (1993). Dispositional affectivity as a predictor of work attitudes and job performance. *Journal of Organizational Behavior*, 14(6), 595-606.
- 15 Currall, S. C., Towler, A. J., Judge, T. A., & Kohn, L. (2005). Pay satisfaction and organizational outcomes. *Personnel Psychology*, 58(3), 613-640.
- 16 Czapiński, J. (1991). Szczęście–złudzenie czy konieczność? Cebulowa teoria szczęścia w świetle nowych danych empirycznych,[In:] Kofta M., Szustrowa T.(Eds.). *Złudzenia, które pozwalają żyć: szkice z psychologii społecznej*.
- 17 Czapiński, J. (2005). Psychological theories of happiness. In: J. Czapiński (ed.), *Positive psychology. Learning about happiness, health, strength and virtue of man*. Warszawa: Wydawnictwo Naukowe PWN, 51–102.
- 18 DeNeve, K. M., & Heppner, M. J. (1997). Role play simulations: The assessment of an active learning technique and comparisons with traditional lectures. *Innovative Higher Education*, 21(3), 231-246.
- 19 Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, 49, 71-75.
- 20 Dziechciarz, J. Z., & Dziechciarz-Duda, M. (2016). Multivariate statistical analysis in missing skills identification. In Michelberger, P. (Ed.) *Management, Enterprise And Benchmarking In The 21st Century*, 109-122.
- 21 Ehrhardt, J. J., Saris, W. E., & Veenhoven, R. (2000). Stability of life-satisfaction over time. *Journal of Happiness Studies*, 1(2), 177-205.
- 22 Feist, G. J., Bodner, T. E., Jacobs, J. F., Miles, M., & Tan, V. (1995). Integrating top-down and bottom-up structural models of subjective well-being: A longitudinal investigation. *Journal Of Personality And Social Psychology*, 68(1), 138-150.
- 23 Ferrans, C. E., & Powers, M. J. (1992). Psychometric assessment of the Quality of Life Index. *Research in Nursing & Health*, 15(1), 29-38.
- 24 Frąckowiak, T. (2012). Poczucie jakości życia osób długowiecznych/The sense of the quality of life for long-lived people. *Psychologia Rozwojowa*, 17(1), 101.



- 25 Goldin, C. (2016). Human Capital. In: *Handbook of Cliometrics*. Heidelberg, Germany: Springer Verlag.
- 26 Graham, C., Eggers, A., & Sukhtankar, S. (2004). Does happiness pay? In *Challenges for quality of life in the contemporary world* (pp. 179-204). Springer, Dordrecht.
- 27 Greenberg, J. (1987). A taxonomy of organizational justice theories. *Academy of Management Review*, 12(1), 9-22.
- 28 Heszen-Niejodek, I. (1996). Jakość Życia w Badaniach Psychologicznych, *Śląskie Studia HistorycznoTeologiczne* 29, 251-255.
- 29 Hill, P. C., & Pargament, K. I. (2003). Advances in the conceptualization and measurement of religion and spirituality: Implications for physical and mental health research. *American Psychologist*, 58(1), 64.
- 30 Hofstede, G. (1984). The cultural relativity of the quality of life concept. *Academy of Management Review*, 9(3), 389-398.
- 31 Iaffaldano, M. T., & Muchinsky, P. M. (1985). Job satisfaction and job performance: A meta-analysis. *Psychological Bulletin*, 97(2), 251.
- 32 Jie, W., Seedorf, S., & Lowry, P. B. (2013). Investigation of the Radio Frequency Identification Assimilation Process in China: A Stage-based Model Perspective. *The Electronic Journal of Information Systems in Developing Countries*, 57(1), 1-17.
- 33 Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. *Psychological Bulletin*, 127(3), 376.
- 34 Kalton, G. (1993). *Sampling rare and elusive populations*. New York: United Nations, Department for Economic and Social Information and Policy Analysis.
- 35 Kalton, G. (2001, August). Practical methods for sampling rare and mobile populations. In *Proceedings of the Annual Meeting of the American Statistical Association* (pp. 5-9). sn.
- 36 Koh, H. C., & El'Fred, H. Y. (2001). The link between organizational ethics and job satisfaction: A study of managers in Singapore. *Journal of Business Ethics*, 29(4), 309-324.
- 37 Konovsky, M. A., & Organ, D. W. (1996). Dispositional and contextual determinants of organizational citizenship behavior. *Journal of Organizational Behavior*, 17(3), 253-266.
- 38 Kowal, J. (1998). *Metody statystyczne w badaniach sondażowych rynku*. Wydaw. Naukowe PWN.

- 39 Kowal, J. (2002). Wybrane zagadnienia weryfikacji reprezentatywności prób w społeczno-ekonomicznych badaniach jakościowych. Metody i oprogramowanie komputerowe. *Zeszyty Naukowe*, 12(11), Wrocław: WSZ E.
- 40 Kowal, J. (2009). Wybrane teoretyczne i praktyczne aspekty metodologii badań jakościowych. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, (51 *Projektowanie, ocena i wykorzystanie danych rynkowych*), 46-75.
- 41 Kowal, J. (2017). Gender and Business Competences of Knowledge Workers in Poland, *Proceedings of the 50th Hawaii International Conference on System Sciences*, 4434–4344.
- 42 Kowal, J. (2020). Perspectives and directions for professional development in the Lower Silesian voivodeship compared to Poland and the European Union. Publisher: Oficyna Wydawnicza ATUT–Wrocławskie Wydawnictwo Oświatowe, Editors: Henryk Jarosiewicz. Updated and developed version from Kowal J.(2011) in *Proceedings of the 7th ECMLG*, France, Antipolis.
- 43 Kowal, J. and Paliwoda-Pękosz, G. (2017). ICT for Global Competitiveness and Economic Growth in Emerging Economies: Economic, Cultural, and Social Innovations for Human Capital in Transition Economies, *Information Systems Management*, 34(4),304-307.
- 44 Kowal, J., & Keplinger, A. (2015). Characteristics of human potentiality and organizational behavior among IT users in Poland. An exploratory study. *An Exploratory Study* (December 12, 2015). *EKONOMETRIA ECONOMETRICS*, 3, 49.
- 45 Kowal, J., & Roztocki, N. (2013). Information and communication technology management for global competitiveness and economic growth in emerging economies. *The Electronic Journal of Information Systems in Developing Countries*, 57(1), 1-12.
- 46 Kowal, J., & Roztocki, N. (2016, January). Gender and job satisfaction of information technology professionals in Poland. In *2016 49th Hawaii International Conference on System Sciences (HICSS)* (pp. 3625-3634). IEEE.
- 47 Kowal, J., Keplinger, A., & Mäkiö, J. (2019). Organizational citizenship behavior of IT professionals: Lessons from Poland and Germany. *Information Technology for Development*, 25(2), 227-249.
- 48 Kowal, J., Keplinger, A., Mäkiö, J., & Sonntag, R. (2016, September). Does human potentiality affect IT professionals' organizational behavior? An experimental study in Poland and Germany. In *EuroSymposium on Systems Analysis and Design* (pp. 179-194). Springer, Cham.
- 49 Kowal, J., Kwiatkowska, A. and Patro, I. (2010) The Prospects of Graduates' Career Development in Poland: The Example of a Competence Survey in the Lower Silesian Region

- 2006-2010, *Proceedings of the 6th European Conference on Management Leadership and Governance (ECMLG 2010)*, College of Management Edukacja and the Professional Development Center Edukacja, Wroclaw, Poland, 28-29 October 2010.
- 50 Kowal, J., Mäkiö, J., & Gochhait, S. (2017). Does Business Competency Affect Information System (IS) Knowledge Workers' Life Satisfaction? A Comparative Multicultural Study. *Journal of American Academic Research*, 5(4), 77-89, <https://www.american-journals.com/december2017>.
- 51 Kowal, J., Mäkiö, J., & Jasińska-Biliczak, A. (2017, July). Business competencies and innovation capability in cross-border small regional enterprises. In *2017 IEEE 15th International Conference on Industrial Informatics (INDIN)* (pp. 905-910). IEEE.
- 52 Kowal, J., Roztocki, N. (2015a). Do organizational ethics improve IT job satisfaction in the Visegrád Group countries? Insights from Poland. *Journal of Global Information Technology Management*, 18(2), 127–145.
- 53 Kowal, J., Roztocki, N.(2015b). Job satisfaction of IS knowledge workers in Poland: does business competence matter? *Journal of Business Economics and Management*, 6(5), 995–1012.
- 54 Kowal, J., & Wegłowska-Rzepa, K., (2011). Women's situation and management competences on the example of Poland: a review and research survey. In Baranowska-Szczepanska, M. (Ed.) *She is in XXI Century*, Poznań: MAIUSCULA, 365-388.
- 55 Lambert, E.G., Hogan, N.L. Barton, S. M.(2001).The impact of job satisfaction on turnover intent: a test of a structural measurement model using a national sample of workers. *The Social Science Journal*, 38, 233–250.
- 56 Lange, T. (2008). Attitudes, attributes and institutions: Determining job satisfaction in Central and Eastern Europe, *Employee Relations*, 31(1), 81-97.
- 57 Łaguna, M. (2012). Satysfakcja z życia i satysfakcja z pracy a motywacja do podejmowania szkoleń: Doniesienie z badań. *Psychologia Jakości Życia*, 11(2), 163-172.
- 58 Łaguna, M. (2013). Self-efficacy, self-esteem, and entrepreneurship among the unemployed. *Journal of Applied Social Psychology*, 43, 253–262.
- 59 MacKenzie, S. B., Podsakoff, P. M., & Podsakoff, N. P. (2011). Construct measurement and validation procedures in MIS and behavioural research: integrating new and existing techniques, *MIS Quarterly*, 35(2), 293–334.
- 60 Mäkiö-Marusik, E., Mäkiö, J., & Kowal, J. (2017, May). Implementation of task-centric holistic agile approach on teaching cyber physical systems engineering. In *AMCIS 2017*

- Proceedings: Proceedings of the Twenty-third Americas Conference on Information Systems, IS in Education, IS Curriculum, Education and Teaching Cases (SIGED)* (pp. 1-10).
- 61 Mäkiö-Marusik, E., Mäkiö, J., Kowal, J. (2017). On education of cyber physical systems engineering. In *ICTM 2017. Proceedings of the International Conference on ICT Management for Global Competitiveness and Economic Growth in Emerging Economies. Conference Theme: Innovations for Human Development in Transition Economies*. Wrocław : University of Wrocław et al., 89-202.
- 62 Mäkiö-Mrusik, E., & Mäkiö, J., & Kowal, J. (2017). Validation of task-centric holistic agile approach on teaching cyber physical systems engineering. (December 30, 2017). *GOSPODARKA RYNEK EDUKACJA = ECONOMY MARKET EDUCATION*, 18(4), 2017, 5-17.
- 63 Mills, J. E., & Treagust, D. F. (2003). Engineering education—Is problem-based or project-based learning the answer. *Australasian Journal of Engineering Education*, 3(2), 2–16.
- 64 Organ, D. W. (1988). *Organizational citizenship behavior: The good soldier syndrome*. Lexington, MA: Lexington Books.
- 65 Organ, D. W. (1997). Organizational citizenship behavior: It's construct clean-up time. *Human Performance*, 10(2), 85–97.
- 66 Organ, D. W., Podsakoff, P. M., & MacKenzie, S. (2006). *Organizational citizenship behavior: Its nature, antecedents, and consequences. Foundation for organizational science*. A Sage publications series. Thousand Oaks, CA: Sage.
- 67 Oxford Dictionary. (2016). Retrieved from <http://www.oxforddictionaries.com/definition/english/gender>
- 68 Peloza, J., & Shang, J. (2011). How can corporate social responsibility activities create value for stakeholders? A systematic review. *Journal of the Academy of Marketing Science* 39(1):117-135
- 69 Peneva, I., Yordzhev, K., & Ali, A. S. (2013). The Adaptation of Translation Psychological Test as a Necessary Condition for Ensuring the Reliability of Scientific Research. *International Journal of Engineering Science and Innovative Technology (IJESIT)*, 2(4), 557-560.
- 70 Roztock, N., & Roland Weistroffer, H. (2008). Information technology in transition economies. *Journal of Global Information Technology Management*, 11(4), 1-8.

- 71 Roztocki, N., Weistroffer, H.R.(2015). Information and communication technology in transition economies: an assessment of research trends. *Information Technology for Development* 21(3), 330-364.
- 72 Seligman, M. E. (2002). Positive psychology, positive prevention, and positive therapy. *Handbook of Positive Psychology*, 2(2002), 3-12.
- 73 Soja, P., & Paliwoda-Pękosz, G. (2013). Impediments to enterprise system implementation over the system lifecycle: contrasting transition and developed economies. *The Electronic Journal of Information Systems in Developing Countries*, 57(1), 1-13.
- 74 Spector, P. E. (1985). Measurement of Human Service Staff Satisfaction: Development of the Job Satisfaction Survey, *American Journal of Community Psychology*, 13, 6, 693-713.
- 75 Straś-Romanowska M. (2005), Jakość życia w świetle założeń psychologii zorientowanej na osobę. *Kolokwia Psychologiczne*, 13, 261-274.
- 76 Straś-Romanowska M. et al.. (2004). *Charakterystyka Kwestionariusza Poczucia Jakości Życia*. Wrocław: Instytut Psychologii UW.
- 77 Straś-Romanowska, M., Kowal, J., Kapała, M. (2016), How to measure spiritual sensitivity at the it user's workplace? The construction process and method of validation of spiritual sensitivity inventory (SSI), *Econometrics/ Ekonometria*, 2(52).
- 78 Stutzer, A. (2004). The role of income aspirations in individual happiness. *Journal of Economic Behavior & Organization*, 54, 89–109.
- 79 Sudman, S. (1976). *Applied sampling*. San Diego: Academic Press.
- 80 Szostek, A. (2002). Czy opłaca się być uczciwym przedsiębiorcą? In *Etyka w biznesie*. Borkowska, M., Gałkowski, J. W. ( Eds.), Lublin 2002, 109-123, 124-136.
- 81 Taguchi G.(1981). *On-line Quality Control During Production*, Japanese Standards Association, Tokyo, Japan.
- 82 Taguchi G., Wu y., *Introduction to Off-line Quality Control*, Central Japan Quality Control Association, Nagaya, 1979
- 83 Tan, M., Xiaoai, D., Qiushi, Y., & Chen, Ch. (2013). An Investigation of eGovernment Services in China. *The Electronic Journal of Information Systems in Developing Countries* 57(1).
- 84 Tatarkiewicz, W. (1962). *About happiness. /In Polish: O szczęściu*. Warszawa: PWN.

- 85 Trejtowicz, M. (2007). The dynamics of mental wellbeing. Exploration of research data. Social diagnosis. /In Polish: Dynamika dobrostanu psychicznego. Eksploracja danych z badań Diagnoza społeczna., *Psychologia Społeczna* 1(3) , 66-81.
- 86 Veenhoven, R. (2006). *World Database of Happiness*, Erasmus University Rotterdam. Available at: <http://worlddatabaseofhappiness.eur.nl>
- 87 Visser, M. R., Oort, F. J., & Sprangers, M. A. (2005). Methods to detect response shift in quality of life data: a convergent validity study. *Quality of Life Research*, 14(3), 629-639.
- 88 Vitell, S. J., & Davis, D. L. (1990). Ethical beliefs of MIS professionals: The frequency and opportunity for unethical behavior. *Journal of Business Ethics*, 9(1), 63-70.
- 89 Wawrzynek, J. (1977). Uwagi o efektywności planowania eksperymentów. *Przegląd Statystyczny*, 24, 83-89.
- 90 Wawrzynek, J. (1993). *Statystyczne planowanie eksperymentów w zagadnieniach regresji w warunkach małej próby*. Prace Naukowe Akademii Ekonomicznej we Wrocławiu. Seria: Monografie i Opracowania (nr 100), (656).
- 91 Westfall, R. D. (2012). An Employment-Oriented Definition of the Information Systems Field: An Educator's View. *Journal of Information Systems Education*. Spring 2012, 23(1), 63-70.
- 92 Williams, L. J., & Anderson, S. E. (1991). Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management*, 17(3), 601-617.
- 93 Wu, C. F., Jeff & Hamada, M. (2002). *Experiments: Planning, Analysis, and Parameter Design Optimization*. Wiley. ISBN 0-471-25511-4.
- 94 Xia, W., Lee, G. (2005). Complexity of Information Systems Development Projects: Conceptualization and Measurement Development, *Journal of Management Information Systems*. Summer 2005, 22 (1), 13-43.
- 95 Zalewska, A. (2003). *Two worlds - emotional and cognitive quality of life and their assessment. Conditions in people with high and low reactivity./In Polish: Dwa światy – emocjonalne i poznawcze oceny jakości życia i ich uwarunkowania u osób o wysokiej i niskiej reaktywności*. Warszawa: Wydawnictwo Szkoły Wyższej Psychologii Społecznej ACADEMICA.
- 96 Zalewski, J., & Gonzalez, F. (2017). Evolution in the Education of Software Engineers: Online Course on Cyberphysical Systems with Remote Access to Robotic Devices. *International Journal of Online Engineering*, 13(8).

### About this book

The monograph is a compilation analysis of Jolanta Kowal's publications which focus on business competencies, organizational ethics, job, and life satisfaction among information technology (IT) professionals, as well as on various models that describe the relations between these factors. By applying the compilation analysis, The Author has constructed several models of dependence between organizational and personal factors in forecasting the quality of life and job satisfaction among IT employees. The proposed models contribute to the development of science in the field of psycho-social aspects of innovation, organizational potential, and organizational ethics. These models focus on micro and small enterprises, and were constructed by extensive research of Polish, German and Indian companies. Jolanta Kowal's publications are part of a research stream on human capital, and, on intangible dimensions of motivation systems, such as job satisfaction, belief in the quality of life, and work-life balance. Moreover, Jolanta Kowal's research is also focused on the field of intellectual capital, and especially, on the predispositions to make innovations, ethical competences, the ability to communicate and the theory of mind. These aspects were examined by considering the IT dimension and competence to use IT systems...