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Dear "e-mentor" readers,

It is my great pleasure to present the newest collection of papers. The diversity of the topics in the current volume reflects the ubiquity of technological progress. Among others, you will learn how modern technologies enable deaf people to take an active part in surveys, how students and graduates perceive the potential usefulness of Artificial Intelligence (AI) in the academic curricula of Finance and Accounting Courses, how open source software supports the implementation of social innovation in SMEs, and about the impact of remote work, resulting from the COVID-19 pandemic, on the functioning of Scrum teams.

Moreover, you can also read about the development of public policy on city center revitalization based on the Town Centre Management concept, the importance of structural capital for the intellectual capital of an organization, the process of building a personal brand by managers in service companies, and about more education-related problems: the usefulness of podcasts in improving English listening comprehension for university students and key competencies in the labour market from the perspective of higher education students. I strongly believe that this collection of papers will satisfy everyone interested in modern trends in education and management worldwide.

Appreciating the invaluable role of reviewers in the process of delivering the best quality papers, I wish to acknowledge the contributions of all of close to one hundred Professors and Experts who cooperated with us throughout 2021:

Magdalena Andrzejewska, Christoph Bach, Jeremy Bachelor, Ufuk Balaman, Przemysław Banasik, Jan Barski, Bartłomiej Biga, Piotr Bołtuć, Dominika P. Brodowicz, Jan Brzóska, Agnieszka Budziewicz-Guźlecka, Beata Bugajska, Wojciech Cellary, Nadia Cheikhrouhou, Ewa Chmielecka, Vickie S. Cook, Adam Czerwiński, Patrick Dougherty, Wojciech Dyduch, Monika Eisenbardt, Osveh Esmaeelinezhad, Artur Fabiś, Jorge Tenorio Fernando, Bartłomiej Gabryś, Beata Gałan, Tomasz Gigol, Agnieszka Huterska, Ewa Jagodzińska-Komar, Joanna Jatkowska, Jan Amos Jelinek, Agnieszka Kampka, Hanna Klimek, Adam Koliński, Michael A. Kolitsky, Rita Koris, Jan Kruszewski, Wojciech Kurowski, Wioletta Kwiatkowska, Agnieszka Landowska, Krzysztof Leja, Regina Lenart-Gansiniec, Faye L. Lesht, Anna Leszczyńska-Rejchert, Anna Lis, Kinga Łazuga, Joanna Łukasiewicz-Wieleba, Joanna Małocha, Katarzyna Mikołajczyk, Bogusz Mikuła, Jerzy M. Mischke, Rafał Mrówka, Dick Ng'ambi, Małgorzata Niklewicz-Pijaczyńska, Hanna Nowak, Anna Para, Justyna Pawłowska, Marcin Piekarczyk, Jana Pieriegud, Anna Pietruszka-Ortyl, Piotr Pietrzak, Dariusz Piotrowski, Jarosław Plichta, Monika Płaziak, Lidia Pokrzycka, Daniel Puciato, Irena Pulak, Marek Rocki, Anna Rogala, Aleksandra Rudawska, Izabela Rudzka, Małgorzata Skibińska, Agnieszka Marta Sokołowska-Durkalec, Monika Sońta, Seweryn Spałek, Mariusz Strojny, Agata Sudolska, Zofia Szarota, Anna Szkolak-Stępień, Dorina Tila, Łukasz Tomczyk, Maciej Walczak, Piotr Walecki, Sławomir Wawak, Jan Wiktor, Sławomir Winch, Lidia Wiśniewska-Nogaj, Agnieszka Włoch-Szymla, Krzysztof Woźniak, Magdalena Wysocka, Przemysław Zbierowski, Jolanta Zielińska, Marta Znajmiecka, Michał Zubek, Joanna Żukowska, and Małgorzata Żytko.

They represent over 40 different institutions:

AGH University of Science and Technology, Akita International University (Japan), Amirkabir University of Technology (Iran), Budapest Business School (Hungary), City University of New York (USA), Comenius University in Bratislava (Slovak Republic), Cracow University of Economics, Excelsior College (USA), Hacettepe University (Turkey), HafenCity Universitat Hamburg (Germany), Heartland Community College (USA), Higher Institute of Technological Studies of Beja (Tunisia), Jagiellonian University, Jesuit University Ignatianum, Kazimierz Wielki University, Kozminski University, Maria Curie-Sklodowska University, Maritime University of Szczecin, Nicolaus Copernicus University in Toruń, Pedagogical University of Krakow, Pontifical University of John Paul II in Krakow, Poznan School of Logistics, Poznań University of Economics and Business, SGH Warsaw School of Economics, Silesian University of Technology, São Paulo State Tech College (FATEC) (Brazil), The Maria Grzegorzewska University, University of Cape Town (RSA), University of Economics in Katowice, University of Illinois Springfield (USA), University of Lodz, University of Opole, University of Silesia, University of Szczecin, University of Texas at El Paso (USA), University of Warmia and Mazury, University of Warsaw, University of Wrocław, Warsaw University of Life Sciences, Wroclaw University of Economics and Business, WSB University in Wrocław.

The growing number of reviewers from all over the world is a result of the "e-mentor" successful struggle for internationalization. At the same time, our constant effort is to create the opportunity for authors with different backgrounds to share their ideas and academic outcomes. "E-mentor" is an open-access journal available for free both online and in printed form. All scientific papers are peer-reviewed. Every article gets its individual DOI registered in Crossref, and the journal is indexed in several global databases, including Web of Science ESCI and EBSCO. There is no publishing fee for the authors. More detailed instructions are available online at http://www.e-mentor.edu.pl/eng/page/8/Info_for_Authors. If you have any questions concerning the publications in "e-mentor", please contact the editorial team at redakcja@e-mentor.edu.pl.

Małgorzata Marchewka
Editor

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Deaf-friendly research – conducting research using an electronic questionnaire

Abstract

A non-exclusive approach in conducting survey-based research which assumes the participation of people with disabilities is one of the important ethical aspects of the research process. The use of the tool, which has been designed in accordance with the universal user-oriented design, makes it possible for people with disabilities to take an active part in surveys. This means that they can present their attitudes and express opinions within the conducted surveys.

The aim of the article is to present the issue of conducting surveys using an electronic questionnaire among deaf people, modelled on the *Avatar PJM* project. People with a hearing impairment, whose first or primary language used for communication is a sign language, should be given a questionnaire in an appropriate form enabling them to complete it easily. The discussed project presents a proposal to construct a questionnaire using the LimeSurvey software. The questionnaire has been adapted to the needs and expectations of the recipient group. The presented solution for designing a user-friendly research tool can be used in other types of research in this group of respondents (e.g. industrial or educational research) or can become an inspiration for further research in this field.

Keywords: electronic questionnaire, Deaf-friendly research, universal user-oriented design, surveys, *Avatar* project

Introduction

Universal Access assumes the right to equal access to Information Technologies for *all* regardless of age, experience, cultural background or disability. It is a perspective that 'recognizes, respects, values, and attempts to accommodate a very wide range of human abilities, skills, requirements, and preferences in the design of computer-based products and operating environments' (Stephanidis & Savidis, 2001, p. 41). In that sense, a well-designed product is usable by anyone, anywhere, at any time, to the greatest extent possible, without the need for *a posteriori* adaptation or specialized design (Connell et al., 1997). It also eliminates the need for additional "special features". The main aim of Universal Access is to undertake systematic efforts to prevent the exclusion of certain users from the information society. On the other hand, it provides a technological substratum for eInclusion in this society, understood as the process of engaging and involving many diverse individuals and cultural or national groups who should help shape and determine technological outcomes (Stephanidis, 2009).

The knowledge and experience derived from such an approach can be applied in the process of equitable inclusion in survey-based research of people who have been excluded so far or who could not be full partners in research, or full-fledged research participants. Therefore, Universal Access can be an approach that supports and provides space for the inclusion in conducting academic research of various minority groups or groups of people with disabilities. We want to present the adoption of the Universal Access approach based on the example of developing a research tool in the form of

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a survey dedicated to deaf[1] people, i.e. those who are classified as people with disabilities and as a linguistic and cultural minority. In the article we will present the implementation of a computerized video questionnaire accessible in the Polish Sign Language in the *Avatar PJM* project. The solutions used in the project may be implemented and duplicated in small-scale research projects dedicated solely to deaf respondents or in studies of wider populations including such minority groups as the Deaf community.

In this paper, we explore the theoretical assumptions as to how representatives of the Deaf community can participate and get involved in academic research. We discuss types of survey research and the possibility for people who use a sign language as their preferred language for communication to take part in it. These indications correspond to the research project, conducted in 2019–2020, on the possibilities of increasing the readability of statements in the Polish Sign Language using an animated virtual character (avatar), in which we have adapted the survey research tool to make the survey fully accessible to deaf people.

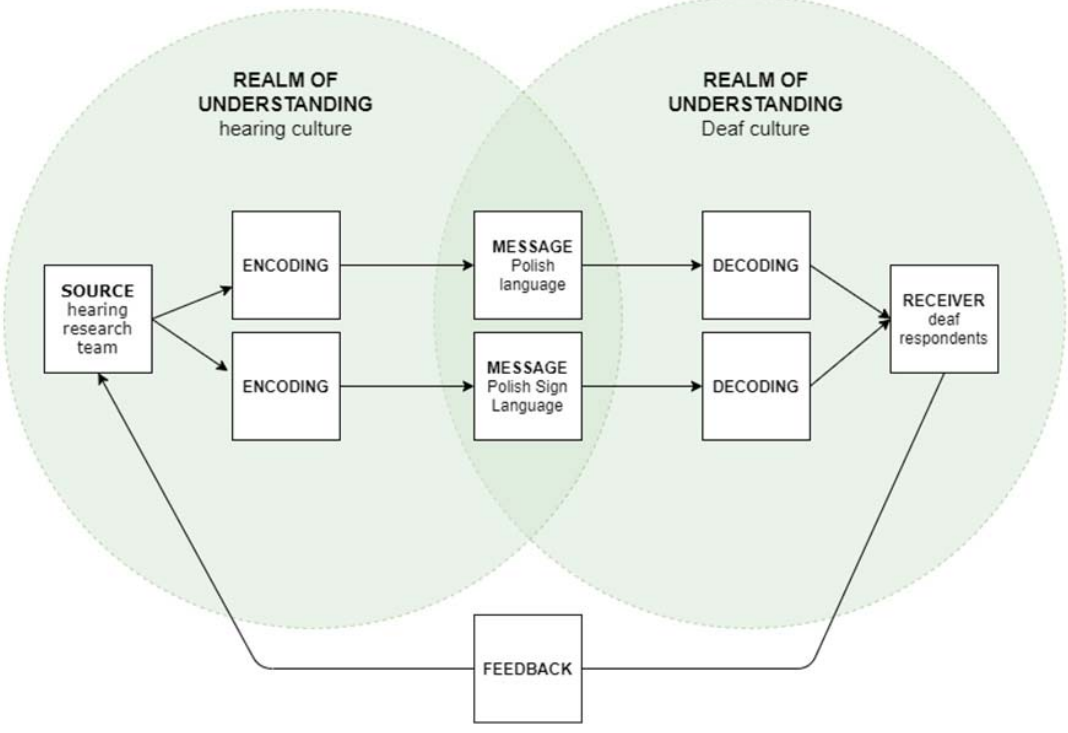
Universal user-oriented design

Today's information society is based on information which is widely used in everyday social, cultural, business and political, life (Krzysztofek & Szczepański, 2005). In such a society, efficient information flow is indispensable, along with its collection and processing (Babik, 2015). Hence quick information transfer should ensure that the information is available in different forms, so that any person can obtain it in any conditions.

Language is for communication, i.e. transferring information. Here the communication process takes place between the sender conveying a message and the message receiver. Communication should be a two-way process during which information is exchanged, and the message is understandable to both parties and free from information noise (interference) or information barriers (restrictions).

The article is focused on the description of the applied tool intended to provide proper transmission of information during the questionnaire-based survey

Figure 1
Model of communication process in Avatar PJM project



Source: produced by the author based on *Marketing communications: discovery, creation and conversations* (p. 41), C. Fill & S. Turnbull, 2016, Pearson.

[1] We use the capital D to refer to people whose first or preferred language is a visual sign, and who identify themselves with and are actively engaged with the Deaf community. We use the lower-case d to describe all kinds of deaf persons, including those who are hard of hearing. This does not mean "oral/medical" but rather biologically/corporally deaf. We use the term d/Deaf when the distinction between these categories of deaf and Deaf is unclear and is not obvious (Kusters et al., 2017; O'Brien & Emery, 2014).

in the selected group of recipients, i.e. the deaf. The research methodology requires suitable information exchange, in the sense of proper communication throughout the period when the survey is conducted. If the survey makes use of a tool, e.g. a questionnaire, the tool should be adapted to and understandable for the recipients. Deaf people are a group of survey recipients to whom the message has to be conveyed in a language they understand.

In order to provide proper information flow during the survey, the challenge faced by the project team was to prepare it in such a way that the communication and information barriers could be overcome, while the information noise, causing certain restrictions to the survey, could be avoided.

"Technological advances related to multimedia frameworks have transformed the ways in which users interact with and access all types of content" (Fonseca, 2015, p. 307). In order to properly design the tool for conducting surveys in the group of deaf people, the project team focused on elements which are important in communication with and between the deaf. Other points of focus were issues and hints for the development of Human-Computer Interaction (see Kostrubała, 2013) and the User-Centered Design (UCD) (see Garrett, 2011), including the usability and accessibility of the tool for the user. Interactive systems play an important role in today's world. Examples of IT solutions are application software, web applications, Internet portals, games, and educational and entertainment applications. Marek Sikorski (2017) emphasizes that the user's satisfaction from a given solution lies in its usability and handling ease. The quality of a given IT product is also perceived with respect to how the user-system interaction is designed, i.e. the user interface ensuring communication with the computer (p. 22). A badly designed interface may cause errors in the system operations and task completion, prolong the learning process, and result in the user's reluctance to work with the product. Therefore, while developing the product, one has to take into account factors such as understanding the users (learning their limitations, habits and customs) and understanding the requirements the product has to meet (context of use – needs, ergonomic criteria) (Sikorski, 2017).

Information which is conveyed in an easy-to-read form has to improve accessibility through more easily understandable text. It is more appropriate for different target groups (Heumader et al., 2020). Therefore, while preparing the questionnaire tool, the authors paid attention to the use of accessibility principles (WCAG, 2021) i.e. it is required to be Perceivable, Operable, Understandable and Robust (European Parliament, n.d.).

Diversity of the deaf

In terms of language and communication, the deaf constitute a non-homogeneous group. As Monaghan et al. (2003) wrote, 'there are many ways to be deaf'. The spectrum of individual communication styles extends across a continuum from the deaf who do not sign, and use only a spoken language, to the deaf who are sign language users, with a significantly limited knowledge of the spoken language.

Even so, sign languages are the primary means of communication for a portion of the deaf and hard-of-hearing communities. These groups in particular are at risk of being excluded from participation in scientific research in which data collection methods based on the national language in speech or writing are used. For many deaf people, a sign language is their first (*mother tongue*) or preferred language in communication. Spoken or written languages are often second languages and literacy levels among deaf signers vary in this respect (Lederberg et al., 2013; Napier et al., 2018). Therefore, the deaf as researchers or research participants are frequently underrepresented, because of the issues with different modalities in conducting research (signed, spoken, written) and the need of interpretation, transcription and translation (McKee et al., 2011; Young & Temple, 2014).

Beyond the issues of language knowledge and literacy, there are also additional considerations of *language preference*. It is possible to know two or more languages, but their mere knowledge does not mean the opportunity to participate in each or any of them in academic research. In the case of the Deaf community, it cannot be assumed that someone's knowledge of the spoken language, e.g. English, will be sufficient to participate in the study. Deaf people have various language preferences and the majority of them switch languages and match their chosen communication to the interlocutor, e.g. they sign with friends, sign or speak with their families and speak in official circumstances (public institutions, health care etc.) (National Deaf Center on Postsecondary Outcomes, 2019; Padden, 2000). Also, it is incorrect to assume that if a deaf person participates in the study, he or she will want to communicate in their sign language. In the case of bilingual or multilingual deaf people (who know at least one sign language and one spoken language) it may be inappropriate to conduct research only in a sign language, without giving the possibility to participate on an equal footing to those whose first language is a spoken one. Therefore, it will be necessary to retain the possibility of answering questions and collecting data in both languages (Young & Hunt, 2011).

Another case of possible exclusion of signing deaf participants from academic research is a situation in which it is conducted by hearing researchers who cannot sign and are not aware of the Deaf community's needs. This situation may result in conscious or unconscious marginalization or even systematic exclusion of deaf participants due to communication difficulties of hearing researchers who lack sign language skills, or due to no/insufficient funding to hire sign language interpreters (Napier et al., 2018).

The above-described issues of excluding the deaf from conducting and participating in academic research have their roots in historical isolation of the Deaf community from a variety of public activities

as a result of communication, cultural, social, and language barriers (McKee et al., 2013; see also Ladd, 2003; Lane, 1993). Therefore, being aware of the current changes in this area and the ongoing processes of including and opening up access to various areas of social life, we take the position that it is necessary to undertake conscious and systematic actions of including deaf people in research processes or their individual stages.

Deaf-friendly surveys

The role of deaf people in scientific research can be considered from two perspectives: deaf people as researchers and deaf people as research participants. In the first approach, it is satisfying that the number of deaf researchers in academia is growing. This increase does not concern only the area of research related to *Deaf studies* or sign languages, but also the humanities, social sciences and hard studies (Kusters et al., 2017). Nevertheless, in this article we would like to focus on issues related to the participation of deaf people in research as respondents and the changes in methodological procedures that make this research more *Deaf-friendly*, i.e. more inclusive and culturally appropriate (Singleton et al., 2015). Many ways are described in literature to adapt and adjust the research process to the needs of deaf people and thus increase the correctness of the conducted surveys. Among them are the following:

- interpretation of informed consent documents into a sign language in order to ensure that deaf participants with limited spoken language proficiency will comprehend them (McKee et al., 2013; Singleton et al., 2015; Singleton et al., 2014);
- ensuring confidentiality and anonymity of data recorded on the video while collecting the responses of deaf participants in a sign language (Singleton et al., 2014; Singleton et al., 2015);
- ensuring a proper physical environment in which the data are collected, for example guaranteeing appropriate room acoustics (no reverberation) for hearing aid users or proper lighting conditions for lip readers (avoiding situations where the light is dim or when it is placed behind the speaker) (Young & Hunt, 2011);
- maintaining visual accessibility and avoiding visual disturbances while conducting research with signing deaf participants. The sign language is based on visual modality, therefore it is necessary to ensure good mutual visibility of researchers and study participants for fluent and appropriate communication and smooth information flow (Hill, 2015; Young & Hunt, 2011);
- ensuring the presence of a sign language interpreter during research with signing deaf participants in a situation when the researcher does not sign at all or signs, but not well enough (*SLLS Ethics Statement for Sign Language Research*, 2016; Young & Hunt, 2011).

Another example of activities to increase the possibility of participation in the Deaf community-based research is modification of research tools and adjusting them to the language preferences of the respondents. In the past, surveys have mainly been conducted in writing, using sheets of paper, and were made during direct contact, the so-called PAPI System – Paper over Pencil Interview. Currently, some surveys still use this form. Since the 1980s, technological advances have transformed the way research data are collected and processed. New, more effective and less time-consuming techniques have been developed, such as: Computer-Assisted Telephone Interviewing (CATI, telephone version of PAPI); Computer-Assisted Personal Interviewing (CAPI, interviewers read the questions and enter the answers into laptops from which they are directly sent to the measurement center); Audio Computer-Assisted Self-Interviewing (ACASI, respondents read or listen to the computer questions and then enter the answers to it on their own. There is also a telephone version of this technique – T-ACASI); Computerized Self-Administered Questionnaires (CSAQ, where questionnaires are submitted as computer files). The latter has been almost completely replaced by Computer-Assisted Web Interviewing (CAWI) (Couper & Bosnjak, 2010; Wright & Marsden, 2010).

All these techniques have at least one thing in common – they exclude people with lower levels of literacy from taking part in them, therefore in certain types of research the representativeness of the research sample may be questioned. In such a situation, the level of understanding of the questions in the written-form questionnaire may be incomplete or inappropriate, especially in relation to the sublime scientific language (Napier et al., 2018). It is a mistake to assume that collecting data in written surveys is not an exclusion because it is independent of hearing ability (Young & Hunt, 2011). In fact, the lack of hearing has a negative effect on the level of literacy (Lederberg et al., 2013)

Modern technologies in the service of the deaf

Due to the rapid development of the Internet and the World Wide Web, the popularity of Internet research has grown significantly and is now widely used in various sectors of the research industry. Internet-based research may be the basic research method or be part of research that uses the triangulation of research methods. The attractiveness of Internet-based research is supported by the speed of data collection, even with a large number of respondents, and the relatively low costs of its implementation. In the context of the Deaf community, a definite advantage of Internet research is the possibility of using complex instruments with rich visual functions and dynamic elements (Bosch-Baliarda et al., 2019).

The advancement of information technology is conducive to the development of solutions that can

enable this group of respondents to participate in surveys and thus give them the opportunity to express their own opinions or share their experiences. Thanks to broadband Internet, web cameras, and modern software, it is possible to develop questionnaires with a sign language version in addition to a text version. It is also possible to save and collect responses provided only in a sign language (European Parliament, n.d.; National Deaf Center on Postsecondary Outcomes, 2019). Ofcourse, many rules still have to be followed and many aspects of using the technology have to be observed, such as: proper lighting, appropriate positioning of respondents in relation to the recording device, or the use of appropriate recording techniques. This is essential in order to ensure that research material is properly managed for further use and processing (Kushalnagar et al., 2017; Kusters et al., 2017).

Visual presentation of the questionnaire content and video recording enable research to be conducted in a sign language, taking into account its specificity and the cultural context in which it functions. It is a system of visual-gestural communication. It is articulated with the whole body of a signer, with the most important role played by hands. In sign language communication, non-manual signals, such as facial expressions, eye gaze, body leaning, head tilting, shoulder raising, mouthing, etc. and interpretation, are also very important as they are used as grammatical markers. Therefore, the ability to transmit and register these visual and motor nuances of expression is extremely important for the subsequent proper interpretation of the collected data in scientific research. Moreover, the sign language syntax possesses a unique characteristic: unlike the linear syntax of spoken languages, it allows for three-dimensionality. That means, as opposed to words of a spoken language, that sign language words can be articulated at different spatial positions (Lachner et al., 2015). This feature, along for example with the presence of metaphors in the sign language, which work a bit differently than they do in spoken languages (Ladd, 2003), causes that the utterances of the sign language users can be recorded, processed and transmitted only in the form of video recordings.

There is no doubt that the language of science and scientific communication is the spoken language, especially English, but modern technology allows us to open up to a completely new area of research conducted from the beginning to the end in a sign language.

There are different topic areas in which questionnaire-based surveys in the Deaf community are conducted. Some of them are dedicated exclusively to the Deaf because their topics are related to *Deaf studies* or to a sign language (see Kotowicz et al., 2020; Leeson et al., 2018). The remaining are about universal human issues when the researchers, due to various reasons, want to collect data from people with hearing disabilities too (see Kushalnagar et al., 2017).

The approaches to creating questionnaires with the use of sign languages are different too. Some are based on already existing questionnaires which are adapted accordingly in order to include the underrepresented group of deaf respondents in the survey (see Cornes & Brown, 2012; Graybill et al., 2010). Others are more innovative. Here the questionnaires are built from scratch and include the authors' original solutions as to how to implement a sign language into a survey tool (see Kushalnagar et al., 2017). There are also questionnaire-based surveys in which, similarly to our survey, questionnaires adapted to a sign language serve to evaluate signing avatars (see Ebling & Glauert, 2016; Kipp et al., 2011).

Avatar PJM project

The project "Research on Increasing the Readability of Expressions in Polish Sign Language by an Avatar" (Avatar PJM) (http://www.migowisko.pl/sztukamigania), was conducted by the EMAG Institute of Poland's Łukasiewicz Research Network (Ł-EMAG) (https://ibemag.pl/en). The project was financed by the State Fund for Rehabilitation of Disabled People in the open competition "Social and technological innovations in the process of disabled people activation". The survey was carried out in the voivodeship of Silesia, Poland, in the period 01.01.2019 – 29.02.2020 and involved 111 deaf participants.

The goal of the survey was to assess the efficiency of the Polish Sign Language (PSL) communication by an avatar and to identify features which, to the greatest extent, contribute to satisfactory reception and suitable comprehension of the communicated message. In addition, the survey allowed diagnosis and description of the preferences of the deaf as far as signing avatars are concerned. The reason to undertake the research was the need to develop a solution which would increase the readability of a signed message provided by an avatar and would contribute to the liquidation of social barriers towards the deaf by providing them with a tool supporting communication in their natural language. Looking further ahead, this research is meant to verify the possibilities of using avatars in information systems (in offices, railway/bus stations, public institutions websites) and to assess the possibilities of efficient integration of the signing avatar application with other IT systems.

The survey was conducted in three stages. In the first, preliminary, stage, we compared how the participants receive sign-language messages provided by a human interpreter as opposed to an avatar. During the second stage, a 3D model of the avatar was made, along with animation considering additional, diagnosed elements which improve the sign-language reception. In the third stage, we verified the reception of the animation which was equipped with extra elements improving sign-language comprehension. The results of the conducted survey were intended to address the issues about the efficiency of avatar-signed presentations.

One of the tasks of the Ł-EMAG team was to prepare tools for the survey that focused on (1) comparing the

readability of the message in the Polish Sign Language provided by an avatar and by a human interpreter, and (2) comparing the readability of the message signed by the avatar before and after introducing the modifications that resulted from the implementation of readability-diagnosed features. This paper presents the survey tool – the questionnaire developed for research purposes.

Questionnaire structure

The challenge faced by the research team was to develop a tool that would make it possible to answer the questions and share opinions within the focus group composed of deaf people. The development concerned both the substantive scope of the questionnaire, i.e. adaptation of the contents, and technical issues, i.e. the usability and accessibility of the contents carrier. As far as the contents adaptation is concerned, the questions were formulated in a way making them easy to read (E2R) (Hartley, 2012) and easy to understand (Kools, 2012). From the technical point of view, the presented tool was unique on the Polish market, as the developed software, containing solutions for the deaf, made it possible to fill in questionnaires in two languages: the Polish language and the Polish Sign Language.

The first step and the scientific basis of the research was a literature survey on the possibility to develop IT systems for sign-language interpretation all over the world. Additionally, the team analyzed different publications to assess the state of the art in the field of avatar construction, and possibilities of presenting the sign language both in the form of avatars and in the form of video-recorded human interpreters. The key issue was to identify, based on the analyzed literature, the language and communication abilities and needs of the deaf with respect to scientific research.

Based on the literature survey, some factors were identified which impact the accessibility of electronic questionnaires available on the Internet and dedicated to people with hearing disabilities. These are factors aimed at increasing the efficiency and methodological accuracy of data collection. In terms of the tool availability through a web page, two concepts were applied: User Experience Design (Brejcha, 2015; Lachner et al., 2015; Marcus, 2006) and Usage-Centered Design (Windl & Heimgärtner, 2013). These concepts were analyzed in terms of differences and similarities which occur, or may occur, between the users from the Deaf community culture and those from the hearing majority. What proved to be useful while preparing a personalized deaf-oriented questionnaire was practical hints on the usability of web pages. These hints were followed to make the proposed tool useful and to ensure positive experience on the user's side (Krug, 2014; Nielsen & Loranger, 2006).

Based on the literature survey and the experience gained during previous projects, a number of aspects were recognized as indispensable in the developed tool. One of the key decisions which affected further work on the tool design and development was to guarantee physical and sensual accessibility of the questionnaire for deaf people (see: deafness medical model) and to consider cultural differences (see: deafness culture-linguistic model, Ladd, 2003). Thus it was decided to provide the contents both in Polish and in the Polish Sign Language in order to increase accessibility and avoid linguistic and cultural biases. Moreover, it was necessary to offer an interface which met the varied needs of users. Here the focus was on the applied colors and fonts.

As far as the Polish language content is concerned, it was stressed that the questions and answers should be formulated in plain language which, on one hand, rendered the text legible and understandable and on the other hand did not raise difficulties during interpretation into sign language. Such an approach ensured that language equivalents in PSL could be found. It also lowered the risk of misrepresentation of the questionnaire contents, depending on the language in which it was conducted. Hence, this approach increased the credibility of the collected data. In addition, regarding the sign-language text, a native signer was employed to interpret the text and sign it in the questionnaire video recordings. A native signer has an ability to place the interpreted and signed contents in the cultural context of the Deaf. This way, the signed message does not become devoid of linguistic and cultural nuances which may be crucial for the research results. Both in the Polish language and the Polish Sign Language, it was necessary to guarantee proper visibility and readability of questions and answers and to prepare precise instructions on how to fill in the questionnaire or submit particular answers (detailed solutions in this regard will be discussed further in the paper).

Another group of factors impacting questionnaire accessibility were the issues related to videos with sign-language content, content structure, and navigation of the questionnaire elements. The key task in this respect was the implementation of the questionnaire signed version into the software tool in a way that would ensure its accessibility and readability.

Bearing in mind the above issues, the LimeSurvey system was chosen as the basic tool for drawing up the questionnaire. LimeSurvey (https://www.limesurvey.org/en/) is a web-based questionnaire system, distributed as open-source software, written in the PHP language. The decision to use the already existing software, which can be adapted, was made based on the fact that LimeSurvey has many useful functionalities, such as the possibility to create questionnaires according to different layouts and with different types of questions, to choose from different templates for the most convenient interface adaptations, to edit the contents using the WYSIWYG HTML editor, and to take advantage of easy import and export of questions. This system had been already used by the Ł-EMAG team in previous research projects, including those concerning increasing the accessibility of persons with disabilities to different services. The work

with the system began with analysis of the original template code available in the administration panel and development tools of LimeSurvey (see Figure 2). A detailed analysis and greater familiarity with the original template code structure made it possible to define a group of questions which would have to be modified for the purposes of the developed questionnaire. The size of the window (according to the selected template), in which the questions and answers were presented, limited the volume of displayable text. Another factor limiting the text volume was the necessity to place extra components related to sign language. This in turn meant that the contents of the questions and the number of possible answers had to be limited. Some questions were split into two (or more) or rephrased.

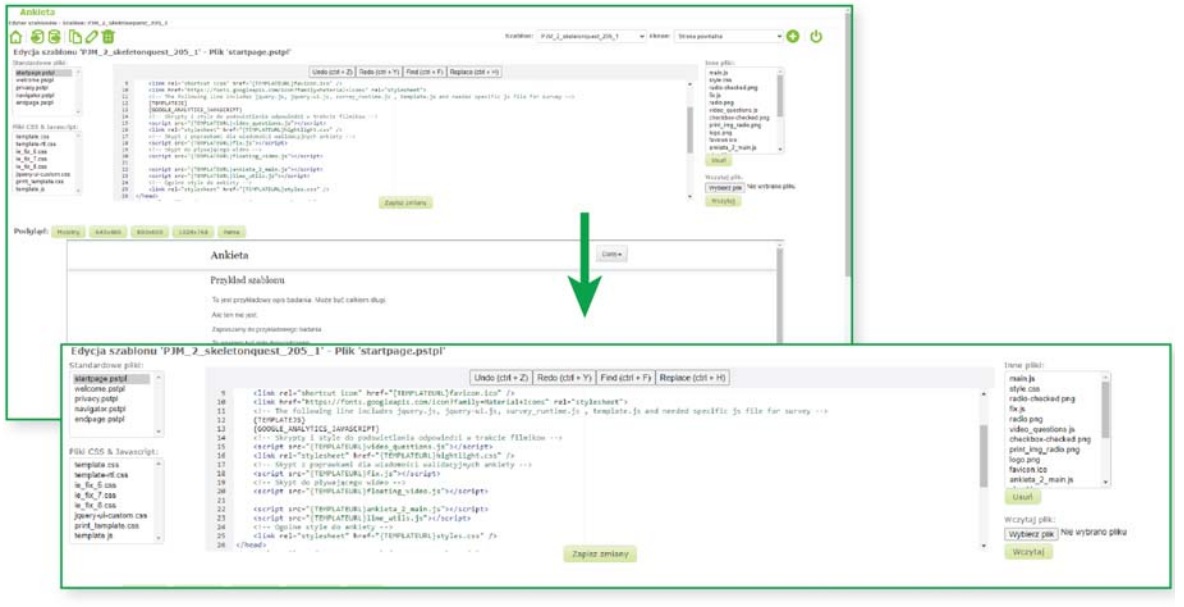
Therefore, providing a tool accessible to deaf signers required, on one hand, selection of a proper interface style with already implemented accessibility solutions. On the other hand, this interface had to be equipped with certain specific elements that met the needs of the deaf and was compatible with the questionnaire-based survey employed in the *Avatar PJM* project.

The selected and applied solutions were divided into several areas. As far as navigation is concerned, we pointed out easy-to-use and intuitive elements that should be available regardless of the user's experience or language abilities. Such elements were one question per page of the questionnaire, and easy navigation between the questionnaire pages/questions by means of clearly visible buttons "next" and "return". A function displaying progress as a percentage of questions answered helped with orientation in the questionnaire. The crucial issue was to provide precise and short instructions in the form of short messages about the necessity to answer a question in order to proceed to the next one, or about the number of answers possible (one or multiple). These messages minimized the risk of unintentional action and improved the questionnaire completion process.

While working on video material, it was important to ensure perceptibility of information, meaning that the information could be conveyed regardless of the ambient conditions or sensory abilities of the user. It was assumed that the group of respondents might include older people with sight dysfunctions or low concentration levels. In this respect, solutions were provided such as the possibility to zoom in/out from the multimedia window, or to pause and replay the video. In order to increase the "readability" of videos with signed contents, proper contrasts were ensured, i.e. dark clothes of the interpreter improving the visibility of moving hands, and a neutral one-color background.

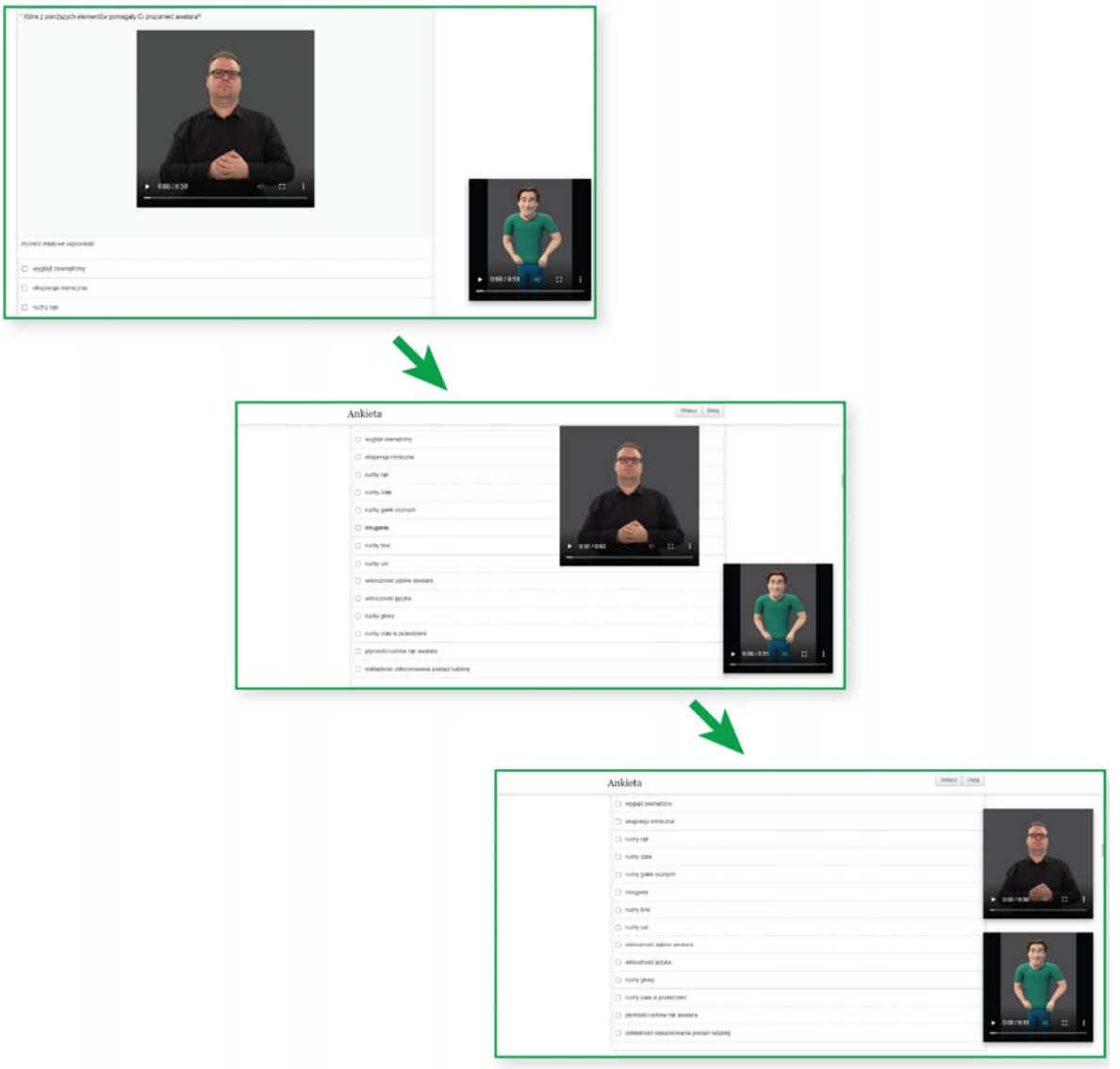
Regarding the content layout on the screen, some solutions were provided to enable comfortable and efficient use of the questionnaire with minimum mental effort. A new function was developed to move the video forward and backward, making the video information accompanying questions with multiple-choice answers readable and comprehensible. In questions with a long cafeteria of possible answers that required scrolling, the video window with the sign-language interpreter was relocated in such a way that the respondent could see each answer without missing the provided video information (see Figure 3).

Figure 2
Development tool



Source: authors' own work.

Figure 3
Relocated video with a sign-language interpreter

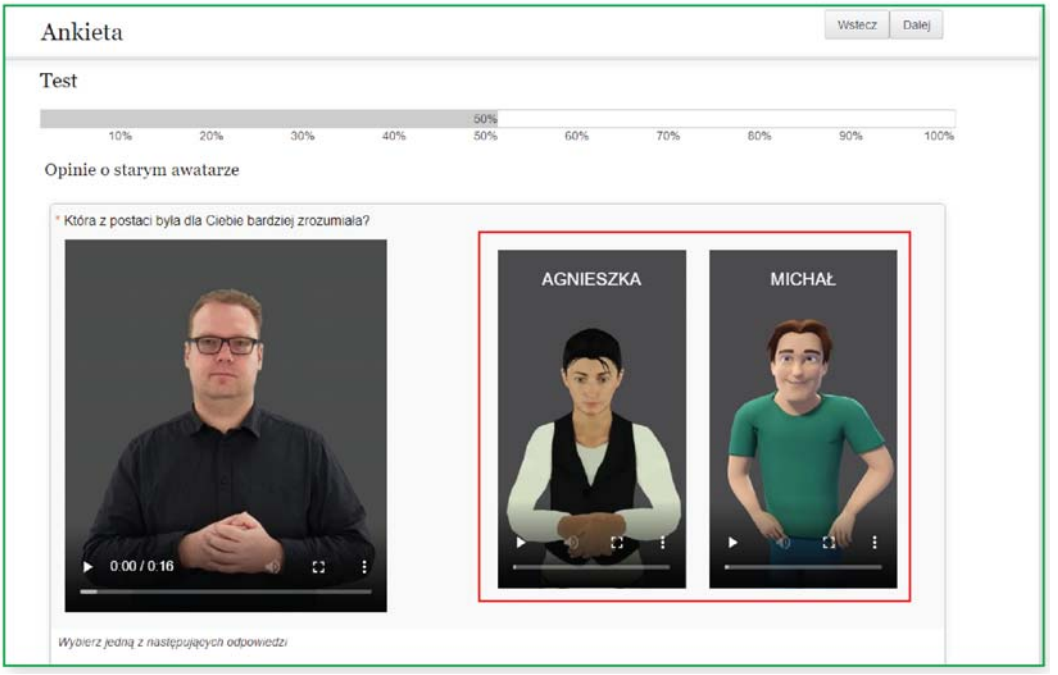


Source: authors' own work.

Due to a specific feature of the project, i.e. the evaluation of readability of the signing avatar, it was decided that the evaluated item (video with the signing avatar) should be visible to the respondent at the beginning of the questionnaire and throughout its duration, as a hint. Where three videos were provided (one explaining the questionnaire contents and the other two being the items to be compared and evaluated), they were laid out in such a way that the user could see each of them in a readable form, in one line, and the videos to be evaluated were separated from the one with the sign-language interpreter (see Figure 4).

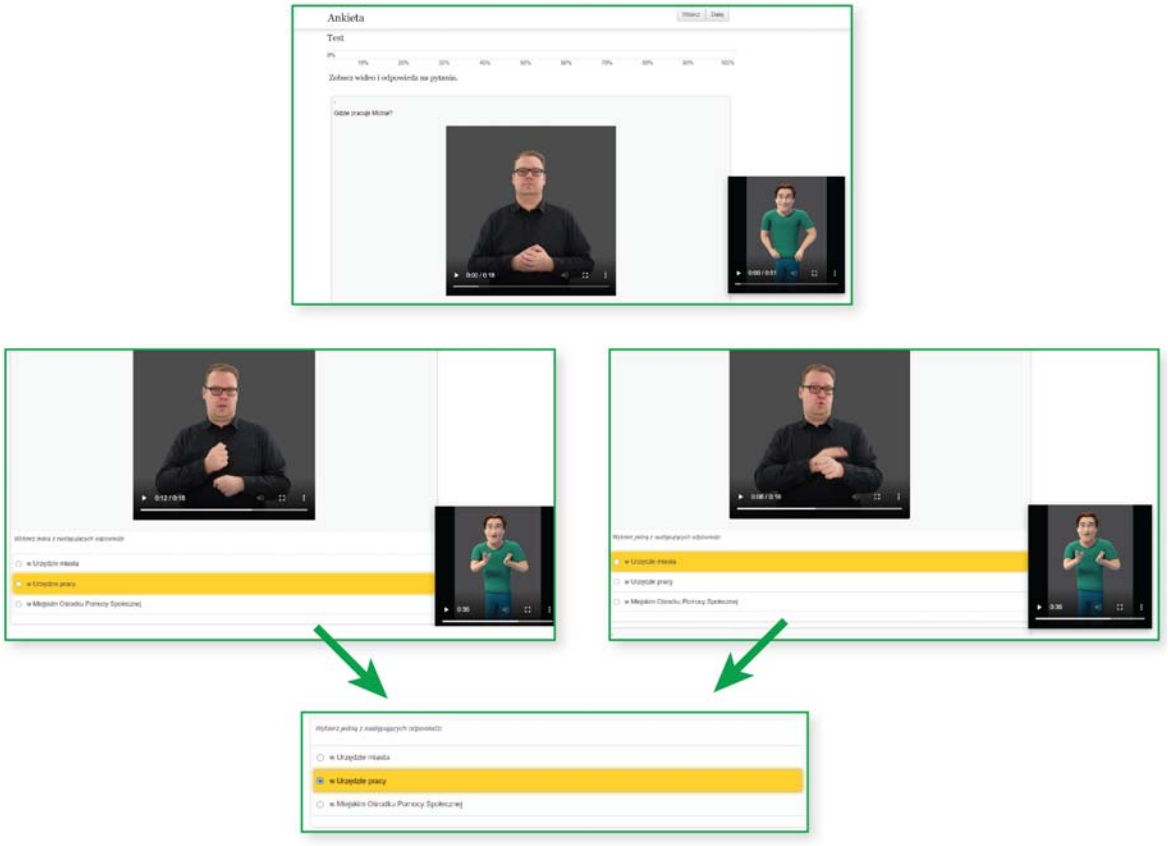
The questionnaire prepared by the Ł-EMAG team could be classified as a one-clip layout for a cross-modal bilingual VSL questionnaire, i.e. the category described by Bosch-Baliarda, Vilageliu and Orero in (Bosch-Baliarda et al., 2019), with separate sign-language videos for each question and only one question displayed per page. However, an extra functionality was developed and implemented regarding the content compatibility between the Polish Sign Language and the Polish language. This was the function highlighting the answer in Polish at the time it was conveyed in PSL in the video clip (see Figure 5). The synchronization of the video and the text was provided on the basis of an additional file with subtitles of the questionnaire contents. The file contained time markers in the video which corresponded to the relevant items of the questionnaire. Thus the questionnaire item which was presented in the sign language at that time was highlighted precisely. Implementing such an original proprietary modification into the already existing LimeSurvey tool meant that two languages could be integrated. It also helped to

Figure 4
The videos to be evaluated and the videos with the sign-language interpreter



Source: authors' own work.

Figure 5
Video with a sign language interpreter combined with highlighted Polish language answers



Source: authors' own work.

prevent any group of users, either using the Polish language or the Polish Sign Language, from being embarrassed or branded.

In-depth interviews with the deaf concerning the researched problem were also an integral part of the survey. Therefore, the discussed questionnaire featured closed questions and the authors decided not to implement the functionality of adding sign language answers by means of a video registration tool. The questionnaire-based survey was the starting point for interviews, making it possible to collect various data that could better exemplify the issue of the readability of a message in PSL presented by the avatar.

Conclusions

Thanks to the use of equitable access and active participation rules, derived from the concept of Universal Access in research tool development, the constructed questionnaire enabled the respondents, i.e. the deaf using a sign language, to provide unassisted and autonomous answers to the questions. One of the elements that distinguish the questionnaire created by Ł-EMAG, at least in the Polish conditions, is the use of videos in a language comprehensible to the respondents (Polish Sign Language), where each text translated into sign language on the video was time-matched with the highlighted text in the Polish language. This enabled deaf bi-lingual people, or the deaf with a very good command of Polish, to switch between languages while filling in the questionnaire. This advantage is remarkable due to the fact that it is difficult to achieve full equivalence in translation between two languages (Dotter, 2000; Janzen, 2005) and any mistakes or false interpretations in this respect may undermine the quality of the collected data and research results.

In the tests presented in this paper, the questionnaire tool was used to verify how accurately deaf people who use sign language every day understood the Polish Sign Language avatar. By answering more detailed questions, the deaf respondents could also give their opinions on the avatar's features, i.e. which of them were designed properly and which required some improvement. The respondents answered properly over 80% of questions intended to verify the understanding of the message conveyed by the avatar in the sign language. This is a good result as to the respondents' understanding of the contents of both the questions and possible answers to these questions. Some preliminary conclusions about the efficiency of using the tool for research purposes can be drawn. It seems justifiable to continue monitoring the level of satisfaction of deaf respondents using the Deaf-friendly tool. Therefore evaluation tests concerning the tool itself need to be developed in order to check such features as easy operation of the tool, its usability, or weak points that require improvement.

Based on the conducted survey, it is possible to draw some conclusions that can serve as know-how while carrying out similar questionnaire-based research. Surveys based on Deaf-friendly questionnaires can easily be distributed in the Deaf community and, thanks to technological facilitators, can be filled in quickly. However, the main work load is assigned to the preparatory stage, which is much more time-consuming than only preparing a monolingual, written version of the tool. What is more, it is necessary to have proper technological assets, i.e. hardware and software, and human assets, i.e. interpreters or native signers.

The survey was addressed to the Deaf community as respondents. Still, we believe that the tool developed for research purposes can be used in other, mainstream studies, in which the deaf are only a part of the focus group, or studies conducted at a point of convergence of the hearing and the Deaf worlds, for example when examining sign-speech bilingualism. Surveys conducted on the basis of an analogical tool address the requirements of ethical standards, which stipulate that collecting data from respondents should be done in their preferred language and suitable linguistic modality. We are positive about the fact that they contribute to building an inclusive approach in scientific research practice and indicate specific methodological solutions for the development of the scientific theory in this field.

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The students' and graduates' perception of the potential usefulness of Artificial Intelligence (AI) in the academic curricula of Finance and Accounting Courses

Abstract

The application of computer-based technologies in academic education has at least three decades of history and experience. In some study fields, it has been present since the very beginning, while in others it has become a necessity only in recent years. The ongoing technological revolution is disrupting the traditional professions with fundamental changes and – in some cases – even with the threat of disappearance of jobs. The finance and accounting professions are expected to undergo a technological change in the near future. While the changes are visible at the corporate level, university education seems to lag one step behind. We conducted a study among the students and graduates of the finance and accounting line of studies at the Cracow University of Economics. Using regression analysis, we investigate the perception of the usefulness of courses providing knowledge on new technologies like Artificial Intelligence (AI). We use a unique Polish setting, which is a leader in terms of outsourcing services. Our findings show that both students and graduates are aware of the importance of technological change. The courses teaching basic subjects are essential, but the current expectations are much higher in terms of the application of new technology based on AI in finance and accounting.

Keywords: higher education, finance and accounting education, student preferences, university curricula, Artificial Intelligence

Introduction

The technological revolution is disrupting traditional professions with fundamental change and, in some cases, even with the threat of evaporation. In some sectors, computer-based technologies are well established, while in others, rapid progress has just gained momentum (OECD, 2017). This applies for instance to engineering, management, health services (doctors), pharmacy, security services, retail services, the military sector (soldiers), and accounting and finance. A very important element of support in this aspect is academic education, which may embrace the change and prepare the younger generation for future challenges. For example, engineering studies have been based for many years on computer technologies. In the case of other study fields like finance and accounting, the exploitation of computer-based technologies, especially Artificial Intelligence (AI)-related courses, has not been extensive so far. However, this is deemed to be changed as skills related to AI appear to be in demand across many sectors of the economy.

We have chosen education aimed at finance and accounting professions as our focal point because it is expected to undergo fundamental technological changes in the near future. The role of new technologies, especially Artificial Intelligence, is raised in this context by many experts (Goldstein, 2005; Hwang et al., 2020; Yap & Drye, 2018; Zawacki-Richter et al., 2019). Consequently, the requirements of employers

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regarding the expected competencies and skills of job applicants are changing. As indicated by Squicciarini and Nachtigall (2021), the sector of "Financial and Insurance Activities" (together with "Information and Communication" and "Professional, Scientific and Technical Activities") is among the most AI-intensive jobs.

Unfortunately, higher education curricula lag behind this change. As the EU reports on education prospects, while universities enhance their graduates' employability, their curricula tend to adapt slowly to the labour market's changing needs (European Commission, 2012, 2018). University policymakers often underestimate the importance of technological change. They are sometimes unaware of which technology, skills, and competencies are or will be crucial in the near future for a given profession and related field of study. We aim to identify key computer-based technologies which are not yet but should be adopted in the university curricula in the context of finance and accounting courses. We are doing this by preparing and analyzing the questionnaire performed on current students and graduates of the Cracow University of Economics. We compare the current students and graduates' results to show how the perception has changed after several years of working experience. We assume the graduates' professional experience may reveal the shortcomings of academic curricula regarding the requirements of accounting and finance professions. Graduates' perception is also a good signpost showing which competencies and skills are the most needed in the labour market but were not provided in the university curricula.

Firstly, we conjecture that graduates with a long professional experience working in the international environment are more inclined to seek knowledge on the newest technologies. For that reason, we have chosen AI as the most modern and revolutionary technology, encompassing numerous subcategories of technology. Secondly, we hypothesize that graduates are more inclined to learn about AI than current students. In the same vein, the results suggest that graduates appreciate more knowledge and skills on AI technology in comparison to students.

The study focuses on students and graduates' perspectives, whether technological change is necessary, and how it should be reflected in the university curriculum. Al-Htaybat et al. (2018) performed a similar study in terms of the concept. However, it was based on educators' perceptions. We extend this line of reasoning by adding the students and graduates' perspectives.

The paper is organized as follows. We start with a literature review describing key technologies related to the accounting and finance profession. This is followed by the relevant theories in the context of implementing AI technologies in the university curricula. Next, we present sample selection, research design, and results, and we conclude the paper by presenting discussion points and closing remarks.

New technologies driving fundamental change in the accounting and finance professions

The accounting and finance professions are undergoing fundamental changes driven by many factors, one of which is the emergence and application of new technologies. Interviews with finance and accounting graduates and conducted questionnaires show that some of them appear repeatedly. Expert systems, robotics, machine learning, big data, data mining, and artificial intelligence are the terms mentioned most often. In the academic curricula, in terms of technology, what can be found are computer spreadsheets (i.e. MS Excel) and expert systems, but rarely any other new computer-based technology. Spreadsheets and expert systems are well known in education and do not need additional explanation. The other terms are not easily defined, and sometimes the difference is difficult to grasp. We have defined those terms from the perspective of their applications in the accounting and finance professions.

AI is defined as the process through which computers and programs perform tasks by simulating intelligent human behaviours by learning from experience and adjusting to new information. Vetter (2021) notes that AI is a term of broad meaning. Literature differentiates between broad and narrow AI. To date *broad AI* is still at the theoretical or even sci-fi level. In the *narrow* sense, AI refers to computers' ability to perform specific tasks and the aim of increasing organizational efficiency through automation. The most frequently cited examples of AI applications demonstrated in literature (Duan et al., 2019) are decision-making, analysis, estimation, judgments, predictions, natural language processing, recommendation, and inference. Nowadays, the main "product" of AI is *intelligent services*, simulating human behaviour (Hwang et al., 2020). These are used in such distant fields as medicine and financial services.

Patrick (2020) provides the following example of a simple calculator and image-recognition technology to understand the essential principle of AI. The calculator performs simple mathematical calculations and, by doing that, emulates human behaviour and potentially meets the definition of AI. However, a human must provide input and select a proper function to perform calculations. In the case of image-recognition technology, the AI program scans a parking lot, differentiates between cars and motorcycles, and provides accurate counts of each category. The task requires identifying the shapes and characteristics of the vehicles, so it involves intelligent decision-making. Petkov (2020) formulates the definition of AI from the accounting perspective as a system that can perform some of the accounting tasks normally requiring human intelligence. The main job of AI in accounting is to learn from company operations. Based on that, AI is expected to identify, sort and process information aimed at forming accounting judgments and estimates, which forms a decision-making process.

Nowadays, AI technology is gaining momentum in transforming business, providing even more useful technologies like AI security, the democratization of technology, hyper-automation and deep learning techniques like image recognition, voice recognition, and natural language processing. Some of them are of special importance for accounting and finance, including machine learning, robotics, big data, etc., which can be perceived as derivation technologies growing out of the common core.

Importantly, AI is predicted to have a huge impact on the labour market, creating opportunities and threats to jobs. On the one hand, it is expected to complement individuals in some tasks and generate demand for new highly specialized jobs, but on the other, it is expected to replace humans in some operations, transform the system of work organization, and create challenges in terms of new skills and competencies expected from the employee. According to a PwC Report by Hawksworth et al. (2018), 30% of jobs across 29 studied countries will be at risk of automation by 2030. The sector breakdown presented in this report indicates that the financial and insurance industry is facing a significant risk of individuals being replaced by technologies. Analyzing the impact of automation on international job markets, Hawksworth et al. (2018) identify three waves. The first one – algorithmic wave (up until the early 2020s.) – is based on automation of basic computational tasks and simple analysis of structured data, which is expected to affect the financial services sector. The second – augmentation wave (up until the late 2020s.) – will affect clerical support and decision-making and robotic tasks in semi-controlled environments. The last – autonomous wave (up until the mid-2030s.) – is based on automation of manual tasks requiring dexterity and problem-solving tasks in a dynamic real-world situation, like construction and transportation. Different countries and industries are predicted to be affected by automation to varying degrees. Financial services stand out as a sector with a high potential for automation in the first wave. It will be exposed to the application of algorithms outperforming humans in a wide range of tasks, including pure data analysis. Differences between countries' potential job automation rates are determined mainly by the structure of the national economy and average level of education, with lower rates for Nordic and some East Asian countries, which already have a relatively high level of automation, and higher rates for Eastern European countries with less advanced industrial production.

Frey and Osborne (2017) assessed what recent technological progress based on computerization and AI is likely to mean for the future of employment in the United States. They ranked and categorized occupations according to their susceptibility to automation. Using a Gaussian process classifier, they estimated the probability of computerization of 702 detailed occupations in the US. According to their estimates, around 47% of total employment is in the high-risk category, which means that they could be automated over the next decade or two. Among jobs, the most susceptible for computerization are accountants and auditors as well as bookkeeping, accounting, and auditing clerks, with an estimated probability of 0.94 and 0.98, respectively. For other professions in the financial sector, the risk seems to be lower, for example an estimated probability of 0.016 for securities, commodities, and financial services sales agents; 0.069 for financial managers; 0.23 for financial analysts; and 0.33 for financial specialists.

Moreover, the authors provided evidence that the higher the level of education, the lower the risk of computerization. The truly important factor is the nature of employment. Computer substitution is highly probable when it comes to both cognitive and manual tasks, which are routine. At the same time, non-routine tasks are very difficult to replace (Autor et al., 2003). From this perspective, proper education is very important in making the least harmful technological change for the labour market. Academic curricula should address transformations that are predicted to reshape the future labour market. Adequate preparation of future employees and constant reskilling and retraining of the existing workforce are key functions of employers and educational institutions.

Robotics is another term for technology getting attention in accounting and finance. It is a subset of AI technology and is understood as robotic automation software solutions applied to repetitive tasks in finance and accounting departments (Ashok et al., 2019). Robotic Process Automation (RPA) and Robotic Desktop Automation (RDA) are employed to facilitate the processing of sales and financial transactions, managing data, preparing financial reports, monitoring, or communicating between different systems (Seasongood, 2016). RPA is designed for repetitive tasks, and does not involve contact with customers. It enables making of credit decisions, loan or insurance underwriting, payment processing, accounting data entry, or procurement. RDA is used in retail, call centres, and other operations, where an individual employee uses a dedicated robot. The main goal is to reduce the number of simple and repetitive tasks, allowing employees to allocate more time to more advanced and complex problems. Robotics allows bookkeeping automation, especially in repetitive human activities, to ensure accuracy and communication of financial information to key stakeholders. XBRL financial reporting language is one of the examples of its application.

Machine learning is technology which emerged from AI's core (Cho et al., 2020). It allows computers to learn without being explicitly programmed (Das et al., 2015). The technology is embodied in learning algorithms, which look at the data and automatically recognize patterns and trends, find documents, retrieve and process information, index documents, determine the appropriate accounting treatment, and analyze and predict market prices. Machine learning can improve the accuracy of accounting estimates (Cho et al., 2020) and construct better models in terms of predicting financial performance and bankruptcy (Bar-

boza et al., 2017; Qu et al., 2019). So far, at least several machine learning techniques have been applied to predict bankruptcy: multivariant discriminant analysis, logistics regression, the ensemble method, and neural networks (Qu et al., 2019). Other examples of machine learning are recommendations made by online stores like Amazon, Netflix, or Spotify (Patrick, 2020).

The Association to Advance Collegiate Schools of Business International (AACSB) and BIG-4 firms recommend integrating new technologies like Big Data or business analytics into the university curriculum (Sledgianowski et al., 2017), stating that they are crucial in audit, tax, risk management, consulting, and many more areas. The term *Big Data* is defined in literature through the concept of five Vs (Zhang et al., 2015). It can be decoded as massive Volume of the database, high Velocity of data added continuously, large Variety of types of data, uncertain Veracity, which addresses the issue of data accuracy and reliability, and the last one – Value, which examines the cost-benefit of collecting the data (Zhang et al., 2015). Big Data allows the designing systems of real-time financial reporting and continuous auditing. Janvrin and Watson (2017) argue that Big Data is especially important for accountants because they always try to make sense of large business data volumes, which corresponds to the anecdotal definition, which states that Big Data is "just turning a mess into meaning."

In summary, AI technologies are useful in various accounting and finance tasks like defining automatic accounting schemes, handling accounts receivables and payables, classifying accounting data, automated recording of accounting records, preparing financial reports, and auditing posted transactions and many more. Al-Htaybat et al. (2018) note that accountants, corporate managers, and regulators are no longer the only parties involved in designing finance and accounting systems. There are new augmented practices like 3D printing, which revolutionize cost accounting or blockchain technology, allowing the creation of one ledger accessible from many points within the network. AI technology is changing business models, and accounting is trying to catch up and adapt to a new situation. Krahel and Vasarhelyi (2014) note that the accounting profession is evolving from poster and preparer of information to retriever and explainer. Traditional bookkeeping is being replaced by the systematic and permanent process of understanding and concern about financial data quality and its security.

Literature provides empirical evidence that AI has a positive influence on the performance of accounting and finance systems (Chukwudi et al., 2018). In more detail, it provides empirical evidence that AI technologies help to reduce the number of mistakes in tax declarations, leading to higher tax compliance (Noga & Arnold, 2002), improve the quality of auditors' evidence processing (Rose & Rose, 2003), and help in many more ways. Bonner et al. (1996) investigate so-called *decision aids*, which can be treated as one of the very early AI technologies, to improve auditors' conditional probability judgment. Apostolou et al. (2019) conclude that integrating new technologies into accounting curricula is important. They advocate that universities adopt an approach based on a broader understanding of emerging AI technologies like automation, biometrics, or cybersecurity surveillance. This approach calls for a redefining of the core competencies needed in the accounting and finance professions. Finally, the accounting and finance professions have high expectations regarding newly recruited graduates, relating mainly to analytical skills, accounting information systems, big data, business data analytics and blockchain technology.

Relevant theories in the context of implementing AI technologies in the university curricula

The literature offers at least three useful theories in the context of our research problem: the unified theory of acceptance and use of technology (UTAUT), institutional theory, and the theory of technology dominance. The unified theory of acceptance and use of technology addresses the vital question in information systems research regarding how and why individuals adopt new information technologies. Venkatesh et al. (2003) developed UTAUT based on conceptual and empirical similarities across previously eight formulated prominent models in information systems acceptance research. As a result, the mentioned authors developed a unified model with four core determinants of intention and usage and up to four moderators of key relationships. Performance expectancy, effort expectancy, and social influence have been categorized as variables directly linked to behavioural intention, whereas facilitating conditions directly determine user behaviour. Moderating variables such as age, gender, experience, and voluntary use have been posited to impact users' intentions and behaviour possibly.

To sum up, UTAUT tries to explain the link between the use of technology and individuals' motives, intention, background, etc. An important premise of the theory focuses on the trade-off between effort expectation and post-implementation performance or self-efficacy. The UTAUT application is widely explored in educational studies on integrating technology as a new and effective teaching and learning delivery method (Abd Rahman et al., 2021; Suki & Suki, 2017; Wan et al., 2017). From the university perspective, the UTAUT theory may find two-fold application. Firstly, it may apply to a teaching delivery method. From this perspective, the theory may explain why using new technologies may increase the education efficacy. Secondly, it may be referred to the students' motivation to allocate their time to these courses' content, which they perceive as the most useful in their future profession. In other words, we conjecture that students perceive a trade-off between time allocated on subjects related to AI technologies and post-graduate performance (self-efficacy) as beneficial.

The institutional theory posits that institutions are founded on the "everyday activities of individuals" (Powell & Colyvas, 2008). The individual's actions are driven by structural (normative and coercive pressure) and ideational elements. In the context of the accounting and finance professions, ideational drivers refer to social responsibility. From this perspective, professionals identify themselves with the organization and society as a whole. Implementation of the technology is perceived to be in the best interest of the community. For this reason, the readiness to use the new technologies among accountants and finance professionals may be higher. Also, the awareness of social responsibility may grow with professional experience.

The theory of technology dominance, developed by Arnold and Sutton (1998), focuses on so-called *intelligent decision aids* (IDAs), also referred to as *expert systems* or *intelligent systems*. They are software-intensive systems that integrate the expertise of one or more experts in a given area and are intended to provide detailed recommendations or expert advice in making a decision more optimal (Arnold et al., 2004). Arnold and Sutton (1998) investigate the prerequisites of successful IDA implementation. The theory predicts individuals' tendency to reliance on IDAs' recommendations from the perspective of four factors: task experience, task complexity, the familiarity of the technology, and cognitive fit (Triki & Weisner, 2014). Arnold and Sutton (1998) postulate that the successful use of IDA recommendations has two prerequisites: the user must accept the technology, and must incorporate it into the decision-making process. According to this premise, the education of professionals plays an important role in the implementation of AI technologies, especially when familiarity with the technology is considered.

The literature presents theories offering different angles to analyze the relationship between professionals and new technologies. The first is the motivation sphere, where the UTAUT theory focuses on post-implementation benefits as opposed to the effort expectation. Secondly, the premises of institutional theory strengthen the motivation sphere through the ideational driver – the mission of the finance and accounting profession, and awareness of social responsibility. Thirdly, the theory of technology dominance points out the user-internal acceptance of the new technologies, in which university education may play an important role.

Sample selection, research design and results

We have chosen the unique Polish setting due to its favourable qualities. Firstly, Poland was the first CEE economy promoted by FTSE Russel's index provider from 'Emerging Market' to the 'Developed Market' status, illustrating the progress over time. Poland offers optimal conditions for international corporations, a good-quality institutional framework, a low level of business risk, and a labour market having well-skilled and educated professionals. At the same time, Poland still holds some characteristics typical of other emerging economies, like the lower labour cost. Secondly, Polish society is relatively young as compared to older EU members, even though the population is ageing very fast (Maj-Waśniowska & Jedynak, 2020). Despite this, the number of students and graduates in Poland is impressive. In the academic year 2020/21, there are more than 1.2 m students and around 300,000 graduates (GUS, 2021). Last but not least, Poland is also one of the world leaders in terms of providing financial outsourcing services thanks to its ability to offer well-educated graduates to international corporations (Łada et al., 2020). The market of outsourcing financial services evolved from executing the simplest accounting tasks to the present state, in which complex financial instruments are processed. The new technologies are constantly being implemented, which induces the raising of expectations of the business sector regarding the graduates' competencies. Therefore, from Poland's point of view, we can determine the utility of academic curricula from both students' and graduates' perspectives. Our study emphasizes the role of courses focusing on new technologies from the broad spectrum of artificial intelligence.

So far, academic curricula have been focused on basic computer-based courses like those teaching how to use spreadsheet software, accounting information systems (AIS), or the application of expert systems in finance. Courses including and explaining technologies like robotics, machine learning, or Big Data are still rare and occur as a novelty in the academic curricula.

We have surveyed two groups of respondents: graduate and undergraduate students enrolled at the Cracow University of Economics, located in a city known as one of the world's largest financial outsourcing services centres. The graduates of that university are sought for by large corporations and can easily find employment in an international environment, requiring technology-oriented skills and knowledge of the latest computer-based technologies. Both groups, students and graduates, are completing or have completed finance and accounting studies. Informal interviews and discussions with the students and graduates preceded the construction of the survey. This allows us, scholars teaching the course, to identify key challenges and problems in accounting and finance curricula. The survey was prepared in the google form and distributed among students and graduates in February 2021. The survey was anonymous. It consisted of multiple-choice questions, Likert scale questions, ranking questions, and open-ended questions. Overall, the survey consisted of 16 questions. The Science Club "Audit" helped us to distribute the link to students and graduates.

The students' survey results show the sample structure of which more than 70% are women, and almost 96% had already completed an internship in their field of study. Students evaluate academic curricula as good (55%) or very good (40%) and express the opinion that computer-based subjects (i.e., financial analysis using spreadsheets or information systems in finance and accounting) are useful (37%) or very useful (46%), and the time allocated to these subjects should be extended (85%). The survey shows that when they were

studying students encountered one of the following terms: AI (14%), robotics (32%), machine-learning (15%), expert systems (56%), and data mining (14%).

Our graduates' survey addresses two areas: the importance of computer-based technologies in their daily work, and the evaluation of academic curricula. The graduates' survey results show the sample structure of which more than 65% are women. The results are mixed with regard to years of professional experience, where 25% are graduates completed their undergraduate studies more than ten years ago, while 20% of respondents completed their undergraduate studies one year ago. Furthermore, 35% of graduates report working in big international corporations dealing with financial services, and 22% in the big multinational corporations, while the others say that they work in another type of company or institution. Graduates evaluate academic curricula based on their working experience moderately positively (67%) or positively (15%), and only 18% of them express a moderately negative opinion. Graduates were asked which type of subjects are the most useful in their current work. The majority (90%) indicated core courses like for example International Financial Reporting Standards (IFRSs), Financial Audit, Financial Instruments, etc. 57% of respondents named computer-based subjects, while only 20% referred to topics like micro, macroeconomy or similar, and only 2% highlighted general academic courses like philosophy or ethics. Graduates report the following final grades on their diplomas: excellent (10%), very good (65%), and good (25%). They also express the need to extend the time allocated in the academic curricula to computer-based subjects.

The graduates' survey results show that almost 67% of them did not have any opportunity to learn about artificial intelligence, robotics, or data mining. In comparison, 28% learned about technologies in their work and only small fractions during the academic or post-diploma studies. Where the technologies adopted by an employer are concerned, almost 85% of graduates report that their firms are using the following as their finance tools: robotics (85%), expert systems (32%), data mining (28%), artificial intelligence (10%) and machine-learning (6%). According to most surveys, these technologies optimize the finance processes, mainly for automatic accounting records, financial analysis, and financial statements preparation. The most useful knowledge and skills in day-to-day work are robotics (63%), expert systems (44%), data mining in finance (41%), artificial intelligence (25%), and machine-learning in finance (16%). Overall, the results highlight the importance of computer-based technologies and, at the same time, insufficient academic education in this regard, which can be only partly explained by the fact that respondents graduated from university many years ago. Therefore, the insufficient academic curricula on the use of AI technologies in accounting and finance courses are not only a problem from the past, but also a challenge for the future.

The second area of our study addresses the graduates' impressions of the academic curriculum of the studies they completed. Firstly, the results show that the most useful subjects in their current profession are the core (100%) and computer-based (63%) subjects. Based on their professional experience, graduates speak of the academic curricula they followed very positively (21%) or moderately positively (63%), and (17%) moderately negatively.

Our survey of students shows that they find the following subjects most useful: expert systems in finance and accounting (56%), robotics (32%), machine-learning (15%), and data mining (14%). At the same time, most students express a willingness to allocate much more time in the academic curricula to computer-based subjects. Students report much more frequent contact with computer-based topics in their curricula as compared to graduates.

The last issue we investigate is what drives the demand for knowledge of the most advanced computer-based subject – artificial intelligence. We hypothesize that graduates with long professional experience working in the international environment are more inclined to seek knowledge on AI, which we have explored using a logit regression with an odds ratio test. Our study sample consisted of 50 responses provided by graduates. We used the following model:

$$Y\_AI_i = \alpha_0 + \alpha_1 GENDER + \alpha_2 Y\_EXP_i + \\ + \alpha_3 CORP\_ERPII_i + + \alpha_4 FIN\_OUT_i + \\ + \alpha_5 UNIV\_GRADE_i + + \alpha_6 EVAL\_STUDY_i + \varepsilon \quad (1)$$

The second hypothesis addresses the difference in students' and graduates' perception regarding the importance of AI technology. To investigate the difference in the students' and graduates' perception of the explored aspect, we added the variable of students versus graduates (ST_VS_GR) and run a logit regression in a pooled sample of students and graduates, which made a total of 229 respondents. Therefore, we used the following model:

$$Y\_AI_i = \alpha_0 + \alpha_1 ST\_VS.GR_i + \alpha_2 GENDER_i + \\ + \alpha_3 Y\_EXP_i + \alpha_4 CORP\_ERPII_i + \alpha_5 FIN\_OUT_i + \\ + \alpha_6 UNIV\_GRADE_i + \alpha_7 EVAL\_STUDY_i + \varepsilon \quad (2)$$

Where:

Y_AI_i – a dichotomous variable coded as 1 when the respondent *i* selected AI as the priority in terms of the most useful computer-based technology required in their profession;

$ST\_VS\_GR_i$ – a dichotomous variable coded as 1/0 (student/graduate);

$GENDER_i$ – a dichotomous variable coded as 1/0 (female/male);

Y_EXP_i – years of experience coded from 1 to 5 based on the years of professional experience (1 year or less, 1–2 years, 3–5 years, 6–10 years, 11 years or more, and zero in the case of students);

$CORP\_ERPII_i$ – graduates working in large multinational companies in which the finance/accounting departments use an ERPII system or equivalent;

FIN_OUT_i – graduates working in large international corporations providing financial services (outsourcing of finance and accounting, financial instruments, etc.);

$UNIV\_GRADE_i$ – the university final grade coded from 1 to 4;
$EVAL\_STUDY_i$ – assessment of the academic curriculum in order from 1 (lowest grade) to 4 (highest grade).

Our findings provide empirical evidence to uphold the first hypothesis and imply that graduates with more professional experience and working in an international environment, especially in financial services sector, perceive AI as the key technology to learn. The results of the second model suggest that graduates are more inclined to learn AI technologies than students, which can be explained by the professional experience of graduates.

The results of the second model based on the pooled sample of students and graduates suggest that respondents who have contact in their work with an ERPII system or equivalent are more inclined to perceive AI as a key technology to be learned. The regression results (Table 1) suggest that graduates are more willing to learn AI technologies than students (ST_VS_GR is statistically significant – p-value below 0.1 and odds ratio below 1.0). This implies that graduates are more aware and troubled by the lack of AI background. The results for the Y_EXP variable, where the p-value is statistically significant and the odds ratio above one, suggest that the more experienced the graduate is, the more they appreciate the significance of AI in academic curricula. Our findings indicate that graduates working in large multinational companies in which the finance/accounting departments use an ERPII system or equivalent, are more willing to learn AI technologies. The same interpretation applies for the FIN_OUT variable, suggesting that graduates working in large international corporations providing financial services are also more ready to learn AI.

Our study has at least several important limitations. Firstly, our sample consists of students and graduates of only one university in Poland. Secondly, more determinants affect the attitude towards AI technologies than those used in our models. Thirdly, our study is based on the opinions and impressions of the surveyed with all its limitations. In this type of questionnaire research, there is always a threat of cognitive bias. For example, the respondents will express their "internal willingness" to use modern technological solutions and not the demand from the workplace.

Discussion and conclusions

The results of our study, in general, provide a supportive argument for the UTAUT theory. Implementing AI technology is perceived to be more beneficial for graduates with more professional experience than students. The trade-off threshold is affected from both sides. Firstly, our findings imply that graduates are more aware of the benefits of AI technologies. Therefore, the perceived post-implementation performance or self-efficacy is higher, especially when based on personal experience. Secondly, we do not know which group, students or graduates, has more knowledge and competence in AI technologies. However, the informal interviews with our students and graduates lead us to conclude that the latter group has more knowledge and experience in this field. Therefore, we conjecture that the effort expectation is lower when the knowledge and skills of AI technologies are higher. However, this issue needs further investigation.

We provide further empirical evidence supporting the institutional theory in the context of new technology use. Our results support the premise that greater professional experience leads to higher social responsibility and awareness. It forms a professional attitude

Table 1
Results of the logit regression with an odds ratio

Variable	Model 1			Model 2		
	Graduate Survey			Pooled Sample		
	Odds ratio	P>|z|		Odds ratio	P>|z|	
Intercept	1.76e-07	0.020		0.004	0.010	
ST_VS_GR				0.0161	0.092	(*)
GENDER	1.5581	0.715		2.5381	0.230	
Y_EXP	4.1360	0.012	(**)	3.6863	0.008	(***)
CORP_ERPII	12.4157	0.110		11.9178	0.077	(*)
FIN_OUT	14.9778	0.077	(*)	19.4857	0.033	(**)
UNIV_GRADE	1.0800	0.944		1.1689	0.745	
EVAL_STUDY	9.0333	0.150		1.3679	0.429	
No. of obs.	50			229		
LR chi2(7)	34.19			47.85		
Prob>chi2	0.0000			0.0000		
Pseudo R^2	0.6203			0.3526		

Source: authors' own work.

towards new technologies and a willingness to devote time to learning. Employee commitment is a crucial factor of success. As Alamin et al. (2020) note, the accounting profession is very specific. Accountants are unique among other corporate staff with features like community affiliation, social obligation, belief in self-regulation, autonomy demands, a constant need for education, and professional dedication. Professional accounting organizations create coercive pressure for self-development. The sense of the greater good and belief that accounting and finance professions promote are beneficial for society. These characteristics form accountants' attitudes towards new technologies. However, former education also plays an important role. AI technologies are already changing the corporations' landscape, especially in financial outsourcing services and financial departments. Universities may either stand aside or embrace the change and play an important role in shaping future generations of accountants and financial experts.

Nowadays, technological change is much less voluntary, and the digitalized environment is enforced in modern organizations. Still, resistance to change hampers the implementation of new technologies. Alamin et al. (2020) note that companies in the US reported $30 billion in unused software over four years. The worker's attitude towards new technologies may result in frustration, ambivalence and underuse. Therefore, addressing the issues of new technologies in the university curricula may solve this problem at least partially. This supposition is confirmed by the requirements of the A5 standard issued by AACSB (http://www.aacsb.edu). This standard recommends that accounting programs include learning experiences, developing skills and knowledge concerning integrating information technology in accounting and business. These technologies relate to data analytics like data management, modelling, text analysis, predictive analysis, data creation, data storage and sharing, data analytics, data mining, and data reporting. Finally, the standard calls for integrating current and emerging technologies throughout academic curricula.

Our findings also provide additional context for the theory of technology dominance. However, our research design does not allow us to address the premises of that theory directly. We can point out that there is a wide acceptance of the use of technology among students and graduates of the finance and accounting professions. We did not investigate the level of familiarity with AI technologies and how it is incorporated into the decision-making process, which is an avenue for future research. However, we expect that incorporating AI technology into the university curricula will increase the degree of ease associated with the use of new technologies.

Generally, both the surveyed groups – graduates and students alike – are convinced that computer-based courses are of importance for their future profession. In the former group, the most useful computer-based AI technologies are robotics, expert systems, and data mining in finance, while for the latter group these are expert systems in finance and accounting, robotics, and machine learning. As AI technology is the most advanced technology-based course, the surveyed graduates demonstrate more awareness of it and more demand for it, especially those working in international financial corporations providing financial outsourcing services and with a longer period of professional experience. Our study results call for a change in the academic curricula adopted in the field of finance and accounting studies. Both students and – to an even greater extent – graduates wish to see more time allocated to computer-based courses and the different scope of AI technologies. In the case of the latter group, the expectations are based on their professional experience.

Our findings and discussions with graduates lead us to conclude that two sets of skills are needed. Firstly, the core traditional knowledge of finance and accounting is required in the labour market related to double-entry bookkeeping, decision-making, or critical thinking. Secondly, the second set of skills related to new technologies is gaining in importance. This relates to skills like the ability to use new technologies, analytical capacity, and problem-solving in the computer/ internet environment.

Based on the UTAUT theory premises, we can deduce that introducing in accounting and finance studies subjects designated to AI technologies will increase the acceptance and decrease the expectation of effort related to new technologies. Secondly, based on the theory of technology dominance, we conjecture that learning AI technology at an early stage of their career allows professionals to incorporate it into the decision-making process more swiftly, which at an older age may be problematic. Finally, based on the institutional theory, we argue that subjects related to professional ethics also curtail user resistance to new technologies as long as it is perceived to be beneficial for the organization and society. Therefore, changing and adopting university curricula may be crucial for adopting new technologies in organizations.

Our results have several important implications. Firstly, our findings may motivate scholars in other fields to test whether the new AI technologies may potentially affect other professions and should be incorporated into academic education. Secondly, the findings upon university policymakers to redefine desired graduates' core competencies and skills, change university curricula, and incorporate new technologies into the teaching content and delivery methods to address the needs of the labour market. Future research should investigate in more detail which aspects of AI technologies may enrich accounting and finance courses. In this regard, it is advisable to work closely with business practice and the professional bodies like the Polish Accounting Association or the Polish Chamber of Statutory Auditors. Finally, our study identifies limitations of the academic curricula concerning the new technologies and leads us to conclude that lifetime learning is becoming a necessity of the day.

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Olena Davydenko

Using BBC Learning English Podcasts to develop university students' listening skills

Abstract

The emergence of podcasts in an English foreign language (EFL) setting is seen as a helpful aid to foreign language learning. Using podcasts might help improve language learning efficiency. This research addresses how podcasts can be an alternative means of improving English listening comprehension for university students. The study was carried out at Nizhyn Gogol State University, Ukraine, using quantitative and qualitative methods of analyzing data. To collect the data, research tools such as a questionnaire, initial and final testing, and observation were used. The procedure was introduced for a group of first-year students and implemented for six weeks. Special BBC Learning English podcast activities were designed and offered to the students. The main stages have been specified in the process of developing students' listening skills. In the pre-listening stage, students do preparation activities to prepare for the podcast using their background knowledge. The while-listening stage is aimed at listening for gist, listening for details, making inferences, and summarizing. In the post-listening stage, the listeners are taken beyond the podcast content and set tasks which contribute to integrating other language skills. Samples of activities which correspond to these three stages are provided. A balanced approach to choosing top-down or bottom-up processing within the stages improves the process of forming competencies in listening of first-year students. Hence, based on the positive results of this study, BBC Learning English podcasts with meaningful, appropriate, and interesting activities attract the students' attention, increase their motivation, and improve their listening comprehension.

Keywords: podcast, taxonomy, listening comprehension, bottom-up processing, top-down processing, prior knowledge, background information

Introduction

Nowadays, the global demand for English creates an enormous spectrum of teaching and learning resources, among which is podcasting. Teachers and English foreign language (EFL) students can make use of a wide range of podcasts, which play an essential role in facilitating teaching and learning processes. In the EFL learning environment, it has completely transformed classroom communication methods, modified teaching and learning the English language, and contributed to interaction and collaboration.

The word 'podcast' originates from two words: iPod and broadcast (Rosell-Aguilar, 2007, p. 473). Podcasts are audio files on the Internet which are usually uploaded at regular intervals. Podcasts can either be pure audio podcasts, video podcasts or enhanced podcasts; i.e. pictures, slideshows, PowerPoint, etc. Podcasting is also considered to be a part of m-Learning, as Tynan and Colbarn (2006) identify m-Learning as 'a different form of eLearning, as it takes the learner away from a fixed point and 'respects that a user would like to interact with educational resources whilst away from a normal place of learning classroom or computer' (p. 826). The idea is that podcasting creates a borderless classroom. By extending the classroom, making it mobile, educators are able to increase the time students allocate to studying. Nowadays, however, podcasting in education is more than an extension of the classroom; it enhances the potential learning outcomes of modern students who are exceedingly technologically advanced.

The research has been done on BBC Learning English podcasts to better understanding their effectiveness in developing students' listening skills, and particularly improving

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EFL audio-visual comprehension. Basically, the investigation of listening skills in language learning has been performed through the analysis of podcasts, specially designed activities, modes of interaction, and the influence of bottom-up and top-down processing of podcasts on the process of English listening comprehension in EFL learners.

The research is based on Action Research, which aims at investigating the impact of regular practice of listening to podcasts on the development of listening skills in EFL students. By providing appropriate techniques, teaching media can play an essential role in the teaching and learning process (Smaldino et al., 2008). This paper examines in particular whether the use of podcasts is useful in both listening and speaking, as it can also provide plenty of classroom activities (Sze, 2006, p. 118). Therefore, as one of the core skills, listening assumes the learners to be not only skilful listeners, but also active ones. Needless to say, it requires plenty of practice to fully develop the effective habits of a good listener. Students have to be provided with opportunities to listen meaningfully; teachers also need to give them the tools to do it effectively. Yet, more notably, students should be guided and regularly reminded that they need to exercise the skills of a good listener, and they should reflect on their own skills in this area.

Podcasting has opened up new opportunities for L2 teachers as they can be used for practising both intensive and extensive listening. However, EFL podcasts are particularly suited for extensive listening, for the purpose of motivating student interest in listening to English, and providing them with exposure to native speakers' speech (Rost, 1991).

This study addresses the following research questions:

1. What is university students' attitude to using podcasts, regarding listening comprehension?
2. Do the activities in the 'Pre-Listening' stage facilitate listening comprehension of BBC Learning English podcasts in first-year students?
3. Can specially designed podcast comprehension activities help EFL first-year students improve their listening?

The study will examine the following hypothesis: regular use of BBC Learning English podcasts will improve first-year students' listening skills.

Literature review

In a language learning context, the idea of using podcasts is certainly considered beneficial for L2 students, and this is reflected in the literature review aiming at emphasizing the importance of podcasting technology in developing university students' listening skills.

The literature analysis reveals that the technology of podcasting is widely used. Many scientists consider podcasting as a powerful technological tool in teaching almost all language skills (Davydenko & Ponomarenko, 2018; Gachago, 2016; Lazzari, 2009; Naidionova & Ponomarenko, 2018; Richard, 2008 and others). Nevertheless, among the other language skills, such as speaking, reading and writing, Graham and Santos (2015) claim that listening is still the least researched, probably due to its temporal nature; the spontaneity of speech; the inability of the listener to go back and review what was said; pronunciation features. According to the studies of the leading methodologists, bottom-up and top-down processing can be crucial for successful listening, and combining them is a really strategic method to help students build better listening skills based on the process rather than the product approach (Newton & Nation, 2020; Wallace, 2012). The way in which top-down and bottom-up skills interact is variable, depending on the task, context, and listener (Flowerdew & Miller, 2005; Wu, 1998). According to McBride and Vandergrift, listening comprehension is accomplished through an orchestration of strategies, using those that best match a given task (McBride, 2009; Vandergrift, 2003). Vandergrift points out that learners benefit from training in metacognitive awareness about listening comprehension and in top-down processes such as using background information to form hypotheses about the spoken message (Vandergrift, 2003). McBride states that teaching these bottom-up skills ought to be approached from two sides: through focused listening activities which direct the learner's attention to specific features of the aural input, and through extensive exposure to authentic speech (McBride, 2009). In turn, top-down listening skills can largely compensate for incomplete bottom-up processing when there is a good match between the listener's expectations and what is said, but when this is not the case, skilled bottom-up processing is what distinguishes more skilled listeners from less successful ones (Tsui & Fullilove, 1998).

The classification and taxonomy of podcasts are considered in great detail by many scientists (Carvalho et al., 2009a; Koppelman, 2013; Naidionova & Ponomarenko, 2018). Firstly, we consider it of great importance to highlight the podcast taxonomy which can help teachers select or even create their own podcasts. The taxonomy offered by Carvalho et al. is classified according to six criteria: the type of podcast, method of presentation, duration, author, style and purpose (Carvalho et al., 2009a, pp. 133–134). As far as the type is concerned, podcasts are divided into informative podcasts, feedback and commentary podcasts, guidelines, and authentic materials. Some scientists assert that a podcast taxonomy has six variables such as type, medium, length, author, style and purpose (Naidionova & Ponomarenko, 2018, p. 179). In turn, these four types of podcasts include informative podcasts which demonstrate concepts, analysis, synthesis, description of tools or equipment, reading of excerpts/poems, etc.; feedback/comments to students' assignments and group work; guidelines; recommendations that may concern studying, reflective learning, etc. and authentic materials, i.e. materials created for the public and not for a specific course or students, such as interviews, news, radio programming, etc. Researchers prove that integration

of podcasts into EFL teaching achieves specific educational goals, such as developing the four language learning skills, improving pronunciation, expanding and enriching vocabulary, and forming grammatical competence (Ducate & Lomicka 2009; Idrissova et al., 2015). Stanley states that podcasting is one example of how technology can be used to support pronunciation, in and out of the classroom (Stanley, 2013, p. 171). In particular, he approves the efficiency of being an active listener using special equipment such as headsets, stand-alone microphones, podcasting websites, voice recognition software, etc.

Moreover, it is acknowledged by methodologists that authentic materials that are regularly used in the classroom influence learners' listening comprehension significantly (Constantine, 2007; Kardashova, 2015; Naidionova & Ponomarenko, 2018; Ramli & Kurniawan, 2017). Encouraging language learners to listen to podcasts outside the classroom also gives them the exposure to comprehensible input as they are involved in authentic listening. Furthermore, some complex analysis of using podcasts as means of increasing students' motivation to foreign language learning is made by some educators as well (Dale, 2007; Hubackova & Golkova, 2014, p. 144; Rosell-Aguilar, 2013, p. 76). McMinn assures us that podcasts can be used to increase the time a student allocates to language learning and 'provide a meaningful experience that is motivating, stimulating and useful for a language learner' (Asoodar et al., 2014; McMinn, 2008).

Some researchers address the effect of podcasting as a tool for becoming an effective autonomous learner in the future (Stanley, 2013, p. 82). Most podcasts have not been created primarily with learners in mind, so they have an access to a repository and can choose topics they are particularly interested in. Besides, listening can be repeated at will, and the audio can also be slowed down, using various audio editors such as Audacity. What is more, the use of podcasts in language teaching enhances not only learner autonomy, but also intercultural awareness and information competence (Hrytsyk, 2015; McBride, 2009; Shekhavtsova & Protopopova, 2019).

Thus, literature review shows that podcasting is as widely applicable in learning environment today as other internet resources, however the practical aspect of the problem of improving listening skills at the tertiary level in Ukraine requires more detailed study.

Methodology and procedure

Tools and action research stages

The research is based on action research which involved two cycles, consisting of posing a problem, devising a strategy, planning, acting, observing, reflecting, and sharing results. The result of one cycle is used to determine the need for the following cycle, until the problems get solved by the strategy (Kemmis & McTaggart, 1992). This was both a quantitative and qualitative study of data collection over a total of six weeks. It is a type of mixed method approach that builds on the strengths of both qualitative and quantitative data collection and analysis (Creswell, 2009).

The first stage of our study was defining a problem area. Before the intervention, it was noticed that there was not enough emphasis on developing listening skills in many students of the group. We intended to tackle this issue by implementing podcasts from BBC Learning English into regular classes and check the research hypothesis.

The second stage involved selecting and evaluating tools. To get answers to the research questions, and accept or reject the hypothesis, it was necessary to select research tools. We used the following tools, such as questionnaires, testing and observation. Earlier it was stated that there were two types of data which had to be collected: qualitative and quantitative. As for quantitative data, questionnaires and testing allowed us to get valid data for investigate how many learners were interested in the activities, and to follow the level of productivity in general. On the other hand, qualitative data could be collected by observation in the most successful way, too. The following data-collecting tools will be described below in a more detailed way:

Questionnaire

The first data collecting tool was a questionnaire. We considered it reasonable to conduct two questionnaires: before and after the intervention. It was rational at the initial stage to find out if the learners would agree to be exposed to any actions, and on the basis on the results of the second questionnaire we hoped to draw some conclusions about this study effectiveness. The pre-intervention questionnaire with three close-ended questions was offered to the students in order to determine the participants' attitude to listening as a skill in general, to find out about any difficulties they had in this area and their desire to be exposed to BBC Learning English podcasts to improve their listening skills. The main goal of obtaining the data in the post-intervention questionnaire was to confirm or reject the validity of our action research. The analysis of the post-intervention questionnaire can be viewed in the findings.

Testing

One more important data-collecting tool which was extremely rewarding for understanding the overall knowledge of the topic was testing. It consisted of two phases: pre-testing and post-testing. Directly before the intervention, the students were given a pre-test to evaluate their performance before starting the process (Taran, 2019, pp. 127–128). The pre-test contained 12 true-false sentences focusing on listening comprehension that could be answered with one correct answer. There were several high performers, while other students faced some listening obstacles, so this was evidence for further intervention based on fostering listening skills in

first-year students through podcasting technology studying the topic 'Meals'. The post-test was planned in a similar format and also contained 12 true-false sentences focusing on listening to a *6 Minute* podcast *'Photo-friendly food'*. The post-test aimed at indicating to what extent podcasting could enhance students' level of listening.

Observation

The last method for data collection was observation. This was done on a regular basis by the teacher for six weeks. It helped to determine the level of students' involvement during the intervention, attitude of all the participants to using BBC Learning English podcasts, and their improvement in EFL. This tool was a meaningful way to collect the information and played an important role in answering the research questions and drawing conclusions in terms of the suggested hypothesis.

The third stage was selecting materials and designing activities. During this stage, a there was significant emphasis on preparing for the intervention. Some podcasts from BBC Learning English were selected and activities for boosting listening skills were designed. Furthermore, the students were set various objectives, so they listened for different purposes: listening for gist; listening for specific information, and listening for detailed understanding. In our research, we employed a three-stage arrangement: pre-listening, while-listening and post-listening. Each of these stages had its own purpose and corresponding set of activities, which were offered to the learners over a period of six weeks and gave us an opportunity to achieve the goal of the research. A sample activity can be viewed below (Figure 1).

Stage 1: Pre-Listening

The aim of this stage is to introduce students to the context of the podcast, activate background knowledge on the topic, eliminate possible language difficulties, facilitate understanding of the podcast, and interpret it. We suggest some activities at this stage, for instance predicting the content of the podcast using the keywords; speculating about the title or pictures of the podcast; discussing students' experiences, expressing their own point of view on the problem raised in the podcast, etc. Here are some of them:

1. Work with a partner. You are going to listen to a podcast about foodies. Look at the photo and discuss with your fellow-student why it might be relevant to the podcast.
2. Work with a partner. Look at the title and the picture of the podcast. Express your suppositions what it is going to be about.

Thus, the presented podcast activities at the 'Pre-Listening' stage are essential and undeniably have to be integrated into the process of developing listening skills in EFL students, as it helps them develop a language conjecture and shapes their ability to anticipate the content of the podcast. Pair work and working in small groups are the most common students' groupings at this stage.

Stage 2: Listening

The 'Listening' stage is actually listening to the podcast in order to obtain general and detailed information. It is advisable to play podcasts twice. During the first listening, students try to understand the general meaning and check the predictions made at the 'Pre-Listening' stage. The following exercises can be suggested to students:

- Listen to the podcast and check the ideas you expressed in the 'Pre-Listening'.
- Rob and Neil, the programme presenters, have Angela Hartnett, Britain's top chef, in their studio. Find out what they are discussing. Were your predictions correct?

During the second listening, students listen to find specific information, answer the questions; say whether statements true or false; provide missing parts of statements; read the transcript of the podcast and find any missing details; make a plan or give an outline of the podcast, etc.

1. Listen to the podcast again and decide if the sentences are true (T) or false (F).
2. Listen to the podcast again and answer the questions.

Figure 1
Sample activities for the podcast 'Are you a foodie?'

Source: BBC learning English. (2018, November 29). *6 Minute English. Are you a foodie?* https://www.bbc.co.uk/learningenglish/english/features/6-minute-english/ep-180412

3. Listen again and then read the transcript of the podcast. Find the details you failed to comprehend.
4. Listen to the podcast again and make a plan of it.
5. Listen to the podcast again. Give an outline of the podcast.

The main objective of the activities at this stage is to teach the students to use their background knowledge to predict the content of the podcast; check their predictions; distinguish between specific and general information; point out the details of the content; think logically; analyse the content of the podcast etc.

Stage 3: After-Listening

At this stage, planning involves the incorporation of listening and speaking. Students interpret the material they have just listened to, evaluate it, and employ it in further interaction:

1. Work in pairs. A'Foodie' is someone who is very interested in all aspects of food. Interview your desk fellow student and ask if he/she considers himself/herself a foodie. Be ready to give reasons.
2. Work in groups of 3-4 and write a list of a foodie's characteristics. Then merge with other groups and share your lists. Work out the criteria according to which foodies can be defined.

Consequently, the activities of 'After-Listening' stage are communicative and the aim was to integrate knowledge gained by students while listening to the podcast into interaction. Incorporating role-playing into the classroom is desirable at this stage, as it adds variety, a change of pace, and opportunities for a lot of language production.

The fourth stage was an intervention when we collected the evidence by offering the students questionnaires and tests and observing the class to check the hypothesis and answer the research questions. This stage gives an overview of implementation of podcast technology as a meaningful technique for increasing proficiency in English. The results will be observed further in the paper.

The fifth stage consisted of reporting and sharing. This stage reveals the results of the investigation and they are made public. After analyzing, evaluating and counting the results, tables and pie charts were designed. During this stage, answers to the research questions were given and conclusions and recommendations were summed up on the validity of the hypothesis.

The research participants

This action research took place in Nizhyn Gogol State University, at the Faculty of Foreign Languages, in the second semester of the 2020–2021 academic year (with the following study formats combined – three weeks online in Zoom Video Conferencing and three weeks face-to-face). These were twelve first-year students aged 17–19 with different language learning backgrounds, levels and learning styles. The research was carried out in a multilevel group with mixed-ability students studying EFL in 80-minute tutorials 5–6 times a week for six weeks. According to their module grades, test results, teacher's observation and Placement Test, their English proficiency level was B1-B2. Regarding their learning styles, there were students of visual and auditory styles. This meant that the use of audio materials in the classroom was met with a positive response from the students.

Ethical issues

The Faculty of Foreign Languages and the students were informed about all actions taken by the researcher. The participants were aware of the right to withdraw from the research at any time and that their data would be destroyed. Consent was sought from them before data collection.

Overview of BBC Learning English podcasts

The podcasts employed in the study are taken from BBC Learning English, namely 6 Minute English (https://www.bbc.co.uk/learningenglish/english/). Firstly, we suggest giving a short overview of 6 Minute English podcasts, which is a long-running series of discussions on various topics, conveyed to listeners by BBC Learning English presenters. This resource is intermediate level English podcasts, which can be easily downloaded and correspond to the language level of first-year students. Secondly, we consider it essential to emphasize the variety of BBC Learning English podcasts in terms of podcast taxonomy that supplies the learners with a great choice of materials; informativeness, which assumes providing students with useful and present-day information; authenticity of podcasts recorded by native speakers; proficiency conveying a real-life message. Due to their nature, 6 Minute English podcasts are informative as presenters acquaint the listeners with the current news, events, discoveries, etc. These podcasts are structurally presented in the form of a conversation containing feedback and studio host comment, who could be well-known scientists, politicians, or celebrities. According to the basic criteria of Carvalho & Aguiar' s taxonomy, the duration of 6 Minute English is 6 minutes and is of medium duration (6–15 minutes) (Carvalho et al., 2009a, pp. 133–134). According to the style of speech, 6 Minute English presenters (Neil, Rob) always communicate in an informal style, using humor and enlisting the wide support of the audience. Finally, the goal of these resources is to inform the listeners about exciting news and discussions on a global scale, enhance motivation for learning English and, certainly, improve language skills. Thus, the usage of podcasts in the classroom at the tertiary level could be justified due to the above-mentioned didactic characteristics, factors and podcast taxonomy.

Findings

The data were collected using different tools from a qualitative and quantitative perspective. Firstly, quantitative data were gathered using questionnaires

to gauge the participants' attitudes, opinions and willingness to use BBC Learning English podcasts in developing listening skills. Before the intervention, the students were given the initial questionnaire with three close-ended questions, the answers to which can be viewed in Table 1, which indicate that 7 first-year students out of 12 have difficulties in EFL comprehension and 11 students out of 12 would not be against being exposed to a new listening experience.

At the end of the intervention, the participants were offered the other questionnaire, which consisted of five close-ended questions concerning the process of podcast activities the students went through in order to evaluate any improvement in their listening. The results are illustrated in Table 2 below.

The answers to the first question '*Do the prior knowledge and background information affect English listening comprehension using podcasts?*' are as follows: 11 out of 12 participants indicated that the prior knowledge and background information affected their English listening comprehension in a positive way. Hence, this helped the learners to develop a linguistic guess and built their ability to anticipate the content of the audio material.

The answers to the second question '*Was the use of podcasts a delightful and stimulating experience for the students?*' show that 10 participants out of 12 stated they had found the podcasting technique challenging, though at the same time stimulating and motivating. 2 students showed no interest in it and were rather discontented.

The answers to the third question '*Has it become easier for the students to comprehend 6 Minute English after the intervention?*' demonstrate positive results. 10 participants out of 12 answered it had become easier for them to comprehend 6 Minute English and they gradually listened to more and more complicated audio materials. 1 found no differences and 1 noticed slight changes.

The fourth question confirmed that the majority of first-year students (11 out of 12) agreed that 6 Minute English is enjoyable, entertaining and raised intercultural topics.

Students' answers to the fifth question *'Can specially designed podcast comprehension activities help EFL learners improve their listening?'* 11 students out of 12 said they were sure that such activities within the main listening stages definitely contributed to the improvement of their listening skills.

Table 1
Pre-Intervention Questionnaire

	Students' answers (number of students)	
	Yes	No
Question 1 Is your attitude to listening as a skill positive?	10	2
Question 2 Do you have any difficulties in EFL listening?	8	4
Question 3 Would you like to be exposed to listening to BBC Learning English podcasts to improve your listening skills?	11	1

Source: author's own work.

Table 2
Post-Intervention Questionnaire

	Students' answers (number of students)		
	Yes	No	Slight changes
Question 1 Do the prior knowledge and background information affect English listening comprehension using podcasts?	11	1	
Question 2 Was the use of podcasts delightful and stimulating experience for the students?	10	2	
Question 3 Has it become easier for the students to comprehend 6 Minute English podcasts after the intervention?	10	1	1
Question 4 Can 6 Minute English be one of the main sources of intercultural issues and useful information in the context of learning?	11	1	
Question 5 Can specially designed podcast comprehension activities help EFL learners improve their listening?	11	1	

Source: author's own work.

The data received from the fifth question helps us answer our second research question and support the hypothesis.

Pre- and Post-Intervention Testing

Learners' test results are one of the ways to evaluate learning, so we started our research with a pre-testing phase in order to define a starting point. Moreover, we used pre- and post-testing as a tool in order to obtain reliable and sufficient results in our action research. As Dimitrov and Rumrill state, the measurement of change provides a vehicle for assessing the impact of interventions (Dimitrov & Rumrill, 2003, p. 159). For that reason, our study suggests that introduction of a pre- and post-test tool supported achievement of the learning objectives with a better understanding and this helps students start to focus on the key issues that will be covered. Before the intervention, an initial test was offered to the students (Taran, 2019, pp. 127–128). It was a part of the radio programme 'Student Exchange Programmes' during which the presenter and the guest were talking about the prospect of students' exchange programmes. The pre-test contained 12 true-false sentences focusing on listening comprehension that could be answered with one correct answer. For each correct statement, the learner could get 1 point. Then we performed an intervention for a period of six weeks, during which each learner was aided by designed activities especially at the pre-listening and while-listening stages, the aim of which was mainly to improve learning and teaching. Consequently, we carried out a post-testing phase at the end of the sixth week. The 6 Minute podcast *'Photo-friendly food'* was selected for this purpose and was designed in a similar format as a pre-test, with 12 true-false sentences (https://www.bbc.co.uk/learningenglish/english/features/6-minute-english/ep-181129). Therefore pre- and post-tests were designed in the same formats, both as radioprogrammes and of similar task type, with the same number of questions in order to demonstrate meaningful results.

First, the results of pre- and post-tests were analysed to determine the mean scores. The mean score of post-test was 8.08 which a difference of 1.33 compared to the pre-test mean score. Table 3 demonstrates that the outcomes of pre- and post-intervention testing are different (percentage). We can immediately see that the ultimate progressive change occurred in the number of low-level students. This approach demonstrates that the selected intervention method turned out to be effective, even though there was a slight increase in the number of intermediate and strong students. Pre-test and post-test improvement was to a large extent due to the content of the BBC Learning English podcasts and due to activating background knowledge of the students.

Second, to verify the validity of our research findings we employed a Sign Test to either accept or reject the hypothesis. Descriptions of the Sign Test can be viewed below:

Formulation of the hypothesis:

H0: There is no shift in the formation of listening skills by means of BBC Learning English podcasts.

H1: There is a shift in the formation of listening skills by means of BBC Learning English podcasts.

A statistical Package of the Social Sciences (SPSS) was used to analyse the data acquired from the pre- and post-tests. $p < 0.05$ was considered as significant (Tables 4 and 5).

Table 4

Students' Pre- and Post-test improvement (Sign Test)

Frequencies		
		N
Post-test results- -Pre-test results	Negative differences[a]	0
	Positive differences[b]	9
	Ties	3
	Total	12

Note. a. Post-test results < Pre-test results;
b. Post-test results > Pre-test results

Source: author's own work.

Table 5

Test Statistics[a]

	Post-test results – Pre-test results
Exact Sig. (2-tailed)	0.004[b]

Note. a. Sign Test; b. Binomial distribution used. The exact p-value is computed based on the binomial distribution because there are 25 or fewer cases.
Source: author's own work.

Total post-test correct responses were highly significant ($p < 0.05$) compared to pre-test responses, and therefore hypothesis H0 can be rejected and hypothesis H1 is accepted. Thus the findings suggest that the improvement was not accidental (Table 6).

Table 3

Students' Pre- and Post-test Scores (percentage)

Criteria	Scores	Pre- Intervention Testing	Post- Intervention Testing
Listening to BBC Learning English podcasts	%	12 mixed-ability first-year students	12 mixed-ability first-year students
	high performers (10–12)	2 (17%)	3 (25%)
	moderate performers (5–9)	7 (58%)	8 (67%)
	low performers (1–4)	3 (25%)	1 (8%)

Source: author's own work.

Table 6
Hypothesis Test Summary

Null Hypothesis	Test	Sig.[a,b]	Decision
The median of differences between Pre and Post equals 0	Related samples Sign Test	0.004[c]	Reject the null hypothesis

Note. a. The significance level is 0.050; b. Asymptotic significance is displayed; c. Exact significance is displayed for this test
Source: author's own work.

Observation

Observation is a basic method for obtaining data in qualitative research. The qualitative researcher's goal is a complete description of behaviour in a specific setting. Qualitative observations rely on narrative or words to describe the setting, the behaviours, and the interactions. There are some specialized approaches to observation, such as interaction analysis (Ary et al., 2010). Observational data can also show change over time within the context of the procedure of the implemented tasks. Observations usually result in reflection and reflections initiate minor or major changes in action research (Crookes,1993).

In our context, a special observation sheet was designed with some definite criteria *(the level of involvement; participation; feedback on the podcast)* focusing on students' performance and interactions in the classroom and how they responded to a podcast as an integral part of a learning process. The new podcast experience seemed to be a bit complicated for low-level students and fascinating for intermediate and strong students. The main advantage of the observation for our action research was that specific, detailed information about the students' involvement could be collected and then analysed. It was discovered that before and at the beginning of the intervention the learners were less active, and asked a lot of questions concerning the instructions to the listening activities. Some low-level participants had no experience in predicting the title of the podcast, for instance. Furthermore, they were afraid of making mistakes. In fact, activating background information turned out to be effective for all participants as they were learning some necessary techniques for improving listening skills such as predicting the content of the podcast based on keywords; speculating about the title; sharing their own experiences, etc. Gradually, both the weak and less strong students started to understand the tasks much more easily and clearly, and they did not ask as many questions as before the intervention. The low-level students were involved in the process of pre-listening, listening and post-listening more actively during the intervention phase. The weak students acknowledged that they used bottom-up processing inefficiently and inappropriately before the intervention. They mainly focused on understanding new words and could hardly understand the whole podcast. Additionally, the reason for the students' more active engagement and collaborative performance in the classroom could be thought-provoking topics raised in the podcasts as well. Overall, the data obtained from the observation showed positive results and that classroom observation as a research tool was beneficial for me as a teacher to get a deeper understanding of the intervention. This is in accordance with the study of Johnson et al. (2020), who confirmed the validity of observation for measuring participants' engagement.

To sum up, based on the reflections from the questionnaires and results of pre- and post-tests and observation, first-year students had successfully improved their achievement in terms of listening comprehension so employing BBC Learning English podcasts in the learning process can be justified.

Discussion

The major objective of this paper was to determine whether BBC Learning English podcasts affect Ukrainian participants' listening comprehension. The findings reveal positive results. Therefore, this study supports the concept that regular practice using podcasts can make a positive and significant difference to listening comprehension for EFL undergraduate students. Past research indicates that podcasting has proved to be a valuable tool for both teachers and students, as it increases the chances of students feeling involved and motivated in terms of the authenticity, student-student interaction and their autonomy. It was observed during the study that the collaborative setting enforced team building skills and the students' sense of teamwork. Lastly, podcasting was valued more highly by a large number of learners than traditional media.

After analyzing the collected data and pointing out the findings, we can answer our research questions. Concerning the first research question of the study *'What is university students' attitude to using podcasts, regarding listening comprehension?'* the answers in the pre-intervention questionnaire, the results of the post-test scores, and students' observation show that the students take a positive attitude towards using BBC Learning English podcasts. Although the prevailing view among the learners in this study was generally positive, one student expressed concern over the length or topic of the podcasts in some cases; thus, teachers must ensure that their choice of podcasts allows their students the best opportunity to take advantage of the medium's overwhelming benefits. Moreover, podcasts as authentic material were perceived to increase students' motivation. Overall, data obtained from this paper demonstrate that Ukrainian

students had positive perceptions of the quality and usefulness of their podcast intervention and a positive attitude towards podcast-based learning. These results are in line with the studies by Brookes (2010), who announced that students' attitudes towards the use of podcasts were positive. The current study also corresponds to the findings of Carvalho et al. (2009b), who stated that students' attitudes towards the use of podcasts were favourable.

In order to answer the second research question *'Do the activities in the 'Pre-Listening' stage facilitate listening comprehension of BBC Learning English podcasts in first-year students?*', the results from the pre-test and post-test scores, students' questionnaires, and observation were analysed. The study confirmed that using bottom-up processing, when students previewed certain key words from the content and speculated on the title, helped them to predict the information from the podcast. This encouraged them greatly to listen to the podcasts in a meaningful way. The prediction process also helps to activate the learners' background knowledge related to the topic. This is in line with the findings of Khuziakhmetov and Porchesku (2016), who state that the bottom-up approach to teaching listening comprehension has proven to be effective in developing listening strategies and it is supported by psycholinguistic findings and experiments.

Regarding the third research question, whether *specially designed podcasts comprehension activities help EFL learners improve their listening,* such activities certainly help to enhance first-year students' listening skills. The current study highlights BBC Learning English podcasts as a powerful technological tool and a useful supplementary means of teaching, and that they have a great positive effect on Ukrainian students' performance. Also, the role of the teacher as a facilitator plays a crucial part in achieving the desired results. The teacher has to focus on the pedagogical design of the podcasts and consider the educational level of his/her students to maximize effectiveness. These results are reinforced with other studies, which found significant changes in student performance when students were exposed to podcasts for listening comprehension (Lu, 2007, p. 88). This research is reinforced by Popova & Edirisingha's study (2010), stressing teaching and learning validity of podcasts as educational technology. The reasons for these positive findings include the fact that podcasts provide an attractive opportunity to expose students to authentic conversations that can help to increase their listening comprehension and vocabulary acquisition. Moreover, participants gained confidence in their abilities to comprehend English overall, as Lu (2007) also mentioned.

The statistical analysis of the obtained data indicates that the students not only improved their listening skills but also had a positive attitude towards the implementation of 6 Minute English podcasts. Therefore, our research hypothesis concerning regular use of BBC Learning English podcasts to develop first-year students' listening skills can be accepted.

Conclusions and recommendations

Based on the findings of this study, there are some recommendations for English teachers, students, and other researchers who are interested in conducting similar research. English teachers are advised to incorporate podcasting as an alternative web-based technique in teaching listening to EFL students within the topics in the curriculum. Applying podcasts in the teaching and learning process gives the students a new learning experience, increases their motivation, and enables the students to access various authentic materials of interest. In addition, it is also suggested that teachers be selective when choosing podcasts, by considering the students' interests, needs, styles, learning objectives, and also the duration of podcasts, so that the teaching and learning process proceeds well. Moreover, students should practice listening to BBC Learning English podcasts using both bottom-up and top-down processing alongside various listening strategies and techniques on a regular basis that they are taught and that they experienced in the class in their own style of learning in order to improve when listening to simple and subsequently more complicated materials. The findings of the current study might provide further insights into the effects of podcast instructions on other EFL courses such as reading or speaking. Moreover, the relationship between learners' learning style and podcasts can be investigated, too.

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The full list of references is available in the online version of the journal

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Public policy on city center revitalization based on the Town Centre Management concept

Abstract

Nowadays, it is impossible to ensure sustainable development of the state without using innovative policies of territorial development, one of which is a city revitalization policy. This article defines the main causes of city center degradation and typical approaches to revitalizing city centers in Europe and North America. The New Urbanism principles are outlined as regards city center revitalization, with an emphasis on their potential importance for sustainable urban development. The evolution of Town Centre Management (TCM) and the features of its application are characterized by authors with a focus on the mechanisms of anti-crisis management professionalization in the conditions of degrading city centers.

A model of the public policy on city center revitalization based on the TCM concept is presented, which envisages the functioning of a TCM manager (office) of (with a list of the main tasks); objectives and the sequence of policy implementation stages; application of tools for public participation and a public-private partnership in this process; city center revival through an integrated effect on various spheres (community, economy, space and environment), and, as a result, achievement of a multiplicative effect for the promotion and development of the entire city. The study used a set of general scientific and specialized methods that are based on the modern scientific principles of public administration and its related sciences (geography, economics, sociology, culturology, etc.), and interdisciplinary and systematic approaches.

Keywords: city center revitalization, Town Centre Management (TCM), New Urbanism, suburbanization, sustainable development

Introduction

Degradation of urban areas is one of the challenges for numerous contemporary cities. This concerns not only the physical dimension, but also social, economic, spatial, ecological, and cultural problems of crisis phenomena (Roberts et al., 2016). Having encouraged rapid city development, the global urbanization trend has led to accumulation of crisis phenomena such as social and spatial exclusion, unemployment, unsatisfactory living conditions, crime, etc. on a local level. Urban revitalization is intended to eliminate the degraded areas and create preconditions for their sustainable development.

Recognizing the transformational contribution of urbanization and the vector of global changes 'from the bottom', the 11th SDG formulates the task of ensuring inclusiveness, safety, resilience and sustainability of cities and residential settlements (United Nations, 2015). This objective calls for urban governance to play a leading role in implementing the global sustainable development agenda. At the same time, the existing and new challenges of supporting urban life are addressed by the New Urban Agenda (United Nations, 2016), which emphasizes the need to introduce public policies in various urban fields, designed to solve socially significant problems.

In fact, the policy of city center revitalization is increasingly practiced, having its own principles, tools and features (De Magalhães et al., 2017; Wojnarowska, 2017). First, this concerns the understanding of the city center as a focus of the governance

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response to crisis phenomena of territorial development. After all, the city center has always played a key role in the overall urban development. However, the suburbanization processes have caused the situation to deteriorate: the central parts of cities are losing their functions and significance.

The development of the public policy on city center revitalization requires scientific substantiation and innovative approaches. The present article aims to introduce a model of this policy based on the TCM concept. To achieve this task, the subjects of suburbanization impact on city center functioning, as well as the New Urbanism principles regarding their revitalization, are considered. Ultimately, this allows research into the causal relationships in this process and grounding the use of the mechanisms of professionalization of city centers' management in the face of their degradation.

Literature review

Urbanization is one of the most important factors of territorial development, covering the world (Gu, 2019). Understood as a long-term process, urbanization leads to an increase in city territories and a share of urban population, spatial concentration of economic and administrative activities, and development of the spheres of services and advanced technologies. Its consequences are reflected in various dimensions, in particular demographic, social, cultural, economic, spatial, ecological, legal, managerial dimensions, etc.

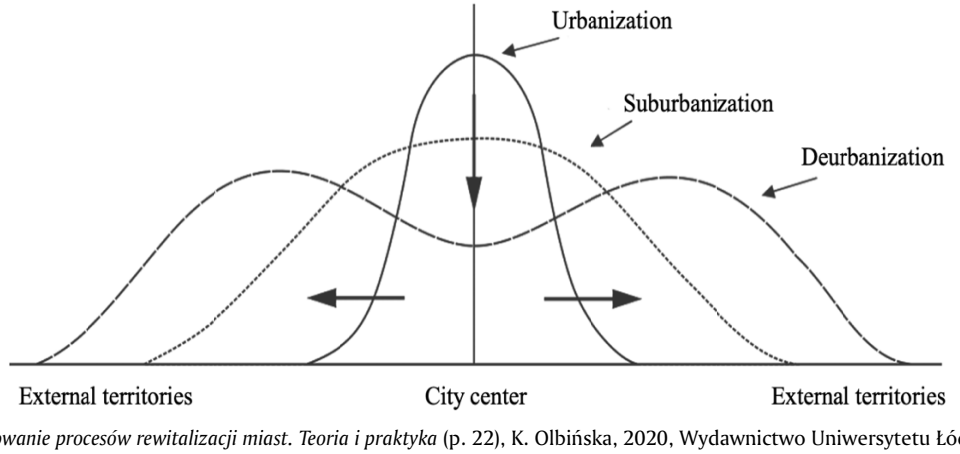
The current state of urbanization has its own peculiarities. Leo van den Berg, alongside traditional urbanization, named a separate stage of city development – suburbanization. Its essential features include resettlement of residents to smaller suburban settlements with better living conditions (clean environment, low population density, private building, etc.). At the same time, a close connection with the urban agglomeration center is maintained, because residents continue to work and receive most services there (Berg et al., 1982).

As a rule, urbanization is characterized by higher dynamics of population growth in the central urban areas than on the periphery, and a more uniform expansion of the city at the expense of adjacent territories. Meanwhile, suburbanization consists in a growing number of inhabitants and size of suburban territories, which is mostly a consequence of a reduction in the number of residents in the central urban areas. Thus, suburbanization is regarded as a factor of a gradual depopulation of city centers in favor of large suburbs (Majer, 1999, p. 7). Over time, suburbanization moved into the next stage – deurbanization, which consists in a gradual dispersion of residents who moved to small and medium-sized cities located outside the metropolis. At this stage, a decrease in the number and density of the population of large cities is observed not only in central parts, but also in suburban areas (Jakóbczyk-Gryszkiewicz, 2008). The processes described above are presented in Figure 1.

The development of urban areas on suburbanization principles took place in the United States and United Kingdom in the first half of the twentieth century. Formation of urban agglomerations as a result of suburbanization and popularization of individual transport had a significant impact on city center development. Gradually, they ceased to perform the function of providing inhabitants with housing. Instead, city centers became attractive locations for offices (including those for public administrative functions), and trade and service enterprises. A growing concentration of capital contributed to extensive construction in central urban areas, often chaotic and uncontrolled. Along with this, sub-centers that perform housing, commercial, social, and other functions are emerging with increasing frequency in suburban territories. city centers began losing ground due to this trend.

The problem of ensuring quality of life for residents in the process of urban planning and revitalization was highlighted by the supporters of the New Urbanism, founded by a group of American urbanists in the 1980s. They criticized new residential complexes of

Figure 1
Influence of urbanization, suburbanization and deurbanization on the growth of urban areas



Source: Planowanie procesów rewitalizacji miast. Teoria i praktyka (p. 22), K. Olbińska, 2020, Wydawnictwo Uniwersytetu Łódzkiego.

the same type, built in the United States, that were designed for private car owners, not for pedestrians, without proper public transportation or public spaces. Instead of multi-lane highways, the representatives of the New Urbanism proposed to design small streets with a compact trade and service area in the main street surrounded by parks, children's playgrounds and offices. The founders of the Congress for the New Urbanism (1993) Andres Duany and Elisabeth Plater-Zyberk, advocated revitalization of the existing cities and city centers within their territories, as well as a thorough planning of internal city districts based on the traditional neighborhood structure (Duany & Plater-Zyberk, 1994).

The basic provisions of this movement are outlined in the Charter of the New Urbanism, which was approved by the 4th Congress for the New Urbanism in 1996 (Fulton, 1996, p. 10). The provisions include:

- revitalization of city centers making them more attractive, in particular by eliminating high-speed roads in this territory, marginalization of car traffic;
- desire to diversify the functions of urban areas, ensuring the quality and accessibility of public spaces, and their adequate aesthetic appearance;
- following local traditions in architectural design and formation of the urban space landscape;
- introduction of low-speed traffic zones and development of infrastructure, suitable for pedestrians, bicycles, and public transport, and elimination of crossings and overpasses;
- implementation of pro-ecological actions, expanding urban green spaces (parks, squares, street plantations), etc.

The principles of the New Urbanism were explicated in the Second European Charter of Cities – "Manifesto of New Urbanism" (Council of Europe, 2008), adopted by the Congress of Local and Regional Authorities of the Council of Europe. Along with the needs to form a higher-density urban environment and ensure stable mobility, the Charter singles out the following areas: preservation of uniqueness of cities based on their culture, traditions and architecture; ensuring sustainable development of territories and environmental protection; encouraging innovation and local knowledge economy; promoting solidarity within an urban territory and among territories; building an effective system of city management based on participation.

These areas are reflected in the modern policy of city revitalization. For instance, Andrew Tallon (2020) introduced it as a combination of four interrelated factors: economic (generation of employment), socio-cultural (improving the quality of life and level of public services), physical (infrastructure development and environmental protection), and management (getting local communities involved in management decision-making).

Michael Leary and John McCarthy substantiates the six major aspects of the modern approach to understanding the revitalization of cities, which include: 1) goals (appear predominantly as compromises between focusing on the community, real estate and economy); 2) management (focused on partnership and public participation); 3) incentives (intended to ensure equilibrium between social needs and competitiveness); 4) areas of interference (internal city areas and suburbs); 5) sources and mechanisms of financing; 6) integration and wholeness (shifting from separate sector-oriented actions to formation of integrated measures embedded in a wider strategy and adapted to local specifics) (Leary & McCarthy, 2013, p. 121).

For further studies, consolidation of the modern understanding of the city center revitalization policy based on the New Urbanism principles remains an actual scientific task. This consists in the application of the TCM concept, which is an innovative approach to city management.

Methodology of research

During the study, interdisciplinary and systematic approaches were used. When substantiating a public policy on city center revitalization, the interdisciplinary approach provides the interpenetration and synergy of various sciences (geography, economics, sociology, ecology, political science, law, urbanism, etc.), since city revitalization is an interdisciplinary subject that cannot be described within the limits of a single discipline. The system approach means that the city can be considered as an open life-supporting social and territorial system, formed by people who are integrated with the ecosystem and have a common internal identity, for which the city center is a lower-level system of special importance.

The study was based on analysis of scientific thought in the field of city center revitalization. Using research methods such as logical-semantic, comparative, abstract-logical, decomposition and deduction, the essence, and characteristics of the public policy on city center revitalization, as well as challenges that made it more relevant under suburbanization, were investigated. With the help of the structural and functional method and the methods of comparison and analogy, the principles of using the TCM concept in the process of city center revival were revealed.

The study presents a model of public policy on city center revitalization, which specifies the typical initial conditions for the restoration of a degraded territory, and identifies the subjects and object of this policy, its goals, principles, and main stages. The authors applied the methods of abstraction, modeling, idealization, and the graphical method in the process of developing the model of city center revitalization policy based on TCM. The conceptual model is a tool for establishing a connection between theory and empirical observations. It is used as a guide that is evolving as new knowledge is acquired. To summarize the research provisions and formulate conclusions, extrapolation and abstract-logical methods were used.

Vision of city center development in light of the concept of New Urbanism

The New Urbanism, which is increasingly finding supporters in the United States, is similar to traditional European urbanism. Its main objective is to counteract the urban sprawl, streamlining the habitable territory and defining urban growth boundaries. Degraded city centers are one of the key challenges that have a negative effect on quality of life of inhabitants, which leads to their resettlement from central to suburban areas, and causes chaotic development of cities. Formation of compact, multifunctional, and vibrant spatial structures is intended to satisfy the needs and interests of their inhabitants. Consequently, in contrast to standardized functional zoning, urban development adopted the concept of spatial planning with an emphasis on the importance of city centers.

From the start of city formation, city centers played a major role in exchange of goods, services, and information. In the present conditions, when large shopping and entertainment complexes are quite often located beyond city boundaries, city centers need to maintain their function as meeting-places and points of exchange (information, views, impressions), which is an important task when revitalizing them. This is facilitated by dominantly pedestrian traffic in this part of the city; consequently, numerous social and cultural interactions occur in central public spaces. In this way, the social capital of the city is formed, which, among other things, attracts people from other territories.

In addition, the center is also the main expression of the city's cultural heritage, being a medium with the highest degree of individuality and character (Wojnarowska, 2017, pp. 36–37). Thanks to unique architectural objects and historical public spaces of different purposes, the center gives people the feeling of connectedness with their social environment and the community. It is their common area, which is used for conducting various activities and strengthening the inhabitants' sense of belonging to the city. The center is an exclusive medium for the formation of urban identity, representativeness, and concentration of social, economic and cultural life. Therefore, city center revitalization should be considered in terms of its influence on the urban development in general. Implementation of a well-developed program to revitalize a territory can help build a modern city and stimulate further development processes, namely:

- introduction of new (or recovery of lost) city functions;
- growth of entrepreneurship and creation of new jobs;
- increasing the city's attractiveness for accommodation, recreation and labor;
- strengthening the city's brand and competitive advantages in the external environment.

Thus, the public policy on city center revitalization should be formulated in compliance with an urban development strategy. In this approach, great importance is attached to the choice of a city-planning concept, or a combination of concepts, among them: compact city, green city, smart city, creative city (Landry, 2012), inclusive city (Anttiroiko & de Jong, 2020), cittaslow (Jang & Jung, 2015), happy city (Montgomery, 2013), etc. The core of the modern urban revitalization policy should comprise people-oriented programs of sustainable renewal of areas, aimed to form an urban environment which is multifunctional, with places of residence, work, and recreation placed close to one another; environmentally friendly as a result of expanding green plantations, sustainable nature management, and pro-ecological educational measures; comfortable due to the introduction of innovations and modern technologies; favorable for the life of creative people; available to all inhabitants without exception; harmonious with nature, the surrounding environment, and local traditions; provides comprehensive lifelong learning. At the same time, it is important to seek to ensure a happy life for inhabitants, which requires, among other things, support for networks and emotional ties within the community (Horbliuk & Dehtiarova, 2021, p. 54). In each of these cases, the city center has a potential for accelerating positive changes in various areas of urban life, and providing a multiplier effect of the introduced activities on the entire city territory.

Causes of city center degradation and approaches to city revitalization

The crisis phenomena, which accumulate in city centers, have become more prominent due to centers losing their regular functions. Presently, the following are the main causes of central urban area degradation:

- progressive depopulation, caused by suburbanization, which leads to a growing amount of unused land and abandoned sites, deterioration of the economic basis for the functioning of urban infrastructure;
- aging of the population living in these territories; most migrants from city centers are young people, families with children, and middle-class representatives; as a result, city center districts have a higher proportion of the elderly in the total population (Jarczewski et al., 2019, p. 88), which affects the formation of the territory's consumer profile;
- weakening of business activity, primarily in the field of trade and services; due to decreased attractiveness of city centers, inhabitants prefer to spend their leisure time in peripheral trade and entertainment complexes;
- deterioration of the environmental situation as a result of atmospheric air pollution by private transport, unsolved parking problems, and shrinking green areas;
- loss of city centers' representative character due to deterioration of the technical condition of buildings and public spaces, as well as the development of service and administration spheres in other parts of the city.

The concentration and mutual reinforcement of crisis phenomena in central urban districts stipulated the need to develop and implement a public policy of revitalizing these very territories. In this sphere, the United States and the EU have many years of experience which is based on the local urban planning specifics. To restore the viability of the American city centers, revitalization measures focused, in the first place, on construction of trade and entertainment complexes, which ensured among other things the provision of recreational, business and other services. Eventually, they became multifunctional lifestyle centers which met the expectations of their residents. These centers differed from traditional shopping malls and markets in their design, covering large trading and service areas and being quite freely modeled in the cities' central streets. The architecture of these public spaces incorporated both traditions (City Place in West Palm Beach, Santana Row in San Jose) and modernity (East Twenty-Ninth Avenue Town Center in Denver, or City center in Reston, Virginia) (Bernaciak, 2015, p. 268). Further diversification of the functional structure of American city centers took place through the development of the real estate market and the introduction of innovative urban development solutions.

The approach to revitalizing European city centers is substantially different compared to the relevant measures in American cities, especially as regards the placement of shopping and entertainment complexes. This is influenced to a large extent by the structure of European city center planning, which is dramatically different from the rectangular street grid dominating in the United States. A popular trend in the European model of using city centers is restriction of car traffic, which often applies to the entire central area (while in the United States, only parts of some streets are intended for pedestrian traffic). A striking example of these urban transformations is Copenhagen, where as early as in the 1960s the city authorities opened the main street for pedestrians. According to Jan Gehl, a leading Danish architect of that time, cities needed to expand their pedestrian zones and develop public spaces, which would encourage communication between residents (Gehl, 2010, p. 13). In general, the policies of European city revitalization pay considerable attention to local identity, tourist attractiveness, spatial accessibility, and environmental stability. An important role of cultural heritage objects of city centers and the efforts made to revitalize them are the focus of the relevant policies.

The emergence of Town Centre Management and its features

The importance of city center development required the city governance bodies to devise special approaches to fulfil that task. TCM has been implemented in European countries over the past 30 years (Belgium, United Kingdom, Sweden, Spain, Italy, Germany and Poland). It dates as far back as 1987, when the town of Ilford established the position of center manager, responsible for integrated management of the development of the central part of the city. This focus on city centers was stipulated by the crisis phenomena of the 1980s: the economic, social and cultural activity increasingly developed in the urban periphery, while the central areas gradually degraded, turning into slums (Kamiński, 2006, p. 8). Ilford and other cities sought to ensure that their centers could perform, effectively and beneficially, for the residents, the functions of a place of the residents' daily life, labor, recreation, as well as commercial and service activity.

TCM emerged as a local entrepreneurs' initiative (bottom up), who failed to compete with large trading centers, created in peripheral parts of cities. This created an economic threat to city main streets and old markets, because social activity, leisure, and shopping were moved outside their historical centers. Private sector representatives were forced to coordinate their efforts to improve the situation in city centers, first of all in trade. A vivid example might be the British companies Marks & Spencer and Boots, and Chemistry (Gawłowski, 2018, p. 2) who began to develop promotional events, encouraging residents to return to the city center. Their activities were aimed at attracting customers using marketing tools used in managing large trading complexes, which successfully operated outside the central areas. Therefore, the initial idea of TCM was to achieve special marketing and sales objectives, its initiators being private sector representatives interested in increasing their profits.

In the 1990s, the application of the TCM concept consisted not only in the cooperation of entrepreneurs of degraded central areas, but also in getting local authorities involved in this activity. Thus, the possibilities of enhancing the social and spatial dimensions of city center revitalization have expanded. Coordination of public and private sector activities required the development of tools for participative city management, including those for promoting public and private spaces located in central urban areas, and encouragement of social and economic initiatives. In the long run, the aim of joint actions was city center sustainable development and improvement of quality of life of residents. To achieve that, a mutually beneficial public-private partnership was formed. The changed understanding of TCM has led to expansion of the scope of its tasks (from promoting private entities to spatial development, cultural life, public security, social assistance and counteracting social exclusion). Thus, as Georgina Whyatt (2004, p. 346) pointed out, it gradually evolved from tactical marketing activities to strategic cooperation, aimed at city center revival.

Implementation of TCM techniques in different cities of the world showed that the existing differences depend on the level of partnership formalization, governance structure, and sources of financing of revitalization measures. For example, in Birmingham, there was a local government division responsible for

the revitalization of the city center, which coordinated the activities of all stakeholders. The aim of the revitalization measures was to create an attractive, clean and safe central part of the city. To this end, revitalization of public spaces was conducted, bridges were built, and the access of pedestrians to the city center expanded; pilot infrastructure projects were implemented, including the construction of an international congress center, which became an impetus for private sector investments.

Another British city, Wigan, established the Economic Regeneration Office to revive its center based on TCM, which was outside the direct control of the city authorities. The Office focused on improving the residents' socio-economic situation by investing in education, training and employment opportunities (Boryczka, 2013, pp. 125–126). The independence of the governance agency, which coordinated and implemented the measures of the city's revival, facilitated formation of effective partnerships and depoliticization of joint activities.

The process of city center revitalization based on Town Centre Management

To revive, develop and enhance the value of the city center, TCM should be aimed at the four key areas of territorial development: (1) community (level of social capital development), (2) space (state of infrastructure functioning), (3) economy (business activity level), and (4) environment (environmental condition).

1. City revitalization measures should be aimed at overcoming or alleviating crisis phenomena of a social nature (poverty, crime, low public trust, etc.). The measures of developing human and social capital in a degraded territory (a variety of programs for training, integration, improvement of residents' skills and qualifications) are currently gaining in importance.
2. Spatial changes are aimed at demolishing or upgrading outdated facilities, constructing new buildings, and creating or improving public spaces. These changes may be aimed at modernizing the existing infrastructure of the historical and cultural heritage while accounting for contemporary needs and improving its aesthetics and functionality.
3. City center revitalization requires creation of new jobs and promotion of entrepreneurship and innovation. The in which such support is provided depend on the local capacities of the territory, as well as on the interests of business entities and the population.
4. The city center should be characterized by a high level of environmental development, which involves targeted energy efficiency measures, a rational use of land, water and other natural resources, introduction of environmentally friendly public transport, arrangement of green zones, adequate lighting, improving public safety, etc.

In the context of these spheres (community, space, economics, environment), it is necessary to analyze internal and external factors that have led to the concentration of crisis phenomena in the city center. The internal factors are those which make it possible to describe the true situation in a specific territory (unemployment, living conditions, providing trade and services for the population, degradation of technical infrastructure, the quality of atmospheric air and drinking water, the level of landscaping, the presence of improvised waste dumps, etc.); the external factors explain the weaknesses and miscalculations of urban policies, which caused degradation of the territory (migration, availability and quality of public services, the levels of budget financing of social and technical infrastructure, external investment, spatial planning).

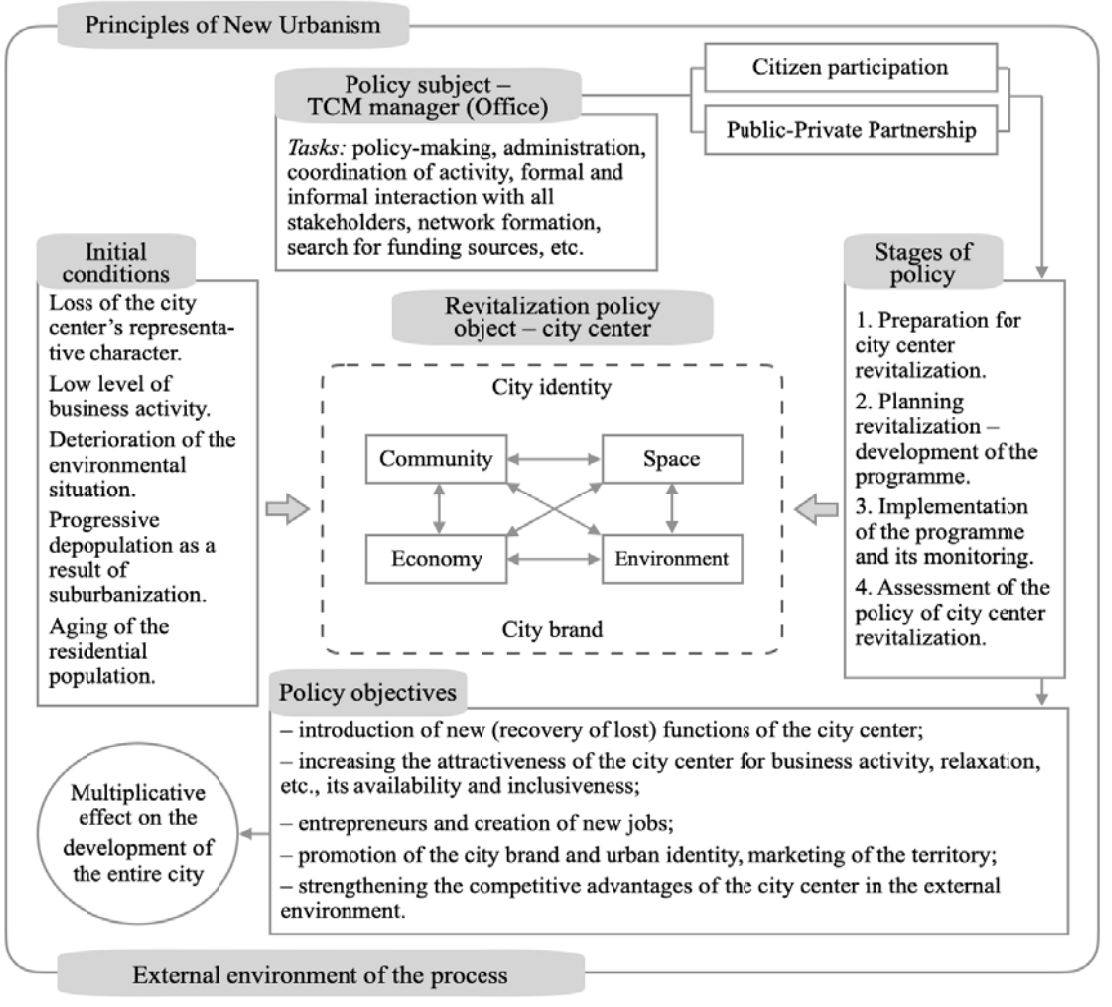
The public policy on city center revitalization is realized by the TCM manager in partnership with all stakeholders through preparation for city center revitalization, elaboration of a relevant program, its implementation, monitoring, and policy assessment. The model of this policy is shown in Figure 2.

The proposed model can be used as a practical guide for: developing a city revitalization policy; analysis of the effectiveness of previous policies and their compliance with the proposed approach; substantiation of the role and tasks of the manager (office) of TCM; determining step-by-step actions and justifying participation of stakeholders (existing and potential entrepreneurs, inhabitants of degraded city areas, representatives of non-governmental organizations, etc.) at all stages of public policy formation and implementation.

TCM performs a function of collecting and exchanging market information, which allows different interest groups to participate in strategic planning. In this case, concentrating joint activities and resources for the revitalization of the central part of the city, the TCM manager (office) together with all the stakeholders should strive to achieve a multiplicative effect on sustainable development not only of a separate area, but of the city as a whole.

The experience of the Polish city of Lodz in overcoming the degradation of its central district, specifically the main city street of Piotrkowska, is interesting. Applying the TCM methodology, an interdisciplinary team "Piotrkowska Headquarters" (pol. Sztab Piotrkowska) was gathered under the city mayor, which consisted of public officials, university professors, entrepreneurs, media representatives, non-governmental organizations, experts, and residents of Piotrkowska. The Strategy for the development of Piotrkowska Street, devised by the team, aimed to restore its status as the most popular place for secular gatherings and family walks, a center of culture and entertainment, and an important tourist route, by building among other things a pedestrian zone and embankment in the city center. Upon the approval of the Strategy, the post of Piotrkowska Street Manager and his supporting staff (pol. Zespół Obsługi Piotrkowskiej) was introduced by the headquarters.

Figure 2
A conceptual model of the public policy on city center revitalization based on Town Centre Management



Source: author's own work based on „Town Centre Management – koncepcja zarządzania centrum miasta na przykładzie miast europejskich", E. M. Boryczka, 2013, *Zeszyty Naukowe Politechniki Częstochowskiej. Zarządzanie, 12*, pp. 120–122; „Town Centre Management jako narzędzie zarządzania procesem rewitalizacji", R. Gawłowski, 2018, *Ekspertyzy i opracowania, 64*, pp. 3–5; „TCM – zarządzanie centrum miasta", J. Kamiński, 2006, *Biuletyn ZPORR, 5,* p. 8.

Their duties included continuous monitoring and evaluation of the tasks performed; initiation of joint street development actions; and establishing cooperation with residents and entrepreneurs. Later, the position of the manager was reorganized into the mayor's authorized representative in charge of the Piotrkowska Street development, nominated by the city's entrepreneurs (Boryczka, 2013, pp. 126–127; Gawłowski, 2018, pp. 6–7). He coordinated the implementation of the measures outlined by the Strategy for the development of Piotrkowska Street, and cultural, tourism and other initiatives under the city center revitalization policy.

Based on the above, the main tasks of the TCM manager (office) are as follows:

- development and coordination of implementation of the policy of revitalizing the central part of the city, and administration of the process;
- organization of cooperation between public and non-public partners, applying the tools of public participation (Falanga, 2020) and public-private partnerships;
- providing support for sustainable development of a degraded territory through projects aimed at making the city center more attractive, functional, and accessible (for example, initiation of the necessary legal changes, expansion of cultural and tourist options, physical planning of public spaces), looking for ways to finance them;
- launching joint campaigns to market the city center, implementation of a consistent information policy and promotion of the city center, development of its brand and urban identity;
- finding solutions to problems, on which non-public partners report in their contacts with city authorities;

- forming networks of stakeholders in city center revitalization and development.

For its part, TCM is realized through formal and informal partnerships, aimed at developing and implementing the city center revitalization program. Notably, the development of informal interconnections distinguishes TCM from a traditional administration model, characterized by a mostly hierarchical organizational structure and formal relations. The informal communications help to establish an effective partnership for achievement of TCM objectives, in particular professionalization of the city center management, diversifying the functions of the central territory, making trade and service more efficient, forming a positive image of the city center, etc. Establishment of long-term cooperation between public and private partners, sharing know-how, and growth of social capital favor successful city center revitalization through active work of entities of various sectors: retail, services, tourism, culture, housing, environmental protection, etc.

Conclusions

Suburbanization has led to formation of urban agglomerations and a gradual cumulation of crisis phenomena in city centers, specifically: progressive depopulation; aging of the population and formation of the corresponding consumer profile; weakening of business activity, primarily in the field of trade and services; deterioration of the environmental situation; loss of the representative nature of city centers due to deterioration of the technical condition of buildings and public spaces, etc. The need for comprehensive countermeasures to stop urban sprawl gave rise to the concept of the New Urbanism, which, among other things, justifies the strategic importance of city center revitalization for sustainable urban development. As a rule, the center is regarded as the most important part of the city, the main focus of urban life, considering the number of cultural monuments, historical places, remarkable public spaces, etc., located in it. The following features of the city center are singled out: a key role in the system of the city's vital activity, uniqueness, presentable appearance, and contact with residents.

City center revitalization requires adequate organizational and institutional support. The experience of using TCM in some European cities proves the expediency of introducing a position of city manager (office) to be responsible for purposeful development of the territory. In the case of city revitalization, the functioning of an entity responsible for the policy implementation is aimed at professionalization, openness and predictability of this activity.

When modeling a public policy on city center revitalization based on TCM, it is necessary to consider the basic factors of its success. Regardless of the adopted organizational form and the mode of operation of the TCM manager (office), the key task is to develop a city center revitalization policy, which requires the relevant staff to acquire competencies, knowledge and expertise in this area, and the stakeholders to have trust in the process. Public participation and a public-private partnership are the pivotal tools in the work of the TCM manager (office), since the revival of the city center needs to establish intensive cooperation (formal and informal) between the public and private sectors, as well as between the local community and other stakeholders in this process.

A public policy on city center revitalization should be implemented according to certain stages: preparation for city center revitalization, revitalization planning – the development of a program of joint actions, introduction and monitoring of the revitalization program; assessment of the city center revitalization policy. The object of a public revitalization policy is a city center which is regarded as a system, formed by four subsystems: community, economy, space, and environment; their condition and the broken relationships between them cause crisis phenomena in the territory; whereas revitalization can be achieved, using TCM, only through a comprehensive and integrated effect on each of them. Taking into account the potential value of the center for the entire city, its revitalization not only must meet the needs of inhabitants and business entities of a degraded territory, but also stimulate positive transformations in other urban areas (for example, through marketing of a territory, evolution of urban identity and brand), creating prerequisites for comprehensive sustainable urban development.

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Marcin Pałys

The role of open source software in the process of implementing social innovation in SMEs

Abstract

Nowadays, small and medium-sized enterprises (further SME) look for ways to overcome pressing social problems. An open-software-based application can be considered a powerful tool for this task, because of functionalities such as data management, BI operation, and efficient channels of communication. A review of literature shows that there is a shortage of studies concerning connections between usage of Free/Libre or Open Source Software (further FLOSS) and implementing Social Innovation (SI). The aim of this research is to investigate how the use of FLOSS relates to the ability of SMEs to implement SI. The author aims to underline key areas in which FLOSS supported implementation of SI. A set of recommendations for future initiatives is created based on the experience of successful implementation. Based on a review of literature, the author created a set of hypotheses which are validated by the in-depth surveys with three companies in the SME sector. The article structure is as follows: first the author presents literature findings concerning the subject, and next the areas of the model and survey answers. Finally, the author performs a critical review of the model, confirming that open software can stimulate the process of developing social innovation in SMEs, especially in cost reduction, flexibility, and community support.

Keywords: social innovation in SMEs, FLOSS, social application, software-based solutions, innovation

Introduction

Nowadays, *social innovation* is a term gaining more and more recognition, especially in the SME sector, which often operates more locally Business proprietors have a personal connection with their clients, employees, and social surroundings and, for this reason, pressing problems such as wastage of food, exclusion or discrimination are more visible to them (Begonia et al., 2016). Fulfilling these issues can present a great value (Prahalad et al., 2009). Moreover, managerial staff can presumably become the benefactor of the innovation they introduced (Graddy-Reed & Feldman, 2015). To meet recognized social needs, SMEs are turning to software solutions with functionalities that give them stable communication channels, adequate data management, or broad business intelligence operations (Bhatt et al., 2016). There is a shortage of research papers on this issue, especially in the view of SMEs. The aim of this paper is to fill that research gap and to investigate how the use of Free/Libre Open Software Solution (further FLOSS) relates to the ability to implement Social Innovation (SI) by Small and Medium Enterprises (further SMEs). The research focuses on an application developed by SMEs that meets social needs and which can also support itself financially. The author performed a set of in-depth queries to identify the key areas of benefits from FLOSS usage (cost reduction, safety, flexibility) and expand knowledge about their impact on the process of implementing SI. The research findings might play an interesting role in operation of SMEs, underlining the importance of a FLOSS-based code in the process of implementing SI. The research gathers benefits and drawbacks of FLOSS, from other areas, underlined in the work of other researchers, and tests the applicability and compliance in SMEs. What is more, broader knowledge of the FLOSS application in these circumstances (SMEs implementing SI), provides tools for simple problem-solving for enterprises, which may not be aware of existing possibilities.

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Review of the literature

Social innovations

OECD research published in 2007 stated that the ability to introduce innovation would be the main source of competitive advantage for enterprises in the following decades (OECD, 2007). Nowadays it is hard not to agree with this research. Innovations play an important role in driving the economy and stimulating the growth of contemporary markets. Research shows that intensified economic activity also creates a potential for creating innovation thus far stimulating the growth of the global economy (Galindo-Martin & Méndez-Picazo, 2014). In theory, the development of enterprises through innovation should make societies wealthier and fulfil their needs. However, the nature of challenges that European countries are facing today is hardly conquered with innovations in their traditional form[1] (Howaldt & Schwarz, 2010). Solving problems such as corruption, food wastage, or overpopulation are rarely part of traditional business model enterprises (Bund et al., 2013). In addition, many government organizations lack necessary instruments and resources to overcome social challenges of this kind. The fact that these problems are difficult to tackle does not make them invisible for societies and organizations. It is possible to identify a shift in values towards a sustainable way of living, and thus far actions taken to resolve social problems are in great demand. A new type of innovation is needed, focused on dealing with challenges that are considered important but are not perceived in conceptualizing traditional innovation. The term used to describe this type of action is *social innovation* (Prahalad et al., 2009).

The concept of social innovation (SI) resolves around "creating new solutions (products, services, models, markets, processes etc.) that simultaneously meet a social need (more effectively than existing solutions) and lead to new or improved capabilities and relationships and/or better use of assets and resources" (Bund et al,, 2013). This definition highlights several key characteristics of SI. The most important one is basing the meaning of innovation on a social need that has to be fulfilled. Usually, they relate to economic development or health and education of excluded social groups (Datta & Ishaswini, 2011). Moreover, the aspect of the novelty of the solution is underlined, binding the term social innovation with a traditional view of innovations. The aspect of better usage of resources and assets leading to lack of waste and encouragement to seek potential in items seemingly useless is also considered meaningful. Another definition formulated by the European Commission underlines the fact that SI may be introduced by various actors. The European Commission (2013) defines social innovation as

> a new response to pressing social demands, which affect the process of social interactions. (…). They are innovations that are not only good for society but also enhance individuals' capacity to act. They rely on the inventiveness of citizens, civil society organizations, local communities, businesses, and public servants and services. (p. 7)

What this means is that social innovation is often introduced by smaller entities (SMEs), having better knowledge of social problems around them and more capabilities to stimulate other members of the group to act accordingly.

The term *SI* is gaining a lot of attention as a supposed tool to resolve crucial social problems and formulate a response to challenges that either way could not be addressed. SI are considered to stimulate connection between society actors, create new a solution, and therefore promote reforms (Hubert, 2010; Moulaert & Mehmood, 2011). However, according to the International Telecommunication Union (ITU), a key factor in solving a modern social problem is access to the means of transmitting information – proper infrastructure which allows connection of social actors and provides a platform for actions (International Telecommunication Union, 2013). Entities search for a free to use, easy to develop and cheaply maintained application that could transfer information necessary to implement SI. The idea of Free/Libre or Open Source Software (further FLOSS) and the ethos connected with it seems to adhere to those needs.

FLOSS

For software to provide value for an organization, it is necessary to provide an opportunity to achieve goals, reduce the operational cost or improve efficiency (Weerawarana & Weeratunga, 2004). Software consists of set of instructions for hardware on how to perform an envisaged task, to fulfill assumed functions. Nowadays, software is a part of almost every product and service, such as cars, electronics, consumables, etc. Moreover, software solutions are a basis for an organization's day-to-day operation, supporting processes of management, information exchange and decision-making (Lippoldt & Stryszowski, 2009).

FLOSS is an umbrella term for a set of software created and released in a particular way[2]. Unlike propri-

[1] Innovation is defined by Schumpter as launch of a new product or a new species of an already known product, application of new methods of production or sales of a product (not yet proven in the industry), opening of a new market (the market for which a branch of the industry was not yet represented), acquiring of new sources of supply of raw materials or semi-finished goods, or creating new industry structure such as the creation or destruction of a monopoly (Shumpeter, 1934).

[2] There is a difference between free and open software (Kelty, 2008), but for the sake of clarity for this article, the author decided to use a term comprising both of these types of software.

etary software, a developer using FLOSS benefits from four freedoms (Stallman, 2002). The freedom to:

- run the program for any purpose,
- study how the program works and change it – access the source code,
- redistribute copies,
- distribute copies of modified versions.

A FLOSS solution can be developed in the same way as standard software, but in most cases it is produced by teams of unstructured developers working together in organizationally and geographically distant environments (Lee & Cole, 2003). This community-based development process can consist of professionals paid to work on a particular FLOSS solution, freelancers – enthusiasts contributing to society, or students learning how to develop software and sharing their code (Lakhani & Wolf, 2003). In some cases, an organization can become a leader and set a direction for development of a particular solution (Fitzgerald, 2006), but many projects are conducted with no management structure. Expanding of FLOSS software led to creation of specialized platforms such as GitHub or SourceForge which are used for storing code, organizing projects, and sharing effects with the wider community (Henkel, 2006). Because of its nature, FLOSS can be defined as a "privately-produced public good" (O'Mahony, 2003).

Nowadays, FLOSS is a mainstream way of developing software rather than an academic curiosity. A number of active FLOSS projects are estimated in thousands and many broadly used programs benefits from it (Chrzanowski & Zawada, 2018). Among the most recognized is the Linux operating system Apache Web Server, many users applications (Mozilla Firefox, Open Office), web-building frameworks (WordPress), programming languages compliers, and integrated development environments (Atom, PyCharm) or enterprise systems (openCRX).

FLOSS has several benefits for an organization, which are distinguished from usage of closed-source software. Firstly, with open communities, software can be easier and cheaper to develop, because an organization can use premade pieces of code (named *libraries*) and create the program that is needed. The open sourced nature of FLOSS means that software can be reconstructed and adjusted to an organization's expectation. Therefore, developers working with FLOSS can react faster to changing environmental factors (such as market demand) and software is more capable of being regenerated (Yildrim & Ansal, 2011). This characteristic means that costs can be cut significantly and improves flexibility of operation. Secondly, developing with FLOSS is easier because vast communities often offer support and advice for developers. Many FLOSS projects include message boards and a mailing list, where authors can ask for a solution to a problem, debugging, or testing of their software (Fuggetta, 2003). Moreover, often, the FLOSS code is available for scrutiny to more developers, and thus is more secure. Security vulnerabilities are identified quicker and could be removed faster. Additionally, because of the open source nature of the solution, an organization can gain an insight into the program and adjust its security policies (Payne, 2002). FLOSS can also serve as a tool stimulating education and research. The cost of obtaining, installation and maintenance is often very low, and in some cases there is no cost, and because of that an organization can support software used solely for educating its members or benefactors or for conducting experiments and developing new software (Lakhani & Wolf 2003).

Using FLOSS has a variety of benefits, beginning with a possibility of cost reduction, more flexibility, and a higher level of security. Moreover, open sourced communities, emerging around FLOSS, grant developers a platform to learn and receive answers for their questions and problems. As stated previously, their purpose is not always to achieve financial success but often to fulfill a social need. To test this theory, the author conducted a series of interviews with three SMEs creating social innovation and asked them about the usage of FLOSS. The methodology and results are presented in the next paragraph.

Methodology

The aim of this research is to investigate how the use of FLOSS relates to the ability of SMEs to implement SI. The author aims to underline key areas in which FLOSS has supported implementation of SI. A set of recommendations for future initiatives is created based on the experience of successful implementation. An in-depth survey was picked as a validation method because the topic of connections between usage of FLOSS and there has been little research into the ability of SMEs to implement SI. Therefore, broad, qualitative research is needed. Organizations for the survey were chosen based on the impact of SI implementation and relevance to the research topic. All the research attendees created applications which were the driver of SI. Surveys were conducted via the online communication platform Google Meet. Each interview was filmed and saved on the university server. Meetings took place from 20th August to 7th September. Each meeting lasted around 45 minutes. After the interviews, data was analyzed regarding other literature findings by the author. After a review, conclusions were drawn for the paper.

Based on a literature review the following research questions were posed:

1. What was the driver of the social need that led to introduction of SI?
2. Did the use of open software lead to cost reduction of the applications?
3. Was FLOSS flexible?
4. Is the application more secure due to using open software?
5. Did the FLOSS community help in overcoming problems at the application development stage?

The questions presented above were asked in three SMEs responsible for introducing SI. Every company

delegated one key employee to answer the research questions. The companies were as follows:

- **Cozato** (platform A) – an application dedicated to the ecological trend "zero waste" and barter exchange among neighbors. The main goal of platform A is to promote reusage of goods and allow members of a social group to help each other and combat poverty. This is achieved by creating a platform on which people can submit offers of old, unused items which can be bartered or given to a person in need. Items can also be sold for a small amount of money. Unlike other solutions, which allow barter trading (Facebook groups, olx.pl), platform A is a platform designed only for this purpose and thus is much more developed, with functionalities supporting the operation (more flexible search engine or segregation and validation of offers). Software is a key factor in this SI because it is responsible for maintaining the platform, gathering, and structuring data, BI processes, and displaying the user interface. The software used in this project was the frameworks NextJs and Django. The software was created by people with professional experience in software development.
- **Zagadkowy.pl** (platform B) – an initiative which emerged during the COVID-19 pandemic. The company implementing the platform Zagadkowy.pl is the Silesian company Cudotwórnia, operating in the entertainment sector, focusing mainly on creating city games, questings[3] and escape rooms. Because of sanitary restrictions in Poland, it was impossible to conduct activities which were a common practice of integration among members of a social group or employers of a company. To support the needs of its clients, Cudotwórnia created platform B, a platform which consists of several online city games and escape rooms. The games use images, videos, sounds, and Google Maps to recreate situations and mechanics of a real-life event. Participants can take part in social activities in their homes, adhering to sanitary rules. Platform B addresses the need for social interaction, prevents alienation, and provides secure entertainment in times of a pandemic. It is especially important for people in quarantine. In this project, software is used to maintain the platform B website, maintain the payment system, analyze data, and store multimedia. Cudotwórnia uses the WordPress framework for its platform. Creation of the site was outsourced to a third party and then the company began to maintain and adjust platform B to their needs. The software was created by people without professional experience in software development.
- **Makeabetterplace.com** (platform C) – a platform inspired by the Georgian concept of social bars – places serving the purpose of stimulating creativity, innovation, and entrepreneurship among citizens. The main idea behind platform C is to connect people locally and support their bottom – up initiatives, by providing g them with a space for organizing meetings, testing business ideas, and finding specialists for their projects. The platform aims at strengthening relations between members of local groups and encouraging them to fulfill social and commercial needs. The main purpose of using software in this initiative is to store and analyze data, provide a way of communication, and unify access to information. The software used in this project is original software named GROT, with some addons based on FLOSS solutions. The software was created by people with professional experience in software development.

Findings

In the section below, the author presents the gathered answers to research questions and the conclusion drawn from them:

- **What was the driver of the social need that led to introduction of SI?** – in all the cases, the presented social need was observed by the entity and the will to solve social problems was the main drive behind introducing SI. Enterprises were looking for a way to capitalize on fulfilling a social need, creating a sustainable solution. The developer of platform C states:

  > We have the human-factor-focus principle, in which we design systems (existing architecture) with people's needs and not with developers playing Chinese whispers (requirements team, substantive design team, architecture team, programming team, test team) and finally the client asks why they built something other than that expected.

  Analyzing the answers to the question, it is worth underlining that SMEs, because of the smaller scale on which they operate, are a vital part of a society, well connected with other entities. The existence of social need is known to entrepreneurs; they are willing to find a solution. With appropriate technology, SMEs could implement a SI. Therefore, to stimulate the process of introduction of SI by SMEs, entrepreneurs need to be educated and presented with technologies able to uphold their ideas.

[3] Questing is a type of geocaching activity. Participants, in small groups search for a particular item or place in the city. Most often a GPS device is used to support the group.

- **Did the use of open software lead to cost reduction of the applications?** – owners of platform A state that thanks to FLOSS it was possible to significantly cut the cost of their platform, mainly by cutting the working hours of developers, because of usage of premade software libraries to fulfill their needs for functionalities. Moreover, platform A could cut the testing time, therefore lowering the cost even more. According to owners of platform B, cost reduction was also significant because without FLOSS not only the writing of the code, but also maintaining the code would have been outsourced. Also, the prices of third-party services concerning known frameworks are lower than the price of implementing closed software. The owner of platform B states:

  > Using closed software would generate enormous costs for our company. We checked it and we priced it, but in an era when everyone was tightening their belts, especially our clients, and especially us, it was not possible to build something from scratch. I think it would be reinventing the wheel, creating functionalities that already exist and are present on the market.

  Company C used their own developed technology GROT for platform C because in their view using FLOSS would increase the cost. Developers would have to learn a new coding language or use a tool in which they are not proficient. Because of their expertise in GROT, it was beneficial to use a closed-software solution. However, they decided to add FLOSS addons to speed up the development of chosen functionalities (such as reading QR codes or gaining access to fast-rotating government data). Moreover, the developers of platform C realize that due to the need of creation of an online shop or banking functionalities their GROT language would not succeed because of malfunction possibilities and the costly process of testing. Hypothesis two was confirmed.
  It is certain that FLOSS can reduce costs on two levels. According to the answers from platforms A and C, FLOSS enables the number of developers to be cut and testers' working hours to be cut using the premade code. What is more, FLOSS offers a solution for most common functionalities of an app, allowing developers to concentrate on more complicated issues during the development process. According to platform B, FLOSS usage leads to minimization of outsourcing and use of in-house resources, reducing costs. Creating many features of app B would not be possible or would have been outsourced without FLOSS. On the contrary, the usage of FLOSS could lead to increased costs if developers have to learn a new coding tool instead of using the known solution. Therefore, the cost benefits of implementing FLOSS may vary depending on the knowledge of the developers and their ability to learn new skills.

- **Was FLOSS flexible?** – platform A owners perceived their FLOSS solution as a flexible one but only if the developers had enough expertise to adjust the framework to their needs. In project A this could be accomplished but platform A states that when picking a framework, it is often the case of the amount of learning in relation to the generated value. Moreover, they point out that many functionalities are similar across platforms so they could use software libraries prepared by other FLOSS community members. Developers of platform A state:

  > The FLOSS we chose turned out to be flexible because we gained experience in it. The team had a lot of experience in React, but we chose Next for technological reasons. This led to some problems in the beginning, when we had to understand the software a bit, but in the end it turned out that choosing this FLOSS was a plus, but it definitely took some time.

  Developers of platform B underline that their framework consists of a vast number of addons ready for use without modification, which fulfilled their need for functionalities, and FLOSS made it easy to change the platform while it was already operational and adjust it to the needs of clients. The platform had basic functionalities which were already covered by the framework. In platform C, the developers perceived the FLOSS solution as flexible for the small task it was responsible for, but would not decide to transform the project entirely into FLOSS, because the GROT language was perceived as more suitable for their needs. Hypothesis three was confirmed.
  FLOSS flexibility is based mostly on the type of the framework of FLOSS and the expertise of the developers. Moreover, it is important to highlight two characteristics of a framework: the spectrum of functionalities and the ease of adjustability. The framework used by platform B is to be considered narrower in spite of functionalities, but even an unskilled developer can quickly adjust the platform to the needs of the client. On the other hand, frameworks used by platform A are to be considered broad in functionalities but proper usage and adjusting requires appropriate knowledge of the developer. Companies like C, already using a custom-made solution, may perceive FLOSS as inflexible because the smaller frameworks do not have the required functionalities, and broader frameworks require too much learning time.

- **Is the application more secure due to using open software?** – developers of platform A state that in their view FLOSS provides a high level of security because of constant testing and regular updates from the community. The work of many developers translates into a regularly updated base of exploits and malfunctions. Potential threats are noticed faster, and many entities are working on preventing them doing damage. The owners of platform B underline that FLOSS made their platform much more secure than they ever could with their lack of specialized knowledge. The developers of platform C state that because of using an unknown to vast community software their platform is more secure, because hostile entities do not have access to GROT specifications to prepare an attack, and it would cost a lot of resources to create malware which would be dangerous to their platform. On the other hand, the security of platform C depends only on its developers and their expertise. Hypothesis five was confirmed.
  The case of software security plays an important role in the development of software-based SI. Because of the lack of knowledge in this area, enterprises like to outsource the issue and mimic that act using FLOSS. Many entities work on the safety of the software and entrepreneurs are benefactors of the process without the need to pay for it. What is more, the safety of the solution is in all its users' interest, so the community contributes to the process willingly and eagerly to make their future projects more secure. On the other hand, a custom-made solution might not be in the scope of most common attacks thus far providing a higher level of security, but it requires a certain amount of knowledge in software security to make this kind of solution secure. Furthermore, a targeted attack, focused on breaching a particular platform, can still be dangerous for custom software.
- **Did the FLOSS community help in overcoming problems at the application development stage?** – during the process of creating platforms A and B, community support was beneficial for the project. Developers solved several problems with the support of a local coding group, internet forums or FLOSS documentation. Moreover, developers could discuss the functionalities of their platform with users of this technology, asking for advice. The developers state: "It's hard to program without Stack overflow[4] and, in addition to official documentation, there is often salvation in finding out that someone has had a problem like ours and it was solved." Support concerning premade addons was beneficial for them. Platform C creators could hardly consult other entities on their problems, and relied mainly on company developers. Hypothesis six was confirmed.
  Based on the answer to this question, it is possible to highlight the two types of community support an entrepreneur could benefit from. One is passive support acquired through documentation and internet activity of other developers (blogs, fora, threads on stack overflow). This provides a deeper insight into the functioning of the FLOSS and basic problem solution. For a more complicated issue, developers seek guidance in active support – consulting the community about a particular issue/functionality in their application. This kind of support demands a developer to be an active community member, participating in knowledge trading.

Discussion

The presented studies are viably important on the spectrum of other FLOSS oriented papers. There are no studies in literature of a similar approach (FLOSS-based Social Innovation in SMEs) therefore the author focused on findings concerning general usage of FLOSS and searched for common ground and new findings. According to Borzaga and Bodini (2014), successful implementation of software depends to a great extent on the understanding of the complexity of the problem being solved by it. The findings of the study correspond to that approach, claiming that the drive for introducing SI in researched SMEs was the social need observed in the company's immediate surroundings. SMEs are implementing social innovation because they see the social need in their surroundings – among their family, friends, employees, or other social groups – and understand it well. Software functionalities also provided companies with more possibilities to conduct their operations and fulfill social needs. In the area of cost and flexibility, it is a common theory that FLOSS allows for a significant cut in expenses because of usage of predeveloped frameworks/libraries which are free for exploitation (Ågerfalk & Fitzgerald, 2008; Kilamo et al., 2012; Reed et al., 2012). Moreover, flexibility of the solution does not have to be limited. Research responders agree with the theory that using FLOSS for standardized, small functionalities translates into time and cost reduction but, in some cases, developing a solution using self-written code can be more efficient and adhere to the user needs better. It depends on the level of professional expertise of the staff of the company. Based the example of makeabetterplace.com, it is possible to underline that if a company has a skilled developer focused on developing self-written technology, it is not efficient to use FLOSS because of the time and effort which must be put into learning a new technology. On the other hand, as the example of Zagadkowy.pl and Cozato proves, FLOSS can lower

[4] Stack overflow – a social networking site where programmers can ask questions about software development.

the cost of a project significantly without limiting its functionality. According to other research, FLOSS solutions are considered safer than closed-software solutions. Exploit and bugs are more likely to be noticed and are fixed faster. Moreover, some security measures are taken even without user knowledge (updates of WordPress framework, fixing known exploits) (Erturk, 2012; Thompson & Wagner 2017; Walden et al., 2009). Research responders expressed two different approaches. In the first two companies, the developers are benefactors of the work of other community members, using broadly known, regularly updated and tested FLOSS code to grant their platform security. This is a convenient solution for SMEs without a high level of programing knowledge. The second approach, mentioned by the third company, is that FLOSS is much more popular, better known, and easier to breach, so self-written or closed software is more secure. The FLOSS code is available for everyone, thus creating malware able to attack the application is simpler. The developers focus on a more expensive solution that can go unnoticed by potential hackers. Importantly, in this approach security depends solely on the expertise of the developers. In the area of community support, other research states that open access to code promotes a process of creating large communities around FLOSS, often in the form of fora, blogs, or code repositories. It creates a lot of source material for developers interested in using that solution, helpful in the process of implementing functionalities or debugging. The process helps to empower developers, and give them freedom of creation (Bhatt et al., 2016). All responders agree that this is a positive factor concerning FLOSS which stimulates the process of introducing SI. Moreover, according to study findings, there is a passive type of support, acquired by publicly available blogs, fora etc., and an active type of support, achieved by reaching out for the help of community members. Passive support is available freely, but active support often requires a contribution for the support group (being a part of a broader initiative, helping other developers etc.).

Conclusion

The findings of the research correspond to the existing theory concerning the relationship between social innovation and FLOSS usage. It was proven that FLOSS stimulates the process of implementing SI and should be considered an important variable in evaluation of its business potential. Moreover, studies confirm that challenges regarding implementation of SI in SMEs in other parts of the earth are like challenges for Polish enterprises[5]. However, research findings provide more insight into the nature of the process of implementing SI in SMEs with FLOSS. A study shows that the amount of developer skills in the company plays a role in determining the method of using the software. Regarding a characteristic of small and local entities, without professional know-how and a high budget, FLOSS could be a solution for implementing expected innovation. To stimulate the process, one should present the means and educate the employers of SMEs about possibilities regarding FLOSS thus far providing them with tools for their needs.

The presented research acts as a focus study and should be broadened to provide more universal findings. A study concerning quantitative research of SMEs is to be conducted to prove that conclusions drawn from three entities can be extended to cover a larger population. Moreover, FLOSS differs vastly in functionalities and capabilities, so research concerning the types of software could isolate factors and the strength of their influence on the process of implementation of SI by SMEs. The SME sector is also known for its diversity. FLOSS usage can vary from enterprise to enterprise, sector to sector. More in depth characterization of SMEs and a broader scale of the research could present interesting findings which did not emerge from the research because of its narrower scale.

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Weronika Muszyńska

Personal branding of managers in service companies

Abstract

Personal branding in the last ten years has been gaining significantly in popularity - especially in the business environment (Gehl, 2011; Wee & Brooks, 2010). Meanwhile, the literature still recognizes the need for empirical research on personal branding that examines how various professions experience personal branding. Managers are increasingly aware that the activities they perform as part of personal branding affect how the organization they represent is perceived. The aim of this article is to identify the process of building personal brands by managers. To achieve this goal, a literature review and qualitative research were carried out in the form of individual in-depth interviews. The choice of the research method is justified by the subject of the analysis. The study covered a group of nine people with at least two years of experience in a managerial position and employed in service companies located in Greater Poland. As a result of the conducted research, it was found that personal branding is perceived as a multi-stage process in which social media is credited with increasing use. In addition, organizations only support building personal brands by managers and executives. The article is a field for further exploration of publications and research.

Keywords: personal branding, branding, personal brand, managers, contemporary organizations

Introduction

Personal branding in literature is defined within many disciplines or theoretical concepts and taking into account various research perspectives. As a result, it causes difficulties in operationalization and comprehensive definition of the concept of "personal branding". Also, in literature there are rarely links of this concept with the achievements of organization sciences, and especially with the achievements of marketing in the area of brand management (Wojtaszczyk & Maszewski, 2014).

Meanwhile, in the last ten years, personal branding has been gaining significantly in popularity – especially in the business environment (Gehl, 2011; Wee & Brooks, 2010). The literature still recognizes the need for empirical research on personal branding that examines how various professions experience personal branding (Jacobson, 2020). Nowadays, recruitment specialists, career counselors and consultants dealing with career planning are more and more interested in the subject of building a personal brand (Shephered, 2005). Kowalczyk (2020) also notes that personal brands are being built more and more consciously by specialists in various fields (e.g. IT specialists, doctors, scientists, lawyers or craftsmen), influencers (e.g. bloggers, youtubers), artists, and managers.

Building one's own brand is for many managers a new quality in their professional functioning, and also forces them to reevaluate their thinking about themselves - especially in the context of activity on social media, the importance of which in personal branding is emphasized by Kampioni-Zawadka (2014). With technological advances that facilitate online communication and the emergence of multiple social platforms, "a career has become a personal brand that needs to be managed in the virtual age" (Gioia et al., 2014). The literature also indicates that an important role in building a personal brand by modern managers is also played by: shifting responsibility for employees' careers from organizations to individuals (Arthur & Rousseau, 1996; Greenhaus & Kossek, 2014) or mismatch (Chłoń-Domińczak et al., 2016) and the volatility of the labor market resulting from the COVID-19 pandemic. In addition, managers are

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increasingly aware that the activities they perform as part of personal branding affect how the organization they represent is perceived and assessed by customers, contractors, employees and other stakeholders. Also, the importance of the manager's brand and its visibility is increasing as the role of managers is to spread companies' missions, values and ideas to both internal and external stakeholders (Chen et al., 2013) and to reinforce or support the company's brand (Górska & Mazurek, 2021).

In this article, based on a review of selected, recent literature and the results of qualitative research, an attempt was made to identify the process of building a personal brand by managers in service companies located in Greater Poland.

This article contributes to existing literature in several ways. First, it fills the research gap defined as an insufficient number of publications that refer to the concept of "personal branding" and examine it on a group of managers employed only in service companies. Secondly, the article refers to the most recent publications in which the concepts of "personal branding" and "personal brand" have been studied, which in turn made it possible to present the latest concepts of defining these concepts.

The article consists of four parts. The first is a review of the literature. The second part presents the methodology of the qualitative research (i.e. the purpose, method and scope of the research). The third part describes the obtained results of the qualitative research. The article ends with a summary, along with limitations and recommendations for future research.

Review of the literature

The vast majority of purchasing decisions are based on a sense of trust, confidence or other emotions that are evoked in people by a specific product, service or person. This is also the essence of branding. It is a process of influencing people, and its effectiveness is primarily influenced by the identity of the brand built. Currently, branding is a concept addressed not only to companies, because a new trend is emerging (Rampersad, 2010). Interest in the personal brand and in personal branding has significantly increased in recent years (Fournier & Eckhardt, 2019). Nowadays, these concepts are the subject of much international discussion (Morgan, 2011; Wetsch, 2012).

Among them, there is the view that a personal brand is an image created of a given person in the mind of another (Walczak-Skałecka, 2018), and it can also be considered the most important factor of personal success (Peter & Gomez, 2019). A personal brand reflects a person's skills, abilities and lifestyle (Gehl, 2011; Hearn, 2008). Setty (2006) claims that "we all have our own personal brand because we all make a promise to the world (…). By living your life, you are living your brand. Your brand is your true face." Contemporary researchers note that a personal brand can be used in competing to enter the labor market (Close et al., 2011) and to pursue the desired profession (Parmentier et al., 2013). It is important, however, that the concept of a "personal brand" should be considered in various contexts, related for instance to the social or professional group it concerns. Therefore, it is worth pointing to the differences resulting from the economic, social and cultural spaces in which a personal brand is built each time (Walczak-Skałecka, 2018).

However, in many scientific publications, the term "personal brand" is used interchangeably with the term "building a personal brand", which results in definition difficulties and undoubtedly constitutes a barrier to the development of this research area (Gorbatov et al., 2018).

While there has been a significant increase in scientific attention to personal branding in the last ten years, it is still a fragmented phenomenon that deserves academic attention (Scheidt et al., 2018). Although there are definitions of personal branding based on empirical research (Khedher, 2019) or more conceptual work (Bendisch et al., 2013), there is still no single, comprehensive definition of this concept that could be successfully applied in both literature and business practice. This article attempts to classify the definition of the concept of personal branding appearing in recent literature. As a result, it was found that personal branding is defined as: 1) a marketing concept, 2) a process, 3) image seen from various points of view (Table 1).

As a result of the review of the latest literature, it was found that the concept of "personal branding" is defined mainly in scientific publications of international scope, which indicates the interdisciplinary nature of the issues raised. Personal branding also appears as a source for new academic impulse, as it may sensitize scholars to opportunities for intensifying collaboration with practitioners to enrich and disseminate knowledge in their fields (Scheidt et al., 2018).

A personal brand is built both in private and professional life – by creating yourself as a valuable employee (Rampersad, 2010). In this process, the greatest importance is attached to creating the image for instance through behavior, manner of expressing oneself, mastering verbal and non-verbal communication, or the level of education. Equally important is striving to distinguish yourself from other people through qualifications, personality traits or appearance. However, the process of building a personal brand should primarily consist of planned activities implemented from a strategic perspective (Gorbatov et al., 2018).

The starting point for building a personal brand is the analysis of oneself in terms of self-definition – recognition of one's own identity (Wojtaszczyk & Maszewski, 2014). Self-recognition of a person's identity is the first stage in building a personal brand. In this process, after the diagnosis stage, there is a planning phase, i.e. setting goals related to a given personal brand. This, in turn, requires the definition of a per-

Table 1
Classification of the definition of the concept of "personal branding"

Classification of the definition	Definition	Author(s), year of publication
personal branding as a marketing concept	Concept related to the marketing strategies that a person adopts in order to promote their major personal characteristics	Zarkada, 2012
	A way of auto-marketing similar to any product or company branding process.	Gujarathi & Kulkarni, 2018
	A marketing concept similar to promoting products and services that has now been extended to people.	Peter & Gomez, 2019
personal branding as a process	Conscious process with a clear aim and goal.	Khedher, 2014
	Long-term process which varies for different individuals.	Sidor-Rządkowska, 2019
	Entire process of establishing, maintaining, and developing an individual's human brand.	Scheidt et al., 2018
personal branding as an image seen from various points of view	Investments made by individuals to improve their public image.	Ilies, 2018
	It involves capturing and promoting the strengths and uniqueness of your target audience.	Khedher, 2019
	Conscious and intentional effort to create and influence the public perception of an individual.	Wróblewski & Grzesiak, 2020

Source: author's own work.

sonal value proposition (PVP) (Morgan, 2011), from which tangible benefits are derived. The analysis of the human identity and the determination of PVP build the stage of planning a personal brand. The next phase of the personal branding process is to define ways to achieve professional and personal goals. This is about taking actions in the field of career management and relating to possible paths of personal development, the choice of the target audience and the means of communication. Due to the fact that in the process of building a personal brand, a person is exposed to many failures, it requires a high level of internal motivation to act and knowledge of self-motivation techniques. Controlling the effects of undertaken actions, i.e. measuring the strength of a personal brand, is also a constant element of the branding process (Wojtaszczyk & Maszewski, 2014).

Personal branding became an important concept also due to the ability to present oneself easily to others through social media sites. Activity in social media, i.e. expressing yourself on websites, forums or blogs, and publishing posts on social media such as Facebook or Twitter, allows someone not only to build an attractive personal brand, but also to reach a wider audience with their message, i.e. through building a wider network of contacts and stronger influence on others. With the rise of social media, many managers have begun to participate in social media as an integral part of both public relations and self-marketing campaigns (Saad & Yacob, 2021). Although social media is an excellent tool for creating, presenting and maintaining an attractive personal brand, it should also be remembered that inadequate use of the available tools can result in unfavorable presentation on the web (Jarska, 2017).

However, personal branding is primarily used to achieve goals related to obtaining a specific and desired position on the labor market - for example by increasing the revenues achieved (Walczak-Skałecka, 2018), visibility and value in relationships with others (Peter & Gomez, 2019), as well as employability (Khedher, 2014).

Also, in recent years, businesses have begun to recognize the importance of creating a personal brand as it is particularly impactful on company reputation and business performance as well as markets themselves (Olanrewaju et al., 2020). An attractive personal brand – especially of a manager, can attract talented professionals, as well as generating interest in their products amongst investors.

Methodology of qualitative research

In order to achieve the aim of the article, a qualitative study was conducted in the form of individual in-depth interviews (IDI). The choice of the research method is justified by the subject of the analysis. Its advantage over other methods of qualitative research is the possibility of a deeper understanding of the subject of the research, as well as obtaining an individualized view of the subject of the research (personal branding is a subjective phenomenon, and therefore it is very important to include the individual actor's perspective). The theoretical basis for the research was the assumptions of the grounded theory.

Taking into account the limitations accompanying the selected research method, the author attaches great importance to research reliability during each stage of the research process.

Due to time and cost constraints, the study comprised three women and six men aged 28-50. The author adopted the following criteria for selecting respondents: 1) at least two years of experience in a managerial position, 2) employment in a service company whose headquarters are located in Greater Poland and listed in the Business Navigator. The selection of the sample for the study was deliberate and was carried out using the snowball technique. Detailed data on the surveyed group of managers is presented in Table 2.

For the purposes of this article, it was assumed that a manager is a person holding a managerial position, having appropriate knowledge and skills, including managerial skills, a specific personality and experience in managing organizations. It is important that in modern organizations, for a manager to be able to effectively perform the managerial duties entrusted to them, they should have not only knowledge and abilities, but also specific managerial skills (Żukowski, 2008) and an attractive personal brand.

Due to the COVID-19 pandemic, individual in-depth interviews were conducted with the use of ICT tools. Each of them lasted from 45 to 60 minutes. All the questions asked were open-ended. In the case of seven individual in-depth interviews, the respondents consented to them being recorded. Transcriptions were made of the recordings. In the remaining two cases, handwritten notes were made during the study, which were then entered into the computer. The in-depth interviews began in June 2021 and the qualitative part of the research continued until August 2021. The interview scenario enabled more extensive interviews while allowing respondents enough flexibility for the free expression of thoughts.

The content was coded using the "line by line" method, due to the tendency of the respondents to break off sentences frequently and change the topic of the conversation. This allowed a comprehensive approach to specific thematic areas. When generating the codes, the following principles were suggested: keeping statements as precise and simple as possible, strictly following the data content, and avoiding one's own judgments (Douglas et al., 2009). Initial, potential thematic threads were outlined at the code generation stage. Specific codes were then assigned to appropriate thematic threads: 1) Definitions of the concept "personal branding", 2) Stages of the personal branding process, 3) Personal branding tools, 4) Support for personal branding in modern organizations. Each of the indicated parts, based on the quoted fragments of interviews with respondents, has been described and commented on in this article (Douglas et al., 2009).

The collected material was subjected for analysis and synthesis using the NVivo software. All information that could be tracked back to respondents was anonymized, including names and companies in which they operate.

Results of qualitative research

Definitions of the concept "personal branding"

Based on a review of the latest literature, it was found that personal branding is defined as: 1) a marketing concept, 2) a process, 3) an image seen from various point of views. During individual in-depth interviews, two respondents clearly defined building a personal brand as building an image seen from different point of views. "In my opinion, this is tantamount to building an image seen from different point of views. That is why it is so important to build a personal brand coherently and consistently" (woman, 32). "Building a personal brand, i.e. consciously creating your own image in someone's eyes. It is acting in accordance with the values and communicating, for example, one's goals, achievements or professional position to other people" (man, 37).

In addition, the surveyed managers, referring to the knowledge acquired during training with personal brand specialists, identified personal branding as a process of creating one's own image/brand, which

Table 2
Detailed data on the surveyed group of managers

Lp.	Gender (F/M)	Age	Type of service activity	Period of work in a managerial position
1.	F	32	IT	4
2.	F	43	HR	7
3.	F	48	education	11
4.	M	28	IT	3
5.	M	33	transport	5
6.	M	37	gastronomy	7
7.	M	43	education	12
8.	M	48	tourism	11
9.	M	50	transport	18

Source: author's own work.

is about defining, describing and selling yourself. "In my opinion, this is the process of creating your own image. As a rule, this is how we strive for interest in our person and what we are currently doing" (man, 33). "Building a personal brand is the process of defining, describing and promoting oneself" (man, 50).

One of the respondents, referring to his professional experience, compared the process of building a personal brand to the recruitment process: "As I deal with the recruitment process on a daily basis, personal branding is a similar process. In both cases, it's about presenting your best side" (woman, 43).

Similarly to the literature, the respondents identified a strong relationship between personal branding and auto-presentation. One of the respondents also indicated that building a personal brand is an activity bordering on PR, marketing, psychology and communication: "Building a personal brand is simply a marketing activity to show us in the best possible light" (man, 28).

However, one of the surveyed managers stated that: "I have not come across a general definition of this concept yet, such as in the case of demand. On many popular blogs there are entries on effective self-promotion, building your own image, etc., so in my opinion they are the same concepts" (woman, 48).

It is important that the surveyed managers, when answering the question about what is necessary to build a personal brand, primarily indicated: 1) confirmed knowledge (certificates of completed courses and studies), 2) professional experience, 3) professional contacts, 4) activity in social media.

The respondents stated that building a personal brand also requires: 1) creativity, 2) openness, 3) truth, 4) consistency, 5) honesty, and 6) commitment. Regarding this question, commitment was most often mentioned by the surveyed managers. "When it comes to a personal brand, this involves creativity, openness, truth and consistency" (man, 50). "In my opinion, the key to building an attractive personal brand is being fully committed in the entire process. It is important to build it coherently in various channels such as LinkedIn or Twitter, and to ensure that this concept implies our true values, goals and expectations" (woman, 48). "Building a personal brand requires commitment, openness and honesty. My name is my brand, and looking at my example, I make it more attractive by speaking at a conference or by publishing engaging posts on LinkedIn" (man, 28).

During the interview, managers emphasized how important it is to build a personal brand simultaneously and adequately in private and professional life. "You build personal brand throughout your life. It is a certain process which, in order to be attractive, should proceed in parallel and adequately both in the private and professional spheres" (man, 37). "You cannot build a personal brand in your professional life in isolation from your personal life" (man, 50).

This statement is agreed in literature for example by Walczak-Skałecka (2018) or Rampersad (2010).

Stages of the personal branding process

The personal branding process includes the identification of one's values and positioning, the choice of the target audience, the means of communication, and control. The interviews confirmed that the managers follow this process and its subsequent stages. In addition, most of them shared the view formulated in the literature that personal branding is a multi-stage process, not a one-time action.

Many respondents emphasize that they want to be perceived as experts in their field and industry: "When I think about building my brand, it is synonymous with positioning myself as an expert. I can't talk about things that I don't understand" (woman, 48).

> The key is to understand what you want to achieve by building your brand. Do I want to be known, I want to be an expert or I want to find my space. It is also important to be interested in the current events in our industry and to speak on topics that interest us. Interaction with our observers also plays an important role. (man, 33)

> As a manager, I try to build my own expert brand. Thanks to this, I am recognizable in the industry and "my field". By building a personal brand, what I say and write is more trusted. I feel fulfilled and my knowledge and experience pay off because I share them with other people. (man, 50)

One of the respondents noted that: "a derivative of building a personal brand is to stand out among other managers and the labor market not only as an expert, but also as a trustworthy or simply interesting and friendly person" (man, 50). Furthermore, managers stated that the first step in building a personal brand is to get acquainted with the opinions about the person: "The first stage should be to interview people from our immediate environment about how they judge us. Then it is necessary to conduct a self-analysis and define our goals" (man, 48).

Another step in the personal branding process is the choice of the target audience. The managers emphasize that they want to be recognizable among business partners, investors, but also the public. Meanwhile, some respondents underline that they are unwilling to be public personas, and their brand is limited only to their business environment. "The first step in this process should be getting to know yourself and the people you want to communicate with – for example investors, clients" (woman, 32). "I'm in business and I'm not looking for media attention. I am not a celebrity, I do not want my brand to be associated with, for example, scandals or the world of celebrities in general" (man, 50). "I focus on building the attractiveness of my brand among internal and external clients of my company" (man, 28).

Another step in the personal branding process is communication. Respondents emphasized how

important it is to maintain consistency between the communication message, the chosen medium and the selection of the recipients of the message. "You need to choose communication channels and create consistent, attractive messages. It is important to update them on an ongoing basis, as well as to interact with their recipients" (woman, 32).

In this question, some respondents emphasize the importance of the press and the Internet, while TV and the radio are considered less important. "I don't feel the need to build my brand on TV or in the press. For us, young people, the most important thing is a presence on the Internet" (man, 28). "I work on the appearance of my profiles on social media, participate in training on a personal brand, and start to act consistently" (man, 28).

Controlling is not commonly used by the interviewed managers, as only a few of them explicitly stated that they control their media appearances: "I try to keep track of what appears on the Internet about me and my company. Even during my vacation I can't give it up" (man, 37).

However, one of the respondents stated that he did not pay attention to the information that appeared about him on the Internet, in the press or on television, and adheres to the principle: no matter how they write, it is important not to misrepresent the name.

Personal branding tools

Managers were asked what tools can be used to build a personal brand. They mentioned: 1) social media such as LinkedIn, GoldenLine, Facebook, Twitter, Pinterest, YouTube, Instagram, 2) original podcast or videocast, and 3) own website or blog.

However, the surveyed managers also said that a personal brand is built not only on the Internet, but also in the real world. Although the pandemic caused the virtualization of work and interpersonal contacts, nowadays conferences, fairs and other events are returning in their traditional form more and more often, and active participation in them is a very effective way to build personal brand as an expert in a given field. It is important that the respondents noted that the purpose of building a personal brand should determine the choice of tools: "Depending on your profession and what you want to achieve, you build your brand differently and use other tools for this purpose. This process cannot be generalized" (man, 33).

Support for personal branding in modern organizations

Only one of the respondents admitted that his organization does not support the process of building personal brands by employees:

> There are no personal branding activities carried out in my company – as is the case with employer branding. Managers independently create their image more or less effectively in and outside the organization. This is mainly limited to occasional postings on LinkedIn and Twitter. When it comes to other employees, they do not receive any support in the field of personal branding. (man, 33)

The surveyed managers also stated that they initiated or supported initiatives in the field of building a personal brand in their organizations. "I learned about a personal brand and the process of building it while browsing various internet blogs. After several training sessions and courses in this field, I decided that it was worth organizing similar training for employees in managerial positions and other managers in my organization. We are active in this area all the time" (woman, 43). "Certainly, we provide employees with many opportunities to build their brands. I mean, for example, publication of articles in our corporate communication channels, participation in fairs or workshops. On the other hand, managers have many other areas in which to build brands, starting with a dedicated tab on the company's website, where they can update their descriptions and publications, and ending with participation in the most important international industry events" (man, 48).

Respondents also stated that even if their organizations do not currently offer support for the process of building personal brands by employees, they intend to change this in the near future: "I have noticed that the topic of building a personal brand is becoming more and more popular. To date each of us has done this in their own way, but in the future it may be worth considering introducing a series of training sessions and workshops in this field in our company" (man, 28).

The surveyed managers emphasized the importance of independence in the process of building a personal brand, which in relation to employees usually takes place without the support of the organizations employing them. The situation is different in the case of managerial and managerial positions, which may indicate inequalities in access, for example, to tools for building personal brands.

Summary

Qualitative research in the form of individual in-depth interviews made it possible to achieve the aim of the article and provided interesting conclusions.

First, as a result of its implementation, it was confirmed that there is no single, generally accepted definition of the concept of "personal branding". The surveyed managers most often understood personal branding as a process that should begin with recognizing the strengths and features that distinguish a given person. Moreover, they pointed out that building a personal brand can be defined as a marketing concept or image in the eyes of other people, which is confirmed by the literature review. This is of particular importance in connection with the observed mismatch and volatility of the labor market, on which it is increasingly difficult to build and manage an attractive personal brand (Kowalczyk, 2020).

Secondly, the article confirms that personal branding is a multi-stage process, not a one-time action. Managers also emphasize that they want to be perceived as experts in their field and industry and how important it is to maintain consistency between the communication message, the chosen medium, and the selection of the recipients of the message. Also, as a result of the study, it was found that observing the progressive digitization, managers identified social media as the most important tool for building a personal brand.

The conducted qualitative research also led to the conclusion that discrepancies were identified between the support for personal branding received by managers and that received by other employees. Meanwhile, the personal brand of each employee, regardless of the position held, is the showcase of the organization in which they work (Ślifirska, 2019).

An evident limitation for the conducted qualitative research is the fact that it included a sample of only nine people. Moreover, the respondents constituted a homogeneous group, i.e. a group of managers employed in service companies whose headquarters are located in Greater Poland and listed in the Business Navigator. The author of the article recognized a research gap that should be filled by undertaking research in the field of personal branding of a qualitative nature (although it would also be desirable to triangulate research methods) on a group that also includes managers from manufacturing companies and by classifying the enterprises they represent into micro, small, medium-sized and big enterprises. Thus, the article opens the field for further research exploration.

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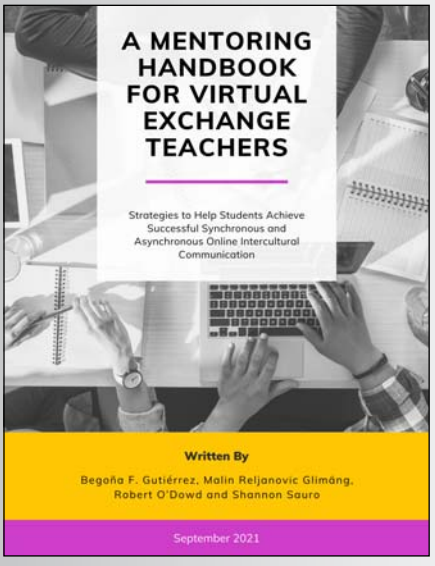
We recommend



Begoña F. Gutiérrez, Malin Reljanovic Glimäng, Robert O'Dowd and Shannon Sauro
A Mentoring handbook for virtual exchange teachers. Strategies to help students achieve successful synchronous and asynchronous online intercultural communication

It is often assumed that students will somehow be naturally prepared to navigate online interactions effectively and efficiently. This assumption is often held in the field of foreign language education by teachers who undertake virtual exchanges. However, there is considerable evidence in the literature to suggest that students who participate in virtual exchanges are usually not naturally aware of effective communication strategies in asynchronous or in synchronous communicative contexts. This handbook is designed for virtual exchange teachers to help support students effectively use these tools.
Date of publication: November 2021
Publisher: The Stevens Initiative
The Mentoring Handbook for Virtual Exchange Teachers is available for free at: **https://www.stevensinitiative.org/resource/mentoring-handbook-for-virtual-exchange-teachers/**

Mirosław Wójcik

Structural capital and its importance for the intellectual capital of an organization

Abstract

This article aims to confirm the thesis that structural capital (SC) is a framework for intellectual capital (IC) in an organization, which allows proper configuration of intangibles. Therefore, in the resource-based view, it determines its strategic character. Realizing such a goal, the author pays attention to the nature of relations and connections of individual components of IC, indicating that the SC is the key factor creating intangible assets of the organization as a source of gaining competitive advantage. The reason for taking up this issue is that, despite years of discussion in the field of IC, there are still unanswered questions concerning the management of an organization's IC, especially its planning and development. The defined knowledge gap concerns the source of strategic characteristics of IC, which, according to the resources-based view, are its rarity, originality, and the inability to be substituted or copied. The ability to shape the strategic value of intangibles makes this source itself a strategic resource and identifying it can change the way we understand IC. To achieve the paper's aim and fill the knowledge gap, the author asks whether SC can provide the characteristics of IC mentioned above and whether the strategic character of IC can be achieved independently of SC. The review and theoretical considerations are based on the analysis of the literature on IC and selected issues that are not directly related to IC, but of which the subject touches on the intangible assets commonly considered to be components of IC, such as the issue of functional stupidity, knowledge management, or resource theory. As a result of the analysis of features and characteristics of SC, the author concludes that SC is responsible for the efficient use of relational capital and human capital potential and thus is a strategic factor shaping IC as a source of achieved competitive advantage.

The topic has important practical implications because by confirming the strategic role of SC, indicates the sources of effective creation of IC and its potential. The discussion also identifies directions for further research on this issue, especially the operationalization of IC and its analysis in organizations' internal structures.

Keywords: intellectual capital, structural capital, human capital, relational capital, efficiency

Introduction

Intangible assets in the conditions of the postindustrial economy have replaced the classical factors of production (Wu, 2006). They are recognized as strategic resources that have become the primary source of competitive advantage. For more than 30 years, the attention of researchers and entrepreneurs has been focused on the issue of intellectual capital (IC), which is seen as an aggregate of intangible assets, including knowledge and its derivatives. Despite the significant role attributed to IC and the impact of this resource on business performance confirmed by numerous empirical studies, the formation mechanism of efficient IC remains largely unexplored and mysterious. Some researchers attribute a key role in building the value of IC to human capital (HC), thus placing it as a source of competitive advantage of an organization. After all, only people possess causal competencies, and in the end, the organization achieves its goals thanks to, their work. HC, being a carrier of knowledge, attitudes, and experiences as well as ideas, appears to be an important factor in creating the

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mentioned value. In the context of knowledge management processes, it is both a source and recipient of processed, codified, and created knowledge. Nevertheless, it seems reasonable in this context to ask why not all organizations with outstanding HC are able to realize their goals. Where do the human decisions and actions that today we can broadly refer to as organizational stupidity come from? What factor or factors must materialize therefore for an organization to be able to make full use of its HC potential? According to the resource-based approach, strategic resources should be considered valuable, rare, have no substitutes, and difficult to copy (Barney, 1991). These characteristics in the case of IC are provided for instance by the proper and unique configuration of its components (Reed et al., 2006). Properly managed IC becomes a strategic resource, and organizations that effectively use such IC are becoming open to innovation (Altindağ et al., 2019) and are more likely to be successful and gain competitive advantages (Ginesti et al., 2018; Hejazi et al., 2016; Meles et al., 2016). Thus, a knowledge gap is revealed here, which particularly touches on the interrelationship of IC components and thus their configuration. In the context of numerous studies that pay special attention to the important role of work organization and processes in the effective use of the organization's knowledge potential, it seems that the role of SC in building the strategic character of IC is not fully recognized yet.

The subject of research undertaken in this paper is SC and its impact on the company's intangibles' proper configuration. Therefore, the article aims to confirm that SC plays an essential role in creating mutual relations of intangible resources, thus becoming an integrator of the organization's IC, responsible for its strategic character. Thus, to achieve the stated objective, the following research questions were posed:

RQ1: Can the provision of strategic resource characteristics of IC, in the sense of the resource approach, occur independently of SC?

RQ2: Does SC influence the configuration and, therefore, the interrelationship of the components of IC in an organization?

The conducted research is theoretical and based on an analysis of literature. To provide highly plausible heuristics, coherent theories in the field of management of intangible assets of the enterprise have been selected and aggregated, including the concept of an intellectual capital-based View (ICbV), the idea of functional stupidity, the concept of a Knowledge-based View of the organization (KbV), the concept of organization life cycle, and selected concepts of measurement and evaluation of IC.

The examined issues are part of the discussion conducted for several decades by researchers of the resource stream in the optimal reconfiguration of resources. The identification of IC integrators and the study of the nature of relationships occurring in the structure of IC is an essential step toward the effective and efficient operationalization of this issue.

Definitions of intellectual capital and structural capital

Even though the discussion on IC has been going on for 30 years, the world of science has not yet developed a consensus on the definition of this concept. IC, which originates from economic practice, is not anchored in theoretical considerations (Kasiewicz & Rogowski, 2006). An attempt to base this concept on modern scientific theories necessarily involves researchers from various scientific disciplines, among whom a consensus is sometimes hard to come by. An example may be the emerging criticism of the concept of IC articulated by economists, in which questions are raised as to whether such intangible assets as ideas can be considered capital at all (Dean & Kretschmer, 2003). Therefore, the ongoing discussion is multidisciplinary and, above all, conducted in the language of various scientific disciplines. The authors define IC in different ways, and we can risk a thesis that each of them tries to emphasize the correctness of their own interpretation (Ujwary-Gil, 2010). Edvinsson and Malone (2001) define IC as the sum of HC, SC, and customer capitals. HC is primarily knowledge, skills, innovation, and the ability to carry out tasks efficiently. SC encompasses IT infrastructure, organizational structure, trademarks, patents, and everything that supports employee productivity. Stewart (1997) identifies IC as the sum of everything that everyone in a company knows that gives it a competitive edge. It is the knowledge that gives value to the individual elements of the organization and is organized in HC, SC, and customer capital. According to Brooking (1996), it is a bundle of intangible resources thanks to which the organization can function. IC is about market resources, human resources, infrastructure, and intellectual property. Sveiby (1997) emphasized the human role, pointing to employee competencies and internal and external structures. IC is also defined as the source of future benefits generated by innovation, unique organizational solutions, and employee performance (Lev, 2001). Despite apparent differences, most of the concepts of IC functioning in specialized literature indicate IC as the sum of HC and other intangible resources.

The difficulty in defining IC is related to the broad scope of the discussed concept. The number of components considered and the substantive area and perspective from which the definition or description of IC is established fundamentally influence the course of the discussion. The multi-disciplinarity and interdisciplinarity of the IC concept is an important factor that hinders the development of a consensus in this regard. The view is also relevant that the number of developed concepts and interpretations of IC is so large that researchers should no longer focus on developing new ones (Marr & Chatzkel, 2004) because in each individual case, IC may be defined differently depending on specific goals or needs (Chatzkel, 2002). Paradoxically, in this approach, all definitions are correct, and the possible categorization of this con-

cept only helps organizations understand what IC is. Huang, Luther and Tayles (2007), in their research on the taxonomy of IC, and Choong (2008), Kasiewicz and Rogowski (2006), and Martín-de-Castro (2019), who conducted detailed analyses of the literature on the subject, disseminated the three-component concept of IC by dividing it into HC (i.e., knowledge, experience, competences, and creativity), Structural or organizational capital (containing assets of the organizational structure, management and information systems) and relational capital (RC, relations with stakeholders). This division can be seen as a reflection of the sources of knowledge represented by people, information systems, processes, and social ties (Reed et al., 2006).

Defining SC seems to be a particular challenge in the discussed context. Some authors refer to it as "structural capital" (Bounfour, 2003; Edvinsson & Malone, 2001; Moon & Kym, 2006; Roos et al., 1997; Stewart, 1997), but there are also terms such as "infrastructure assets" (Brooking, 1997), "internal structure" (Sveiby, 1997), "intellectual assets" (Sullivan, 1998) and "organizational capital" (Bozbura & Beskese, 2007). The taxonomy of this concept in the works of individual authors also differs. For example, Sveiby (1997), when designing an IC measurement and assessment tool known as the *monitor of intangible assets*, explicitly assigned culture and "organizational spirit" to the internal structure. The internal structure, as seen by the monitor, is not entirely identical to the SC defined by other authors, if only because it also includes elements or features attributed to the human community, such as common identity or values. The differentiation of the SC taxonomy in the works of individual authors also results from the very essence of intangible assets, which makes it difficult to assign them to a single category unambiguously. For example, internal communication systems are classified in SC as systems or in HC because communication is the domain of people, and, in practice, it is a competence of HC rather than SC (Huang et al., 2007). According to Brooking (1996), SC is a framework that strengthens the organization, and formalizes the organizational culture, relations, and relations between employees and processes.

Unlike HC, which is the wage-earning capital of the organization and remains the property of the employees (Edvinsson, 1997), SC is wholly owned by the organization (Martínez-Torres, 2006). It includes processes, methods, procedures (Khavandkar et al., 2016) and the Non-Employee State, and sources of knowledge supporting the HC of the organization (Watson & Stanworth, 2006). According to Edvinsson and Malone (2001), SC is divided into organizational capital and customer capital. "Structural capital can best be described as an embodiment, empowerment and supporting infrastructure of HC." It consists of Innovation Capital in the form of intangible assets, Intellectual property, and other intangible assets for introducing new products and services to the market, and process capital covering all kinds of processes, procedures, and principles supporting the efficiency of production and delivery of services. SC is "everything that gets left behind at the office when employees go home" (Edvinsson & Malone, 2001). In the concept of Saint-Ongea (1996), SC is divided into four elements: a hierarchical organization that defines the relationships and positions of members of the organization, systems that determine how the organization operates (processes) and provides services, a strategy that defines the organization's goals and its achievements, and a culture within which it defines the values, norms and thinking of the organization. The presented approaches define SC as a diverse set of all elements shaping the environment, working conditions, and the way it is performed, as well as the knowledge contained in the organization's information systems. A similar approach was also adopted by other researchers, such as Pietruszka Ortyl, Brooking, Bratnicki and Sveiby (Sopińska, 2010). However, some researchers emphasize that the organizational culture revealed in SC is only its codified form (Huang et al., 2007).

Mutual relations of the components of intellectual capital

In attempting to answer whether the provision of the strategic resource characteristics of IC can occur independently of SC, attention should first be paid to the issue of organizational structure. An organizational structure is a framework of relationships between employees and their groups in the work process, designed to enable the organization to achieve its goals (Minterzberg, 1992). It is also a set of methods that divide tasks into specific responsibilities and their coordination (Ahmady et al., 2016). It forms the basis of its formalized communication channels and refers to its participants' internal relationships, and defines the source of authority, responsibility, and delegation of authority (Arnold & Feldman, 1986). According to Drucker (1954), the structure is a tool to achieve the short- and long-term goals of an organization. The organizational structure, which is a strategic resource and a part of the SC, must define the relationships between the intangible resources of the organization, becoming the source of the configuration of the IC, an important factor that gives the IC a strategic character. In the light of the cited literature and based on the results of empirical studies, SC, especially concerning work processes and organization and formal aspects of organizational culture, affects the ability of the organization to use its intellectual potential. Defining clear rules of action and expected attitudes and values defines standards of behavior and relations with all organizational stakeholders. In a study of fuzzy cognitive mapping of IC, it was shown that the relationships between HC, SC, and RC occur at the level of the individual components of these aggregates. These relationships take a unidirectional or bidirectional form and can either reinforce or weaken the other elements of IC. Based on the simulations associated with targeted development activities, it

was found that investment in SC provided the most significant return (Arvan et al., 2016).

The synergistic effect resulting from the interconnectedness of all the components was confirmed by Bontis (1998), who conducted a pilot study on a group of MBA students (representing various industries) and indicated the existence of relationships between the components of IC and their impact on company performance. Using similar research methods and applying them to a selected group of German pharmaceutical companies, Bollen et al. (2005) confirmed that the individual components of IC indeed interact, which means that the strengthening of any of them strengthens the others. In this view, the source of company value is IC as a whole, and its transformation into a value, is not possible as long as even one of its components is too weak or directed in the wrong direction (Edvinsson & Malone, 2001). The interaction of these factors generates leverage, which is consequently a source of permanent competitive advantages (Youndt & Snell, 2004). This approach is also accented by the concept of value platform (value platform), defining a "good" organization as one that evenly develops the components of its IC (Kuzel, 2018). The interconnectedness of intangibles is therefore much more important than their individual value (Bollen et al., 2005; Bontis, 1998; Reed, 2000), according to the principle that more is not always better (Reed et al., 2006). Pulic's (2008) primary indicator and measure of a company's success is the added value, and IC is an essential resource in its creation. According to the VAIC methodology of measuring IC developed by Pulic, the value of SC is determined by the difference between the value added and the value of HC. This confirms the strong relationship between the two components in the context of organizational performance. This simple formula is also confirmed in business practice. In a study conducted on a group of banks, researchers of the Reed team (2006) showed that the performance of the studied organizations became poorer the more extensive their internal regulations were. Thus, SC can generate bureaucratic and social barriers that limit the organization's efficiency, thus leading to a deterioration in the company's results (Reed et al., 2006). In practice, there are several examples of companies in which valuable HC in no way translates into business results. One of the reasons for this may be the systemic solutions, deeply rooted in the culture and tradition of the organization, which largely relieve employees of the burden of making their own decisions and creating solutions. Reduced need to think often results in the rigidity of action, over-reliance on plans, strict operational rules, and procedures. It is believed that a form of work organization that limits the individualism and innovative approach of employees can be the source of problems that consequently limit the ability to compete (Pech, 2001). The SC, which should have a supportive role to HC, does not fulfill this role. Without this support, HC does not represent a significant value in the context of the company's performance (Bontis, 1998). This problem is also related to the concept of so-called functional stupidity. Attention was drawn to this issue by Alvesson and Spicer (2016), asking the question, "Why was it that organizations which employed so many smart people could foster so much stupidity?". Albrecht (2003) referred to this situation as successive submission to "collective stupidity." Conformist attitudes are a natural part of the employment process and result from the individual's need to adapt to rules and regulations established not only in the form of internal laws but also arising from the actual organizational culture. Consequently, the SC, which defines the entirety of the organization's rules, also perpetuates solutions that support the presence of stupidity in management processes, including decision-making (Chwiłkowska-Kubala et al., 2020). Improper regulation leads to erroneous managerial decisions, and this supports the thesis that illogical employee actions find their origins in functional stupidity (Alvesson & Spicer, 2016), so to speak, in SC. This problem does not only apply to commercial organizations. A prime example of institutions accumulating eminently valuable HC is universities. The problem of the so-called Gordian knot of university IC indicates that the extent to which an organization can transform the potential of its HC into efficient IC is determined by the SC, among other factors (Bratianu & Orzea, 2013). It is not difficult to illustrate this problem with the example of dynamic changes and market turbulence. Inflexible bureaucratic management and decision-making systems become a source of constraints. It forces employees to make decisions inadequate to the situation or not to make them at all. Thus, the impact of SC on IC efficiency should also be viewed through the prism of its flexibility, that is, the organization's ability to create and use dynamic competencies within the organization (Sharabati et al., 2010), which are predominantly concentrated in HC. Research on organizational agility shows that ensuring flexibility is practically possible through the strategic use of best practices (proven patterns of operation) and appropriate tools (Sharifi & Zhang, 2001). Thus, the ability of an organization to adapt to a changing environment is the result of the right relationships between the components of IC, including SC.

Providing IC with the characteristics of a strategic resource, i.e., its value, uniqueness, being difficult to copy and replicate, should be considered through the prism of the number of components that build this capital. The idea that originality, or rather uniqueness, is related mainly to the configuration of IC components rather than to their individual characteristics seems to be correct. SC is the element that configures IC components and, at the same time, influences their basic parameters. The role of SC in shaping organizational stupidity seems particularly relevant in this context, as it clearly indicates that SC may be not only a source of value but also a source of its lacks, contributing to inefficient use of the potential of the organization's intangible resources. Thus, shaping the strategic nature of IC is not possible in isolation from the SC of the organization.

Creation of structural capital and its impact on the configuration of an organization's intangible resources

According to Edvinsson's concept, the common source of SC creation is HC. In the four-phase idea of IC development Edvinsson defined, organizational capital results from the transformation of HC. According to this approach, SC results from the externalization of knowledge and successively develops as the knowledge processes proceed. SC is the effect of the directed actions of people. Theoretically, it could be assumed that HC is responsible for IC configuration, so valuable HC should transform into valuable SC. In the context of knowledge management and knowledge externalization processes, such an approach may seem reasonable. Nevertheless, SC is also, to a large extent, the processes, rules, and principles of functioning of the organization's members, including the limitations of this functioning. Thus, SC is a set of institutions in both formal and informal fields (organizational culture). Belief in the rationality of the formation process of IC, precisely including the transformation of HC to SC, is based on the theory of expected utility derived from economic sciences or its development in other areas of social sciences called the theory of rational choice. This neoclassical approach has been criticized by empirical researchers who emphasize that human rationality in the face of decision-making is limited by knowledge and competence but also by formal and informal institutions (Strycharz, 2013). In this context, considering the complexity of human behavior and the motivations behind it, the possibility of HC to arbitrarily shape the organizational rules and externalize knowledge seems a far-reaching simplification. Therefore, the process of changing the existing rules (SC) is difficult. It is spread out over time, which explains why more organizations fail due to internal maladjustment and not due to market competition (Albrecht, 2003).

The difficulty of changing and effectively adjusting SC by the organization is one of the sources of organizational failure but also evidence that SC is the integrator and configurator of the organization's intangible assets (Bratianu & Orzea, 2013). Unable to change existing rules, the organization must adhere to them, so regardless of the value of HC, it is SC that becomes the day-to-day cementing factor of intangible assets in the organization.

The configuration of intangible resources results primarily from the identification of the organization's needs, which are predefined in the company's strategy and translated into medium-term and short-term goals, tasks, and guidelines which are then implemented using defined tools and rules (Kopecka, 2015). SC not only defines the catalog of resources (e.g. competencies) needed for strategy realization, but also provides the tools necessary for the implementation of these needs in the form of procedures, algorithms, information systems, databases, etc. Similarly, the way these resources are used, the principles of their mutual interaction, cooperation, information exchange, or all sorts of issues related to the delegation of authority, also find their legitimacy in the organization's knowledge codified in the form of regulations, policies, and principles (Sopińska, 2010). An excellent example of this in an organization is Human Resources Management (HRM) processes, within which the competencies of the organization are acquired, used, and evaluated. The manner of selection, as well as their subsequent placement and use, is to a large extent a derivative of SC expressed in HRM procedures and organizational structure. In the concept of human capital architecture, it is stated that the way HC is managed should depend on the type of work performed, competencies used, or objectives pursued, determining the effectiveness of this capital (Lepak & Snell, 1999). Creative work, and the creation of new knowledge, requires suitable conditions. After all, the human mind cannot be programmed to engage and work effectively only at the designated time and place. SC in the form of proper working conditions, appropriately designed to suit the needs and nature of a given position or substantive area of the organization, is an element of efficient management of knowledge workers (Morawski, 2017) and effective transfer of HC in IC (Morawski, 2009).

Similarly, knowledge management in an organization requires mechanisms that will motivate and activate HC in knowledge processes (Saito et al., 2007). A study conducted by researchers at the University of Technology in Sydney argues that knowledge codification by itself does not increase the practical value of IC and thus does not translate into corporate performance (Attar et al., 2019). Given the mercenary nature of HC and hence its transient nature (Edvinsson, 1997), the knowledge codified in SC will never represent employees' actual knowledge. Knowledge is a strategic resource, but only its active use allows organizations to obtain benefits. If this codified knowledge is not reflected in HC, its use becomes impossible. Thus, organizations must identify key resources, update them, and collect, codify, and transfer them (Gierszewska, 2006). In this sense, SC is a factor that not only strengthens HC but, above all, prevents its depreciation.

SC, as Edvinsson points out, is the result of the transformation of HC. Still, the competence to create and shape it is limited and clearly defined in the organizational structure. SC is the formal framework of decisions made in the organization and solutions applied, and through defined rules and institutions, it influences how other intangible resources are used and configured.

Taking the above into account and referring to the previously quoted concepts of organizational stupidity and the role of organizational structure in the process of IC configuration, the answer to the question posed is not unequivocal. It indicates some limitations of this discussion. In young developing organizations, where knowledge codification takes place on a limited scale, HC mainly creates the

structure of intellectual capital. The development of the organization, the progressive codification of knowledge, and the fluctuation of HC related to its mercantile nature make the way of aggregation and selection of intangible resources a derivative of SC, determining its strategic nature.

Conclusions, limitations, and directions for future research

The "passive" role of SC, resulting from the definition, identified mainly with the organization's stock of knowledge in the form of its codified databases and other sources, limits the interest of IC researchers in this issue. Many authors emphasize the important or even leading role of HC in the process of shaping and using IC (Edvinsson & Malone, 2001). It is assumed that since knowledge is created in the minds of people and only in the process of integrating the knowledge of all employees is it possible to determine the IC of the organization (Bontis, 1999; Nonaka & Takeuchi, 1995) it is HC that constitutes the efficiency of IC. However, SC is, besides the deposits of codified knowledge, also the formal and technical aspects related to the organization's functioning. SC, also called *organizational capital* by Edvinsson and Malone, defines how the organization should function and what internal structure it should have, divides it into activities, and tasks, and defines directions of development and goals for the future. SC formally "binds" intangible resources together and sets the rules for their use under the principle that the source of enterprise value cannot be a single component of IC. Its transformation into value will not be possible as long as at least one of its components is too weak or directed in the wrong direction (Edvinsson & Malone, 2001). Research in cognitive IC mapping confirms the unique role of SC, which contributes most clearly to IC value. At the same time, developing research on functional stupidity ensures institutions' role in the effective use of knowledge and experience of employees. Researchers who address the topic of functional stupidity point out the numerous similarities between the mechanisms of functional stupidity and at least the mechanisms of knowledge processes (Chwiłkowska-Kubala et al., 2020). This means that the same solution in different organizations may generate completely different effects. This highlights the role of SC in creating strategic features of IC in the form of hard-to-copy value resulting from the intangible resource structure of the company. Thus, SC is the backbone that reinforces IC (Brooking, 1996), constituting the structure and functioning of the organization. In this context, SC is responsible for the proper distribution and use of intangible resources possessed by the organization, and therefore for their configuration. By creating the right working conditions or adapting management to the different organizational structures following the concept of the architecture of HC, SC appears as a source of mutual relations within IC. In this context, SC is an integrator that determines how effectively an organization uses its IC potential (Bratianu & Orzea, 2013). SC activates the organization by enabling it to materialize its potential in the form of any value. In this sense, SC is less obvious and much more specialized than the other components of IC (Moon & Kym, 2006). By answering the questions posed, the paper confirms the thesis presented at the outset that SC is a strategic resource of an organization responsible for the strategic nature of IC. This responsibility is expressed by the competence of the configuration of intangible resources in the organization, thus building relationships and activating its potential. The defined conclusions provide value for organizations wishing to effectively manage their knowledge resources and indicate that any investments and activities aimed at developing IC and RC require, first of all, the right organizational environment and the practical possibility of using the effects of these investments. At this point, it should be emphasized that these considerations concern mainly large organizations. Due to their extensive structure and scale of operations, they have defined formal rules of functioning expressed in described processes and some internal regulations. This limitation is significant because, in smaller structures, some of the principles and methods of operation result directly from the knowledge and practice of employees or even an owner (especially in micro and small companies). This knowledge is in no way codified.

The confirmed thesis and the conducted discussion open several research targets. The key issue seems to be the analysis of IC at the level of organizations' internal structures. If SC configures the intangible resources in the structures of the company, and the appropriate configuration makes them a strategic resource, then, from the management point of view, IC should be analyzed at the level of the structure of the organization. In this context, the essential questions seem to be:

1. Is SC within the structures of the organization a cohesive resource, or is it internally divisible?
2. What is the mutual relationship of IC elements at the interface of different internal structures of the organization?
3. Which intangible resources are shared throughout the organization?
4. Does optimal IC in each place of the structure mean the same thing?
5. How to measure IC in separate structures of the organization?

Answers to these questions are sought in vain in literature. From the managerial point of view, IC, and its operationalization at the level of organizational structure, will allow it to precisely address development activities and identify barriers to its development. Further research and exploration of this issue are therefore justified both scientifically and from a utilitarian point of view.

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Agata Matuszewska-Kubicz

Key competencies in the labour market from the perspective of higher education students

Abstract

The subject of key competencies in the labour market has been discussed in many publications and reports in recent years, presenting the point of view of researchers and employers on the issue. However, the perspective of future employees also seems to be worth discussing; hence this research covers university students currently entering the labour market. Ten competencies identified as key in the labour market are examined: problem-solving, creativity and innovation, analytical and critical thinking, active learning and teaching, interdisciplinarity, emotional intelligence, social intelligence, intercultural competencies, virtual cooperation, digital competency. The study aimed to determine the respondents' opinions and beliefs about selected key competencies on the labour market, their willingness to develop them, and their declared level of these competencies. The survey was carried out using the quantitative method, using the CAWI technique, on a sample of 352 respondents – students of the University of Lodz. The results indicate that the students mostly share the view that the competencies indicated as being key will be expected by employers in the labour market in the next five years. Moreover, for most of the competencies being studied, they assess their current level to be high and see the need to develop them for professional purposes. Discrepancies are also indicated between the students' self-assessment of their competencies and their employers' assessment.

Keywords: labour market, key competencies, students' competencies, competency level, expectations of employers

Introduction

Competencies have long been recognised as the most important component of human capital (Beck, 2003). During recruitment processes, employers are guided by personal and interpersonal competencies in more than 32% of their choices, and intellectual and academic competencies also influence the selection of applicant in about 25% of cases (Piasecka-Robak, 2016). At the same time, it has been noted for years that transformations in the macro- and microeconomic environment also cause changes in competencies expected in the labour market (Marszałek, 2011), hence the proposal to focus on competencies of the future in educational planning (Turek, 2015). Currently, researchers emphasise that in the face of the changes taking place, new flexible labour markets that require new competencies are taking shape (Rakowska & Sitko-Lutek, 2016), and professional activity in the current economy 4.0 requires different characteristics and skills than in the traditional labour market (Janowska & Skrzek-Lubasińska, 2019). Meanwhile, the OECD recommends focusing on developing the most relevant competencies from an economic and social perspective and viewing them in the short and long term (OECD, 2012).

Research to date on key competencies on the labour market is mostly based on employers' and experts' opinions on the competencies desired in future employees. However, it is also worth investigating the opinions of future employees themselves on competencies of the future in the labour market. Obtaining the perspective of this group will allow us to compare the opinions of employers and potential employees on key competencies and perform a more complete analysis of the phenomenon under study. This approach constitutes the originality of the research and is an attempt to fill a significant research gap in this respect. Hence the research aimed to find out the

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opinions of university students currently entering the labour market on the competencies of the future.

Key competencies in the labour market

In recent years, the topic of competencies desired now and in the future in the labour market has been the focus of many researchers and institutions. Researchers say that in the future, employees will be required to have "interdisciplinary competencies that combine IT knowledge, creative/cognitive skills, intercultural skills, emotional and social intelligence, and the ability to work collectively (in virtual, multicultural teams)" (Przytuła, 2018, p. 202). Today's workers should be able to adapt to sudden changes in the labour market and be equipped with meta-competencies (Sopegina et al., 2016). The authors of a recent World Economic Forum report (2020) predict that the key competencies by 2025 will be analytical thinking and innovation, active learning and learning strategies, complex problem-solving, critical thinking and analysis, leadership and social influence, technology use, monitoring and control, programming and technology development, stress resilience and flexibility, reasoning, problem-solving and thinking, emotional intelligence, user experience, service orientation, systems analysis and evaluation, and persuasion and negotiation. A similar list of future competencies was created for 2022 and described in an earlier edition of the Future of Jobs report. It includes the following competencies: analytical thinking and innovation, active teaching and learning strategies, creativity, originality and initiative, technology design and programming, critical thinking and analysis, complex problem-solving, leadership and social influence, emotional intelligence, reasoning and problem-solving, and systems analysis and evaluation (World Economic Forum, 2018).

Another report – Future Work Skills 2020 – includes among the competencies of the future: sense-making, social intelligence, novel and adaptive thinking, cross-cultural competency, computational thinking, new-media literacy, transdisciplinarity, design mindset, cognitive load management, and virtual collaboration (Davies et al., 2011). A very similar list of competencies was created by the authors of the report Future Skills: Update and Literature Review, adding resilience, i.e. using resources to achieve a long-term goal or positive outcome (Fidler, 2016).

Research has also been conducted in Poland. The "Employee of the future" report (Infuture Institute, 2019) gives the following list of competencies of the future: skills in STEM sciences, the ability to share knowledge, design thinking, critical thinking, digital skills, a problem-solving attitude, active learning ability, creativity, negotiation, and cooperation skills. Another Polish report, "Active+ Future on the labour market", includes, among others, digital competencies, the ability to cooperate with other people and machines, and emotional intelligence among the competencies desired by employers (DeLab UW & Gumtree, 2017). In turn, according to the authors of the report "Shoulder to shoulder with a robot. How to use the potential of automation in Poland", the key competencies on the labour market in the future are creativity, teamwork, empathy, critical thinking, problem-solving, and using technical knowledge with the help of technology (McKinsey & Company, 2018). Some of the competencies – design thinking, the ability to adapt easily to changes, and the ability to communicate effectively – were also indicated as competencies of the future by members of the discussion panel of the 2nd Adult Education Forum (Buks, 2017).

Analysing the lists of key competencies mentioned in the above studies, there is an incomplete semantic consistency and similar competencies are named differently (e.g. similar in meaning, although not identical: "non-standard and adaptive way of thinking" and "creativity"). In addition, some of the competencies were included more broadly, and others in a narrower way (e.g. "empathy" being one of the areas of "emotional intelligence").

Bearing in mind the above limitations and inaccuracies, an attempt was made to select the ten most frequently indicated key competencies described in the cited publications. They were divided into three categories, using Smółka's (2008) typology:

- cognitive competencies – problem-solving, analytical and critical thinking, active learning and teaching, interdisciplinarity;
- social competencies (social-psychological, soft) – creativity and innovation, emotional intelligence, social intelligence, intercultural competencies, virtual cooperation;
- hard (technical) competencies – digital competencies.

The ten competencies were the subject of the research carried out and described in this article.

Methodology

The research aimed to find out the respondents' opinions on selected key competencies in the labour market, including the declared level of competencies they possess, their willingness to develop them, and an assessment of their degree of desirability to employers. The results can be used to compare the perspective of experts and employers with that of students entering the labour market in the area of key competencies. They may be helpful in exploring the topic of young people's awareness of how prepared they are to enter the labour market. The selected competencies are indicated as key competencies in the labour market and were described in the earlier parts of this article.

The following research objectives, presented in the form of research questions, were set out in the research:

1. To what extent do the respondents think the competencies will be desired by employers in the labour market in the next five years?
2. How do the respondents assess their competency level?

3. How willing would the respondents be to develop their competencies for professional purposes?
4. Is there a statistically significant relationship between the competencies that the respondents believe employers want and how they assess their level of this competency?
5. Is there a statistically significant relationship between how the respondents assess their level of a given competency and their willingness to develop it for professional purposes?

The relationship between the fourth and fifth research objectives is shown in Figure 1.

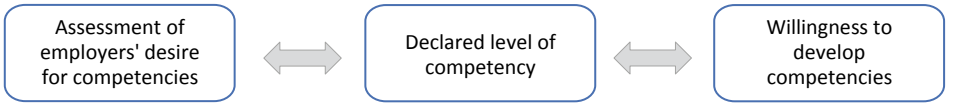
The research used a quantitative method, using the survey (CAWI) technique. It was conducted between June and December 2020 and was based on purposeful selection. It covered a group of 352 full- and part-time students in the last two years of undergraduate studies and in postgraduate studies at the University of Lodz. The structure of the sample is presented in Table 1.

Results

The first research objective was to ascertain to what extent the respondents think the competencies will be desired by employers in the labour market in the next five years. It was measured on the Likert scale from 1 to 5, where 1 meant that the competency will not be desired at all, and 5 – it will be very highly desired by employers. The answers are presented in Figure 2.

As the results indicate, the students believe that the most desirable competencies in the labour market in the next five years will be digital competencies, creativity and innovation, virtual cooperation, analytical

Figure 1
The relationship between the fourth and fifth research objectives



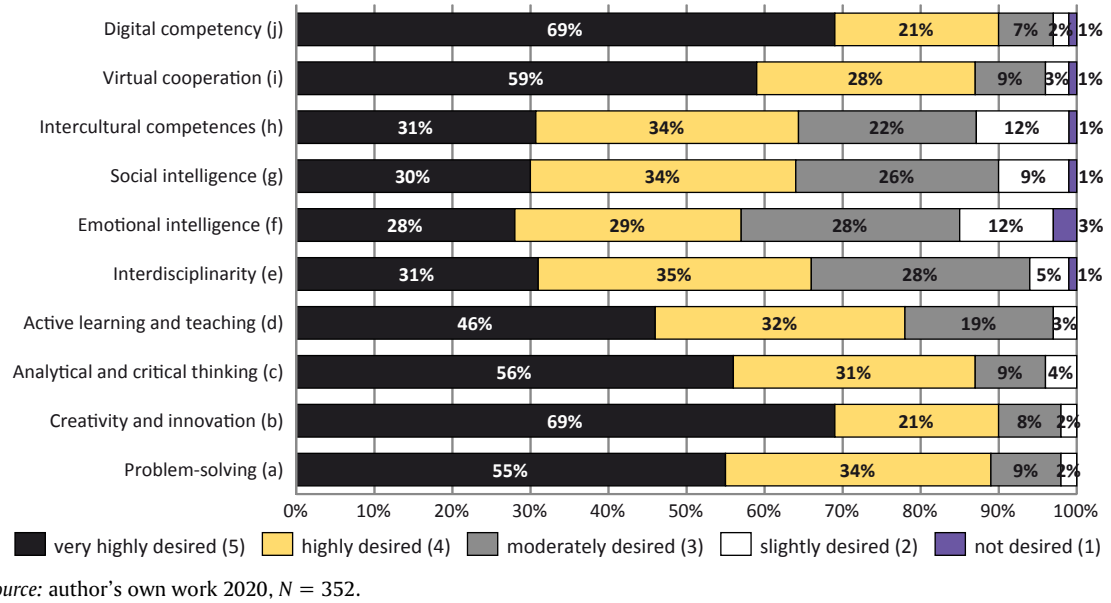
Source: author's own work.

Table 1
Structure of the surveyed sample

Total number of respondents	Number of respondents by gender		Number of respondents by level of study		Number of respondents by mode of study	
352	Female	Male	Undergraduate studies	Postgraduate studies	Full-time studies	Part-time studies
	251	101	78	274	285	67

Source: author's own work.

Figure 2
Evaluation of the degree of desirability of the competencies to employers in the next few years according to respondents



Source: author's own work 2020, $N = 352$.

and critical thinking, and problem-solving. At least 87% of the respondents indicated that these competencies will be very highly or highly desired by employers. From the competencies listed, the least desired will be emotional intelligence, social intelligence and intercultural competencies. However, even for these competencies, at least 57% of respondents said they believe that they will be very highly or highly desired by employers. At the same time, the percentage of respondents who think that a given competency will be little or not desirable in the labour market is, at most, 15% (in the case of emotional intelligence). Therefore, it may be assumed that those surveyed mostly share the view that the competencies indicated as competencies of the future will be expected by employers in the labour market in the next five years.

The second research objective concerned the respondents' assessment of the competencies they possessed. This assessment was measured on the Likert scale from 1 to 5, where 1 meant a very low level and 5 meant a very high level. The respondents' answers are presented in Figure 3.

As the results indicate, the respondents assessed the majority of the competencies at a very high or high level, i.e., problem-solving, creativity and innovation, analytical and critical thinking, active learning and teaching, emotional intelligence, social intelligence, virtual cooperation, digital competency. As regards the two remaining competencies – interdisciplinarity and intercultural competencies – most respondents assessed their level as medium.

The third research objective concerned the respondents' willingness to develop the indicated competencies for professional purposes. This willingness was measured on the Likert scale from 1 to 5, where 1 meant extremely unlikely and 5 meant extremely likely. The answers are presented in Figure 4.

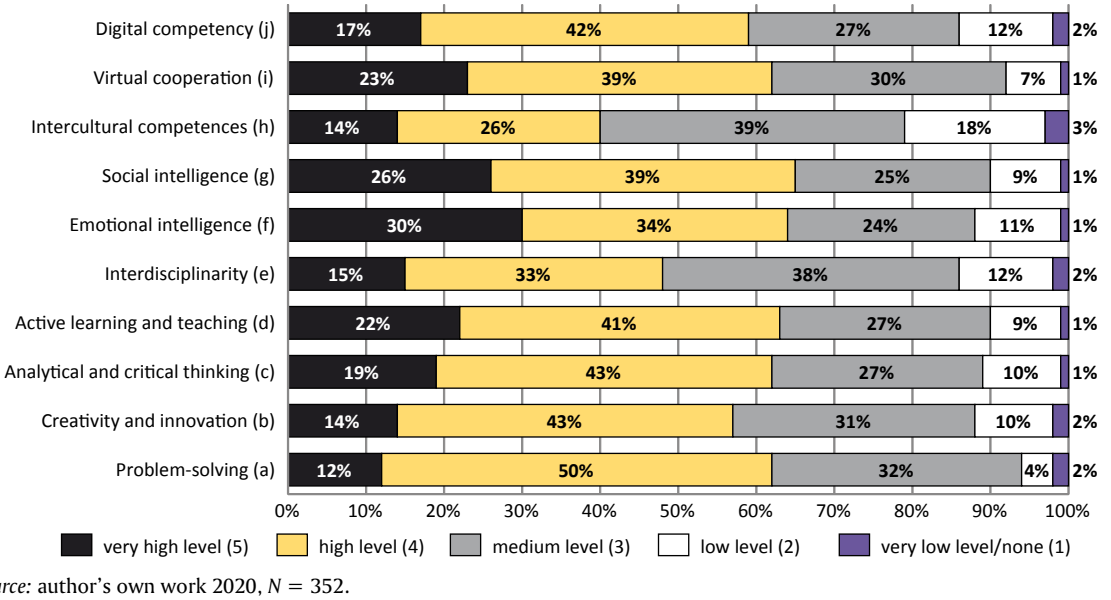
As the results indicate, the students overwhelmingly expressed their willingness to develop all the indicated competencies for professional purposes. For each of the competencies, at least 72% of respondents indicated that they were extremely likely or likely to develop them. The competencies that students are most willing to develop are problem-solving, analytical and critical thinking, creativity and innovation, and digital competencies. In contrast, they are least likely to develop emotional intelligence.

The fourth research objective determined whether there is a statistically significant relationship between the competencies that the respondents believe employers want and how they assess their level of these competencies. For this purpose, for each pair of variables related to a given competency (perceived assessment of the desirability of the competency and the assessment of their level of this competency), the Spearman rank correlation coefficient was calculated along with the test of statistical significance, which are presented in Table 2.

As Table 2 shows, for each competency, there is a statistically significant correlation between the competencies that the respondents believe employers want and how they assess their level of these competencies ($p < 0.05$). This means that as the respondents' assessment of the desirability of a given competency to employers increases, how they assess their level of the given competency also increases, which is confirmed by positive values of the Spearman rank correlation coefficient. However, the low values of that coefficient indicate that for almost all analysed competencies, the relationship is weak – the weakest being "Problem-solving". The only exception is "Interdisciplinarity", where the coefficient reached the highest value among the competencies studied, and this relationship can be considered moderate (Cohen,

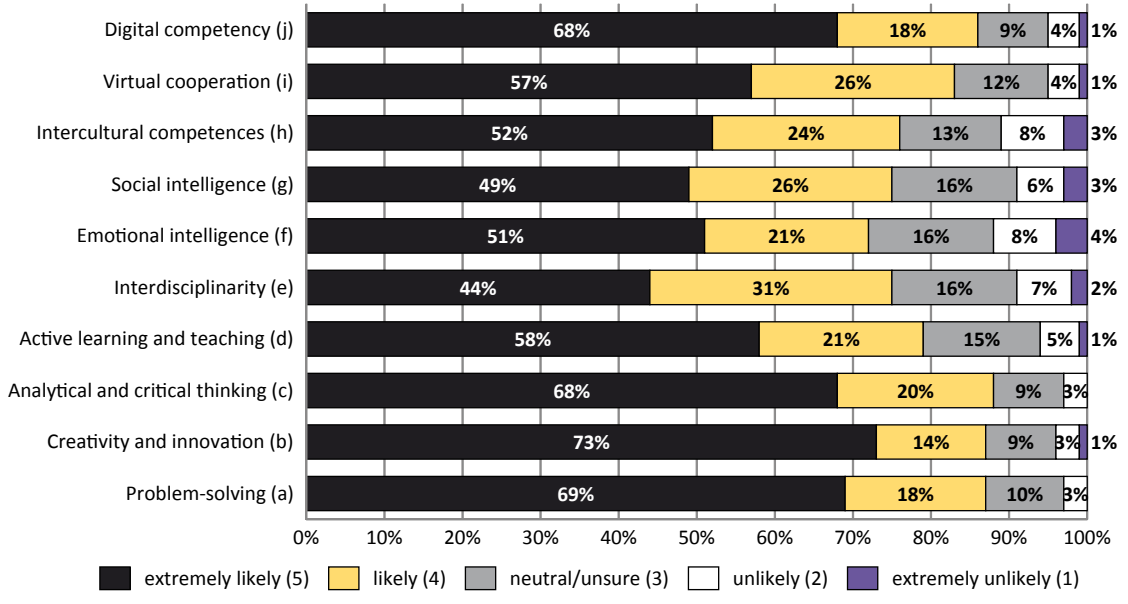
Figure 3

Assessment of the current level of competencies



Source: author's own work 2020, $N = 352$.

Figure 4
Willingness to develop the indicated competencies for professional purposes



Source: author's own work 2020, $N = 352$.

Table 2
Correlation between the competencies that the respondents believe employers want and how they assess their level of these competencies

Competency	Significance	Spearman rank correlation coefficient
a. Problem-solving	0.007; $p < 0.05$	0.144
b. Creativity and innovation	0.001; $p < 0.05$	0.169
c. Analytical and critical thinking	0.005; $p < 0.05$	0.203
d. Active learning and teaching	$p < 0.001$	0.271
e. Interdisciplinarity	$p < 0.001$	0.374
f. Emotional intelligence	$p < 0.001$	0.198
g. Social intelligence	$p < 0.001$	0.225
h. Intercultural competencies	0.001; $p < 0.05$	0.184
i. Virtual co-operation	$p < 0.001$	0.185
j. Digital competency	0.004; $p < 0.05$	0.155

Source: author's own work 2020, $N = 352$.

1988, after Field et al., 2012, p. 58). This means that there is a moderate, positive relationship between how desirable the respondents believe "Interdisciplinarity" is for employers and how they assess their level of this competency.

The fifth research objective was to check whether there is a statistically significant relationship between how the respondents assess their level of a given competency and their willingness to develop it for professional purposes. For this purpose, for each pair of variables related to a given competency (how the respondents assess their level of a given competency and their willingness to develop it for professional purposes), a Spearman rank correlation coefficient was calculated along with the test of statistical significance, which are presented in Table 3.

As Table 3 shows, for each competency, there is a statistically significant relationship between the respondent's declared assessment of a given competency and their willingness to develop it for professional purposes ($p < 0.05$). This means that as the respondent's assessment of the level of a given competency increases, so does their willingness to develop it for professional purposes, which is confirmed by the positive values of the Spearman rank correlation coefficient. However, low values of this coefficient indicate that this relationship is weak for all surveyed competencies (Cohen, 1988).

Table 3
Relationship between the respondent's evaluation of the level of a given competency and their willingness to develop it

Competency	Significance	Spearman rank correlation coefficient
a. Problem-solving	0.001; $p < 0.05$	0.169
b. Creativity and innovation	$p < 0.001$	0.220
c. Analytical and critical thinking	$p < 0.001$	0.248
d. Active learning and teaching	$p < 0.001$	0.265
e. Interdisciplinarity	$p < 0.001$	0.239
f. Emotional intelligence	0.005; $p < 0.05$	0.149
g. Social intelligence	0.001; $p < 0.05$	0.183
h. Intercultural competencies	$p < 0.001$	0.269
i. Virtual co-operation	0.007; $p < 0.05$	0.143
j. Digital competency	$p < 0.001$	0.231

Source: author's own work 2020, $N = 352$.

Discussion

The research results provide answers to the research questions posed. Regarding the first research question, the majority of students believe that the competencies will be desired by employers in the labour market in the next five years. They consider digital competencies, creativity and innovation, virtual cooperation, analytical and critical thinking, and problem-solving to be the most desirable. These indications correspond to the results of other studies, where the surveyed students and graduates of Polish universities "are aware of the importance of competencies of the future in the context of the efficient functioning on the changing labour market" (Włoch & Śledziewska, 2019, p. 11).

The students' opinions on the competencies desired in the labour market are worth juxtaposing with the employers' perspective. Table 4 presents the results of 17 surveys of Polish and foreign employers regarding the competencies expected from employees, and reveals that they largely overlap with the ten competencies described in this article. Employers most often indicated the following competencies expected from employees: communication skills, interpersonal skills, teamwork, establishing relations (which is included in social intelligence), creativity and innovation, problem-solving and decision-making, analytical thinking, active learning, and digital skills. In contrast to what the above-cited publications indicate, employers did not specify (or rarely specified) interdisciplinarity, intercultural competencies or virtual cooperation as desirable. The differences between the employers' expectations presented in those studies may be due to the specifics of the individual countries, industries, or organisations.

To a large extent, the opinions of the students presented in this article coincide with the opinions of employers (presented in Table 4). Both groups most often recognised creativity and innovativeness, problem-solving and decision-making, analytical thinking, active learning, and digital skills. Some differences between the opinions of the students and employers may be observed in the area of "social intelligence", the elements of which (communication skills, interpersonal skills, teamwork, establishing relations) are very often listed by employers, while only 36% of students considered them, at most, moderately desirable. However, this discrepancy may be due to inconsistency in the meaning of the names of the competencies or a lack of knowledge of the elements that constitute social intelligence. On the other hand, 87% of students considered virtual cooperation as highly or very highly desirable – a competency that was not listed as expected in the analysed opinions of employers.

At this point, it is worth emphasising the issue of inconsistency and ambiguity in defining particular competencies, which was mentioned earlier in this article. This is connected with the various names given to competencies of similar meaning and the different levels of detail and generality of a given competency, an example of which may be the aforementioned "social intelligence". This problem was also highlighted by Pater (2019), who, citing the International Labour Organisation (2014), among others, emphasised the lack of a coherent, universal typology of competencies and the lack of an integrated approach to measuring the demand for skills.

Regarding how the students assess their competencies, which is the crux of the second research question, most of them evaluated their level as very high or high in eight out of ten competencies, i.e., problem-solving, creativity and innovation, analytical and critical thinking, active learning and teaching, emotional intelligence, social intelligence, virtual cooperation, and digital competency. It is also worth comparing the results with other studies of students from the University of Lodz regarding their competencies (Pamuła, 2018; Popczyk, 2018). The results are also consistent with those of other Polish studies concerning students from universities with an academic profile, which showed that 45% of respondents rated their skills (such as communication, organisational, analytical, teamwork,

Table 4
Employers' expectations regarding employees' skills

Authors	Surveyed employers	Employers' expectations regarding employees' skills
Azmi et al., 2018b	Employers from Malaysia	leadership skills, teamwork skills, critical thinking and problem skills, communication skills and resource skills, communication skills (the ability to speak English)
Dorożyński et al., 2016	Employers from Poland	being able to discuss and present arguments in an understandable way, working under time pressure, teamwork, drawing conclusions, decision-making under conditions of risk, managing teams of workers, presentation skills, using numerical and statistical data, drafting analyses and syntheses, ability to find creative solutions to various problems, persistence and self-discipline in completing long-term activities, coping with stress, foreign languages, Internet literacy, good command of Polish, ability to use negotiating techniques, ability to conduct a SWOT analysis
Dryl and Dryl, 2016	Employers from Poland	creativity, innovation, dealing with stress, ability to work as part of a team
Dymek--Maciejewska, 2018	SME, employers from Poland	ability to work as part of a team, knowledge gained from experience, ability to deal with stressful situations
Dyrla-Mularczyk et al., 2018	SME, employers from Poland	willingness to learn, organisational skills, communication and interpersonal skills
Guàrdia et al., 2021	Employers from East Africa	Knowledge of a foreign language, cross-cultural and diversity competency, the set of subject-specific skills required to successfully perform a specific occupation, results-oriented performance, digital skills, teamwork, stress management, conflict management, the ability to cope with change, self-management, problem-solving, communication and interpersonal skills, decision-making, creative thinking, analytical thinking, learning to learn
Kocór et al., 2020	Employers from Poland	Self-organisation competencies (time management and punctuality, readiness to take responsibility, self-organisation of work and coping with stressful situations), Interpersonal competencies (being communicative, easily establishing contact with people, teamwork), Cognitive competencies (learning new things, inventiveness, creativity, analysing information and drawing conclusions)
Kudzia, 2017	Employers from Poland	communication skills, technical and computer skills, personal skills (e.g. empathy, willingness to learn and improve one's qualifications, ability to make decisions in time-pressured stressful situations, willingness to learn in order to acquire experience, creativity and innovative approach, learning speed), general professional skills (e.g. attitude to perform tasks efficiently, resistance to stress)
Kurantowicz et al., 2017	Employers from Poland and Spain	employers from Poland: social competency, ability to establish and maintain contacts, ability to cooperate, dealing with difficult situations, teamwork and work organisation skills and curiosity about the world employers from Spain: the ability to adapt to the working environment and labour market situation, often also referred to as the flexibility or versatility of the job applicant, to take on different tasks, ready to take on new challenges, in a constant state of readiness to learn, social, communication and work-team competencies, professional/industry competencies, computer skills and experience of working in an international environment
Lisá et al., 2019	Employers from Slovakia	engagement and willingness to take on extra work, a responsible approach to work, moral and ethical behaviour, learning from feedback, flexibility and adaptability to changes, the ability to achieve the goal; the conviction that I can finish my job; psychological resilience, burden and stress management; flexibility, adaptation to change; overcoming obstacles
Low et al., 2016	Employers from New Zealand (accounting sector)	interpersonal skills, the ability to work with the organisational culture of the firm, oral communication skills, listening skills, teamwork skills, problem-solving skills, perceived ambition/motivation, emotional intelligence
Malik and Venkatraman, 2017	Employers from India	technical skills, soft skills, team building, overall attitude, ethics and values
Polańska, 2019	Employers from Poland	digital skills, teamwork, creativity, work experience, language skills
Rios et al., 2020	Employers from the USA	oral and written communication, collaboration, problem-solving, social intelligence, self-direction

Table 4, continue

Authors	Surveyed employers	Employers' expectations regarding employees' skills
Roszyk-Kowalska and Kraśniak, 2020	Employers from Poland (hi-tech sector)	high level of entrepreneurship, high level of creativity, effective processes of acquiring, using and sharing knowledge, high level of use of the potential of teamwork, high level of innovativeness, ability to cooperate in relational arrangements, high level of independence of employees, skilful management of R&D activity, basing communication systems on modern IT technologies
Różański, 2018	Employers from Poland and the USA	employers from Poland: relationship building, decision-making skills, specialist knowledge, organising teamwork; employers from the USA: communication skills, specialist knowledge, relationship building, creativity, readiness to develop
Suleman et al., 2020	Employers from European countries	cognitive (analytical skills), interpersonal (communication) and organisational abilities (orientation towards results)

Source: author's own work based on indicated studies.

problem–solving, computer, creativity skills, etc.) as high or very high, and 64% rated their social competencies (such as resistance to stress, assertiveness, willingness to learn, commitment to work, the ability to elicit appropriate responses in other people, etc.) as high or very high (Bartczak & Szymankowska, 2020).

On the other hand, a study conducted within the framework of the Human Capital Balance shows that respondents aged 18-35 rated their competencies highest (a mean score of 3.8 to 4.2 on a scale from 1 to 5) in terms of using new technologies, learning new things and analysing information, independent work organisation, easily establishing contact with people, working in a group, performing simple accounts, and a willingness to take responsibility. The level of "Working with people of different nationalities" was rated slightly slower (a mean score of 3.4), which corresponds to intercultural competencies in this study (Czarnik et al., 2020). The results are worth comparing with a similar study of Italian students. The areas in which students perceive themselves to be more skilled are relational (knowing how to resolve conflicts, communicate, and work in a group), with an average score of 4.5 on a 6-point scale, and the area of the self (self-enhancement, emotional management, resourcefulness), with an average score of 4.24. On the other hand, the greatest perceived difficulties concern soft skills (organisation of time and space, study strategies, problem-solving and decision-making), which fall within the task area, and motivation (goal orientation, causal attribution, resilience), with an average score of 3.96 and 3.86, respectively (Ricchiardi & Emanuel, 2018).

Students' opinions on their competencies should be compared with the employers' perspective. According to a survey of Polish enterprises, the strengths of university graduates that employers indicated included the ability to search for different kinds of information quickly, the ability to use IT tools, the willingness to learn and improve professional qualifications, and knowledge of foreign languages. Meanwhile, the weaknesses included poor self-presentation, a lack of independence in solving problems, a lack of self-confidence during interviews, and a lack of ability to use acquired knowledge in practice (Kudzia, 2017).

Jasińska and Podgórska's (2015) study showed that employers pointed out students' difficulties with teamwork, communication and self-presentation, a reluctance to make decisions or look for solutions, and continued learning. When it came to their strengths, they pointed mainly to digital competencies. Slightly different conclusions were drawn from a study by Żukowska and Kuźniar (2019), where the largest competency gap of university graduates was noted by employers in the areas of IT and communication, while the smallest competency gaps were identified in the area of general competencies.

Analysing the results of foreign employer surveys, it is worth mentioning that Suleman and Laranjeiro (2018) presented many examples of surveys in which the results indicate employers' dissatisfaction with the competency level of graduates (mainly teamwork and problem-solving skills). Additionally, in their own research, almost all the employers were dissatisfied with graduates' level of soft skills (communication and ability to adapt) and other personal traits. Nevertheless, the firms highlighted good academic knowledge and good technical skills (Suleman & Laranjeiro, 2018). Surveys of Russian employers also indicate inadequate soft skills among modern university graduates for effective professional work (Gruzdev et al., 2018). The results of these studies may therefore indicate some discrepancies between students' self-assessment of their competencies and how employers perceive them.

The third research question concerned the willingness of students to develop the indicated competencies for professional purposes. The vast majority of students expressed a desire to develop all the indicated competencies for professional purposes, in particular, problem-solving, analytical and critical thinking, creativity and innovation, and digital competencies. These results correspond to the Human Capital Balance survey, according to which over 80% of adult Poles are developing their competencies, and the main motivators for the development of professional competencies are the importance of work and the need to meet the challenges it poses (Górniak et al., 2020, p. 30, 37). A similar opinion was also expressed by students and graduates participating

in the "Competencies of the future" study, where 97% of the respondents considered that "nowadays, it is necessary to constantly improve one's education, and studies are only one stage in a lifelong process of acquiring new knowledge and experience" (Włoch & Śledziewska, 2019, p. 25).

The next two research questions concerned the relationship between three variables – the competencies that the respondents believe employers want, how they assess their level of these competencies, and their willingness to develop competencies in the future for professional purposes. Regarding the fourth research question, for each competency, there is a statistically significant positive correlation between the competencies that the respondents believe employers want and how they assess their level of these competencies. For most of the competencies, this relationship is weak, and moderate only in the case of "interdisciplinarity". In response to the fifth research question, for each competency, there is a statistically significant positive correlation between how the students assess their level of a given competency and their willingness to develop it for professional purposes. For all the surveyed competencies, the relationship is weak. As regards examining the interdependencies between the above three variables, for each competency and dependence, a statistically significant positive relationship was found. This may prove that the respondents perceive the need to develop these competencies even when they assess their level as high. Moreover, their declared willingness to develop competencies is connected with their perception of what will be expected in the labour market in the future.

The literature existing today lacks similar broader research on the relationship between the assessment of the desirability of a given competency by employers according to students, the assessment of the level of this competency declared by the student, and the desire to develop the competency in the future for professional purposes. However, it is worthwhile to analyse the individual studied variables in a broader context. The first of these is the issue of assessing competencies by means of self-assessment. There are many tools available in literature for students to self-assess their competencies, e.g. self-assessment of incoming students' base competencies (Zehetmeier et al., 2014) or assessment of students' innovation competencies (Keinänen et al., 2018). There is also research based on self-assessment of competencies of students, e.g. on how prepared they are to the modern labour market (Gawrycka et al., 2021), on the effect of self-assessment on students' independence and writing competency (Ratminingsih et al., 2018), on the ability of first-year students to self-assess communication skills (Mort & Hansen, 2010), on the impact of self-assessment by students on their learning (Sharma et al., 2016) or on self-assessment and peer-assessment as the strategies to empower learning (Seifert & Feliks, 2019). However, despite the popularity of self-assessment of competency, this approach is associated with serious limitations. As Ward and colleagues (2002) point out, despite the accepted theoretical value of self-assessment, studies have consistently shown that the accuracy of self-assessment is poor. Other research on the accuracy of students' self-assessment ability showed that the overall correlations between the scores of self-, peer and tutor assessments suggest a weak to moderate accuracy of student self-assessment ability (Lew et al., 2010). Similar findings were presented in research on the consistency between professional assessment and self- and peer assessment of oral presentation skills, where there were significant differences between self-assessment scores and teacher scores. Self-assessment scores are, for the most part, higher than the marks given by teachers (De Grez et al., 2012). Therefore self-assessment of students' competencies in this study should be approached with caution.

Apart from the issue of the limitations of self-assessment of competencies, it is also worth discussing further the issue of the need to develop competencies – the second variable. The universality of the need to develop competencies can be related to the concept of lifelong learning, which is defined as "all purposeful learning activity, undertaken on an ongoing basis with the aim of improving knowledge, skills, and competency" (Commission of the European Communitie, 2000, p. 3). There are numerous studies on the idea of lifelong learning in the context of higher education institutions' activities, such as supporting university students' lifelong learning development (Ya-Hui et al., 2012), factors effecting students' lifelong learning in higher education (Bayrakçý & Dindar, 2015) or changing curriculum design to engage students to develop lifelong learning skills (Kuit & Fildes, 2014). Even a Lifelong Tendency Scale (LLTS) tool has been developed to determine university students' lifelong learning tendencies (Coşkun & Demirel, 2010). Thus, the declared willingness of the surveyed students to develop competencies in the future for professional purposes may be due to the necessity of lifelong learning as a trend already present in the labour market and ingrained in the students' consciousness.

The third examined variable is the assessment of the desirability of a given competency to employers according to the respondents, which is related to the broader topic of students' awareness of the requirements on the labour market, preparing them to enter the labour market and the concept of employability. Employability is defined as "a set of achievements, skills, understandings and personal attributes, that make graduates more likely to gain employment and be successful in their chosen occupations, which benefits themselves, the workforce, the community and the economy" (Yorke, 2004, p. 410). There has also been research on employability from the students' perspective, on the understanding of the concept (Gedye & Beaumont, 2018; Tymon, 2013), on employability skills (Azmi et al., 2018a; Griffin & Coelhoso, 2019; Succi & Canovi, 2020) and on the actions/strategies taken by students to increase employability (Kinash et al., 2016). When analysing research findings on the labour market from

the students' perspective, students may hold skewed perceptions of the relevance of generic employability skills to their chosen career path, and this fact should be considered when delivering employability skills programmes (Scott et al., 2017). It therefore seems important to build awareness among students about employers' expectations in the labour market.

Conclusion

Summing up the research results, the majority of students surveyed share the view that the competencies indicated as competencies of the future will be expected by employers in the labour market in the next five years. Moreover, although they assess most of their competencies at a high level, they definitely see the need to develop them for professional purposes. These results may prove the high level of awareness of the students surveyed regarding the expectations on the changing labour market and their perception of the need to invest in their professional development. It is also worth noting that the competencies studied are, to a large extent, universal, which means that they may be seen as important for future employees in various industries for various positions. Additionally, comparing the results with the perspective of Polish and foreign employers, both the students and employers agree that most of the competencies will be desirable in the labour market. However, discrepancies appear when assessing the level of students' competencies, with employers in the quoted studies assessing them lower (especially social competencies) than the students themselves. This discrepancy may be due to the subjectivity of the students' self-assessment, and thus the lack of awareness of what observable behavioural indicators demonstrate the possession of a given competency.

The results and limitations of the research point to possible directions for further research in this area. First of all, the author sees the need for more detailed research on key competencies that take into account the division into industries and areas of the labour market, which was not considered in the research presented in this article. From a broader perspective, research on the opinions and beliefs about key competencies of people already working, including a breakdown into employees by generation present on the labour market, also seems worth further attention. Moreover, due to the aforementioned semantic inconsistency and ambiguity of the names of the competencies surveyed, the author suggests that further research should use more precise explanations, short descriptions of the competencies, or a coherent typology of competencies, which could standardise the way they are understood among the respondents. This issue also has practical implications. It is recommended to build young people's awareness (including when they study at university) regarding the competencies they possess, in particular specifying them, ways of measuring them, and ways of improving them.

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Remote communication in Scrum teams – a COVID-19 preventive measure or work time optimisation?

Abstract

The article presents the impact of remote work, resulting from the COVID-19 pandemic, on the functioning of Scrum teams. Attempts have been made to analyse the positive and negative aspects of remote work. The article also looks at the impact of remote work on the level of communication and efficiency of Scrum teams. For this purpose, the author conducted research on a sample of 40 organisations that declared to use Scrum methodology, using 187 questionnaires as the research material. The study was carried out at the turn of April and May 2021 and was carried out using the CAWI technique. The obtained results were analysed using the Principal Component Analysis and Cluster Analysis methods, and enable defining a picture of an organisation's readiness to work remotely. In addition, they also allowed for an assessment of how the infrastructure used for remote work communication translates into the organisation of Sprint meetings. This paper presents conclusions aimed at counteracting the observed irregularities detected during the tests. At the end, the author proposes solutions that could improve communication within Scrum teams, with remote work in mind.

Keywords: Scrum Team, remote communication, agile, communication channel, COVID-19

Introduction

The development of technology has significantly influenced the way IT projects are managed. Scrum methodology is currently the most frequently used approach for agile organisations. Over the years, Scrum has gained both followers and opponents. As the COVID-19 pandemic unfolds, many organisations have been forced to re-organise their current work model and move their businesses from offices to employees' homes. Not everyone was prepared for this, and not every company was able to cope. Agile methodology, including Scrum, turned out to be the solution to many problems. In volatile, changing conditions, it allows for quick adaptation thanks to an iterative approach to problem solving. The project team itself, which is self-sufficient and self-organising, also plays a key role. More and more organisations worldwide are opting for agile thinking (Denning, 2019; Ragas, 2019). Unfortunately, many of them have not had any training in software development in an agile environment. The decision to introduce changes often results from the prevailing trend in the implementation of projects in Agile processes, and the teams that create them work in a real environment. There is a lack of validation of the adopted approach and adaptation to the actual shape of the organisation (Aghina et al., 2018, 2019). The basic problem concerns the change in the method of communication, and clear rules that were previously related to the complexity of the project (Griffiths, 2015; Phillips, 2019).

In literature on the subject, you will find research by various authors regarding communication in Scrum methodology:

- from the perspective of the role of communication in agile processes (Sarker & Sarker, 2009; Wang et al., 2012);
- in terms of communication as a key factor in the success of an IT project (Ji & Sedano, 2011; Lenarduzzi et al., 2015; Mishra et al., 2012; Mishra & Mishra, 2009);

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- in terms of the lack of communication in IT teams as the main cause of the failure of projects (Parnas, 2006);
- from the point of view of various forms of communication in IT teams and influencing product development (Beck, 2000; Kim, 2007; Korkala et al., 2006; Kraut & Streeter, 1995);
- in terms of team complexity and the impact of the number of people on inter-team communication (Duffield & Whitty, 2016; Melo et al., 2011);
- in terms of remote communication of agile teams, characterised by dispersed organizations (Kajko-Mattsson, 2008; Nevo & Chengalur-Smith, 2011).

In such literature, there are also studies indicating how the lack of communication in a team influences the success of agile projects. According to Hummel et al. (2013), even the lack of communication in a team does not affect agile software development. Rola et al. (2016) studied communication with regards to Scrum team functioning. The main goal of the research was to acquire knowledge that would allow the team to function effectively. Betteke Van Ruler (2015) focused his research on how Scrum teams in the public sector communicate.

In literature on this topic, there is a research gap regarding remote communication as a compulsory form of functioning and producing IT projects. There are no studies on the impact of long-term remote work related to COVID-19 on its effectiveness. On this basis, the author tackles the following research questions:

- How does remote communication affect the work of project teams using Scrum?
- What are the positive and negative aspects of working remotely for Scrum teams?
- Can remote work due to the COVID-19 situation have a positive effect on the work quality of teams using Scrum methodology?

The aim of the article is an attempt to answer such research questions. For this purpose, the following research hypotheses were formulated:

H1: Remote communication has a positive effect on the efficiency of work in a Scrum team.

H2: A positive aspect of working remotely is a significant saving of time and money due to the lack of the need to reach the company's premises.

H3: A negative aspect of working remotely is the possibility to perform other tasks during working hours.

H4: The effectiveness of remote work depends mainly on the tools for remote communication.

Providing the pillars necessary for the proper functioning of Scrum methodology in an organisation requires efficient communication between its participants. It is communication within the team that has become an interesting research area worth further analysis.

Scrum methodology and communication in Scrum Teams

Scrum is a framework of rules, roles and principles aimed at helping individuals, teams and the organisation itself to solve complex problems. The first mentions of Scrum can be found as early as 1986. Takeuchi and Nonaka were the first to show the purposefulness of creating small, interdisciplinary teams. This thought was continued by Schwaber and Sutherland, who have been developing and improving Scrum to this day (Scaled Agile, 2017; Schwaber & Sutherland, 2020). The Scrum approach does not impose communication techniques, but only gives guidelines on what actions should be taken by the team in their daily work Kaczor, 2016; Project Management Institute, 2017). The more dynamic development of an organisation, the greater the probability that this success is thanks to the implementation of Scrum methodology (Trzcieliński, 2011).

Both classic and agile project teams are distinguished on the basis of the company's organisational structure. Agile methods are currently used more and more often, thanks to more detailed analyses and the possibility of confronting them with more traditional projects (Gill, 2015; VersionOne, 2017). After the completion of a project, a given team is often dissolved and a new team is formed with its participants (Stabryła, 2006). Such rotation is deliberate and, as a result, enhances the project culture in an organisation. Each project team requires effective communication (Liebert, 2017). Communication within a team is crucial for successfully manufacturing a product that meets customer requirements. Advanced interpersonal skills and empathy of Scrum Team members enables knowledge sharing, helps avoid potential conflicts and builds positive working patterns within the team (Kozarkiewicz & Paterek, 2019; Ozierańska et al., 2016).

In literature on this topic, you can find many references to the impact of communication on issues related to employee development in an agile project team (Brosseau et al., 2019; Wysocki, 2018). Large organisations, creating interdisciplinary and multicultural teams, must pay special attention to communication. Consistently understanding the Scrum assumptions enhance the quality of work in complex projects, carried out by people from different parts of the world, often working in different time zones (Dingsøyr et al., 2019). It is a big mistake to implement Scrum without providing training and preparing the organisation for an agile transformation. Such a change is a complex process and in order to minimise the risk it should be carried out on a pilot team (Paterek, 2017).

Effective communication requires correct coding of information and then decoding it. In the communication process, the sender's task is to transmit information to the recipient over a communication channel, with simultaneous interference (Figure 1). Correctly processed information by the recipient leads to sending the response as feedback to the sender (Pawlak, 2008).

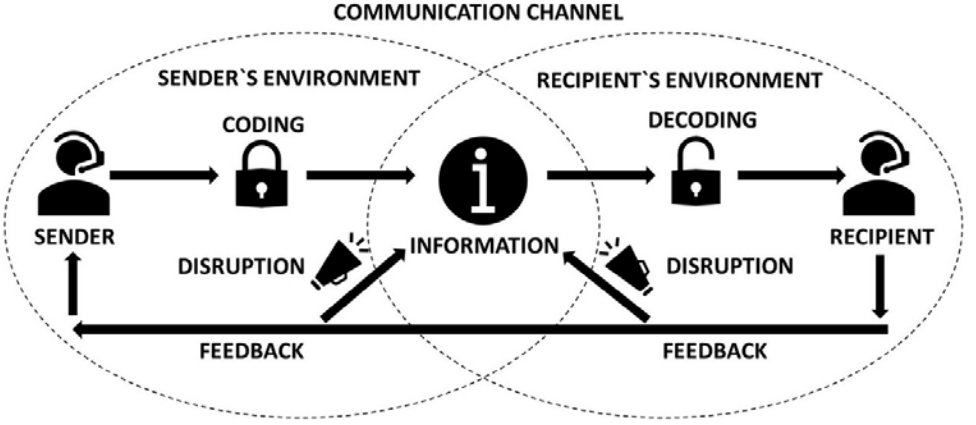
According to Kaczmarek (2005), the greatest influence on communication efficiency is made by disruptions, which include:

- unclear messages and incorrectly understanding them;
- language issues, both in the linguistic and generational sense (eg using abbreviations, emoticons);
- too many emotions – stress, euphoria, anger, panic;
- contradicting verbal and non-verbal messages (attempting to concentrate on the message while performing other activities);
- communication interference, resulting in receiving fragmented information;
- interpersonal differences – introvert, extrovert, phlegmatic, choleric;
- too much information, making it difficult to process.

Research on effective communication in Scrum teams was conducted by Katzenbach and Smith (2015). They defined five principles that characterise an effective team. Linz (2016) conducted research focused on Scrum artifacts, with emphasis on transparency. On the basis of the conducted research, measures aimed at improving the effectiveness of communication in Scrum methodology can be proposed, as presented in Table 1.

The roles specified in the Scrum Guide (Schwaber & Sutherland, 2020) have a positive impact on the involvement of team members in a manufactured product. Validation and implementation of improvements helps eliminate ineffective areas and optimisation of the time spent on ensuring growth in the project.

Figure 1
Communication model



Source: author's own work based on *Communications: discovery, creation and conversation* (p. 41), C. Fill, & S. Turnbull, 2016, Pearson.

Table 1
Scrum communication

Process step	Operations in accordance with Scrum methodology	Responsible
Sender	• Monitoring the order of statements • Keeping track of the scheduled time • Moderating the event	Scrum Team / Scrum Master
Coding	• Ensuring continuous access to information (Sprint Backlog) • Ensuring compliance with customer requirements • Compliance with the Definition of Done	Product Owner
Communication channel	• Daily Scrum implementation • Presentation of work progress on the Scrum board	Scrum Team
Decoding	• Schedule of meetings before each event • Supporting questions during the Daily Scrum process	Scrum Master / / Product Owner
Noise	• Eliminating tasks outside of the Sprint Backlog • Verification of compliance with the Definition of Done	Scrum Master
Feedback	• Observance of all events	Scrum Master
Sender's environment	• Eliminate non-work related activities • Ensuring optimal working conditions	Developers / Scrum Master
Recipient's environment		

Source: author's own work.

Research methodology

Research on the impact of remote work on the effectiveness of activities in Scrum Teams was carried out at the turn of April and May 2021. The research was carried out using the CAWI technique. For this purpose, a questionnaire was created consisting of five sections: Organisation, IT Tools, Team and remote team communication, Remote Sprint organisation, Scrum Team participant. The questionnaire consisted of closed questions. The respondents were asked to choose an answer, specifying on a Likert scale whether, from the perspective of the organisation in which they operate, a given statement is true or not. The respondents had the following answers to choose from: 1 – definitely not, 2 – no, 3 – neither yes or no, or I do not know, 4 – yes, 5 – definitely yes. The questionnaire was sent to 193 organisations randomly selected, limited by the time of the company's operation – minimum 5 years. Requests for participation in the survey were sent by e-mail, containing a link to the survey. In the record, as a filtering question, the respondents were asked to state how long the organisation has been operating using Scrum methodology. Only those surveys in which Scrum has been respected for at least 2 years were classified for further analysis. In addition, due to the possibility of receiving more surveys from a given organisation, while maintaining the anonymity of the survey, we were asked to enter the survey ID. The survey identifier was any string of characters given by the respondent, not shorter than 8 characters, enabling the identification of surveys from one organisation. As a result, 187 correctly completed questionnaires from 40 organisations were obtained. The results are presented in Table 2.

The obtained data was subject to inference. In is worth mentioning the shortcomings of the CAWI method, which includes the limited scope of the research sample and a lack of possibility to verify the person completing the survey.

The results obtained from the questionnaires were analysed by Principal Component Analysis (PCA). The PCA method is used to reduce information included in multivariate dimensional date space to that in two-dimensional space without losing information. Using the PCA method it is possible to represent data in the form of a smaller number of uncorrelated variables called principal components (Draper & Smith, 1998). The Cluster Analysis (CA) was used to grouping variables (Rokach & Maimon, 2005). The PCA and CA analyses were done by using Statistics v13.3. Individual sections of the questionnaire with questions are presented in Figures 2 to 6. Additionally, the PCA uses an abbreviation referring to the questionnaire question (e.g. [D3]).

Remote communication in Scrum Teams – the results of empirical research

Based on the data obtained, a conclusion was reached that 87% of those surveyed declare their organisation's readiness to work remotely. Their employer had also provided the necessary resources to provide it (86%). Only 18% of respondents declare their employer's support in organising space for remote work. As many as 79% of respondents indicated the possibility to choose the form of work with their employer (stationary, hybrid, remote), and 68% declared that their employer preferred remote work. The obtained results are presented in Figure 2.

For communication with remote work – since the beginning of the pandemic – the same software has been used (90%), which is intuitive (97%), and thus does not need to be replaced (94%). All Scrum Team participants operate using the same communication software (99%). It is worth noting that not all communication functionalities in remote work are used (recording meetings, working on a shared screen) – 10% of responses. The obtained results are presented in Figure 3.

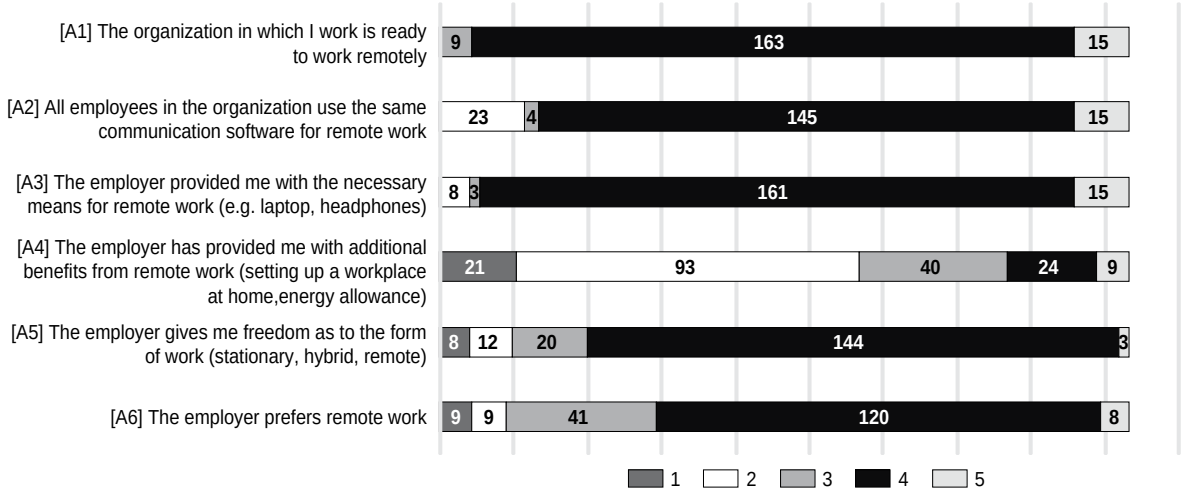
Functioning in a remote environment is not a problem (97%). Verbal communication was indicated as the main medium of communication (96%), and as many as 21% of those surveyed did not turn on their camera during meetings. Remote meetings are seen as more effective than stationary meetings by 79% of

Table 2
Companies participating in the research

Provinces	Number of companies to which a link was sent with a request to participate in the survey	Number of correctly completed questionnaires
Lower Silesia	5	31
Lodzkie	3	23
Masovian Voivodeship	10	67
Lesser Poland	7	15
Opole Province	3	14
Pomeranian	7	25
Greater Poland	5	12
Total	**40**	**187**

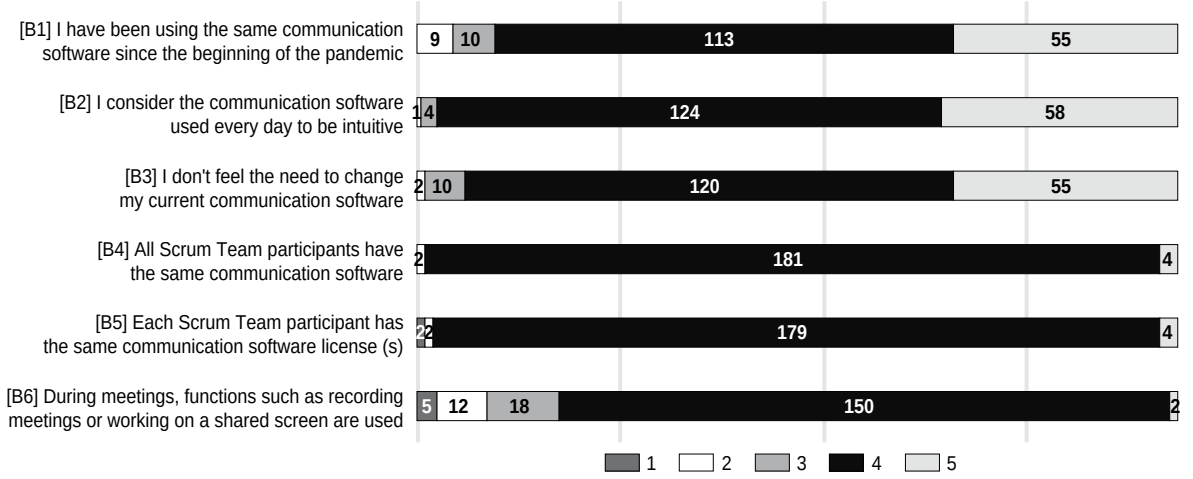
Source: author's own work.

Figure 2
Organisation



Source: author's own work.

Figure 3
IT tools



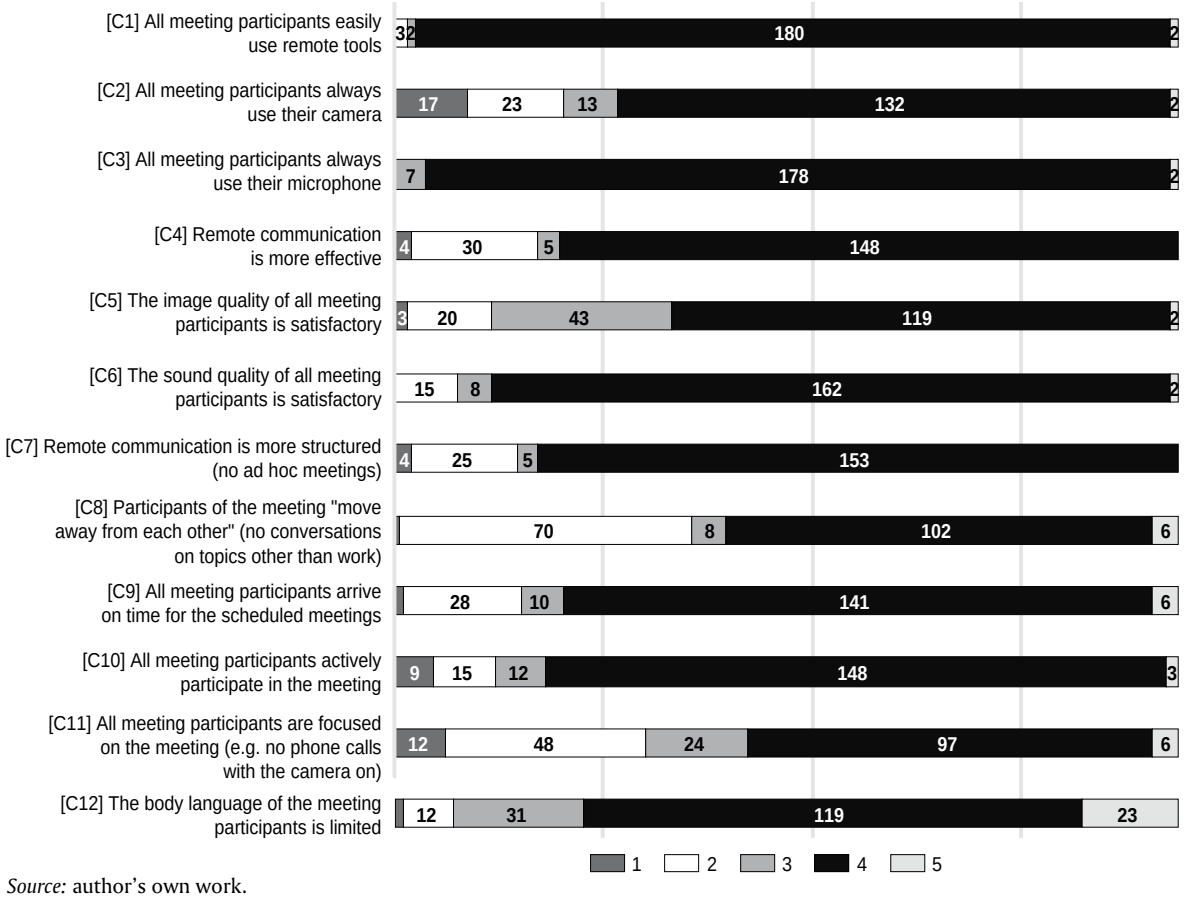
Source: author's own work.

respondents. Both the sound (88%) and image (64%) quality of the meeting participants is satisfactory. Remote communication is more structured (82%). The advantages of remote communication also include the punctuality of participants (79%) and active participation in meetings (81%). Unfortunately, during these meetings, not all participants are fully concentrated. As many as 32% of respondents experienced conversations on the phone during a meeting. The obtained results are presented in Figure 4.

According to the respondents, organising a remote Sprint meeting is more effective than in stationary (80% of responses). As many as 71% of people did not notice any difficulties in tracking the progress of the team's work remotely, and in 96% it is monitored using a Scrum table. Worth noting are a relatively large number of indications (35%) regarding non-compliance with all the ceremonies provided for in Scrum methodology. Such a state of affairs may often be conditioned by different working hours in remote form and the desire to limit meetings. The reason may also be the lack of compliance with the time frames of meetings and the tendency to run over time (20%). The obtained results are presented in Figure 5.

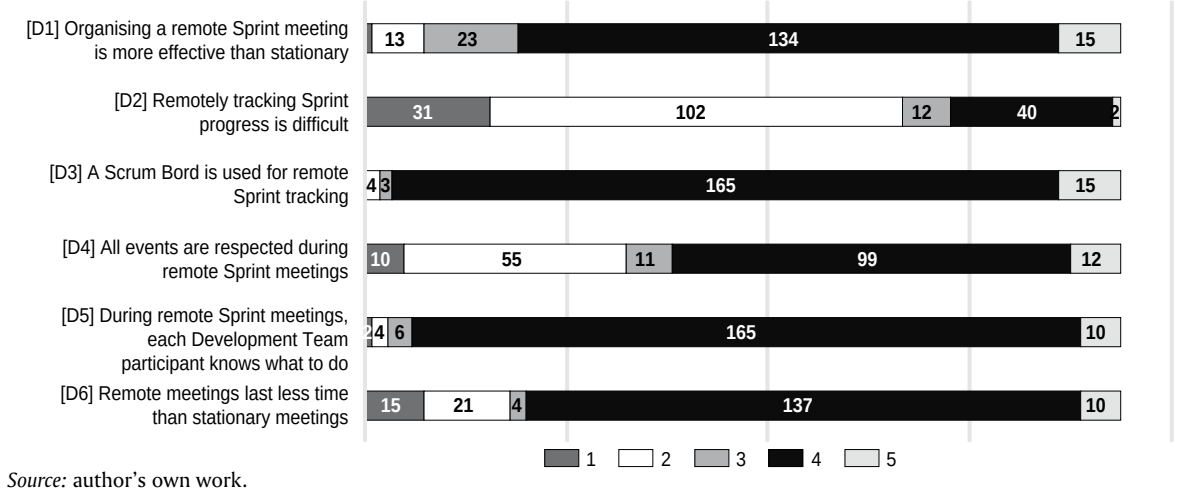
Research has shown that 77% of respondents declare that remote work inhibits communication. 38% of people admitted to performing tasks other than those provided for in the meeting plan. This is undoubtedly due to the limited body language (87%). The topics that were not the main focus of the meeting were not discussed (92%). It is worth mentioning that for as many as 29% of respondents remote work influenced their self-esteem. The reasons for this are the lack of conditions for comfortable remote work. Remote work during the pandemic is often also requires looking after children and sharing office space with other residents, which was declared by 63% of respondents. The obtained results are presented in Figure 6.

Figure 4
Team and remote team communication



Source: author's own work.

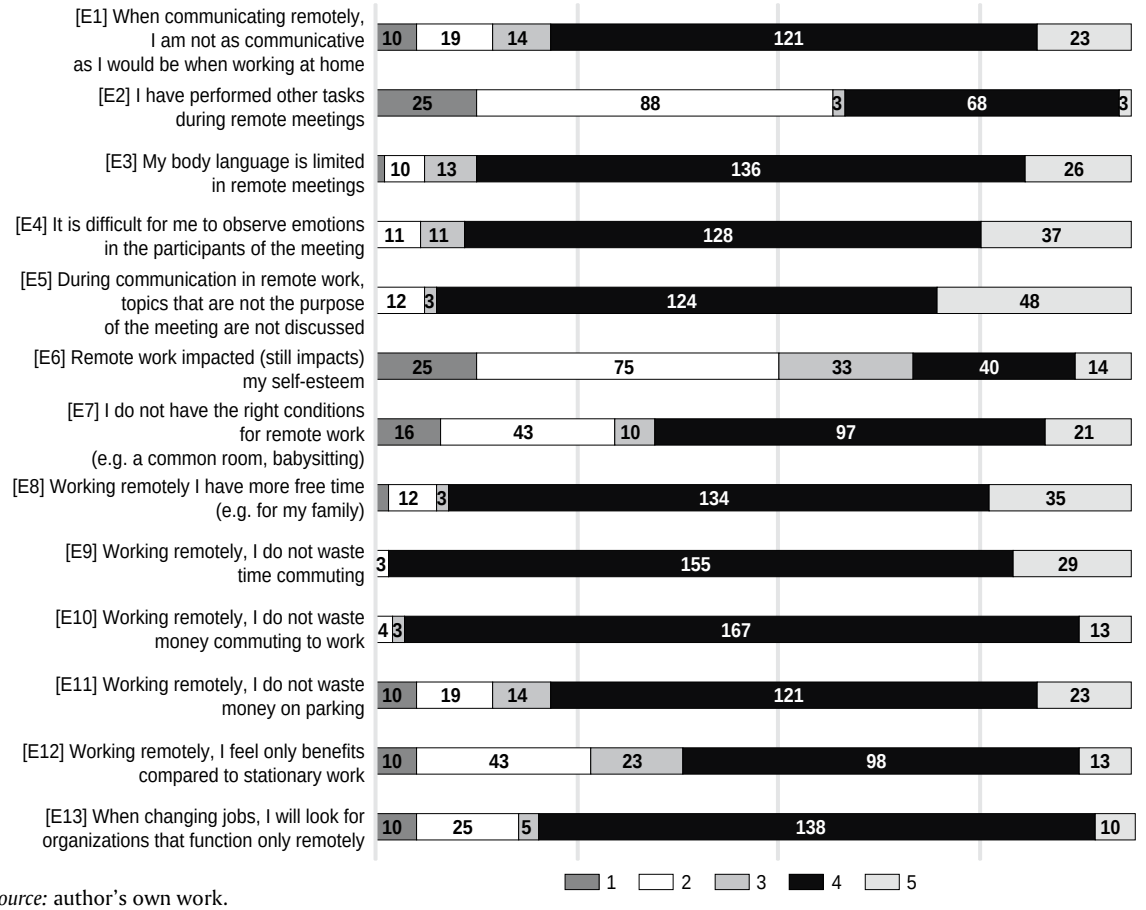
Figure 5
Remote Sprint meetings



Source: author's own work.

Remote work also has its advantages. Working remotely, the respondents declared more free time outside of work (90%), for example due to the elimination of time spent on commuting (96%). The costs of commuting to and from work (96%) and parking costs (77%) also decreased, which had a positive effect on household budgets. Remote work is an important decision factor for employees. Although only 60% of the respondents saw only positive aspects of remote work, 80% declared that if they change their job they will look for organisations operating only remotely.

Figure 6
Scrum Team participant



Source: author's own work.

Application of the PCA method in research

The data obtained from the CAWI study was analysed using PCA analysis. The obtained results are shown in Figure 7. The analysed variables were arranged on the two-dimensional plane PC1 and PC2. The first and second components explain the variability in 95.33%. This indicates the existence of a strongly arranged pattern of data.

In order to group the variables correlated with each other, CA analysis was then performed, the results of which are presented in Figure 8.

Based on the obtained results of the bond distance, the variables were divided into four groups, which are marked with a dashed line in Figure 8. In the case of the PC1 and PC2 plane (Figure 7), these groups are marked with circles – a solid line. In addition, within one circle, an additional five circles were diagnosed, which are depicted with a dashed line. The factors from these five circles are grouped in terms of their specific features. The first group consists of the following variables: A4, D2, E2. The second group is the variable E6. The third group are the variables C8, C11, D4, E7 and E12. The fourth group consists of the following variables: A1, A2, A3, A5, A6, B1-B6, C1-C7, C9, C10, C12, D1, D3, D5, D6, E1, E3, E4, E5, E8, E9-E11, E13. These variables are arranged on the PC1 and PC2 plane and the direction of change is marked with a dashed arrow in accordance with the criterion:

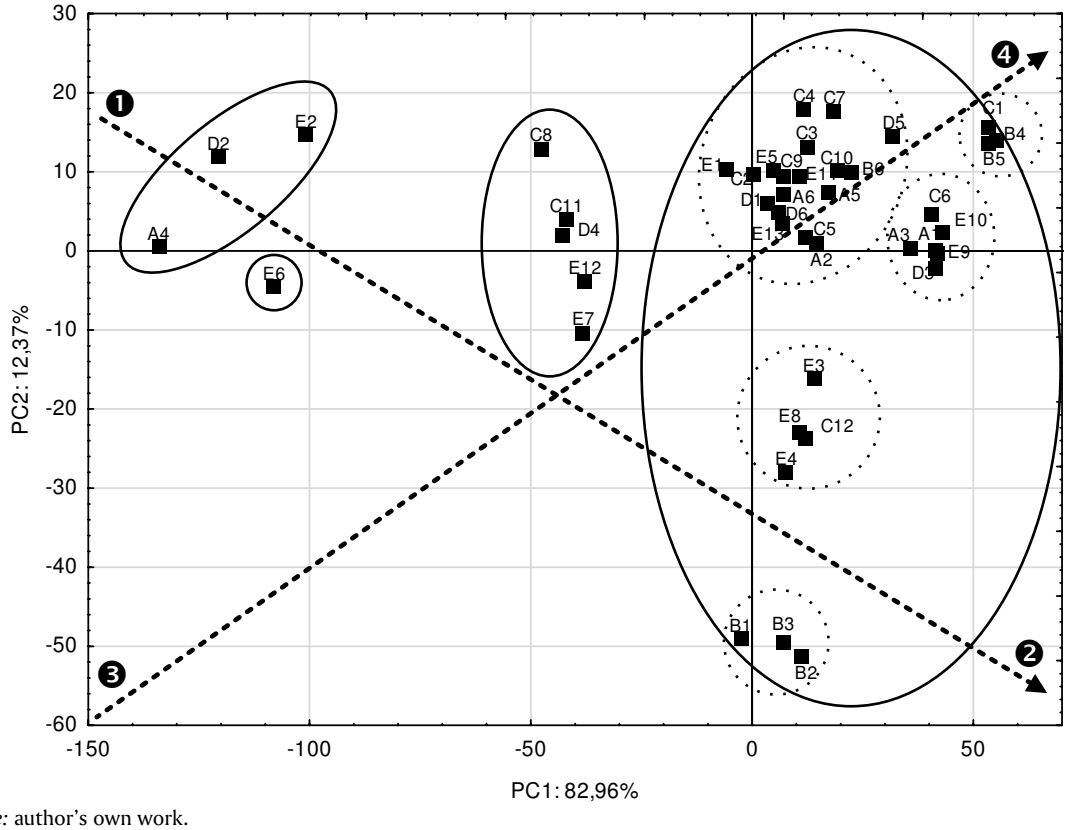
- negative (❶) and positive (❷) aspects of working remotely;
- the least important (❸) and the most important (❹) features of working remotely.

Conclusions

Remote work has become a popular option. Before the COVID-19 pandemic and changed regulations, no one thought about the benefits and limitations of working remotely. Almost overnight, many companies were faced with the necessity to close their offices and announce a lock down. Despite the next waves of the pandemic, many institutions are trying to return to normal operating and are re-opening their offices, while the sanitary restrictions in force require the introduction of preventive measures. One such preventive measure is shifting to remote work.

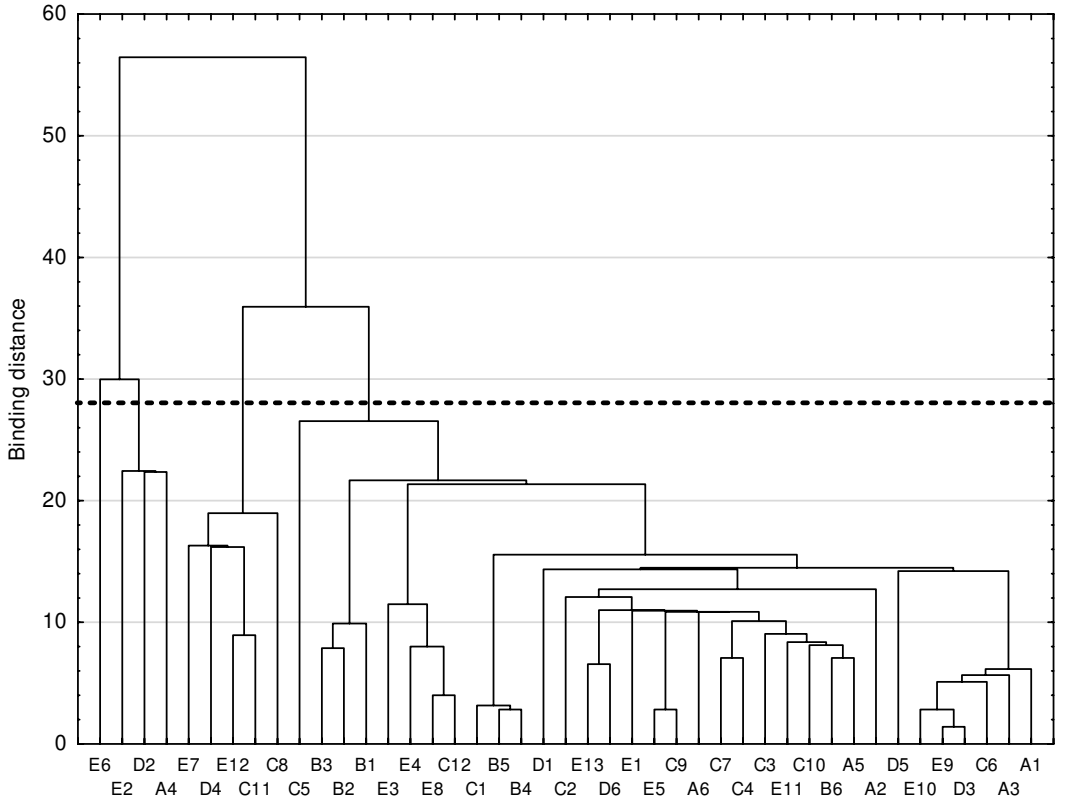
Various workshops and meetings are held to optimise and make remote work more attractive. This is aimed at getting used to the situation where remote work is a necessity, and not the employee's choice.

Figure 7
Principal Component Analysis



Source: author's own work.

Figure 8
Cluster Analysis



Source: author's own work.

The conducted research has shown that remote communication has a positive effect on the efficiency of work in a Scrum team and is more effective than in stationary form (the result of grouping the variable [D1]), thus the H1 hypothesis has proven to be true.

Although remote work shows tangible benefits, there are areas for further improvement. Work and remote communication in Scrum teams requires constant control and reaction of the Scrum Master to situations deviating from the accepted norm. The Development Team is a self-organising group of people, and the Scrum Master should be invisible in their activities. However, this approach is wrong when assuming only remote work. A quick reaction by the Scrum Master to a signalled message about a problem help avoid escalating further problems.

A positive aspect of remote work is the significant saving of time and money due to the lack of the necessity to reach the company's offices (distribution of the variables [E9] and [E10] on the PC1 and PC2 levels). Thus, the hypothesis H2 has proven to be true.

A negative aspect of remote work is the ability to perform other tasks during working hours (occurrence of the variable [E2]), often without the knowledge and consent of the employer. Thus, the H3 hypothesis has proven to be true. Very often employees, feeling unsure about their job security, took on additional work. This work was aimed at ensuring the stability of employment in the event of redundancies. As a result, employees often had to work more efficiently to manage both jobs. It is also worth noting that remote work influences employees' self-esteem (variable [E6]). This assessment is often a result of isolation and lack of contact with the external environment, organisation, and loss of established bonds with colleagues.

It is therefore important to introduce practices that allow employees to feel more relaxed and are similar to working in an office. It is worth enriching formal meetings with short conversations about everyday life. "On-line coffee" is more and more often used in organisations as a relaxed form of spending time with team members and nurturing mutual relationships. Positive relationships, often developed during stationary work, cease and become very formal over time. It is also worth providing team members with the same hardware infrastructure for remote communication to avoid disproportions and categorising meeting participants as better and worse.

Very often, the mere fact of communicating from home causes the participants to feel uncomfortable and use the camera less and less often. They then use a bad connection or pro-ecological approach to reduce their carbon footprint as an excuse. In addition to remote communication software, it is worth implementing a chat in the organisation in which team members will be able to communicate on an ongoing basis. Emoticons, used for expressing emotions in remote form, should function in everyday communication.

An important aspect of the functioning of a Scrum Team in a remote environment is to ensure a balance between group and individual work. The most common mistake is to unconsciously isolate team members who are trying to be self-sufficient. As a result, they lose control over the task being carried out and make mistakes. Mistakes that often cost time and money. The basic environment for Scrum methodology is mutual communication, support and exchange of experiences. The exchange of experiences requires meetings, because without them learning is impossible. Before planning a Sprint meeting, it is worth doing research on the preferences of team members and how their work can bring better results. Meetings participants should not be forced to meet, because the effect of such meetings will be counterproductive. There is nothing worse than the awkward silence and general embarrassment of meeting participants that have nothing to say.

The conducted research has shown that remote communication in Scrum teams is more effective than in stationary form, which largely depends on remote communication tools. The H4 hypothesis has therefore proven to be true. On the basis of the research (Figure 7), the variables [B1], [B2], [B3] and [C1], [B4], [B5] are clusters concentrated both in terms of positive aspects of remote work, as well as in terms of the most important features constituting remote work. From the perspective of the success of communication in remote work, it is necessary to have and know the software used by the entire development team, and this software should be homogeneous and with the same rights for all participants.

The benefits of this approach are immense, and organisations are increasingly supporting such initiatives. A larger number of people operating remotely is an opportunity for cost optimisation in the organisation and reduce the size of office space. Remote work – as a standard form of work in modern organisations – can also be problematic for employers. Remote communication and agile operations provide great opportunities on the labour market, getting rid of geographical barriers. The information exchange takes place in the same way whether working locally or internationally. The effect of this is the continuous increase in expectations and salaries of people from the IT industry.

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