Challenges and use of virtual tools in teamwork

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Abstract

Purpose of the article There have been many studies focusing on teamwork. However, the digital transformation has caused new challenges in this field. Thus, the aim of the article is to provide insight into the most significant challenges in virtual teamwork and to identify the used and known virtual tools.

Methodology/methods This study adopted a quantitative approach by means of questionnaire administered online. The final sample consisted of 622 respondents from two universities from Poland and Romania. The survey was conducted on January 2019. Students from several classes from the bachelor and the master pro-grams of all faculties of both universities were approached to respond to a survey.

Scientific aim The aim of the survey was to diagnose the students' experience in virtual teamwork, their challenges of working in this type of teams, and knowing and using of tools for virtual teamwork.

Findings The research results shows that almost half of the students (48,1 percent) have experience in virtual teamwork. Their experience is mainly regarding with preparing a project or a presentation for classes. However, the most used tools are these which are the most popular: messengers, mobile phone, social media like Facebook, e-mail and tool for creating folders and holding files like Google drive. Thus, one of the dimensions of challenges of work in virtual teams is insufficient knowledge of IT tools by team members and technology difficulties (e.g. software, computer, internet access).

Conclusions In the context of growing needs in this area, it seems important to support to acquire teamwork skills. It seems that the students learn to use virtual tools by the way doing of something for classes. Thus, the classes should teach students how to use of virtual tools to a greater extent, especially that some of the tools are well known but not used. Organizations might offer internships to enable students to develop skills in using specific virtual tools.

Keywords: teamwork, virtual tools, virtual team

JEL Classification: M12, M5

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Introduction

Globalization, economic fluctuations, cultural diversity, rapid environmental changes and improved networking and collaboration technologies are changing the way organizations operate their activity. The new challenges of competitiveness and the needs of the organization in terms of flexibility and adaptability cause an increase in the importance of team in an organization (Matwiejczuk and Samul, 2016).

In this context, many organizations try to implement virtual teams in order to sustain their competitive ad-vantage. The main reason is that virtual teams can do things collectively that collocated teams cannot. When valuable members are geographically dispersed, the adoption of virtual teams enables organizations to benefit from knowledge, skills, expertise and new perspectives that wouldn't be available for on-site collaboration. In other words, virtual teams have the potential to generate innovative and valuable results (Pinjani and Palvia, 2013) given the fact that they excel at idea-generation and brainstorming tasks, due to fewer interruptions and greater equality in participation among members (Martins et al., 2004).

Großer and Baumöl (2017, p. 298) highlight another important advantage for companies: they might gain from making good use of virtual teams with respect to organizational guidance and attracting a workforce, as it might be a style of work, which is appealing to the younger generation that have native digital skills. However, it is necessary to undertake studies that identify the perceptions of younger generation about working in virtual teams as well as their knowledge of virtual instruments used, so that companies can invest in a targeted way in their future employees in terms of trainings.

All the aforementioned benefits are based on the assumption that virtual teams are well designed, managed and implemented. But if little attention is paid to above-mentioned activities, then virtual teams will fail. Hence, identifying and understanding challenges faced by virtual team members is critical.

The paper is structured as it follows. The article starts with a literature review on virtual teams in terms of definition, virtual tools and main challenges. Then it is discussed the research methodology, followed by the results of the empirical study. In the end, implications and conclusions are presented.

1 Conceptual background

1.1 Virtual teams defined

Virtual teams are composed of members that are geographically dispersed, work interdependently and in-formation flows among members are enabled by communication technology, in order to achieve common goals and share outcomes. They have new types of work patterns, decision making styles, relationships (Alsharo et al, 2017), decentralized work processes and versatile structures (Bisbe and Sivabalan, 2017, p. 14) given that their members have different national and cultural backgrounds, expertise and organizational affiliation.

Some teams are completely virtual and have never met face to face, while others are slightly virtual in which team members primarily interact face to face, but also spend time working with each other through in-formation and communication technology (Wadsworth and Blanchard, 2015, p. 387). Gibson and Cohen (2003, p. 5) highlight that "just the use of technology does not make a team virtual, because all teams use technology". The level of virtuality is often determined by the degree of reliance on electronic communication and geographic dispersion of team members. Some researchers analyze geographic dispersion in terms of multiple dimensions: spatial distance, temporal (time difference) and configurational (sites, isolation and imbalance) (O'Leary and Cummings, 2007). Moreover, other researchers use the concept partially distributed team, a hybrid of virtual and co-located face-to-face teams that has at least one co-located subgroup and at least two geo-graphically-dispersed subgroups (Eubanks et al, 2016, p. 556 after Huang and Ocker, 2006).

However, as levels of team virtuality increase, the lack of communication richness, relative to face-to-face interactions, will pose greater challenges for such teams (Schaubroeck and Yu, 2017, p. 640). Anyway, it is hard to imagine in today's workplace environment teams in which the members do not have some level of virtuality.

Other studies highlight other types of virtual teams: inter-organizational teams and distributed ad-hoc task groups (Espinosa et al, 2007; Malhotra and Majchrzak, 2014). Also, some studies mention that team members may belong to the same organization or multiple organizations; thus, virtual teams may be transnational or global and multiorganizational (Gibson and Cohen, 2003, p. 4).

From the perspective of organizations, some advantages of virtual teams include: higher profits, improved access to global markets, environmental benefits (Cascio, 2000), 24/7 productivity by using different time zones of members who are geographically dispersed (Dulebohn and Hoch, 2017), greater flexibility and responsiveness (Hunsaker and Hunsaker, 2008, Piccoli et al., 2004, Powell et al., 2004) as they are based on flat organizational structures without hierarchies and central authority (Jarvempaa and Tanriverdi, 2003), opportunities to reduce travel, relocation (Dulebohn and Hoch, 2017), operating and capital costs (Geister et al., 2006). Additionally, virtual teams may be formed to unify functions across an organization, integrate employees as a result of mergers or acquisitions and increase working opportunities in organizations with an undesirable location (Cascio and Shurygailo, 2003).

From the perspective of employees, they may enjoy the flexibility of accomplishing their tasks from the lo-cation of their preference. Such flexibility may facilitate the balance of employees' work and life and potentially increase their satisfaction with the job.

Consequently, virtual teams can more easily and innovatively respond to the changing requirements of the environment based on the latest knowledge, flexible working arrangements and application of information and communication technologies, making organizations agile and competitive.

1.2 Tools used in virtual teamwork

The continuous development of information and communication technologies have facilitated the creation of new mechanisms for coordinating work and new collaborative organizational forms, business models and working practices (Snellman, 2014, p. 1254).

Virtual tools are defined as modes of communication used by team members to interact virtually, to per-form the functions essential to a standard team (Hertel et al, 2004). There are multiple tools aimed at fulfilling the communicative and working requirements of virtual teams: email, video conferencing, group conferencing platforms, group chat rooms, instant messaging, shared workspaces, online meeting tools, collaborative design tools, knowledge-management systems, social media and other virtual reality options. They all provide auditory and/or visual connections between team members (Bouwman et al, 2008), and some of them offer the opportunity of information sharing.

Nedelko's (2008) study showed video conferencing is a tool that is frequently leveraged in virtual team communication and can optimize performance within the team. Conferencing platforms not only enable multiple participants to communicate simultaneously, but also facilitate: information sharing, negotiating, problem solving and team decision making (Laitinen and Valo, 2018, p. 13). Being able to communicate with immediate feedback represent a basic requirement in virtual team collaboration and instant messaging is a simple and rap-id solution. Another tool that can be used by members of virtual teams is represented by discussion forums based on some specific tasks. These forums provide area for members to communicate and to learn. Social media (social network sites and also virtual environments) is defined as a group of internet-based applications built on the ideological and technical foundation of Web 2.0, which allow creation and exchange of user generated content (Kiesler and Cummings, 2002:61). Social media provides a platform for sharing, discussing, and co-creating knowledge and information (Sigala and Chalkiti, 2015) between virtual team members. Finholt and Sproull stated in 1990 that "virtual team environments not only lack a shared physical setting, but, depending on the technology used, members are also invisible to each other". Nowadays virtual environments eliminate this disadvantage; virtual environments allow users, through their avatars, to participate in modifying the con-tent of rich virtual environment, create objects, move around in a virtual environment and utilize team working-tools (Bosch-Sijtsema and Haapamäkib, 2014, p. 396).

Tools such as Electronic Performance Monitoring systems (EPM) and Team Awareness Systems (TAS) re-port feedback information on the activities and performance of each member of the team. These are conducted to improve the coordination of communication between parties comprising the team (Dabbish and Kraut, 2008). While EPM and TAS are valuable to all teams, virtual teams tend to depend much more on these electronic-based tools than non-virtual teams (Bisbe and Sivabalan, 2017, p. 15).

1.3 Challenges in virtual teamwork

While virtual teams provide a number of advantages to both organizations and team members, there are inherent challenges resulting from team virtuality. Moreover, some studies show that managing virtual teams is more

difficult than managing collocated teams (Hoch and Kozlowski, 2014; Fiol and O'Conner, 2005). Re-searchers have noted that "just bringing people with the required knowledge and skills together virtually provides no guarantee that they will be able to work effectively and innovate across contexts" (Cramton, 2001, p. 452). Consequently, challenges of managing virtual teams have received significant attention in academic literature (Cascio and Shurygailo, 2003; Martins et al, 2004).

Some challenges in working in virtual teams include: diffused roles and responsibilities (Lee-Kelley and San-key, 2008), communication and collaboration difficulties, potentially lower team engagement by team members, difficulties in creating trust and shared responsibility among team members, high levels of social distance between members (Dulebohn and Hoch, 2017, p. 569), differences in salience and interpretation of written texts, the absence of non-verbal communication, more limited set of communication cues conveyed by electronic media (Powell et al, 2004), more scope for opportunistic behaviors and social loafing (Jarvenpaa and Leidner, 1999) and greater difficulty with socio-emotional processes such as relationship building, cohesion and trust (Warkentin et al, 1997).

Further, we will focus on presenting the challenges of using information and communication technologies in virtual teams such as: members' lack of technology experience and/or skills, limited training and support, user unfriendliness to technologies and the cost of technologies.

The first challenge concerns the members' skills to use certain virtual instruments. The new technologically mediated working arrangements require sometimes new skills and team members might not have enough time and/or technical support to learn to use these new tools. New technology that the team is not skilled enough to implement well may completely ruin a team, especially at formation stage (Gibson and Cohen, 2003, p. 250).

Even if team members use known software tools and long implemented within the organization, there are in-evitable and needed upgrades, service packs and new version releases that might reduce the functionality of the virtual team for a certain period of time. Another challenge is that there might be incompatibilities between the tools or versions of the same tools used by team members in order to collaborate.

Choosing the right technology for a virtual team might be also a challenge. Gibson and Cohen (2003, p. 262) suggest that:

- asynchronous communication technologies are appropriate, and may even be the best choice, when tasks are low in complexity;
- synchronous communication technologies are the most appropriate choice for complex tasks that require independent collaboration, such as sense making, problem solving, and decision making.

In addition, a number of researchers have argued that rich media communication (video conferences, for example) is more suitable when sharing knowledge that is of a complex, equivocal nature (Klitmøller and Lauring, 2013, p. 398 after Hayward, 2002 and Kezsbom, 2000). On the other hand, lean media moderates negative team outcomes such as increased conflict and social fragmentation in an intercultural context (Stahl et al, 2010). Also, Pinjani and Palvia (2013, p. 145) stated that effective information and communication technology increases the positive impact of diversity and diminishes the negative effects of cultural diversity.

2 Methods

This study adopted a quantitative approach by means of questionnaire administered online in order to reach the largest possible group of respondents. The results obtained in this way allow us to know the opinion of a given group of respondents on the research topic and to use them to form certain generalizations. The data presented were collected in the two last week of January 2019 from 622 students from two universities: Bialystok University of Technology in Poland (346 respondents) and University of Babeş-Bolyai in Romania (276 respondents). An invitation email containing a link to an online survey was sent to several classes from the bachelor and the master programs of all faculties from both universities. The online survey allowed to collect responses to the dependent measures as well as information on teamwork experience, field and year of study, level of foreign language skills, place of residence, and gender. Of the respondents, females were more numerous than males (66 percent); the students were from the first year of the bachelor programs to the second year of the master programs (M_114,40, SD_123,41). Most of students (43 percent) were from a large city (over 150,000 inhabitants), slightly less of them were from a medium or a small city (35 percent) and the rest (22 percent) were from village (M_155,5, SD_78,35).

Finally, half of students know an English language, and one-third of them know this language at least on intermediate higher level (B2); the half ones know other languages, like German, Russian, Hungarian or French.

The questionnaire was made up of several sections: working in multicultural teams, working in virtual teams and willingness to cooperate in team. The section of working in virtual teams focus on work experience in virtual team, challenges of working in this type of teams, and knowing and using of the tools for virtual teamwork. The questionnaire consists of different kind of questions: yes/no questions (for example: Did you have the chance to participate/work (e.g. at work or in college) in virtual teams?), opened questions (for example: Describe activities you had the opportunity to cooperate in virtual teams), questions with using a 5-point Likert scale (1 = 'strongly disagree' to 5 = 'strongly agree') (for example: What were the main challenges you encountered when working in virtual teams?).

Once data collection were partly finalised, the SPSS statistical software package was used to organise and analyse the data. In the analysis, the descriptive statistics using non-parametric techniques and factor analysis with varimax rotation were conducted.

3 Research results

The respondents were asked about work experience in virtual team which was defined as a team of people working on the implementation of a common goal, in which team members are spatially dispersed, and communication takes place through modern information technologies (e.g. messenger, Skype). Almost the half of the students (48,1 percent) have experience in virtual teamwork and these respondents were taken into account in further analyzes. The respondents were asked about their experience in working in virtual team with using open question. Among describing activities which gave the opportunity to cooperate in virtual teams, students mainly indicate experiences regarding to study such as the preparation of projects or presentations for classes or regarding to professional work:

"Group work at the university, for example creating a presentation in the cloud." (student, female, second year of the bachelor program, Faculty of Engineering Management)
"Preparation of presentations for classes, using Skype, Messenger from Facebook" (student, male, third year of the bachelor program, Faculty of Engineering Management)
"*Implementation of the Best Entrepreneurship Classes competition, cooperation with coordinators from 6 cities in Poland*" (student, female, second year of the bachelor program, Faculty of Engineering Management)
"Completing notes on a virtual disk and solving and consulting exam tasks" (student, male, second year of the bachelor program, Faculty of Engineering Management)
"Professional remote work - mainly marketing agencies" (student, male, second year of the bachelor program, Faculty of Engineering Management)
"Support for social networking sites, creating game programs and projects, solving problematic issues from various fields" (student, male, first year of the bachelor program, Faculty of Electrical Engineering)
"Teleconferences at work regarding cooperation between foreign and Polish branches" (student, female, first year of the bachelor program, Faculty of Engineering Management)

This study provides insight into the most significant challenges that respondents encountered during working in virtual teams. Table 1 presents the principal components analysis of factors that influence virtual teamwork. The data demonstrate adequate internal reliability (Cronbach's alphas 0,847).

The factor analysis of these items leads to the extraction of tree factors which cumulatively explain 72 per-cent of the variance. One of the dimensions of challenges of working in virtual team is insufficient knowledge of IT tools by team members and hardware difficulties (e.g. software, computer, internet access). The other dimensions are related with language skills (the first factor) and with management of this kind of team (the third factor) such as leadership and different skills of team members.

Table 1 The main components of analysis

Factors	1 (language skills)	2 (IT tools and IT skills)	3 (leadership skills)
coordination problems	0,302406	-0,142785	0,741892
lack of involvement, motivation and commitment of team members	0,139944	-0,088242	0,762995
decision making problems	-0,045636	0,316069	0,685824
leadership problems (i.e. delegating, monitoring and providing feedback)	-0,113934	0,445211	0,687835
team roles problems (unclear tasks/roles of each member)	0,017597	0,351942	0,693998
not meeting the deadlines	0,216130	0,014062	0,673704
skill-level differences between members	0,394575	-0,035075	0,670124
personality differences between members	0,529335	0,101205	0,319959
language proficiency difficulties of the members	0,805156	0,279383	0,012101
communication problems	0,573552	0,366293	0,425951
insufficient knowledge of IT tools by team members	0,319501	0,776699	-0,011443
hardware difficulties (software, computer, internet access)	0,154875	0,801817	0,078854

kurtosis -0,4359; coefficient alfa 8,0405

Source: own compilation

From the study point of view is important to obtain the information about respondents' knowledge of IT tools. Thus, the study analyzes the knowing and using the tools of virtual teamwork by students (tab. 2). The most used tools are these which are the most popular among young people: various kinds of messengers, mobile phone, social media like Facebook, e-mail and tool for creating folders and holding files like Google drive – over 76 percent of students use the tools (M_82,5, SD_6,1), at least 7 percent know the tools, but do not use (M_15,4, SD_5,6), and only 2 percent do not know the mentioned tools (M_2,2, SD_1,1).

Next group of tools for virtual creating and sharing documents are also quite well known: between 47 and 53 percent students use tools such as Scribbler, Google Docs and SharePoint, Dropbox; between 28 and 37 percent students know it, but do not use; and between 15 and 18 percent students do not know it. Meetings with using Skype, phone and video are used on average by 34 percent of students; known, but not used by 60 percent; and not known by 6 percent.

The least known and used tools are those which are more advanced such as Yammer or Jive for social networking and Huddle or Blackboard Collaborate for collaboration (used M_4,6, SD_1,1; known, but not used M_25,3, SD_1,9; not known M_70,2, SD_3,0)

Table 2 Types of virtual tools used for teamwork

Factors	'I use'	'I know, but I don't use'	'I don't know'
messenger tools (Facebook Messenger, whatsapp)	91,8%	7,1%	1,2%
mobile phone	84,2%	14,1%	1,6%
social media (Facebook, LinkedIn)	81,9%	14,5%	3,6%
e-mail	78,3%	20,4%	1,3%
Google drive	76,1%	20,8%	3,1%
document cocreation (Scribbler, Google Docs)	53,0%	28,8%	18,3%
document sharing (SharePoint, Dropbox)	47,4%	37,3%	15,3%
Skype meetings	43,1%	53,9%	3,0%
video-conferences	30,8%	61,3%	7,9%
telephoneconferences	29,1%	64,5%	6,4%
project management tools (Microsoft project, Basecamp)	20,0%	32,5%	47,5%
virtual meeting rooms	16,3%	60,2%	23,4%
cloud computing	15,4%	40,2%	44,5%
meeting tools (Google hangouts, GoToMeeting)	13,5%	44,7%	41,8%
3D tools (Second Life, World of Warcraft, Interior Space Design programs)	12,5%	36,3%	51,2%
social networking (Yammer, Jive)	5,3%	26,6%	68,1%
collaboration tools (Huddle, Blackboard Collaborate)	3,8%	23,9%	72,3%

Source: own compilation

Conclusion

To sum up, the research results shows that many students have experience in a virtual teamwork, but half of them do not have such experience. Their experience is mainly regarding with preparing a project or a presentation for classes. Instead of meeting and work together they communicate by virtual tools. Some of students have opportunity to use virtual tool in working. Among the reasons for the difficulty of working in a virtual team, the respondents indicated insufficient knowledge of IT tools by team members and hardware difficulties. Although the use of various virtual tools is quite common, the most popular ones are those that allow to communicate at a distance or allow to share documents.

A practical implication arising from this study is follow. In the context of growing needs in this area, it seems important to conduct classes that will enable to acquire teamwork skills. It seems that the students learn to use virtual tools by the way doing of something for classes. They do not participate in any especially dedicated activities that could prepare them for virtual team work. Thus, the classes should teach students how to use of virtual tools to a greater extent, especially that some of the tools are well known but not used. The same recommendation can be made to organizations that might organize internships in order to familiarize students with IT tools used in virtual teamwork.

Acknowledgment

This research is supported by a project 'BUT InterAcademic Partnerships' fund by NAWA, (PPI/APM/2018/1/0003) and by research work no. S/WIZ/1/2018 at the Białystok University of Technology and financed from a subsidy provided by the Minister of Science and Higher Education

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