

WORKING IN DISTRIBUTED TEAMS AND THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES

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ABSTRACT

Highlights: Working in distributed teams means that it does not take location into consideration and uses modern communication and computer technology. In terms of managerial implications, the impact of perceived proximity can add value to telecommuting in distributed teams. Distributed teams (or remote teams) are those in which the members are geographically dispersed. Some of the conflicts presented may be generated by the remoteness of the team from the project they are working on. **Aim:** Analyze the work in distributed teams through the use of information and communication technologies in companies from different sectors. **Design/Methodology/Approach:** In the article, literature and field research were used, and the approach used was qualitative. The field research was based on the method of multiple case studies in sectors such as education, technology, beverages, and industrial and medical gases, with respondents from higher education backgrounds. In addition, non-participant observation and semi-structured interviews aided by a script of questions (open and closed), and non-probabilistic sampling techniques were used. **Results:** The results indicate challenges such as language, time zone, culture, commitment, training graduation, and confidence trust. There was no concentration on any of the challenges, but language was the only challenge mentioned twice by the respondents. **Research limitations:** The main limitation of the research in terms of method and results was the number of companies investigated. **Practical Implications:** Identification of work conflicts in distributed teams and the benefits of information and communication technologies (ICTs) in reducing them. **Originality/value:** With the COVID-19 pandemic, researchers start their studies in distributed teamwork, but the theme has been discussed for a long time. The research was done in different sectors, with the analysis of a Brazilian perspective of the existing problems among Brazilian workers; however, problems between these workers and employees abroad were not identified.

KEYWORDS: Distributed teams; Information and Communication Technologies (ICT); Challenges; Multiple case studies.

1. INTRODUCTION

Innovations in information technology (IT), the increase in the number of remote workers, and the emergence of computer-mediated groups have led to changes in the way employees communicate and collaborate in companies (Abarca *et al.*, 2020). Added to this, the COVID-19 pandemic has strengthened the use of distributed teamwork, also known as virtual teams, remote teams, computer-based teams, and teams, and the way they are referred to in the literature on the subject. The most important aspect of virtual teams (and their synonyms) is related to the fact that they bring together a group of dispersedly located individuals who collaborate to accomplish certain tasks (Schumacher and Poehler, 2009, p. 169). In this paper the term “distributed teams” will be used.

To minimize these problems, companies have started using distributed teams that rely on technology to maintain communication, since there is no face-to-face contact between team members. Such technologies can be e-mail, real-time chat tools, teleconferencing software, and virtual meeting rooms, so you can stabilize relationships and do business (Serçe *et al.*, 2011).

In these teams, there are various problems, as cited above, and according to Watson-Manheim *et al.* (2012), when a discontinuity is perceived, i.e., a conflict, then this can indeed affect the distributed team and remain continuous. From the analysis of these conflicts, studies have emerged to show how they can be minimized or even solved through the use of Information and Communication Technology (ICT) tools.

In this context, ICTs are important for mediating communication and collaborative work, because members of distributed teams spend only part of their time in meetings, and thus there is a need for a means to maintain communication with each other (Hinds and Bailey, 2003). As there is a high number of ICTs, managers should select those most aligned with the team, establishing networks with harmonious social relationships and coordinating conflict and cooperation among members of distributed teams to promote knowledge integration and innovation performance (Li *et al.*, 2020).

Distributed teamwork means that it is location-neutral and uses modern communication and computer technology. However, how could this impact the way companies operate today? Distributed teams allow work to be done at any location with suitable information processing and telecommunications equipment, providing flexibility with regard to work location. In a distributed team, the worker can choose to work from home.

This research is then justified because it will result in the analysis of the benefits of using ICTs to reduce conflicts through the integration of employees working in distributed teams from geographically distant units. This paper aimed to analyze how organizations manage distributed teams via the use of information technology. The secondary objectives are:

- Identify existing ICTs that assist in group work across geographically distant units or facilities;
- Identify existing communication problems in remote work via distributed teams;
- Analyze the use of ICTs for promoting distributed teamwork, its advantages, and disadvantages.

2. METHODOLOGY

For the research, the steps of bibliographic survey, literature review, construction of the research instrument (question script), application of the research instrument, data analysis, and conclusion were established. In the first step, the bibliographic survey and the selection of articles were carried out based on Golobovante *et al.* (2018) and Gomes *et al.* (2018). Thus, the search bases were Scopus, Web of Science (WoS) and Scielo, with the strings “distributed AND teams AND information technology”; “virtual AND teams AND information technology”; “virtual AND teams AND information technology AND covid-19”. The selected articles were in the period 2010-2020 and some from earlier periods that proved adherent to the research theme. From this stage, the literature review focused on the general objective and the specific goals, and lastly, the script of questions was built.

The method used was multiple case study, in which an in-depth analysis of the realities of the companies’ distributed teams was sought, allowing interaction between the researchers and the companies in the sample (Berto and Nakano, 1999). Regarding the approach, the qualitative one was used, due to the description and interpretation of the data coming from the reality of the companies belonging to the sample, generating a participative knowledge (Creswell, 2003).

The data collection and analysis techniques used are the following: non-participant observation, since the researchers did not integrate themselves into the reality, but only observed it; the interview, since there was a face-to-face conversation (sometimes via Skype) between the researchers and the interviewees; the question script, with multiple choice (closed) and open questions, where estimation or evaluation questions were used.

In the article, the non-probabilistic sampling techniques were used and, more specifically, intentional, since managers were interviewed in companies located close to where the researchers work and study and were available to participate in the study. Chart 1 presents the research sample:

Interviews in companies were conducted by e-mail, by virtual conference tool, by telephone, and in person in the education/technology, technology industry, beverage industry, and industrial and medical gases sectors. The questions were about the relationship between team characteristics (age, experiences, positions, and roles), ICT usage, conflicts, and challenges among team members (language, culture, gender, and trust). The analysis of the responses used data triangulation between literature review, interviewees, and researchers. As the survey was conducted before the pandemic period, it may be that companies have learned to use other ICTs, as observed in sectors such as education.

3. LITERATURE REVIEW

Information Technology (IT) and Telecommunications in Distributed Teams

Telecommunication has been widely used in the electronic transmission of signals between teams. It enables organizations to carry out their processes and tasks through effective computer networks. One of the foundations of the distributed teams is the use of IT that uses telecommunication systems at its base. The use of the Internet and audio and video conferencing tools as a means of linking networks and exchanging information is an additional option for this type of work.

Although ICTs are essential for working in distributed teams, there are advantages as well as disadvantages. Regarding the former, these technologies facilitate the rapid

exchange of information, file sharing, and the clarification of doubts and exchange of opinions (Kumar Goel *et al.*, 2014).

ICTs allow each member to communicate with other teams and coordinate their work from different locations and with different time zones outside the boundaries of the organization (Baskerville and Nandhakumar, 2007; Poehler and Schumacher, 2007). Ruiller *et al.* (2018) state that, firstly, the level of IT usage and perceptions (objective and subjective) related to employees' working time and satisfaction are related to the flexibility that ICTs grant to work and assist in work and interpersonal relationships.

In terms of managerial implications, the impact of perceived proximity can add value to telecommuting in distributed teams. This is because distributed teams can be encouraged to implement new practices when traditional work reaches its limit (working hours, for example), and these organizational innovations can enrich knowledge in new communication structures (Ruiller *et al.*, 2018).

O'Leary *et al.* (2014) reported increased communication in telecommuting due to the proximity that ICTs allow, regardless of whether members have daily contact or not. Based on this perspective, a cultural vision of IT supporting interpersonal dynamics, can be considered as a way to enrich the interaction among members, adding even more value in terms of increased productivity, reinforcing communication and the identification process. According to Ruiller *et al.* (2018), with shared identity in the group of members and loss-free communication, one has an influence on perceived closeness and, in turn, relationship quality in a dispersed team.

In short, the argument linking collaborative cognition with situational and technological factors has been an important line of research on teams operating in complex settings. These views converge on the perspective that cognition can occur at the intersection of the individual, the team, its technology, and the environment, to influence

Chart 1. Companies scheduled for field research

Sector	Programmed	Local	Performed
Education	On-site (2 interviewees).	Rio de Janeiro, Minas Gerais, São Paulo	Questionnaire sent by e-mail (5 respondents).
Technology (hardware and software)	On-site (2 interviewees).	São Paulo	Via Skype (1 interviewee).
Drinks	Not scheduled.	Rio de Janeiro	Questionnaire sent by e-mail (1 interviewee).
Industrial and Medical Gases	On-site (1 interviewee).	Rio de Janeiro	1 in-person interview.
Total	5 interviews.	Southeast - Brazil	2 in-person interviews.

Source: The authors themselves

behaviors in the context in which team members are (Fiore and Wiltshire, 2016). For Anderson *et al.* (2007), ICTs are important tools for business globalization when planning the work strategies for any type of organizational structure; in this case, Business Intelligence and Big Data can be used as examples.

Some disadvantages are related to the fact that there are people of different cultures in the teams – which can generate communication problems that will be addressed in the next item – and the need to constantly update information so that it does not become obsolete. In addition, there are difficulties in operating the software, little knowledge of the software used, and lack of face-to-face contact to resolve issues pertinent to the work (Hinds and Bailey, 2003). And there is yet another disadvantage associated with the use of ICTs in distributed teams: auditing the technology on a periodic basis can cause some procedures to be changed, generating the need to review the files sent from time to time, so that the users responsible for posting them are warned. One solution proposed by Kumar Goel *et al.* (2014) is an alert that should be sent to the file moderator automatically when a minimum time for its review is reached.

The most used ICTs are the following: *Cloud computing* (CC), *Big Data* (BD), *Business Intelligence* (BI), and *Computer Mediated Communication* (CMC); Internet; Intranet; Extranet; and Management Information System (MIS) (Simpson, 2002; Duranti and Almeida, 2012; Sanchéz, 2017).

Cloud computing (CC) is understood as a tool to store and possibly process the information of an organization, but it can only be accessed through an Internet connection. It is a technology that, coupled with the business model, represents progress; however, it must be adopted in a modular form that provides a vast set of possibilities for reconfiguration, so that resources or services can be flexibly accumulated to meet changing market demands (Sanchéz, 2017).

Big Data is the result of technological advances that make the consumer a source of data, meaning that there are a considerable number of fast and diverse data sources available (Erevelles and Fukawa, 2016). Business Intelligence derives from knowledge management in organizations and is composed of a series of strategies, actions, and tools for creating and managing knowledge along with analyzing the data belonging to an organization or company (Tello and Velasco, 2016).

As for CMC technologies, they strongly influence organizations, not only in the way members collect, communicate, share, and distribute data, but also in the dynamics of their relationships (Berry, 2011). For Cavalcanti *et al.* (2009), the adoption of tools such as Scrum (a project management tool) has the advantage of reducing travel costs, facilitating

the involvement of specialists in key areas, besides being flexible for the creation and deactivation of work teams.

Group Work: Concepts and conflicts

Distributed teams (or remote teams) are those in which members are geographically dispersed. They rely on ICTs to communicate, and the challenge is to reduce gaps, redundancies, and inefficiencies. Individuals must know their teammates (know their specializations), even without meeting face to face, in order to build trust among team members (Maynard *et al.*, 2012). Based on this thought, Koehne *et al.* (2012) define geographically distributed work as work in which the individual does not need a physical office to work, since he uses ICTs for his collaborative work processes, performing it remotely, thus enabling him to work from home. According to Hinds and Bailey (2003), distributed teams differ from traditional teams in only two aspects: members are separated by distance from each other and must rely on technology to mediate their communication and collaborative work.

Thus, according to Jang (2013), distributed work creates a challenge for team members, because, due to geographic dispersion, the sharing of work and artifacts can only be accomplished through electronic means, and the impact of the means of communication must be analyzed. Jarvenpaa and Leidner (1999) and Abarca *et al.* (2020) further place communication, task types, cohesion, empowerment, and leadership as challenges for work in distributed teams.

In these teams there are problems related to the trust that individuals have in each other. Some examples are sociological problems, since many individuals on these teams work alone, some in their homes, with no face-to-face interaction with any other individual on their team; communication problems, as mentioned above, can also be generated, as well as conflicts between team members, which must somehow be minimized and solved for the team to work efficiently.

Due to digitalization and global markets, new ways of working are becoming prevalent. To remain competitive as organizations, cooperation across time, place, and organizational boundaries becomes necessary. Distributed teams offer these advantages and can be both an opportunity and a difficulty for employees.

Distancing generates dependence on ICTs and leads to a distancing of personal contact at work between members who are geographically apart and in different time zones, leading to expectations and effectiveness (or not) that there will be permanent availability between the distributed teams (Glazer *et al.*, 2012). Consequently, members of

distributed teams have observed a greater difficulty in managing the member's work and personal life (Mellner, 2016).

The results indicate that stress reduces the quality of sleep of the members of these teams in the sample studied by Rohwer *et al.* (2020). In contrast, in the same research, a detachment from work was positively related to sleep quality. The leaders of these teams have high levels of psychological detachment.

Finally, the challenges in distributed teams are: cultural diversity (Böhm, 2013; Verburg *et al.*, 2013; Ferreira *et al.*, 2012; Mukherjee *et al.*, 2012; Pinjani and Palvia, 2013); trust (Jang, 2013; Panjil and Chan, 2014; Olson and Olson, 2012; Fan *et al.*, 2011; Pinjani and Palvia, 2013; Schiller *et al.*, 2014; Jarvenpaa and Leidner, 1999); and risks (Olsson, 2007; Reed and Knight, 2010; Robert Jr. *et al.*, 2009; Lee *et al.*, 2007; Anderson *et al.*, 2007; Lee and Watson-Manhein, 2014).

Cultural diversity is the construct used for the globalization of distributed teams (Hoch and Kozlowski, 2014; Gibson and Gibbs, 2006; Tsui and Nifadkar, 2007). Findings suggest that perceived differences in country cultures and language barriers can negatively affect teams (Au and Marks, 2012).

Trust is necessary to ensure that members of distributed teams can organize themselves and begin their work quickly and effectively. By identifying upfront the factors that can influence trust formation between members, managers and VT members can understand the importance of development in the early stages of distributed teams and understand how this can affect their performance, productivity, and effectiveness (Gardner *et al.*, 2019). The literature on trust posits that building trust and having a members' identity with the team are two important sources of concern. In fact, if team members do not know each other, they do not know whether they can trust each other, and before becoming an effectively virtual team, members have to know each other (Abarca *et al.*, 2020).

For Olsson (2007), risk management is a decisive and integral part of project management and depending on the maturity of the organization's risk management, different approaches are applied. For him, regardless of the type of risk management process, the application of risk management has a positive effect, since it finds and takes preventive measures to avoid events that could cause negative consequences for the project or the organization. In this sense, risk management in distributed teams is a major concern because of the distance between members and the difficulty there may be in communicating. The big risk challenge perceived in organizations is that risks are treated in a sentimental way by decision makers and not as a concept of probability (Lee *et al.*, 2007).

According to Lee *et al.* (2007), individuals perceive problems that prevent successful communication, and thus it is possible to identify three risks associated with this perception. According to the authors, the first risk (reception) occurs when the individual observes a threat to accurate reception of the message; therefore, the second risk (understanding) is related to the individual's comprehension of the message by being aware of potential problems in the message receiver's ability to understand the message, and the third risk (action) occurs when the individual notices possible problems in the implementation or intended effect of the communication. According to Reed and Knight (2010) there are three factors that can bring risks to communication: loss of communication or poor communication, technical connectivity issues that prevent communication, and insufficient knowledge transfer. Some perception risks can also lead to communication problems.

4. RESULTS

Company A: IT

The company uses synchronous IT tools such as online chat because it offers agility and speed, and audio-conferencing, because it is convenient for sharing statuses and obstacles with the team, obtaining more subtle information. The asynchronous tools used are e-mail, for more detailed information and for formal signatures and agreements, discussion forums to search for technical articles, and repositories to keep documents in the cloud and access them from anywhere with internet access. The company has an Intranet, which is used for travel policies, expense reimbursements, internal technical documentation, product road maps, procurement, announcement letters, among others. The Extranet is used to maintain targeted communication to business partners or customers. In addition, they maintain an Information Management System used for paycheck, vacation planner, HR-related activities, and more.

This company has challenges such as: the difference in time zone, culture, language, communication, gender, and commitment. Regarding time zones, the company has a tool that calculates the time zone difference related to working hours for each team member, so that the most convenient time for everyone can be chosen. Regarding cultural differences, the company has a website with information about common or general traits of a specific culture so that members can prepare in advance. The different languages also influence the work, as there may be losses during translation. For this, the company has a team responsible for transcribing the translation and for making the oral communication; the different professions generate different priorities, concerns, skills, and interests, which may lead to rework. Man-

aging communication and expectations and focusing primarily on stakeholders are ways to reduce this type of challenge. In gender differences, defensive or aggressive behaviors are avoided by campaigning. The degree of commitment can determine the success (or not) of projects. Thus, the tasks, their deadlines, and responsibilities are well defined, allied to a scheduling process to control whether or not part of the work is being done and if its contribution is consistent with what is expected by the company.

Trust is an aspect of great importance in teams. Even when trust is built with someone in a previous job, this trust is maintained because of the recognition of the work of the person in question. To increase trust, there is, in the company, a training in which it is necessary to perform a series of activities, discerning about which one should or should not be performed, according to the needs of the project, along with the partners and clients, developing trust among the team members. There are times when there is no need for face-to-face communication, and it has no influence on trust. However, there are moments in the project when this communication is essential for the development of the activity in question. Thus, checks are performed at different times for project risk management. For the interviewee, knowing the co-worker personally has an influence on the work as it increases the level of trust. Communication problems are related to expectations, to a member's or customer's perception of whether or not communication is flowing. These expectations can lead to frustration, creating a loss of trust.

The biggest communication problem is related to the lack of understanding of technical issues, especially in the sales sector. There is a reaction to the problems generated by this communication failure, but there is no way to correct it in the company. The maintenance of communication is important and requires a communication plan to develop projects, adapt, and react, if necessary, to increase the points of communication. Knowledge transfer is carried out from the most to the least experienced since the company works on the development of technologies that have not yet been developed in Brazil. For the interviewee, the team members have a good understanding of the project and are aware of what is happening in their execution.

Company B: Virtual Education

For this company, which operates in the virtual education sector at the higher education level, the information resulting from the interviews conducted with five employees (C1 to C5) and the company partner (C6) was summarized in Table 2. The company uses synchronous technologies such as Facebook Chat, Slack, and WhatsApp for online chat, Skype for audio and video conferences (Hangout), with more frequent use of chat and video conferencing. In asynchronous

technologies, e-mail (Microsoft Outlook), repository (Google Drive and Dropbox), and Facebook (discussion forum) are used. Interviewee C3 added Slackoverflow, a forum, and Bitbucket, used to control the code he developed, as ICTs. According to the partner, the company also uses Google Docs for sharing operational spreadsheets, class recordings, editing, scheduling, etc. The company does not use Intranet and Extranet tools. According to interviewee C5, for the information management system, the company uses Slack together with Trello and, as per the owner partner, the structure was developed by the team itself and supports the business metric data and is used in the company's management decision making.

Some of the interviewees (C1, C2, C4, and C5) stated that the challenge is the partial dedication of the employees, which could be solved with the exclusive dedication of each one. This challenge also affects the level of commitment of the members (all except C3), because of their other commitments. Thus, members seek to analyze and discuss task execution, maintain constant contact, and seek flexible solutions to the company and team members. For C5, the approximation between employees is crucial for understanding each other and knowing how to communicate. The partner uses a model of execution based on deadlines, so that, as a member, he can organize his work. Added to the other challenges, for C5 and partner, the different backgrounds are a challenge, and the solution is to show the interdisciplinary gain from fostering discussions and potentiating strategies.

Trust is not an issue for the interviewees, to the extent that - even if they do not know each other personally - contacts, via IT tools, help in bringing team members closer together, although C5 and C6 point out that knowing the co-worker personally is important because it creates a bond between members. In addition, it was stated that respect for deadlines and readiness to solve problems increases trust.

One of the interviewees (C3) performs risk management by separating the tasks with higher risk by means of a scale, and the higher the risk level, the more tests he develops and uses tests performed through research (C5). For the company, it is necessary to improve the control of the operation, because Trello and Slack are good tools, but not all participants use them (C5). To manage risks, the partner structures the operations based on the individual delivery capacity, so that when a problem occurs, he can solve it, preventing the company from being damaged.

The interviewees stated that there are no communication problems between them, but understand that these problems can generate failures related to the development and punctuality in the delivery of tasks, which can affect confidence. The biggest communication issue is the recurrence of topics that have already been addressed for lack of a clear

and precise understanding of them (C5 and partner). The company tries to solve this issue with a task chart with detailed activities, pointing out the reason for their execution. According to some interviewees, lack of communication can generate a loss of trust and an execution of tasks with results lower than expected because the members are geographically distributed.

For another interviewee, C4, knowledge transfer occurs constantly through daily communication, and there is also a face-to-face meeting with all members at certain times. Thus, all members have a good knowledge of the development of other members' work, and if a message is not understood, members ask for more details for clarification. According to C5, the members have a reasonable knowledge of the development of the project as a whole but not always check if the message passed was understood. The company is seeking an improvement in the material spreadsheets so that everyone knows what was created, what will be published, because sometimes they do not know how some moments of the operation are (recording video classes, for example). According to C6, the constant knowledge exchange through meetings and comments is important to maintain knowledge transfer in the team, so that it is apt to carry out the company's activities. "The company is virtual and has technology in its DNA. This facilitates our relationship with technological support tools and mitigates several problems of traditional companies" (partner).

Company C: beverage industry

A case study was conducted at a Brazilian company based in Brazil that operates in the beverage industry. The firm uses the concepts of distributed teams to exchange information, documents, and communication in its base in Brazil and in several bases distributed around the world.

The main tools used by the company are e-mail, conference call, telepresence, Outlook, and WhatsApp. The synchronous tools are used for audio-conferencing, videoconferencing, and online chat. Asynchronous tools are used for e-mail exchanges and file repositories. The company has Intranet, Extranet, and Information Management System that are often used.

According to the interviewee, the company has no challenges relevant to the scope of the study. For him, trust among members is not currently a challenge for the team. However, knowing the partner personally influences the development of the work. The lack of face-to-face contact affects trust, and one way to solve this issue is to have periodic in-person meetings and/or with telepresence and constant checking.

The lack of communication can generate a misalignment regarding objectives, delays, and loss of productivity, causing a misunderstood message to be clarified in a meeting. Communication failure generates loss of quality in the analysis and in the decision-making process. Therefore, in order to correct this problem, the workload is increased to compensate for the time lost during the failure. It is necessary to maintain constant communication, but the communication time must be dosed so that other tasks can be carried out and no more time is wasted than necessary on meetings and e-mails.

Formal training and "passing the baton" processes (when there is a change of function and technical and operational standards) are the main forms of knowledge exchange between team members. Thus, the members have a reasonable knowledge of the project/work as a whole.

Company D: industrial and medical gases

A case study was conducted at a multinational company headquartered in Brazil that operates in the industrial and medical gases industry. This company has thirteen engineering groups for Project Management Engineering located in different countries (South America, Mexico, United States, Europe, China, India, Russia, etc.). The company uses the concepts of distributed teams to exchange information, documents, and communication in its base in Brazil and several bases distributed around the world. For at least five years, from the economic crises to the pandemic, in-person visits outside the state of Rio de Janeiro have been reduced.

The main asynchronous tools used by the company are e-mail (the main one), cloud computing, a file repository, Intranet (where the videos from recorded meetings and shared documents are stored), Extranet, while the synchronous ones would be videoconferencing and remote working tools.

The issue of trust is strengthened by the meetings with the team, as the problem that exists in the company is the compliance with the deadline; however, the company manages to overcome the issue by integrating the team through in-person or remote meetings where all those involved in the project participate. In the projects, there is always a meeting when the project starts, and whenever there is a need for a discussion, even if there are zones, they are held.

Lack of communication affects trust and leads stakeholders to understand that there may be a problem. The interviewee understands that the internal project sponsor needs to be in direct and continuous contact with customers and pass on their needs to the rest of the team and to the sectors that provide funding and other resources. This way, the

disruption of these resources for the projects is avoided. In the company, there is a survey managed by the interviewee, applied internally, and presented to the director at the annual strategic planning meeting. This survey shows what internal sponsors think of the sector, improving the communication between customers/sponsors and the responsible sector. In addition, it was clear in the research that communication has improved greatly in recent years with tele- and videoconferencing. The communication problem was not restricted to an absence of information, but to the way it was sent and written in another language, where writing with grammatical errors can compromise a project. For this, the company has a very structured translation system in order to eliminate this limitation with the language of another unit and/or employee.

Chart 2 summarizes each company's characteristics, tools, challenges, and conflicts.

5. CONCLUSIONS

From the analysis of the responses of the companies studied, we can conclude that all companies have distributed teams and use IT tools. However, unlike the ICTs presented in the literature review, the companies use online chat and audio-conferencing as synchronous tools. For the asynchronous tools, all firms use e-mail and some kind of repository. Other tools used by most companies are Intranet, Extranet, and Information Management Systems. Most companies use some kind of discussion forum to exchange knowledge and solve doubts and difficulties, and videoconference to solve some of the most important issues that influence the decision-making process.

Regarding the challenges, one of the companies did not present any. Two other companies pointed to language as a cause of conflict. Differences in time zones, cultural differences, gender differences, commitment levels, and differences in the areas of the professionals (graduation) were challenges mentioned by only one of the firms (not necessarily for all the challenges). Only one of the firms pointed out a conflict related to trust among its employees. In addition, only one pointed out a problem in communication, which cannot be corrected, because the lack of understanding of technical issues ends up generating wrong sales, causing rework. All conflicts can create alienation among team members; however, lack of trust is the one challenge that can be most detrimental to working in distributed teams, due to the sharing of information and tasks in the development and completion of projects and other routine work tasks.

The research was limited by the number of companies investigated, although the aim was to conduct a multiple

case study in order to begin studying the theme. As future research, we intend to expand the number of respondents and companies, and to compare the work distributed before, during, and after the pandemic. Since the research was conducted before the pandemic, it may be that other ICTs will be used and will produce new results.

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Chart 2. Company Comparison

Company/ Sector	Respondent role	Tools	Challenges	Conflicts	Problems in communication
A –IT	Technical leader in complex projects	Online chat, for offering agility and speed, and audio conferencing (synchronous) e-mail, discussion forums, and repositories (asynchronous) Intranet Extranet	Time zone difference cultural differences different languages gender differences	Trust	lack of understanding of technical issues, especially in the sales sector
B – “Virtual” education	Various	Facebook Chat, Slack, and WhatsApp for online chat; Skype for audio and video conferencing and Hangout for video conferencing, with higher frequency of use for chat and video conferencing (synchronous); email (Microsoft Outlook) and repository (Google Drive and Dropbox); Facebook (discussion forum) (asynchronous); Slackoverflow and Bitbucket for information management system use Slack along with Trello; Google Docs.	Partial dedication Level of commitment of the members Having professionals with diverse backgrounds	None	None
C – Beverage Industry Company	Senior Procurement and Transportation Manager	E-mail, Conference Call, Telepresence, Outlook, and WhatsApp	None	None	None
D – Company in the industrial and medical gases industry	Project Management Office (PMO) and Financial Planning Analysis (FPNA) – Brazil	E-mail, Cloud computing, video conferencing, Intranet, Extranet, Management Information System – MIS	Yes	None	Problems with time zone and language proficiency

Source: The authors

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