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Cloud Computing Turns Virtual Teams into a Competitive Usage

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Abstract: Cloud computing is provided computing resources as a services and allow users to access them via. the internet (the cloud) without the need to acquire knowledge or experience or even control the infrastructure that supports these services. When there is a group of people who work through time and space and organizational boundaries with links supported by cloud computing this is called the Virtual Team (VT). In this study, we examined the virtual teams supported by cloud computing. Specifically, we evaluated the cloud computing role on the relationship between conflict management and behavior of members and virtual team performance. An experiment was conducted with 200 respondents were chosen from 11 countries. More than 3 quarters of the survey participants (77%) are from the research sector in different areas, followed by participants of the educational sector (63%). In addition, there are participants from finance, industry and security sectors. The results shows that the most important need for VT is leadership (37%), to avoid team's conflicts and most of the participants mention that good planning is the best way.

Key words: Virtual team, cloud computing, conflict management, trust, communication tools, survey

INTRODUCTION

The increasing of numbers of communication tools, the virtual world still suffers from many problems which negatively affect the project's environment that depends on VTs. A VT is defined as a group of people who geographically live far away from each other (Seerat *et al*., 2013). All VTs, sometimes called Global Virtual Teams (GVTs) or even multi-cultural virtual teams, share several characteristics. They operate by electronic communication are non-permanent and are diverse with respect to the cultures and geographical locations of their members (Gulla, 2011). There is a clear acceleration in the use of cloud computing technologies day after day by teams. However, there is great variation among VTs in terms of the characteristics of space, time and configuration. For this reason, many issues arise in working within a VT framework. Many of these issues are dealt with by Casey and Richardson (2006b) with special attention given to the dynamics of information sharing and the ability of management to mitigate problems. Ebrahim *et al*. (2009) suggest proactive structuring as an effective approach to VTs while Chidambaram (Banica *et al*., 2009) discusses the importance of adhering to milestones on a timeline as a way to encourage team members and to draw from the benefits of a diverse team. In such projects where members are geographically separated, VTs play the main role to achieve their objectives successfully and to have an effective VT. However, characteristics like communication tools, conflict management, good planning wisdom leadership and trust building which still factors must be taken into consideration to build a successful team.

Literature review: Lee-Kelley and Sankey (2008) discuss the crucial technological subjects that influence the performance of virtual project teams. Their findings support the following four guidelines. First, establish the trust in the team through using communication technology. Second, use technology to monitor team progress. Third, enhance the visibility of virtual members within the team and outside the organization. Finally, benefit from the team for individual members through VT settings. Other study by Sridhar *et al*. (2007) has examined the performance of globally distributed VTs through an exploratory experimental study. They find a strong relation between communication effectiveness of the team and the trust between the team members.

Alho and Sulonen (1998) study the supporting virtual software project by investigate the modeling and

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environment of software process to find the major challenges concerning virtual software projects. Then, they have found several separated parties could be supported in software process. They have come up with six factors that need to be addressed, organizational structure, risk management, infrastructure, process, conflict management and team structure. Thus, it requires a special effort from all participants. Beise (2004) stated that, using different skills of project teams such as knowledge, cultures and perspectives has positive influences on team outcomes. He tries to find answer to what extent can project management methods and tools benefit in VT to minimize its challenges?

For this purpose, they presented the research model and the initial methodology for a study working on a common database design project where all members should using communication electronic tools in order to obtain the greatest amount of useful information to researchers concerning virtual teams and project management.

Weimann *et al*. (2013) are inconclusive about the role of conflict within VTs. They argue and study the complex relationship between structural stability, conflict and VT performance within a project. This study provides a developmental view of the emergence and impact of structural stability within VTs as well as greater understanding of the contribution of conflict to VT performance. In a survey study by Basharat *et al*. (2013) about the major risks in virtual projects of the software industry, he explained that using interact risk identification and assessment factors in an actual business organization concludes in three major risks: communication risk, schedule and cultural risks. He concentrates on the concept of virtual project management.

In the study of Ebrahim *et al*. (2012), the researchers try to solve the problem of finding the vague factors which influence the effectiveness of VTs for new product development. To find these factors they use a field survey and literature review. They study the knowledge workers in one hand and the technology on the other hand. They suggested that in virtual teams should be considered early in technology. Also for effectiveness virtual teams should be it incorporated with the use of software as a service, web solution, report generator and tracking system.

Pinjani and Palvia (2013) focus on how the global VTs might be more helpful than face-to-face teams in certain contests (that require cross-functional skilled inputs). Their findings in team relations indicate that cultural and time differences (according to the geographical and temporal-distance features) should be taken in consideration. Other study by Clear and MacDonell (2011) presented alternative model to study in a global context, through a longitudinal interpretive field study for comprehend how using global virtual teams in technology. The study implemented at a global scale among the geographically and temporally distant locations, these locations was of New Zealand, the United States of America and Sweden. It Included faculty and support staff and student members. They focus on the manner of research in the context of global software and in particular as theoretical to the activities and communications of global virtual teams. In addition to software engineering researchers applied new research approaches for globally distributed teamwork. Malik *et al*. (2012) presented an approach for cooperative cloud computing amid universities and research institutes using virtual cloud. Their propose approach of cooperative cloud computing involves the concepts of cloud federation and volunteer computing in addition to it is based on specific virtual cloud architecture. The study implemented among the geographically and temporally distant locations. The results proved, so, the amount of benefit obtained by institute's higher computing power available through cloud federation.

This study presents a study about VTs, carried out in cloud computing environment, more specifically, the conflict management and behavior of members and virtual team performance, to highlighting some of the dynamics and complexity that these VTs face as well as their reactions to the challenges. Putting the organization and organizational practices at the centre of attention, this research advances the understanding of successful factors for VTs from a work organization point of view.

MATERIALS AND METHODS

We designed a questionnaire to collect information about VTs and tools used in various activities, some of the challenges encountered, suggestions for these problems and improvements that clouds computing supports. The survey is divided into three sections. The first section concerns the nationality of the member and his experiences in VTs. Also, it concerns the member's roles and numbers dealt with. In the second section, the questions are about the mostimportant needs in the VTs, the conflicts which could be faced and some suggestions to solve such issues. Also, some questions are raised about the difference between face-to-face teams and VTs in their productivity. The last section is concerned with the impact of cloud computing and technological tools that are used in VTs and the characteristics of each used tool. The sample was gathered in many ways such as

publishing the questionnaire by e-Mail, got some data from a conference that was held at the university. After gathering the sample of the target group (who worked in VTs), we analyzed the data to get the results of the study, that are mentioned in the next section of the study. We use the gathered results to give some recommendations and advice for VTs, hoping to get a qualified and successful VT.

RESULTS AND DISCUSSION

The 200 respondents were chosen from eleven countries, ranged from 23-55 years old. More than three quarters of the survey participants (77%) are from the research sector in different areas, followed by participants of the educational sector (63%). In addition, there are participants from finance, industry and security sectors.

Figure 1 note that the top need in VT is leadership with a percent of (37%), followed by software tools and training with almost equal proportions (21 and 19%). The 15% of the respondents said that culture is an important need in VT. When people were asked about the more productive team, virtual or face-to-face, their answers are different as shown in Table 1. Do you feel that your VT meets its objectives as a face-to-face team?

Results show that project teams still prefer to work through traditional meetings, i.e., VTs still need more training and improvement tips to increase the confidence of VT's idea. In spite of the technological environment, our study shows that the most commonly used tool is e-Mail, another question is about the way that the members use to avoid conflicts and the responses are shown in Fig. 2.

Most of the participants mention that the success of any VT depends mainly on good planning, followed by respondents who choose avoiding conflicts by dividing the roles and responsibilities among the members of the team. Respecting time comes in the third place. Others say that you need to use skills to manage your conflicts.

When, we ask some participants about the way of solving the conflicts in VTs, they give different opinions. Most of them consider this task as a manager's role but for others, it should be solved between the members of the team. In their opinion as the manager is the responsible person in the team, he should start by planning the team in a good way, giving a task to everyone and dividing the roles in a suitable way. In this way, the leader can ensure that each member feels he is an integral part of the group and has a full opportunity to participate to provide a base for education including the

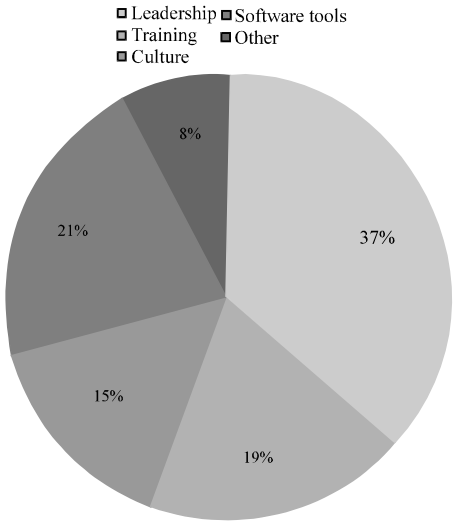

Fig. 1: The most important needs in VT

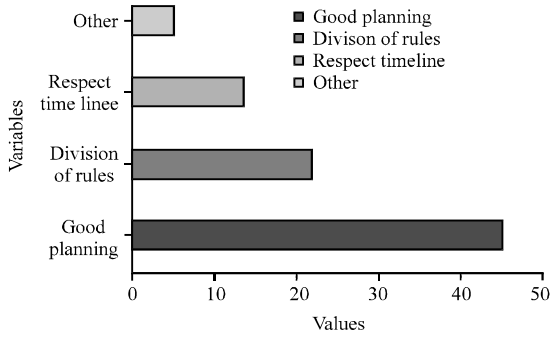

Fig. 2: How a member can avoid conflicts?

Table 1: Responses about more productive team

Questions	Responses	Percentage
More than face-to-face. Why?	24*	12
Same as face-to-face. Why?	28**	14
Less than face-to-face. Why?	68***	33
Depends on the project itself	78	41

*Those whose responses are more than face-to-face justify their answer as they can make decisions and have collaborated with less effort, less time and of course, less cost also, they can easily understand and negotiate the given issues to be handled; **Those who answer that VT is similar to the face-to-face team because using communication tools, like Skype allows them to do a face-to-face discussion which gives them the same advantages of the face-to-face meeting also because no hardware tools or equipment are needed at these meetings; ***The third group says face-to-face teams achieve their goals better than VTs, since, the members in VTs are not serious enough and sometime they misunderstand each other or there are management problems

ability to listen, work in groups and solve problems. Then, when there is a problem, the leader should explain it to the other members and try to find a solution without searching who is responsible for the conflict. Some say that the leader should talk to members privately to reach an agreement between them but at the same time, if they

Table 2: The reason of cloud storage

Cloud storage	Percentage of prefer	Reasons
SkyDrive	85	Compatible with windows Supports with 7 GB The maximum size for one file is 50 MB The ability of sharing and collective modification of files and links The ability of create and modify files for free from within the browser using office software
Dropbox	78	If supports 2 GB free storage that can be increased to 16 GB in case of inviting participants. Compatible with facebook environment
Google Drive	72	Support with 7 GB The maximum size for one file is 50 MB
Box	41	Compatible with all application and operating system except mobile windows Support Google docs and quick office Integration with other Google services such as Google G-mail and e-Mail plus support for text editor Google docs and chat
iCloud	32	Support with 5 GB free In spite of it is not support helping tools, there are many persons prefer using it because of its compatibility with Apple, MAC, IOS and mountain line
Amazon	17	Support with 4 GB free

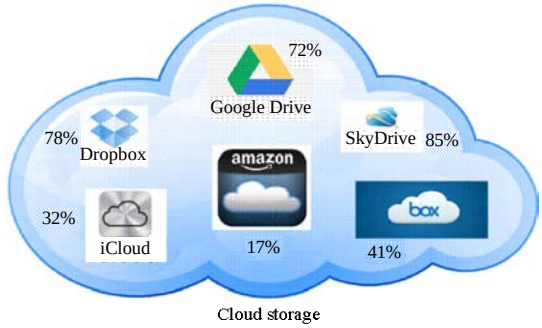

Fig. 3: Tools used in storage in VTs

do not find a solution, they must make critical decisions. Others say that members should clarify their ideas with some diplomacy using technology tools such as Skype calls, e-Mails, chatting or phoning. On the other hand, a small group of the participants has a contrary opinion to the VT's criteria which includes arranging face-to-face meetings.

Other opinions hold the responsibility of solving problems upon the members themselves, not the manager by accepting or refusing the roles from the beginning, discussing the route and the reasons of the problem to find out a solution. But they all should take respecting the time line in consideration to avoid such conflicts.

There are many cloud storage tools that support VT's such as Dropbox, Sky box, iCloud, box, Amazon and Google Drive. When we ask them about their preferable cloud computing tool(s) in VT, they response in different ways (Fig. 3 and Table 2). On the other hand, some complain about the need high rate of internet connection, especially, for video communication and the lack of reliable interest connection and body language.

Tips to help you build an effective virtual team: Based on feedback from the many users of the cloud computing that have been mentioned previously as well as the results of the analysis of questionnaire we conclude have a set of useful tips and guidelines to build an effective VT when use cloud tools.

The team's leader has great responsibilities in managing problems, so, choose a successful leader, who leads you to a successful project. A deep study of the characteristics of the leader and training courses via. the internet will be helpful, before proceeding with the project.

Managing conflicts is an essential part while developing the plan, this assumption will protect your team from the problems that may encounter leader and members. Choose the suitable technology tool and cloud storage that supports your need. The development of the technological and cloud tools makes it easier for us in doing things. These tools are there to support people in VTs, so, there is no need to be without them anymore. These tools include: Dropbox, Google drive, the internet, video cams, shared directories, etc. At the same time, however, be sure to choose the suitable tool.

Be aware of cultural differences. Of course, when you are a project manager in a VT, you will expect different members from different cultures and traditions. So, they will not behave and work in the same way. Make sure you have some appreciation for the differences between the members and try to understand them.

Almost the members in VTs never meet each other face-to-face, this requires considerable effort to build confidence. All the members of the team should know and understand the whole work. Not only their own role but

also they must share the ideas between each other. Because if they work individually, they will just be individual contributors. Be aware of time differences; do not forget the differences in time zones. Thus, if it is suitable for you to talk at a certain time, it may be harder for others because of their time zone.

Respect the timeline. One of the basic rules that help to improve the VTs is to set the working and meeting hours among the members. Each member should respect this time and meet the milestones on time.

Wide communication protects members from some conflicts and misunderstandings which increases the level of confidence. One of the most irritable factors that affects the team's work is the misunderstanding between the members, since, they come from different countries and different cultures. To minimize this problem as much as possible, help the members communicate and talk freely to protect the team from most of the conflicts and to minimize the cultural gap between them.

Assign shorter tasks to members, do not overload the members with work and tasks. So, to reduce the conflicts and to avoid postponing tasks, give the members short assignments to expect better results on time. Produce a backup of files and data, the virtual teams heavily depends on the internet. So, in anticipation of injured service penetration process and to ensure that you have to resort to deal with large reputable companies and high reliability.

CONCLUSION

This study introduces the effective keys in VTs. The main benefit of a virtual team operating with data available in cloud computing and web based systems is exchange of experience and talent. It is necessary transfer of expertise and member's talent among themselves and not to restrict them in one place or even one country. They can employee their manpower from anywhere in the world. When VTs use cloud storage, they can reap a lot of benefits such as save space, time and money which is a target in any project. The results have manipulated and analyzed, provide a good idea about how to form a successful VT. Our study's findings focus on two main factors. The first one is the leadership role in avoiding conflicts as much as possible. The second one depends on cloud computing and its roles in communication, sharing knowledge, managing conflicts, etc.

RECOMMENDATION

For future researches, we will go into a detailed and comprehensive study for the factors that affect the VTs.

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