The Relationship between Project Management and E-Collaboration

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Abstract

Understanding and enhancing the value of electronic collaboration (E-collaboration) technologies is essential for supporting distributed projects. Development of E-collaboration has provided workable infrastructures for group communication and information processing. Also E-collaboration has the potential of networking and collaborative technologies to support the project management teams in the creation of shared understanding. On the other hand, project management has been considered as an academic field for planning, organizing, controlling to producing products with predictable cost, time and quality and, in other applications of engineering requirements. A conceptual relationship between project management and E-collaboration can play a vital role in addressing many problems among the participating companies. In this paper we review the relationship between E-collaboration and project management in industry. And it is going to present some definitions such as E-collaboration, its evolution, past research on E-collaboration, and project management, and the need of it to project management based on conceptual model. A guide line for future research is also presented.

Keywords
E-collaboration, project management.

1. Introduction
In the past few years, many researchers were interested in E-collaboration between the teams in a company or among the relevant companies. Also, it is often the case that the topics' within the purview has become quite broad to allow the various interpretations what portray scholarly investigations. But collaborative projects are complex and are difficult to handle ,therefore the effective management of the distributed processes and knowledge is essential to enhancing the electronic collaboration and finally, it is critical to enhancing the group productivity [1]. On the other hand "project management can be used as a tool to maximize the success of projects and ultimately the success of construction companies" [2]. Effective project management is key for the successful accomplishment of complex projects [3, 4]. Furthermore project management has evolved to plan, coordinate and control the complex and diverse activities of modern industrial, commercial and management change and IT projects, also all projects share one common characteristic – the protection of ideas and activities into new endeavors. Besides Project management has received wider researcher interest in the last decade [5]. As this field is expanding fast, needs for an internal discussion about project management research increases.

2. Collaboration and it Evolution
E-collaboration has been defined in many ways in the past. E-collaboration is "collaboration among individuals engaged in a common task using electronic technologies" [6]. According to Cai and Kock (2009), E-Collaboration is defined as collaboration among different individuals to accomplish a joint task using electronic technologies[7]. Also Bafoutsou and Mentzas (2002) have said "The field of collaborative computing encompasses the use of computers to support coordination and cooperation of two or more people who attempt to perform a task or solve a problem together" [8]. One way people started technological collaboration from the date of invention of the telegraph by Samuel F. B. Morse as early as the mid-1800s [6]. The telegraph allowed individuals to accomplish collaborative tasks interacting primarily electronically. Such collaboration promoted soon after that, in the 1870s, with the invention of the telephone by Alexander Graham Bell [6]. E-collaboration became a fact after the first commercial computers in use in post World War II. Those computers were referred to as mainframes. At that time, organizations were very centralized, which inhibited collaborative work. Besides, mainframes were too expensive to be used to support communication and collaboration among groups of individuals. Computer use was limited to only a few specialized operators. One of the first and most successful E-collaboration tools, a version of email, was in fact a spin-off of a wide area computer-networking

project called ARPANET, sponsored by the US Department of Defense. The project took place in the late 1960s. As the frequently repeated story goes, Arpanet's inventors did envision it as an infrastructure to enable group communication or collaboration. At the time of its initial development, Arpanet was seen primarily as a means for researchers and computer scientists to share expensive mainframe resources [9]. E-mail was initially perceived as a "toy" system, which researchers involved in the ARPANET Project used to casually interact with each other. This perception gave way to one that characterizes e-mail as the father (or mother) of all e-collaboration technologies [10]. In fact email was detected during the 1970s and 1980s. As the ARPANET grew, new computer chip production techniques enabled the development of large-scale integrated circuits, with much lower cost. Personal computers have improved, and these personal computers were connected into local area networks (LANs) through LAN operating systems, whose market was initially dominated by Novell Corporation with its NetWare operating system [6]. ARPANET, LAND and personal computers, created E-collaboration technologies in the 1980s. In 1990s the ARPANET was evolved into today's present internet, which is cardinally a worldwide network of computers made up of many LANs, interacting through the same general correlation protocol.

3. Past Research on E-collaboration

The oldest articles about E-collaboration dated back to the early mid-1990s. Hitherto research on topics related to E-collaboration has a great account, dating back to the late 1970s. That research was conducted under different ensigns. E-collaboration research is in fact made up of several research streams, with different names and traditions. One such research stream is that of computer-mediated communication, also known as CMC, which has been traditionally concerned with the effects that computer mediation has on individuals who are part of work groups and social communities [6]. E-collaboration research traditions is that of computer supported cooperative work (CSCW), which dates back to the 1970s, and whose first inscribe conference ,that is called CSCW Conference, took place in the early 1980s [11, 12]. As another e-collaboration research tradition one can mention to GDSSs (group decision support system). GDSS research has grown during the years to become one of the prime locations of research in the broader field of information systems. That research has often attended on the comparison between GDSS tools and group tasks, especially decision making tasks done by groups of individuals meeting at the same time and in the same room [6]. By appearance of the internet, especially in web, many CSCW and GDSS researchers were surprised. Therefore, it brought in researchers from many other areas of investigations into the field of E-collaboration research. Amongst those disciplines are accounting, marketing, environment human resources management, psychology, economics, and education (just to name a few).

4. Dynamics of Project Management

Project management is becoming more focused on the implementation of organizational strategy [13]. Project management is ''the application of knowledge, skills, tools, and techniques to project activities to meet project requirements''[14]. It helps organizations [2] develop new products by standardizing and reducing forgotten tasks [14]. Project management, as defined by the bodies of knowledge, is focused mostly on a ''management-as-planning'' view of control and appears to be an appropriate approach for projects with clear goals and methods [15]. According to Shenhar, project management has become very useful and important to industrial organization, for instance, in building construction, defense development and commercial product[16]. Project management defined as ''The manner of implementation, of expertise, paraphernalia, knowledge and modus operandi to an extensive range of activities for the fulfillment of prerequisite of the specific project'' [17]. Cammarano says, "evoke that project management is fundamental for lucrative and incessant enhancement of programs and obviously it is a stipulation not a lavishness" [18].

For several centuries, collaboration in different projects has been important for better life [19]. Making pyramids, detecting the new world , crowding the countries with federated troopers; the history books are full of singular, complex undertakings limited in time and scope[20]. For realize to filed project management, it is better at first, know about how it has changed again time. Like another professional field, project management osculate several challenges as the tools of, methods of, and approaches to management that contain the discipline are applied to different areas, for different ends, in different cultures[21]. Some important theoretical work about project management had been done before the Second World War [19]. In 1910, Frederick W. Taylor's "disciple" Henry L. Gantt assembled a new chart, that is Gantt-chart, and in 1931 the Polish scientist Karol Adamiecki presented his network-like technique "Harmonogram" [20]. During the 1950´s, network analysis and planning techniques were in central of improvement in project management like PERT and CPM [19].The extraction of the project management is in managing US department of defense contracts being first documented during the 1950s and 1960 [22]. During the 1960´s the Cost/Scheduling Control System Criteria (C/SCSC) was interested by the defense and aerospace industries [23]. During the 1970´s there existed punctuation on breakdown structures and systems concepts [24]. During the 1980´s, the need for structuring the project management knowledge of researchers and practitioners became clear [20].

5. Project Management and its Bearing on e-Collaboration

All of the firms are organized by projects. The word project is used to explain the ways of organization or communication. Project management was studied by different researchers and this topic is important for most of them. By investigation about why firms exist ,found very reasons why project organization exist[25]. Project scientists interest to use an intellectual discuss in this field. At first some projects exist because some objects are complex to be solved and important [26]. Second, there is a need for a purposeful organization effort and need of coordination in order to execute some of activities[5]. Also 'One of the reasons why you need project management is because you need control of all the nebulae and break it down into logical pieces, that you can understand, or have somebody who does'' [27]. "Project management fits your description like a glove. If you are looking for a field in need, project management is a prime candidate" [28]. Another exposition has been propounded. One of them is the literature on industrial marketing[29]. Finding different of explanations about project management helps us for better understanding in this filed , for example, power perspective [30], knowledge-based causing [31] and transaction cost causing [32].

6. A Conceptual Model of E-Collaborative Project Management

Qureshi suggested a model of project management to provide practical insight into the E- collaboration effects and how they may be used to manage projects and also, it used to manage projects across different organizations [33]. A company in a value network can concentrates on the functions that it does best and rely on other partners to carry out the other functions, but for this value network to create value in its real sense, it requires cooperative attitudes, clear understanding of central objectives, electronic coordination and communication, adaptations and flexible modules, cultures and workforces[34]. This model also proposed that exchanging information on each project member's schedule will help to coordinate the team, sharing project schedules and task related information can help members to overcome their respective adaptation difficulties and enable conflicts to be resolved more easily and distributed project management requires a high degree of communication and coordination[33]. However, the part of cooperation is added for improvement e-collaboration in project management. The main propose of e-collaboration effect is developing complex cooperative strategies that change the way people work together to solve problems and generate wealth. These effects and their relationship to each other are illustrated in the following model of electronic collaboration effects in figure 1 below:
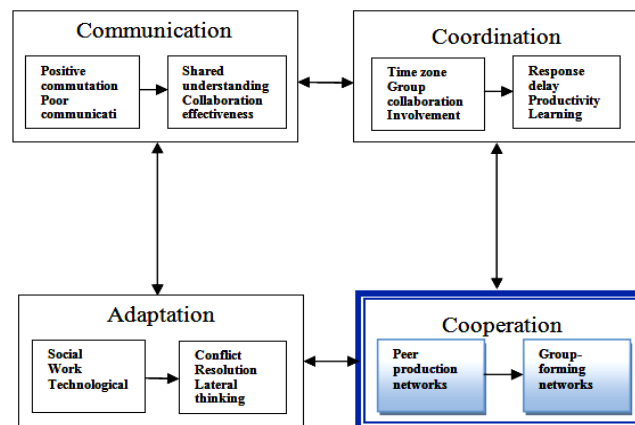

Figure 1: Model of electronic collaboration effects (modified from [33])

7. Key Terminology in Conceptual Model

7.1 Communication

Communication was found to play a central role in virtual team performance. Effective communication means not only passing the information to the receiver but also understanding and utilizing the information passed. Teams operating in the virtual environment face greater obstacles to orderly and efficiently information exchange because they rely heavily on information technology to communicate[35]. The results of the coding suggest that there were numerous issues with communicating electronically. Episodes relating to communication were both positive and negative. The consequences of these episodes affected the extent to which the virtual team was successful.

- Shared Understanding

The process of creating shared understanding is the communication of different perspectives and exchange of information through which behaviors are modified and/or action is carried out. Group Collaboration is the act of

constructing relevant meanings that are shared by all parties involved to achieve congruent goals. The act of collaboration in groups is the act of shared creation and/or discovery in which two or more individuals with complementary skills interact to create shared understanding that none had previously possessed or could have come to on their own [36].

7.2 Adaptation
Adaptation is the process by which members of a group learn to engage with themselves, the distributed work environment and the collaborative technologies with which they work. Virtual teams need to adapt their practices constantly to the organizational challenges in three aspects: social, technology and work adaptation. Virtual teams members need to change their own way of doing things to adapt to the virtual environment. It affects the work process itself and the way in which work is carried out [37].

- Social adaptation

Social adaptation requires team members to conform to the created patterns of interaction, established rules and knowledge. A key issue to effective social adaptation is what sort of communication etiquette and norms of behavior evolve on the electronic social space and which of these is most conducive to the creation of technology supported learning environments.

- Work

Work adaptation occurs when people adapt the technology to their own ways of working. When groups are involved in changing organizational norms and values while using the collaborative technology, the process of work adaptation takes place.

- Lateral thinking

Lateral thinking is the use and implementation of new and unconventional forms ideas to solve problems and or carry out tasks.

- Technology

Technology Adaptation occurs when people learn how to use the technological tools available to achieve their communication goals. It involves single-loop learning, in which group members adjust their procedures according to changes in the environment. The more flexible the technology, the more easy the team members will adapt to.

7.3 Coordination
Coordination is a challenge between teams and management and these challenges are many but, opportunities exist. "Leadership in virtual teams varies widely as a function of circumstances and culture. However, a rotating style of leadership is especially popular. As such, leadership is based on characteristics of the task at hand and the fit of a particular team member with that task"[33].

- Productivity

Group collaboration impacts the productivity of a group by influencing the parts of the project that have been worked on. That it is (in theory) possible to get on ongoing process of productivity: one part of the team can work when the other part of the team is asleep: productivity advantage is in our view the result. When successfully applied by a company it can provide a competitive advantage vis a vis competitors who do not use this. It's difficult to coordinate the work with a group member in another country with a different time-zone.

- Involvement

This effect of electronic collaboration on the success of distributed projects had the most episodes relating to coordination. Involvement in a distributed project is the ability to participate or interact in a virtual team setting. This requires an awareness of the group and ability to engage in its efforts.

- Learning

When members of a group are able to involve themselves in a joint project, they are able to exchange ideas, information and build upon each others' ideas. This brings about learning – this is an essential ingredient for projects that are to produce customized products or services. The following episodes illustrate some of the learning effects of electronic collaboration: Team Learning is important.

7.4 Cooperation
Emerging digital technologies present new opportunities for developing complex cooperative strategies that change the way people work together to solve problems and generate wealth.

- Peer production networks

Create a framework for volunteer communities to accomplish productive work. These potentially unbounded communities create new value by rapidly solving problems that would tax or stymie smaller workgroups.

- Group-forming networks

Represent ways to support the emergence of self-organized subgroups within a large-scale network, creating exponential growth of the network and shortening the social distance among members of the network.

8. Significance of the Study

Communication is often seen as the most important factor contributing to the success of individuals, project teams, and organizational growth and effective communication is vital for virtual teams that cannot meet in face-to-face settings[38]. Virtual enterprises are composed of many different, dynamic and temporary distributed business processes in different, widely dispersed areas or countries. One challenge for managing communication among distributed processes is that advanced technology is needed to offer an environment that provides reliable and timely task-related information sharing and a support for rapid decision-making [38]. Study found that for virtual teams, the addition of video to audio-based communication can result in improved decision making when compared to other collaborative technologies. Another challenge is coordination. As the business processes are performed by various enterprises, the management of the value-chain is a complex task, especially when some degrees of coordination are envisaged for support [39].

9. Research Questions

Now, there are several questions in developing an integrated model. These are summarized as below:
Which elements of a distributed project or a group of projects require collaboration?
What information, knowledge or expertise needs to be tapped into?
Which tools and techniques do employees need to apply in their work teams?
What are the key factors affecting the success in distributed projects?
Who can understand and hold the relationship between E-collaboration and project management in dynamic environments?

10. Conclusion

The fields of e-collaboration and project management have a promising future, in terms of both academic research and commercial software development. As an area of academic research, E-collaboration has flourished since 1980s and particularly in 1990s. As an area of commercial software development, E-collaboration is likely to benefit from a critical assessment of how it can be applied to the benefit of individuals, organizations and society. In this article, the authors have provided with some concepts and definitions such as E-collaboration, a historical review of E-collaboration, past research on E-collaboration, project management and need to roject management based on concept model which has been defined as a relationship between e-collaboration and project management. According to the existing gap in this model (Sajda Qureshi) [30], future researches should focus on integration of communication, coordination, adaption and cooperation that can solve many problems of project management.

References

1. Cai, J., A social interaction analysis methodology for improving E-collaboration over the Internet. Electronic Commerce Research and Applications, 2005. 4(2): pp. 85-99.
2. Isik, Z., et al., Impact of corporate strengths/weaknesses on project management competencies. International Journal of Project Management, 2009. 27(6): pp. 629-637.
3. DG, H., Successful utility project management from lessons learned. Project Manage J 1990. 21(30): pp. 19–23.
4. Chan APC, S.D., Chan PL., Factors affecting the success of a construction project. J Constr Eng Manage, 2004. 130(1): pp. 153–5.
5. Söderlund, J., Building theories of project management: past research, questions for the future. International Journal of Project Management, 2004. 22(3): pp. 183-191.
6. Kock, N. and J. Nosek, Expanding the Boundaries of E-Collaboration. Professional Communication, IEEE Transactions on, 2005. 48(1): pp. 1-9.
7. Cai, G. and N. Kock, An evolutionary game theoretic perspective on e-collaboration: The collaboration effort and media relativeness. European Journal of Operational Research, 2009. 194(3): pp. 821-833.
8. Bafoutsou, G. and G. Mentzas, Review and functional classification of collaborative systems. International Journal of Information Management, 2002. 22(4): p. 281-305.
9. N. Kock, R.D., R. Ocker, and R. Wazlawick, E-collaboration: A look at past research and future challenges. J. Syst. Inform. Technol, 2001. vol. 5, no. 1, pp. 1–9.
10. Sproull. L, K.S., Computers, networks and work. Scientific American, 1991. 265(3), pp. 84-91.
11. Bannon, L.J., CSCW: An initial exploration. Scandinavian J. Inform. Syst., 1993. vol. 5, no. 2, pp. 3–24.
12. Grudin, J., CSCW: History and focus. IEEE Computer, 1994. vol. 27, no. 5, pp. 19–26.
13. Kwak, Y.H. and F.T. Anbari, Analyzing project management research: Perspectives from top management journals. International Journal of Project Management, 2009. 27(5): p. 435-446.

14. Mahaney, R.C. and A.L. Lederer, The role of monitoring and shirking in information systems project management. International Journal of Project Management. In Press, Corrected Proof.
15. Collyer, S. and C.M.J. Warren, Project management approaches for dynamic environments. International Journal of Project Management, 2009. 27(4): p. 355-364.
16. Shenhar, A.J. and D. Dvir, Toward a typological theory of project management. Research Policy, 1996. 25(4): p. 607-632.
17. Qureshi, T.M., A.S. Warraich, and S.T. Hijazi, Significance of project management performance assessment (PMPA) model. International Journal of Project Management, 2009. 27(4): p. 378-388.
18. Cammarano. J, Project management: how to make it happen. IIE Solut 1997. 29(12):30–4.
19. Olsson, R., MANAGING PROJECT UNCERTAINTY BY USING AN ENHANCED RISK MANAGEMENT PROCESS, in Department of Innovation, Design and Product Development Mälardalen University. 2006, Mälardalen University: Sweden.
20. Packendorff, J., Inquiring into the temporary organization: New directions for project management research. Scandinavian Journal of Management, 1995. 11(4): p. 319-333.
21. Crawford, L., J. Pollack, and D. England, Uncovering the trends in project management: Journal emphases over the last 10 years. International Journal of Project Management, 2006. 24(2): p. 175-184.
22. Loo. R, Training in project management: a powerful tool for improving individual and team performance. Team Perform Manage, 1996. 2(3):6–14.
23. Turner, J.R., The Handbook of Project-Based Management: improving the processes for achieving strategic objectives. 1993, McGraw-Hill, Berkshire, England.
24. Stretton, A., A short history of project management. Aust.Project Manager, 1994. Vol. 14, No. 3, pp. 48.
25. Nelson, R.R., Why Do Firms Differ, and How Does It
26. MATTER. Strategic Managernemnt Journal, 1991. Vol. 12, 61-74(School of International and Public Affairs, Columbia University, New York, U.S.A.).
27. Goodman RA, G.L., management issues in temporary systems: a study of professional development and manpower - the theater case. Administrative Science Quarterly, 1976. 21:3 494-501.
28. Gallo, M. and P.D. Gardiner, Triggers for a flexible approach to project management within UK financial services. International Journal of Project Management, 2007. 25(5): p. 446-456.
29. Rand, G.K., Critical chain: the theory of constraints applied to project management. International Journal of Project Management, 2000. 18(3): p. 173-177.
30. Cova B, H.K., How to create competitive advantage in project business. Marketing Management, 1993. 9(2): 105–21.
31. Hodgson. D, Disciplining the professional: the case of project management. Management Studies, 2002. 39(6):803–20.
32. Grant. R, Toward a knowledge-based theory of the firm. Strategic Management 1996. 17:109–22.
33. Williamson. O.E., research: governance and competence perspectives. Strategic Management 1993. 20:1087–108.
34. QURESHI, S., The Effects of Electronic Collaboration in Distributed Project Management. Group Decision and Negotiation 2006: p. 15: 55–75.
35. Willcocks, L.P., How Corporations E-Source: From Business Technology Projects to Value Networks. Information Systems Frontiers 5:2, 175–193, C Kluwer Academic Publishers. Manufactured in The Netherlands, 2003.
36. Powell A., P.G., and B. Ives, Virtual Teams: A Review of Current Literature and Directions for Future Research. The DATA BASE for Advances in Information Systems, 2004. 35(1), 6-36.
37. Schrage, M.S.M., The New Technologies of Collaboration. New York. Random House, 1990.
38. Qureshi S., a.D.V.G.D.a.N., Organizational Adaptiveness in Virtual Teams Group Decision and Negotiation 2001. 10(1), pp. 27-46
39. Baker, G., The Effects of Synchronous Collaborative Technologies on Decision Making: A Study of Virtual Teams. Information Resources Management Journal, 2002.
40. Pereira Klen A. A., R., J. Ricardo, Ferreira, Campos Aureo and Spinosa, Marcio, Luiz., Managing Distributed Business Processes in the Virtual Enterprise. Journal of Intelligent Manufacturing, 2001. 12(2), pp. 185-197.