



Virtual Team Management Challenges Mitigation Model: A Systematic Literature Review Protocol

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Abstract: Virtual team management has a special role in developing software at global level, where the team members are not present physically at one location but they are engaged to complete their task instead apart from one another. They can also face various challenges regarding virtual team management. Like other protocols, this protocol has a special objective which is to provide a road map for developing a Model for Virtual Team Management Challenges (MVTMC). We will try to find out all the risks faced by team members in virtual team management. This model will be useful for outsourcing vendor industries in addressing the problems in virtual team management and will provide the practices to overcome these challenges. The method which we will use in this study for development of MVTMC is systematic literature review (SLR) methodology for identifying the challenges faced by outsourcing vendors in virtual team management. We have also planned to conduct empirical study in software field for the validation of identified challenges and also to point out practices for the identified risks or challenges. The expected outcome of this research work would be to develop MVTMC that will be based on the finding of SLR and empirical study.

Keywords: Global software development (GSD), model for virtual team management challenges (MVTMC), systematic literature review (SLR) and vendors.

I. INTRODUCTION

A basic and important part of any team is the social interaction. Virtual team is defined as a team whose members are scattered at different locations of the world, for performing the associated task, they are connected through modern communicating device[1]. To select, train and socialize employees in virtual team environment is now becoming one of the important human resource function one a day's [2]. Virtual teams has too many different types such as teams whose members are centered oriented, located at some centered point and some distributed members[3]. This different type of virtual team is useful in explaining the problems associated with the research of the area. Kirkman et al [4] stated in his study on virtual teams that virtual teams may be a team that has a members face-to-face, team whose members are distributed geographically and some teams are individual's modern communicating teams, but he does not compare with each other. So researchers on virtual team are aiming for more research in this regards[5].

Distinguishing characteristics of virtual team are Geographical distribution, organizational differences and diversity in culture, creating problems to virtual teams in the sense of social interactions, by effecting understanding development among members and relationship development[6].

According to Kimball [7] virtual team management means the management of the overall\ system of interaction and project management strategies, as well as the management of humans and social activities in such a way that will help virtual team. So it is very necessary for a manager to monitor their social issues and change the style of their management accordingly. The managers have strategies and models of virtual teams, which help them to minimize the social issues and gives guidelines for adoption of a distributed style of management.

The main objective of this research work is to create a model for the purpose of learning and understanding of virtual team management challenges. Expected result of this protocol would be to identify the important barriers (CBs) by using systematic literature review (SLR) protocols for enhancing virtual team management challenges.

II. BACKGROUND

Global software development (GSD) is the task of development where the task is distributed across too many companies in the world in order to develop software in distributed manner. The real fact that today's organization cannot ignore is the globalization and software organization is also effected by globalization in shapes of offshore companies[8]. Main reason behind adopting the global software development is to get access to skillful and experienced software developers, seeking lower cost and organizations existence globally[9].The reasons behind

encouraging GSD are; small number of skillful employees, round the clock software development as negotiated with customers, the rate of cost may vary country to country, and government tax policy favorable to customer encouraging GSD[10]. Now a days software are developed in a distributed manner throughout the world for the purpose of low cost, less amount of time taken as work is distributed among too many software developers, and for high quality of products[11]. The reason behind the adopting the approach of global software development is the reduced cost as compared to normal organizations, high quality of products and increased benefits from the software products[12].

Some 25 to 30 years ago, virtual organization came into existence when technology makes it possible to work at home and manage the business from there[13, 14]. Since from that time such term like virtual organizations, virtual management, classroom virtual management and virtual corporation were used widely in the literature concerned[15-17].

There are three types of virtual organizations that will be discussed here in this literature.

The first type is in which organization outsources some part of the activities of the whole business, thus forming alliance which is virtual for achieving organizational objectives[18].

The second type of virtual organization is a conceptual organization which is 'abstract. Abstract means that it is unseen and is existed in the mind of those people who makes a specific organization[19].

The final and third one is that type of virtual organizations which are formed by links not physical in nature, means virtual, through use of information technology[20],

There are four characteristics of virtual team and each characteristic is defined in detail as below[21].

A. Connectivity

Thinking about connectivity means that which kind of barriers has been broken, what kind of structural modification has gained and unity of what kind would be achieved. Many virtual team or organizations break the barrier of distance by use of technology; distance irrelevant. Unity among different groups with different aims is created by connectivity.

B. Purpose

Purpose means that how much benefits one can get from virtual organization. Speedy development and to save space are quantifiable aspect of this category. User, coworker and employees satisfaction are also important factor of the purpose. Connectivity and purpose describe the benefit

aspect of virtual organization. If the purpose is stronger one and more the selective the arrangement is, the result will be more stable for the virtual organization.

C. Technology

Our main focus in this paper would be on technology.in technology information technology would be our area of target. Information technology has resulted in breaking of the barriers as telecommunications has finished the concept of distances, databases gives organizations a kind of memory and so makes time irrelevant and finally multimedia like audio and video creates virtual reality by using sound and moving pictures.

D. Boundary

For virtual organizations, traditional physical boundaries have no meaning now a days. Similarly to separate the parts of a virtual team to those that are not the parts of a virtual team, efficient boundaries are needed to be established. This is the only way through which outside temperance is blocked with the organization or get advantages from it for which they are not allowed. As progress in communication and information technology is made, virtual organization's boundaries become well established but at the other hand less visible. Measuring the virtually of the organization, the invisibility would be an important indicator. The boundaries which are more invisible, the organization will be more virtual.

We have found from the literature review that there are various types of challenges regarding virtual team management. Bradley et al. [22] have found some basic challenges faced during virtual team management such as: 'creating trust among the team workers', 'thinking of loneliness among virtual team members', 'equalizing skills among virtual team members' and 'monitoring and supervising the member of a virtual team'.

The main challenges are, cultural differences among different races and the coordination among the members problem[23] to develop a confidence among the members is the second challenge which must be kept in mind in dealing with such kind of organizations[23]. Without knowing the position for outsourcing is the result of failure for many organizations which they don't know[24].Sahay [23] has pointed out the problems that were cultural related.

The most common and main challenge that virtual team members are facing is the challenge of good communication and cooperation, as compared to communicating and networking technologies, face to face communication is very rich in information transferring, which is missed in virtual team interaction[25].

III. SYSTEMATIC LITERATURE REVIEW PROTOCOL

In research work, we would use Systematic Literature Review for getting the required information from the literature. SLR a systematic way is needed. We have planned to collect the challenges faced by the offshore software development outsourcing (OSDO) vendor organization in virtual team management through SLR. The SLR has three important types of systematic review, planning the review, conducting the review and reporting the review [26]. In this research work, we will deal with the planning phase; the planning the review type will yield the systematic review protocol which generates the purpose and method for review. Researcher's bias possibility is reduced by pre-defined protocol definition[26]. To design a protocol, we have to study various protocols for the purpose of guidance [27-29].

IV. RESEARCH QUESTIONS

RQ1. What the barriers are, to be escaped from, by offshore software development outsourcing vendor organizations in order to design an effective virtual team management?

RQ2. What are the real-world practices used for mitigation of virtual team management challenges?

A. Constructing Search Term

The following literature will help us to design a search term which is related to our research question.

Population: Software buyers and vendors.

Intervention: problems, challenges.

Outcomes of relevance: virtual team management model.

Experimental Design: Empirical studies, systematic literature review, experts' opinions, case studies.

Our research question with the above details is given below:

RQ1.

[What challenges/ barriers/problems]....."INTERVENTION" to be escaped by [Vendor]..."POPULATION" for the purpose of designing an [Efficient model for virtual team management] "OUTCOMES OF RELEVANCE".

RQ2.

[What are the real world practices]... "INTERVENTION" as pointed out in [Virtual team management literature]... "POPULATION" for mitigation [Virtual team management challenges]"RESULT OF RELEVANCE".

V. SEARCH STRATEGIES

A. Trial Search:

We would use this kind of search, trial search, by using the below string in Google scholar, Science Direct, IEEE Xplore, SpringerLink and ACM digital library.

Trial search string

((“software outsourcing” OR “global software development” OR “global software engineering”) AND (“virtual team” OR “virtual group” OR “logical group”) AND (Management OR arrangement OR sorting) AND (challenges OR barriers OR obstacles OR risks OR hurdles) AND (solution OR practices))

The research papers obtained by applying the above string would be used as a guideline for the development and validation of the most commonly used search strings in a specific protocol.

B. Identifying Search Terms Characteristics

For making search strings, the following strategies would be used.

- a) In order to obtain some main term, research question would be used.
- b) Main terms that has been derived, one has to find out alternative words or spellings.
- c) Major keywords would be verified in some standard paper.
- d) Boolean operator would be used if system allows to do so Boolean operator “OR” is used for the concatenation of alternative spellings and synonyms whereas “AND” operator is used for the concatenation of major terms.
- e) Search strategies are integrated into a summarized one, if needed Integrate.

Results for a)

RQ1: virtual team management, barriers, challenges, obstacle to client, process of client selection.

RQ2: virtual team management, Real World, practices, mitigation of challenges.

Results for b)

(i) *RQ1:*

Outsourcing: (“software outsourcing” OR “global software development”)

Virtual team: (“virtual team” OR “virtual group” OR “virtual assembly” OR “virtual gathering”)

Challenges: (challenges OR barrier OR obstacles OR hurdles OR risks OR “risk analysis” OR “critical factors”)

Vendor(s): (vendor OR service-provider OR dealer OR trader OR marketer OR seller OR developer)

Management: (“Management” OR “arrangement” OR “sorting”)

(ii) *RQ2:*

Practice: (Solution OR "Best practice" OR practice OR "Lessons learned" OR "Process improvement" OR "Process enhancement" OR "Process innovation") AND (mitigation

OR minimization) AND (“virtual team management challenges”)

Result for c)

Team, team management, virtual team, virtual team management, challenges, barriers, criteria for dealer selection, risk analysis, outsourcing alliance, vendor screening,

Result for d)

(i) RQ1:

((“virtual team” OR “virtual group” OR “virtual assembly” OR “virtual gathering”) AND (challenges OR barrier OR obstacles OR hurdles OR risks OR “risk analysis” OR “critical factors”) AND (“Management” OR “arrangement” OR “sorting”)).

(ii) RQ2:

(Solution OR "Best practice" OR practice OR "Lessons learned" OR "Process improvement" OR "Process enhancement" OR "Process innovation" OR SPI OR Advice).

((“software outsourcing” OR “global software development”) AND (“virtual team” OR “virtual group”) AND (Management OR arrangement OR sorting) AND (challenges OR barriers OR risks OR hurdles OR problems OR “risk analysis” OR “critical factors”) AND (solution OR practices OR “best practices” OR “lessons learned” OR “process improvement” OR “process enhancement” OR “process innovation” OR SPI OR advice)).

TABLE1. SUMMARY OF SEARCH RESULTS

Search engine	Total found	Primary selected	Final selection
Springer link	2230	280	56
IEEE	1303	210	33
ACM	877	110	15
Google Scholar	710	60	06
Science Direct	612	56	06
Total	5732	716	116

C. Resources that would be searched in this research work

- A. IEEE Xplore <http://ieeexplore.ieee.org/Xplore/guesthome.jsp>
- B. ACM Portal <http://dl.acm.org>
- C. Science Direct www.sciencedirect.com
- D. Springer Link www.springerlink.com
- E. GoogleScholar www.scholar.google.com

VI. SELECTION OF PUBLICATION

This part of our research work explains the criteria for inclusion, exclusion and at the last for primary source of information, so we would include only those research publications that are relevant to our research question main focus of us in this paper would be on offshore outsourcing.

A. Inclusion Criteria

Criteria for inclusion is used for the purpose of to which part should be included in the literature which is found by search string. Data extraction will use the finding of the search string.

Our criteria will be challenges in virtual team management and paper that are written in English. The criteria are given below:

- Include those kinds of literature which are related to vendor’s capability for virtual team management challenges.
- Include that kind of literature that clearly states the barriers faced in virtual team management
- Include the literature which is related to the encouragement of virtual team management challenges.
- Include that literature which states the problems in virtual team management challenges.
- Include that literature which states the effectiveness in virtual team management challenges. .
- Include that kind of papers and literature which are composed in English as a medium.
- Include that kind of literature whose main title is about virtual team management challenges.
- Include that kind of papers that have keyword which are defined in our main search string.

B. Exclusion Criteria

This type of criteria is related to that kind in which papers are not considered for inclusion in our research work found by the search string. The main points to be excluded are as under.

- Exclude those types of literature that is not related to the research questions.
- Exclude that types of literature in which there is no words related to clients or venders or users.
- Exclude that types of literature in which challenges or barriers are not mentioned.
- Exclude the literature which doesn’t satisfy with the virtual team management challenges.
- Exclude the literature that is based on expert opinions.
- Exclude the literature or papers which are duplicated.

C. Selecting Primary Sources

In this section, selection of primary sources is done here through viewing the title of the paper, keywords in the literature, and abstract of the literature. The main aim of this section is not to include all those sections which are irrelevant to our wants and goals of the research work. The whole study is done in order to check the inclusion/exclusion criteria by viewing the whole literature. The source is reviewed by secondary reviewer for the purpose of exclusion or inclusion of a particular literature. The findings are properly stored of the primary source. At the final review the primary source information is decided whether in exclude or include.

VII. PUBLICATION QUALITY ASSESSMENT

When the final choice of selection is made, then the quality measurement is done. Quality assessment is done in line with the data extraction. Quality performance would depends on the below points.

When the process in completed, the above points would be treated as “YES” or “NA” or “NO”. For the purpose of validation, my supervisor would score a small subset.

VIII. DATA EXTRACTION STRATEGY

A Primary Study Data

This kind of study is used for the purpose of information gathering form the literature and its main focus would be on the satisfaction of research question. Information extracted from the literature is as below. Data collection from the publication is performed through this study.

- Literature details (Title, Authors, Journal/Conference title, etc.
- Information that points to research questions.

Data that would address the research question are as follows.

RQ1: virtual team management challenges from vendors’ point of view

- a. Background Data, Critical Barrier Factors (CBs): it is that kind of factors that don’t have positive effect virtual team management challenges

RQ2:

- b. Background Data, Practices: it is that kind of practice or solutions which are pointed out in the literature for the development of virtual team management challenges.

Below are the data that are gathered through data extraction Table as shown in Table 2.

TABLE 2. DATA EXTRACTION TABLE

<ul style="list-style-type: none"> • Date of review • Title • Authors • Reference • Database • Methodology (interview, case study, report, survey, etc.) • Sample Population • Publication Quality Description • Organization Type (Software house, University, Research institute etc.) • Company size (small, medium, large) • Country / location of the analysis • Year • Critical Barriers (CBs): factors that have a negative impact on software outsourcing clients in the selection of software development outsourcing vendors in outsourcing contract management. • Real world practices as identified in the literature for virtual team management challenges.

B Data Extraction Process

Single researcher can perform the primary review process and he will be responsible for data extraction. If there is an issue the data extraction, the secondary reviewer can give the help. The responsibility of data extraction is on the shoulders of the primary reviewer. The job of the secondary reviewer is to select the literature randomly from the present literature produced by primary reviewer. From randomly selected publication, the secondary reviewer gets the literature independently and would compare it with the findings of primary reviewer.

C Data Storage

For each publication, the data or information would be stored on SPSS document and would be saved at the local hard drive of University of Science and Technology Bannu.

IX. DATA SYNTHESIS

Summary table is used for the purpose of data synthesis, the summary table would have columns (Serial Number, challenges, Frequency, Percentages) showing the list of all the virtual team management challenges along with their frequencies and percentages.

X. VALIDATION OF THE REVIEW PROTOCOL

The protocol was validated through my supervisor, external reviewer and research group of UST Bannu.

XI. DIVERGENCES

If there is any changes in the protocol that may be resulted from the literature study will be stored on a new Appendix to this document.

XII. LIMITATION

- Digital libraries like CiteSeerX and Science Direct don’t give sufficient result.

- Integrated rule ‘e’ would be used for sound result from Google Scholar are used.
- For finding the world practices in our literature, (RQ3) would be included.
- By doing empirical or questionnaire survey, The RQ3 would be used.

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- Is the vendor selection process a nice one?
- In what manner the critical barriers (CBs) of the virtual team management challenges are find out?
- Is it right that expert opinion was not taken?

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