Critical Challenges of Quality in Software Outsourcing from Vendor Perspective across Continent to Continent

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Abstract— In software outsourcing for services and development purposes professionals from third party are hired in order to get benefits of low cost and time saving. Quality challenges identification in the vast area of software outsourcing from vendor perspective across continent to continent is theme of this paper. For this purpose, we have analyzed literature and discovered different challenges having negative influence on quality of software outsourcing like 'Culture difference challenge'. 'Requirement analysis challenge', 'remoteness challenge', '5-C's (communication, collaboration, co-ordination, co-operation and connection)', 'linguistic skills challenge' etc. Moreover, in identified challenges across various continents similarity and dissimilarity significance will also be highlighted. The objective of this paper is to pay proper attention to these challenges in order to enhance the quality of software outsourcing.

Keywords— C*ritical challenges, Quality, Software outsourcing, SLR, Vendor, Continent*

INTRODUCTION

In this age of competition, every IT company wants to reduce their expenditure, get new skilled talent, enhance their quality products in short period of time; all this can be possible when company decides to adopt the approach of software outsourcing. Kazmi et al. [1] state that to hire experts for different activities such as development, other tasks achievement in distributed environment (DE) is software outsourcing (SO). Major IT companies mostly for developmental purposes depend on software outsourcing [2] that is the main reason of its swift growing rate [3]. Reducing developmental cost, enhancement of quality and expert staff contracting are the main advantages of SO [4]. So, software outsourcing can be precisely defined as hiring someone else for your work who is not part of your team.

Quality is a very broad term; each individual has its own perception about quality. Desired results or doing right things is the exact definition of quality. Quality is the key player in software production industry. Success of software projects fully depends on client satisfaction which has directly link to the quality [5].In software engineering, quality is the most discussed topic.

The aim of this research to find quality related challenges across different continents, for this purpose we have formulated two research questions (RQ).

RQI. What are the challenges from quality perspective faced by the vendor organization in software outsourcing?

RQII. Do all the identified quality challenges varies from continent to continent?

We will discuss Literature Review in Section-II, in Section-III Research Methodology, in Section-IV Analysis Results, in Section-V Limitation and then in Section-VI Conclusion.

LITERATURE REVIEW

After literature review we find out that there are numerous quality challenges i.e. 'culture difference challenge', 'requirements analysis challenges, 'communication challenge' etc. that impact software outsourcing quality (SOQ).Literature study reveal that quality of software outsourcing is highly impacted by culture differences [6]. Working style approach of vendor which is related to culture differences make it difficult to manage offshore software development (OSD) [7].
Developmental and quality related issues in software outsourcing issues are directly related to poor requirement analysis [8, 9]. Niazi et al. [10] consider poor requirements issue is the main reason for the failure of global software development (GSD) projects.
Remoteness challenge create complications in building desired quality software [11, 12].
Due to nature of OSDO projects communication and co-ordination ultimately it becomes very difficult to control on project and its quality [13, 14]. So, in such projects quality ensuring is also compulsory [15]. Improper communication may be sometimes leads to Software outsourcing project failure [16].
Yaseen et al. [17] mentions that linguistic challenge is one of the major cause of software project delay. Sameer et al. [18] also argue that linguistic barrier have directly affected the quality of GSD software.
Annous et al. [19] describes that the lack of proper project management is one of the top challenge for outsource project development

(OPD). It means that skillful management hiring should be the top priority for OPD. Niazi et al. [20] also agrees that failure of GSD projects is not understanding the problems of project management (PM), so before starting any global activity it is necessary to PM challenges. Lack of proper management is a major challenge than any other for low quality of offshore software development (OSD) [21].

Quality is also reduced when there is lack of team spirit [22]. Low quality is due to the reason of IT skills shortage [23], inexperienced and untrained staff [24]. Vendor exposure [25, 26] to outsourcing experience also affect the quality of software. In the same way client exposure [26] to outsourcing project can impact the quality. Lack of knowledge [27] of vendors about particular business domain hugely impacted quality. Failing to adopt technology complexities [28] make difficult to achieve the desired quality. Employees high turn-over lowering the quality of product [20] as well as the morale of team members [26].

Poor programming practices [11, 29] is one the major reason of failure of offshore projects development (OPD). Poor contract [30] also affect the quality of OPD.

RESEARCH METHODLOGY

For identification of challenges we conducted Systematic Literature Review, for this purpose study different protocols [31-33]. Our first step was developing a search string in order to find out the relevant literature on different libraries and then selection of primary publications which totally basis on title of paper, abstract and keywords. Then we defined inclusive and exclusive criteria for final selection of literature which we have already discussed in our published protocol [34], after that data was extracted from those publications which fulfill the criteria of RQs. The results of primary and final selected papers is shown in Table-1.

Table 1 Table 1 Search Result of Primary and Final Selected Papers

Name of Library	Search Result	Primary Selected Papers	Final Selected Papers
Google Scholar	16700 (980 access)	299	42
IEEE	281	58	9
Springer Link	9916	157	4
ACM	211	4	0
Total	27108	518	54

As sample size of final selected paper was low to get targeted characteristics of sample; we decided to adopt snowballing approach a sampling technique used in qualitative research for collection of data [35]. After applying the snowballing approach results of total final selected papers is given below in Table-2.

Table 2 Search Result of Total Final Selected

Final Selected Papers from different Database	Snowball Selected Papers	Total Final Selected Papers
54	24	78

Other researchers [25] also use the snowballing approach during their research work. During data synthesis phase, we have identified various quality challenges for RQ1 from the sample size of 78 final selected papers. Initially, we have categorized these challenges into 35 groups then we review the challenges again and merge them into 12 groups.

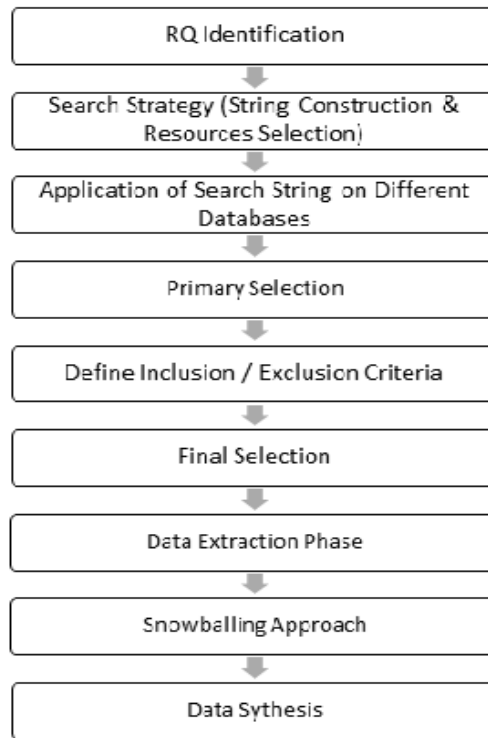The above discuss research methodology is represented in the figure 1.

Figure 4 Research Method Process

RESULT ANALYSIS

After categorization of these challenges we analyze these challenges on continent base so for analysis purpose we use SPSS which is one of the leading data analysis tool [36].

QUALITY CHALLENGES IDENTIFICATION

To address RQ1, we identified quality challenge with the help of SLR which is shown in Table-3.
As, we have already discussed that we categorize these challenges into 12 groups. Among these 12 challenges 9 challenges are considered to be critical i.e. challenges which have a frequency of 10 or above 10. Previous literature review shows critical challenges identification approach has also been used by other researchers [37].

Table 3 Qualities Challenges Identification List

Challenge (For CC criteria N≥10)	Frequency (N=78)	Percentage
Culture differences challenge	27	35
Requirements analysis challenge	27	35
Remoteness challenge	13	17
5-C's challenge	26	33
Linguistic skills challenge	11	14
Individualistic approach challenge	5	6
Management challenges	14	18
Lack of expert challenge	25	32
Employees turnover challenge	8	10
Geo strategic economic challenge	7	9

Code quality challenge	11	14
Agreement deed challenge	13	17

Table-3 shows that 'Culture differences challenge (35%)', 'Requirements analysis challenge (35%)', 'Remoteness challenge (17%)',' '5-C's challenge (33%)', 'Linguistic skills challenge (14%)', 'Management challenges (18%)', 'Lack of expert challenge (32%)', 'Code quality challenge (14%)' &' Agreement deed challenge (17%)'are the critical quality challenges identified from SLR.

QUALITY CHALLENGES ANALYSIS ON CONTINENT BASE

To address RQII we further analyzed these quality challenges on the basis of continent to continent as shown in Table-4.

Table *4 Quality Challenges Identification across Continents*

Challenge	Sample Size N=78 Identified through SLR										Chi Square Test (Linear-by-Linear Association) α=.05		
	Asia (N=41)		*Europe (N=22)*		*North America (N=10)*		*SouthAmerica (N=3)*		*Australia (N=2)*		X^2	Df	p
	frequency	%age	frequency	%age	frequency	%age	Frequency	%age	frequency	%age			
Culture differences challenge	13	38	**9**	**41**	3	30	1	33	1	50	0.142	1	0.706
Requirements analysis challenge	14	34	8	36	1	10	3	100	1	50	0.379	1	0.538
Remoteness challenge	4	10	3	14	4	40	1	33	1	50	6.207	1	0.013
5-c's challenge	16	39	8	36	0	0	1	33	1	50	1.267	1	0.26
Linguistic skills challenge	3	7	4	18	3	30	0	0	1	50	0.32	1	0.572
Individualistic approach challenge	2	5	1	5	2	20	0	0	0	0	0.342	1	0.559
Management challenges	7	17	4	18	2	20	1	33	0	0	0.022	1	0.882
Lack of expert challenge	13	32	8	36	3	30	1	33	0	0	0.217	1	0.642
Employees turnover challenge	5	12	3	14	0	0	0	0	0	0	1.307	1	0.253
Geo strategic economic challenge	4	10	2	9	1	10	0	0	0	0	0.265	1	0.606
Code quality challenge	7	17	3	14	1	10	0	0	0	0	1.177	1	0.278
Agreement deed challenge	6	15	3	14	2	20	2	66	0	0	0.933	1	0.334

Table-4 results shows that 'Culture differences challenge (38%,41%,30%,33%,50%)', 'Requirements analysis challenge (34%,36%,10%,100%,50%)','Remoteness challenge (10%,14%,40%,33%,50%)', '5-C's challenge (39%,36%,0%,33%,1%)', 'Linguistic skills challenge (7%,18%,30%,0%,50%)', 'Management challenges (17%,18%,20%,33%,0%))', 'Lack of expert challenge (32%,36%,30%,33%,0%)', 'Code quality challenge (17%,14%,10%,0%,0%)' & 'Agreement deed challenge (15%,14%,20%,66%,0%)' occur in Asia, Europe, North America, South America and Australia respectively.
Furthermore, finding any significant difference in those identified challenges for different continents uses chi-square test. A linear by linear association Chi-square is considered to be more effective than Pearson chi-square test [38]. Our analysis also reveals that in all our identified challenges except 'remoteness challenge' p value is greater than α=.05 so it means that for these challenges there is no

significant difference across different continents. While in case of 'remoteness challenge' value of $p= 0.013$ is less than $\alpha=.05$ it means that it has statistical significant difference across different continents. Moreover, our results also reveal that our quality identified challenges have maximum similarities than dissimilarities across different continents because mainly all face these challenges.

LIMITATION

As, all these quality challenges are identified from SLR where authors mention that from vendor perspective quality is impacted due to these challenge but have not described that why affect quality.

CONCLUSION & FUTURE WORK

The main aim of this research study is summarize all those challenges which are critical for quality from vendors 'side in software outsourcing and also analyzed those quality challenges across various continents. Our next step is from SLR find out practices for mitigation purposes of all these critical challenges.

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