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Establishing trust in offshore software outsourcing relationships: an exploratory study using a systematic literature review

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Abstract: Offshore software outsourcing is a widely used business strategy for producing high-quality software at low cost. Trust plays a vital role in establishing the offshore software outsourcing relationships between client and vendor organisations. The objective of this research study is to identify factors via systematic literature review (SLR) that are important for establishing trust in offshore software outsourcing relationships. The authors have performed an SLR by applying the customised search strings, which were derived from the research questions. The authors have identified factors such as face-to-face meeting, better communication, contract management between client and vendor, defining processes, tools, procedures and policies, reliable management, knowledge sharing, mutual expectations, better client-vendor relationship and training programmes that are generally considered critical for establishing trust in offshore software outsourcing relationships. The results also reveal the similarities and differences in the factors identified through different study strategies and in different continents. Offshore software outsourcing companies should focus on the frequently cited factors in order to compete in the offshore software outsourcing business.

1 Introduction

Offshore software outsourcing is a modern business strategy for developing high-quality software in low wages countries. In offshore software outsourcing, a client(s) contracts out all or part of its software development activities to a vendor(s), who provides agreed services for remuneration [1, 2]. Offshore software outsourcing gained a dramatic increase after 2001 and is still growing continuously because of the recent economic downturn [3]. There are many reasons for offshore software outsourcing [4]. Client organisations benefit from offshore software outsourcing because vendors in developing countries (offshore vendors) usually cost one-third less than onshore vendors and even less when compared with in-house operations [5]. 'India and China are the two Asian countries that take the most of R&D outsourcing contracts nowadays. The top players in India's software development industry are HCL and Wipro [6]. Moreover, offshore vendors improve their skills and service quality with the experience of offshore software outsourcing projects, use of state-of-the-art technology, skilled human resource and appropriate infrastructure to satisfy the clients' needs [7]. However, in addition to the benefits different challenges during offshore software outsourcing have been observed [8].

One of the key challenges is handling complex communication and coordination problems because of conditions of time and cultural separation [8–11]. Other challenges include the development of offshore software outsourcing practices, creating confidence and trust among the offshore software outsourcing companies and poor contract management in offshore software outsourcing environment [12–17]. However, despite the importance of offshore software outsourcing, little empirical research has been carried out on offshore software outsourcing practices in general and the identification of factors that play an important role in establishing trust in offshore software outsourcing relationships in particular.

This research is premised on the need to gain an in-depth understanding of different factors that play an important role in establishing trust in offshore software outsourcing relationships. The objective of this research paper is to identify factors via systematic literature review (SLR) that are important for establishing trust in offshore software outsourcing relationships. Understanding these factors will assist offshore software outsourcing companies in addressing issues relating to establishing trust. This may also help to ensure the successful outcome of offshore software outsourcing projects and long lasting relationships between clients and vendors [1, 18].

To do this we intend to address the following research questions:

RQ1: What factors are important for establishing trust in offshore software outsourcing relationships?
RQ2: Do the identified factors vary from continent to continent?
RQ3. How are these factors related to the study strategies used?

This paper is organised as follows. Section 2 describes the background. Section 3 describes the research methodology. In Section 4, findings from the SLR are presented and analysed with some discussion. In Section 5, summary is provided. Section 6 describes the limitations. Section 7 provides the conclusion and future work.

2 Background and motivation

Offshore software outsourcing is defined as a situation where a company (a client) contracts out all or part of its software development activities to another company (a vendor), who provides agreed services for remuneration [1, 19]. 'Outsourcing is derived from 'finding the source from the outer', which is a kind of new service mode that the hosts deliver all or part of their IT business to other professional service providers' [20].

Gallivan and Oh [21] have grouped the software outsourcing relationships into four different types, based on the number of clients and vendors involved in the outsourcing contract. These are simple dyadic relationships, multi-vendors relationships, co-sourcing relationships and complex relationships.

In a simple dyadic relationship, there is one client and one vendor involved in the outsourcing contract. The client outsources its software development activity to a single vendor who is alone responsible for the fulfilment of the job as per clients' needs.

In a multi-vendors relationship, there is one client and many vendors involved in the outsourcing contract. The client relies on more than one outsourcing vendors for the fulfilment of the software development activity.

In co-sourcing relationships, many clients' firms are involved with one vendor for the offshore software outsourcing activity. It is the inverse of multi-vendors relationship. In this type of outsourcing relationship occurs in a situation where two or more than two outsourcing clients need common software for their operations. Hence, they jointly outsource the software development project to a single vendor.

The complex outsourcing relationship comprises many clients and many vendors. This type of situation occurs when two or more outsourcing clients' organisations need a common software solution for their business and hence they outsource the project to multiple vendors who work on its development jointly such as partners [21].

Trust plays an important role in all above of the four relationships. This is because in general, researchers are agreed that trust refers to an aspect of a relationship between client and vendor in which the parties are willing to establish a relationship that will result in a positive desired outcome [22, 23]. There is no acknowledged definition of the term 'trust' as researchers in different disciplines have different views [1, 23–25]. However, Oza *et al.* [25] definition is more appropriate for this paper. Oza *et al.* [25] define trust in offshore software outsourcing relationship as 'clients and vendors having positive expectations of each other's actions, while having a rational interest in maintaining that relationship in the awareness of the risk in those expectations'. It is clear from this definition that the trust in offshore software outsourcing relationships is expected to enable more collaboration between client and vendors in order to reduce conflicts and risks.

Theories of trust have been divided into two types, that is, trust formation and trust development [26]. Trust formation theories are concerned with how trust is initially formed whereas development theories deal with how trust initially formed is further developed. Trust behaviour in early stages of work is different from later stages as initial perception about the other team members form the trust. These perceptions may change with passage of time as a result of interactions between team members. The most commonly used theory of swift trust developed by [27] seems to be more relevant to globally distributed teams which have members from different culture, geographical location, experience and skills working on projects with tight schedules.

Owing to trust's relatively new position in the offshore software outsourcing business, no SLRs have been conducted on factors that are important for establishing trust in offshore software outsourcing relationships. A systematic review is 'a means of evaluating and interpreting all available research relevant to a particular research question, topic area or phenomenon of interest' [28]. A systematic review can also discover the structure and patterns of existing research, and hence identify gaps that can be filled by future research [28]. The results of the SLR will assist offshore software outsourcing companies in better addressing issues relating to establishing trust.

3 Research methodology

We have used an SLR process [29] as the main approach for data collection because an SLR is a defined and methodical way of identifying, assessing and analysing published primary studies in order to investigate a specific research question. Systematic reviews differ from ordinary literature surveys in being formally planned and methodically executed.

An SLR protocol was written in 2009 [30, 31], validated and implemented in a team work by the researchers (authors).

The major steps in the SLR methodology are described in the following subsections.

3.1 Search strategy and search

The search strategy for the SLR is a plan to

(a) Construct search terms by identifying population, intervention and outcome
(b) Find the alternative spellings and synonyms
(c) Use Boolean operators

Results for (a)

Population: offshore software outsourcing relationships
Intervention: factors, characteristics, trust builders
Outcomes of relevance: establishing trust, trust building, strengthening outsourcing relationship

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Experimental design: empirical studies, theoretical studies, case studies, SLRs,experts' opinions.

Results for (b) and (c):

RQ1:

('offshore software outsourcing' OR 'information systems outsourcing' OR 'information technology outsourcing' OR 'IS outsourcing' OR 'IT outsourcing' OR 'CBIS outsourcing' OR 'computer-based information systems outsourcing' OR 'software contracting-out' OR 'distributed software development' OR 'multi-site software development' OR 'global software development') AND [(trust OR trustworthy OR trustworthiness OR trusted OR reliance OR 'relationship building' OR 'relationship maintenance' OR reputation OR satisfaction OR reliable OR reliability OR best performance OR 'expectations match' OR responsiveness OR 'good track record' OR 'project success' OR co-ordination) OR (factors OR drivers OR motivators OR elements OR characteristics OR parameters) OR (establishing OR establishment OR setting-up, building, launching, creating, agreement OR contracting OR alliance OR approval OR pleasure OR sure OR confidence OR 'successful relationship' OR 'relationship management' OR satisfaction)].

3.2 Publication selection

3.2.1 Inclusion criteria: The inclusion criteria we used to determine which piece of literature (papers, technical reports or 'grey literature' or book) found by the search term will be used for the data extraction. The criteria are listed below

- Studies that describe factors/motivators for offshore software outsourcing trust building/trust development
- Studies that describe offshore software outsourcing relationships
- Studies that describe criteria for a successful offshore software outsourcing relationships
- Studies that describe issues in offshore software outsourcing relationships

3.2.2 Exclusion criteria: The criteria are listed below

- Studies that do not describe offshore software outsourcing trust
- Studies that do not describe offshore software outsourcing relationships

3.2.3 Selecting primary sources: The planned selection process had two parts: an initial selection from the search results of papers that could plausibly satisfy the selection criteria, based on a reading of the title and abstract of the papers; followed by a final selection from the initially selected list of papers that satisfy the selection criteria, based on a reading of the entire papers. In order to reduce the researcher's bias the inter-rater reliability test was performed where the source was sent to the secondary reviewer, for review in case of any uncertainty regarding the inclusion or exclusion decision. We have identified 18 papers as shown in Appendix 1.

We received a large of number of papers (2351) but only 18 studies satisfied the final inclusion criteria. We excluded the studies which were not conducted in offshore setting. Also because of a large number of synonyms in our search string and poor quality of interfaces of online databases, a large number of irrelevant papers were found. After initial filtering and discarding duplicates, we were left with 166 studies only to apply the final selection process (see Table 1).

Table 1 Data sources and search strategy

Name of database	Total publications found	Initial selection	Final selection
IEEExplore	675	72	11
ACM portal	52	4	0
cite seer digital library	1473	46	4
science direct	151	44	3
total	2351	166	18

3.3 Publication quality assessment

The measurement of quality was performed after final selection of publications. The quality checklist contains the following question:

- Is it clear how the factors for establishing/building trust between clients and vendors were identified in offshore software outsourcing relationship?

Each of the paper was marked as 'YES' or 'NO' or 'Partially'. After applying the quality assessment criterion, all of the 18 papers were included in the final list.

We have also observed that the selected publications are reliable as they have gone through external reviews that ascertain that these publications have sufficient quality to be included in this study.

3.4 Data extraction

The review was undertaken by a team of two researchers, who were responsible for the data extraction. A third reviewer was approached for guidance in case of an issue regarding the data extraction.

The inter-rater reliability test was performed after the data extraction process by the primary reviewers. From each paper we extracted a list of quotes, where each quote described a list of factors which are important for establishing trust in offshore software outsourcing relationships.

Appendix 2 shows the data extraction in general and which studies yielded the results in particular.

3.5 Data synthesis

The primary reviewers with the help of secondary reviewers performed data synthesis. At the end of the data extraction phase a list of trust factors from the sample (from vendors' perspective) of 18 papers was created. The researchers (authors) reviewed these factors in order to derive a list of categories and a final list of 39 categories was identified.

4 Results

In this section we discuss the results relating to the research questions.

Table 2 List of factors for establishing trust

Number	Factors for establishing trust	Frequency ($n = 18$)	%
1	face-to-face meeting	9	50
2	better communication	8	44
3	contract management between client and vendor	7	39
4	defining processes, tools, procedures and policies	7	39
5	reliable management	6	33
6	knowledge sharing	6	33
7	mutual expectations	6	33
8	better client and vendor relationship	6	33
9	training programmes	6	33
10	bi-directional travelling/visits	5	28
11	cultural bridge	3	17
12	conflict resolution	3	17
13	common values	3	17
14	realistic expectations	2	11
15	working environment	2	11
16	creativity	2	11
17	giving faces	2	11
18	organisation chart development	2	11
19	investments and initiatives by vendor	2	11
20	future planning	2	11
21	using references	2	11
22	change of control modes exerted by the client	1	6
23	business improvement	1	6
24	a system to monitor cost	1	6
25	eliminating power hierarchy	1	6
26	employees' security and satisfaction	1	6
27	maintaining consistency	1	6
28	corporate intranet for shared understanding	1	6
29	home processes and coordination/control systems establishment at developer site	1	6
30	governance	1	6
31	measurement charter	1	6
32	change management	1	6
33	anticipated change plan	1	6
34	feedback plan	1	6
35	foundation characteristics	1	6
36	service level objectives	1	6
37	process ownership plan	1	6
38	service level contents	1	6
39	integration activities	1	6

4.1 Factors for establishing trust identified through SLR

To answer RQ1, Table 2 shows the list of factors identified through the SLR. 'Face-to-face meeting' is the most common factor (i.e. 50%) for establishing trust in offshore software outsourcing organisations. Our results also indicate that 'better communication' (44%) is an important factor for establishing trustworthy relationships between client and vendor organisations.

'Contract management between client and vendor' (39%) has been ranked third in the identified list. Chou and Chou [32] have worked on contract management in outsourcing and have identified various risks that may occur during the various phases of the outsourcing contract. Based on their findings, outsourcing contract can be divided into three phases, namely, pre-contract, contract and post contract. For each phase, Chou and Chou [32] have identified different risks, that is, during pre-contract phase insufficient preparation for outsourcing practice induces high risk, in contract phase any deviations from contracted services could generate enormous risks and for the post-contract phase lack of review mechanisms are frequently encountered risks [6, 32].

In our study, 39% of articles have cited the factor 'defining processes, tools, procedures and policies' as important for building trust in offshore software outsourcing relationships. Although trust establishment is a main objective in offshore software outsourcing relationship, the identified factor can improve the success rate of the outsourced projects as it can lead to client satisfaction by providing with the quality processes and products. We believe this is the reason why software process improvement (SPI) certifications are considered important for vendors in obtaining offshore software outsourcing projects. Owing to the growth in free markets of globalisation and advancements in information and communication technologies, organisations have to consider taking advantage of outsourcing strategies, not only to utilise the cost advantages but also to benefit from the improved quality that offshore vendors provide [33]. Indian software companies have been reported to provide high-quality software [34]. This is the reason that in the software export market, India is a dominant offshore software outsourcing provider [35]. These trends show that 'quality of products and services' is used as one of the criteria in the selection of offshore software outsourcing vendors.

We have also identified 'reliable management', 'mutual expectations' and 'better client and vendor relationship' as the important factors (i.e. 33%). Research suggests that half of the companies that have tried outsourcing have failed to realise the anticipated results [36, 37]. Global projects tend to be unsuccessful, because 'physical, time, cultural, organisational and stakeholder distances negatively influence communication and knowledge exchange between onshore and offshore project team members' [38]. Our results show that 'reliable management', 'mutual expectations' and 'better client and vendor relationship' can address offshore software outsourcing problems and can also play a vital role in establishing a trustworthy relationship between client and vendor organisations.

'Knowledge sharing' was reported, as an important factor by six articles (i.e. 33%) in our study. Knowledge sharing management is an operation that helps enterprise to find, select, organise, disseminate and share important knowledge and expertise necessary for software activities [39]. 'By sharing knowledge in IT outsourcing environments, clients and vendors are able to confirm an effective outsourcing relationship over time' [40, 41].

We have also identified 'training programmes' (i.e. 33%) as an important factor for establishing trust. Often offshore software outsourcing organisations develop a written training policy and these policies are reviewed on a periodic basis. It is also important to provide appropriate training for enhancing and uplifting technical capabilities of employees in order to better compete in offshore software outsourcing business. In addition, often a client organisation is eager to know the technical capability of an offshore software outsourcing vendor organisation [15]. Moreover, high-quality skilled staff are the backbone of the IT industry and offshore software outsourcing vendors should employ high skilled workers with professional degrees in computer science, engineering, management and similar fields [42].

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Table 3 Categorisation of success factors for establishing trust based on continents (only factors with >2 frequency are shown)

Sr#	Factors for establishing trust	Total frequency in SLR ($n = 18$)	Continents of the company as mentioned in the literature identified through SLR							
			Asia $n = 7$	Europe $n = 1$	Australia $n = 1$	Mixed continents $n = 3$	Not Mentioned $n = 6$	Chi-square test (linear-by-linear association) $\alpha = 0.05$		
								X^2	df	P
1	contract management between client and vendor	7	4	1	0	0	2	2.085	1	0.149
2	reliable management	6	5	0	0	0	1	5.018	1	0.025
3	face-to-face meeting	9	2	1	1	2	3	0.668	1	0.414
4	knowledge sharing	6	2	0	0	1	3	0.632	1	0.427
5	better communication	8	3	1	0	1	3	0.008	1	0.927
6	mutual expectations	6	3	0	0	1	2	0.084	1	0.773
7	defining processes, tools, procedures and policies	7	1	1	0	1	3	1.641	1	0.200
8	better client and vendor relationship	6	2	1	0	1	2	0.005	1	0.942
9	bi-directional travelling/ visits	5	1	0	1	2	1	0.540	1	0.462
10	training programmes	6	1	0	0	3	2	2.088	1	0.148
11	realistic expectations	2	2	0	0	0	0	2.762	1	0.097
12	cultural bridge	3	3	0	0	0	0	4.419	1	0.036
13	conflict resolution	3	1	0	0	0	2	0.409	1	0.522
14	common values	3	1	0	0	0	2	0.409	1	0.522

4.2 Factors for establishing trust based on continents

To answer RQ2, Table 3 shows the list of factors identified in different continents. We have categorised the SLR papers into different continents where the original study was conducted. Our aim is to find whether these factors differ from continent to continent. We suggest that understanding the similarities and differences in these factors can contribute to the body of knowledge of offshore software outsourcing trust. This is because the factors that have a positive impact on client–vendor relation in any continent should be taken seriously by the offshore software outsourcing organisations in that continent.

It is clear from Table 3 that most of the studies (39%) were conducted in Asia. This may be a reason that most of the vendors in the offshore software outsourcing industry are from Asian countries. Table 3 also depicts that 33% of the studies have not mentioned the location where the actual studies were conducted. We are unable to find the actual reasons and this may be of one the limitation of our study.

As the data was of ordinal nature, the linear by linear association χ^2 test was used in order to find significant differences between factors identified in different continents. The linear by linear association test is preferred when testing the significant difference between ordinal variables because it is more powerful than Pearson χ^2 test [43].

By comparing the factors identified in different continents, we have found significant difference for only two factors (i.e. reliable management and cultural bridge). The frequency of 'reliable management' is high in Asia (five out of seven that is 71%), while it has zero or 1 frequency in other continents as shown in Table 3. We argue that as most of the vendors are from Asian countries (India, China etc) they consider reliable management important in order to avoid any risks associated with the offshore software outsourcing trust. Government policies and political stability in offshore software outsourcing countries can play an important role in establishing trust among offshore software outsourcing organisations. The Chinese government has focused on reliable management over the past few years [44], which maybe a reason that China is soon expected to lead the offshore software outsourcing industry.

Another factor, for which we found a significant difference, is cultural bridge. The frequency of 'cultural bridge' is high in Asia (3 out of 7 that is 43%), while it has zero frequency in the rest of the continents as shown in Table 3. Culture is the most difficult factor to address in offshore software outsourcing [45, 46]. Asian vendors find a great difference in dealing with their clients, normally from North America and Europe.

Our findings show that 'face-to-face meetings', 'defining processes, tools, procedures and policies', 'better client and vendor relationship', 'bi-directional travelling/visits' and 'training programmes' have been cited in different continents as shown in Table 3.

4.3 Factors for establishing trust based on study strategies

We have grouped the papers found through SLR into four study strategies, which are commonly used in the empirical software engineering, as shown in Table 4. These study strategies are case studies, experience reports, interviews and surveys. These four study strategies were initially identified by two primary reviewers during the data extraction process. Two secondary reviewers have also validated these study strategies using the inter-rater reliability test discussed in Section 3.4.

To answer RQ3, Table 4 shows the list of factors identified through different study strategies. In Table 4 it is clear that 61% of the articles represent case studies, 17% represent surveys whereas the rest are experience reports and interviews. A case study approach is the most popular

Table 4 Categorisation of success factors for establishing trust based on study strategies

Factors for establishing trust	Study strategies				χ^2 test (linear-by-linear association) $\alpha = 0.05$		
	Case studies ($n = 11$)	Experience reports ($n = 2$)	Interviews ($n = 2$)	Surveys ($n = 3$)			
	Freq	Freq	Freq	Freq	X^2	Df	P
contract management between client and vendor	6	0	1	0	3.718	1	0.054
reliable management	2	0	2	2	0.358	1	0.550
face to Face meeting	7	1	0	1	0.716	1	0.398
knowledge sharing	4	0	1	1	0.559	1	0.455
better communication	6	1	1	0	0.895	1	0.344
mutual expectations	4	1	1	0	0.089	1	0.765
defining processes, tools, procedures and policies	5	1	0	1	0.037	1	0.847
better client and vendor relationship	5	0	1	0	2.707	1	0.100
bi-directional travelling	3	0	0	2	0.003	1	0.958
training programmes	3	1	1	1	0.358	1	0.550
realistic expectations	1	0	1	0	0.140	1	0.708
cultural bridge	1	0	1	1	0.143	1	0.705
conflict resolution	2	1	0	0	0.143	1	0.705
common values	3	0	0	0	1.754	1	0.185
working environment	1	1	0	0	0.945	1	0.331
creativity	1	1	0	0	0.945	1	0.331
giving faces	0	1	0	1	5.374	1	0.020
organisation chart development	0	1	0	1	5.374	1	0.020
investments and initiatives by vendor	1	0	0	1	0.089	1	0.765
future planning	2	0	0	0	1.096	1	0.295
using references	1	0	0	1	0.089	1	0.765
change of control modes exerted by the client	1	0	0	0	0.516	1	0.473
business improvement	1	0	0	0	0.516	1	0.473
a system to monitor cost	1	0	0	0	0.516	1	0.473
eliminating power hierarchy	0	1	0	0	4.211	1	0.040
employees' security and satisfaction	0	0	1	0	0.042	1	0.837
maintaining consistency	0	0	1	0	0.042	1	0.837
corporate intranet for shared understanding	1	0	0	0	0.516	1	0.473
home processes and coordination/control systems establishment at developer site	1	0	0	0	0.516	1	0.473
governance	1	0	0	0	0.516	1	0.473
measurement charter	1	0	0	0	0.516	1	0.473
change management	1	0	0	0	0.516	1	0.473
anticipated change plan	1	0	0	0	0.516	1	0.473
feedback plan	1	0	0	0	0.516	1	0.473
foundation characteristics	1	0	0	0	0.516	1	0.473
service level objectives	1	0	0	0	0.516	1	0.473
process ownership plan	1	0	0	0	0.516	1	0.473
service level contents	1	0	0	0	0.516	1	0.473
integration activities	1	0	0	0	0.516	1	0.473

approach as out of 39 factors 34 factors were identified in case studies.

The factor 'face-to-face meeting' got highest occurrence (64%) in the case studies. Other factors 'contract management between client and vendor' and 'better communication' were ranked second with 55% of occurrences in the case studies. Similarly 'defining processes, tools, procedures and policies' and 'better client and vendor relationship' both got 45% of occurrences in the case studies.

Out of 39 factors, 11 factors were identified in surveys. 'Reliable management' and 'bi-directional travelling' both got 67% of occurrences in surveys. The remaining nine factors got 33% occurrences in surveys as shown in Table 4.

Out of 39 factors, 11 factors were also identified in interviews. 'Reliable management' got the 100% occurrences in interviews whereas the rest have similar occurrences, that is, 50% in interviews.

As the data was of ordinal nature we have used the linear by linear association chi-square test in order to find significant differences between factors identified in different study strategies. By comparing the factors identified in different study strategies we have found a significant difference in only four factors (i.e. 'contract management between client and vendor', 'giving faces', 'organisation chart development' and 'eliminating power hierarchy'). This is because these factors were identified in one or two of the study strategies only.

5 Summary of results

A number of researchers have argued in the business literature that trust is a vital factor in business relationships [47, 48]. It is interesting to observe that trust is critical for many business relationships as it enables organisations in improving their performance, communication quality and decision-making process [22, 48]. Trust has also received much attention in other fields such as social sciences and organisational management [49, 50]. However, trust is relatively a new area of research in offshore software outsourcing relationships [1]. Ali-Babar *et al.* [1] have identified this

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Table 5 Summary of results

Research question	Answer
RQ1: What factors are important for establishing trust in offshore software outsourcing relationships?	• Face-to-face meeting • Better communication • Contract management between client and vendor • Defining processes tools, procedures and policies • Reliable management • Knowledge sharing • Mutual expectations • Better client and vendor relationship • Training programmes
RQ2: Do the identified factors vary from continent to continent?	• Owing to low sample size we cannot identify any common pattern of factors. However, most of our studies were conducted in Asia region and we have identified frequency cited factors in this region. 'Contract management between client and vendor' and 'reliable management' have been frequently cited in Asia. Other frequency cited factors in Asia are 'better communication', 'mutual expectation' and 'cultural bridge'
RQ3. How are these factors related to the study strategies used?	• We have identified three frequently cited factors in case studies: 'face to face meeting' (39%), 'better communication' (33%) and 'contract management between client and vendor' (33%) • 'Reliable management' is frequently cited in interviews and surveys

issue 'on the one hand, there are increasing numbers of software outsourcing contracts between companies with different languages and cultures. On the other hand, there is a paucity of studies into the role of trust in software outsourcing relationships and factors critical to the establishment and maintenance of trust in such relationship'. There is an increasing realisation that understanding the factors in establishing trust between clients and vendors is important in successful execution of offshore software outsourcing projects [1, 51, 52].

This research is premised on the need to gain an in-depth understanding of different factors that play an important role in building trust in offshore software outsourcing relationships. The objective of this research paper is to identify factors via SLR that are important for establishing trust in offshore software outsourcing relationships. Our research goal is to provide offshore software outsourcing practitioners with a body of knowledge that can help them to design and implement successful outsourcing initiatives. However, because of the non-existence of a proven theory about human and organisational aspects of offshore software outsourcing efforts was a real challenge in this research. The findings from this research are expected to assist a wider offshore software outsourcing community to identify a research direction to develop and validate a theory of offshore software outsourcing based on a certain trust model. That is why we aimed at gathering facts in the hopes of drawing some general conclusions.

To address RQ1, we have identified nine frequently cited factors in the literature that are generally considered critical for establishing trust in offshore software outsourcing relationships as shown in Table 5.

For RQ2, we have not identified any factor that is frequently cited in all continents. However, within continents 'contract management between client and vendor' and 'reliable management' have been cited in 57% and 71% of the studies conducted in Asia. Other frequency cited (43%) factors in Asia are 'better communication', 'mutual expectation' and 'cultural bridge'.

RQ3 relates to different study strategies used in the literature. For RQ3, we have identified three frequently cited factors in case studies: 'face to face meeting' (39%), 'better communication' (33%) and 'contract management between client and vendor' (33%). 'Reliable management' is frequently cited in interviews and surveys only.

These findings indicate the importance of factors for establishing trust in offshore software outsourcing relationships. The results of our study revealed that offshore software outsourcing organisations need to be trustworthy, having better communication and reliable management strategies in order to secure a good relationship. We have identified a list of important factors using RQ1. However, because of low sample size we could not identified any common patterns of these factors for RQ2 and RQ3. Our common recommendation is that offshore software outsourcing companies should focus on the frequently cited factors in order to compete in the offshore software outsourcing business.

Our long-term research goal is to build an empirically tested body of knowledge of different aspects of offshore software outsourcing. We are approaching this by firstly focusing on complementing and/or extending the current knowledge in the literature via SLRs [3, 52]. We plan to develop appropriate support mechanisms and tools to facilitate the design and implementation of suitable offshore software outsourcing strategies. In this study, we have gained important insights into the important of factors for establishing trust in offshore software outsourcing relationships. We found that literature views certain factors are of 'high' value and should be paid more attention in any offshore software outsourcing initiative.

The outcomes of this research will provide other researchers and practitioners with a firm basis and knowledge on which to develop different offshore software outsourcing activities. New offshore software outsourcing processes will then be developed in order to address the high number of failures currently reported in offshore software outsourcing. In addition, the results of this paper will provide the offshore software outsourcing practitioners with the knowledge to determine how ready companies are for establishing trust in offshore software outsourcing relationships. This will assist offshore software outsourcing practitioners with the ability to understand the strengths and weaknesses of current offshore software outsourcing processes and to address areas that need attention.

6 Limitations

One possible threat to internal validity is that for any specific article, their reported factors may not have in fact described underlying reason. We have not been able to independently control this threat. The authors of these studies were not supposed to report the original reasons why these factors were used during the selection of vendors. It is also possible that in some studies there may have been a tendency for particular kinds of factors to be reported. Many of the contributing studies were self-reported experience reports, case studies and empirical studies which may be subject to publication bias.

How safe is it to generalise these findings? Our findings are not based on any studies that used a random sample of offshore software outsourcing organisations in the world. However, in the investigation of our research questions, our study is the most comprehensive to date. The issue of generalising these findings can also be considered by comparing our findings with results from other related studies. We found many similarities in our findings and findings by other people, and this provides some support for generalisation. Moreover, some of the categories of the continents and study strategies have a very low sample size. This may create a validity threat in generalisation of our findings

Table 3 depicts that 33% of the studies have not mentioned the location where the actual studies were conducted. However, we are unable to find the actual reasons and this may be of one the limitation of our study.

Sample size may be another issue as these findings are based on the extraction from finally selected 18 papers. However, these papers were selected on predefined and validated inclusion/exclusion criteria.

7 Conclusion and future work

The offshore software outsourcing companies should not be seen as being 'at fault' for not having successful relationships during offshore software outsourcing projects instead the trust establishing approaches and their transition mechanisms should be improved. Research shows that understanding the dynamics of building trust between clients and vendors in offshore software outsourcing is important in successful management of offshore software outsourcing relationships. In this paper we have explored the factors which are important for establishing trust in offshore software outsourcing relationships. We have identified that the factors such as face-to-face meeting, better communication, contract management between client and vendor, defining processes tools, procedures and policies and reliable management play an important role in establish trust between client and vendors in offshore software outsourcing relationships. We have also explored the similarities and differences among different continents and the study strategies used for identifying factors. The results revealed that offshore software outsourcing organisations need to be trustworthy, having better communication and reliable management strategies as well as technically competent staff in order to secure a good offshore software outsourcing relationship.

We encourage independent studies on this topic. This will increase confidence in our findings and will also track changes in attitudes to offshore software outsourcing relationships over time. From the findings of this study, we have identified following goals that we plan to follow in future:

- Collect additional data on the perceived value of different factors that are important for establishing trust in offshore software outsourcing relationships by exploring the basis of practitioners' perceptions and experiences through more in-depth interviews and case studies.
- Conduct empirical studies to determine how to successfully implement the identified factors in order to establish trustworthy relationships in offshore software outsourcing.
- It is also important to determine the mechanics of encouraging practitioners to support those factors that have not been cited frequently but are required to establish trust in offshore software outsourcing relationships.
- Conduct empirical studies to determine how to successfully maintain trust in offshore software outsourcing relationships.

8 Acknowledgments

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10 Appendix 1

See Table 6

11 Appendix 2

See Table 7

Table 6 List of identified papers

Sr#	Trace#	Citation	Number of factors identified
1	IEEE-14	Gregory, R., 'Breaching the Knowledge Transfer Blockade in IT Offshore Outsourcing Projects – A Case from the Financial Services Industry', The 42nd Hawaii International Conference on System Sciences, Waikoloa Village, HICSS, 2009, pp. 1–10	6
2	IEEE-15	Prifling, M. *et al.*, ' Changing Psychological Contracts and their Effect on Control Modes in IT Offshore Outsourcing Projects – A Case from the Financial Services Industry', The 42nd Hawaii International Conference on System Sciences, Waikoloa Village, HICSS, 2009, pp. 1–10.	4
3	IEEE-82	Beulen, E. and Ribbers, P., 'Managing complex IT outsourcing-partnerships'. The 35th Hawaii International Conference on System Sciences, Big Island, HICSS, 2002, pp. 267.2	6
4	IEEE-84	Bhat, J. M., G. Mayank, *et al.*, 'Overcoming Requirements Engineering Challenges: Lessons from Offshore Outsourcing.' IEEE Software, Volume 23, Issue 5, 2006, pp. 38–44	6
5	IEEE-89	Bhatt, P. and Shroff, G *et al.*, 'An Empirical Study of Factors and their Relationships in Outsourced Software Maintenance. Software Engineering Conference', 13th Asia Pacific Software Engineering Conference, Banglore, APSEC, 2006, pp.301–308	3
6	IEEE-182	Erik, B. and Pieter, R., 'Control in Outsourcing Relationships: Governance in Action' The 40th Hawaii International Conference on System Sciences, Waikoloa Village, HICSS, 2007, pp. 236b	3
7	IEEE-243	Heeks, R.. *et al.*, 'Synching or Sinking: Global Software Outsourcing Relationships', IEEE Software, Volume 18, Issue 2, 2001, pp. 54–60	8
8	IEEE-250	Herbsleb, J. D. *et al.*, 'Global software development at Siemens: experience from nine projects', 27th International Conference on Software Engineering, St Louis, Missouri, ICSE, 2007, pp. 524–533	12
9	IEEE-254	Hugo, G., T. *et al.*, 'Managing the Outsourcing Marriage to Achieve Success', The 40th Hawaii International Conference on System Sciences, Waikoloa Village, HICSS, 2007, pp. 239c	2
10	IEEE-285	Jianhua, Y. and Zhaohua, W., 'An analysis on the operation modes of outsourcing network in the perspective of cases', IEEE International Conference on Service Operations and Logistics, and Informatics, Beijing, IEEE/SOLI, 2008, pp. 322–325	17
11	IEEE-462	Reifer, D. J., 'Seven hot outsourcing practices.' IEEE Software, Volume 21, Issue 1, 2004, pp. 14–16	3
12	CS-3	Paasivaara, M. and Lassenius, C., ' Collaboration practices in global inter-organisational software development projects', Article first published online: 22 SEP 2004, DOI: 10.1002/spip.187, Copyright © 2004 John Wiley & Sons, Ltd.	5
13	CS-288	Prikladnicki, R., ' Global software development in practice lessons learned', Article first published online: 22 SEP 2004, DOI: 10.1002/spip.188, Copyright © 2004 John Wiley & Sons, Ltd.	4
14	CS-918	Cusick, J. and Parsad, Alpana., 'A practical management and engineering approach to offshore collaboration' IEEE Software, Volume 23, Issue 5, 2006, pp. 20–29	8
15	CS-S1	Pyysiainen, J., 'Building Trust in Global Inter-Organisational Software Development Projects: Problems and Practices', International Workshop on Global Software Development co-located with International Conference on Software Engineering, Portland, ICSE, 2003, pp. 67–74	8
16	SD-41	Dayasindhu, N., 'Embeddedness, knowledge transfer, industry clusters and global competitiveness: a case study of the Indian software industry.' Technovation, Volume 22, Issue 9, 2002, pp. 551–560	4
17	SD-56	Goo, J. and Huang, C. D., 'Facilitating relational governance through service level agreements in IT outsourcing: an application of the commitment-trust theory.' Decision Support Systems, Volume 46, Issue 1, 2008, pp. 216–232	5
18	SD-114	Oza, N. V., *et al.*, 'Trust in Software Outsourcing Relationships: an Empirical Investigation of Indian Software Companies', Information & Software Technology, Volume 48, Issue5, 2006, pp. 345–354	5

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Table 7 Data extraction

Factors for establishing trust	1 IEEE-14	2 IEEE-15	3 IEEE-82	4 IEEE-84	5 IEEE-89	6 IEEE-182	7 IEEE-243	8 IEEE-250	9 IEEE-254	10 IEEE-285	11 IEEE-462	12 CS-3	13 CS-288	14 CS-918	15 CS-S1	16 SD-41	17 SD-56	18 SD-114	Total
a system to monitor cost	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
anticipated change plan		—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
better client and vendor relationship	1	—	1	—	1	—	—	1	—	—	—	—	—	1	—	1	—	—	6
better communication	1	—	1	—	—	—	1	1	—	1	—	—	—	1	1	—	1	—	8
bi-directional traveling	—	—	—	—	—	—	—	1	1	—	—	1	—	1	—	—	—	1	5
business improvement	—	—	1	—	—	—	—	—	—	—	—		—	—	—	—	—	—	1
change management	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
change of control modes exerted by the client	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
common values	—	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	1	—	3
conflict resolution	—	—	—	1	—	—	—	—	—	1	—	—	—	—	1	—		—	3
contract management between client and vendor	—	1	1	1	—	—	1	1	—	1	—	—	—	—	—	—	1	—	7
corporate intranet for shared understanding	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
creativity	—	—	—	—	—	1	—	—	—	1	—	—	—	—	—	—	—	—	2
cultural bridge	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	3
defining process, tools, procedures and policies	—	—	1	1	—	—	—	1		—	1	—	1	1	1	—	—	—	7
eliminating power hierarchy	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
employees' security and satisfaction	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
face to face meeting	1	—	1	1	1	—	—	1	1	—	—	1	1	—	1	—	—	—	9
feedback pan	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
foundation characteristics	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
future planing	—	—	—	—	—	—	—	—	—	1	—	—	—	1	—	—	—	—	2
giving faces	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	2
governance	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
home processes and coordination/control systems establishment at developer site	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
integration activities	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1
investments and initiatives by vendor	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1	2
knowledge sharing	1	—	—	—	—	—	—	1	—	1	1	—	—	1		1	—	—	6
maintaining consistency	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
measurement charter	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
mutual expectations	1	1	—	—	—	—	1	1	—	—	—	—	—	1	1	—	—	—	6
organisation chart development	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—	—	—	2
process ownership plan	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
realistic expectations	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	2
reliable management	—	—	—	1	—	—	1	—	—	—	1	—	—	—	—	1	1	1	6
service level contents	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
service level objectives	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	1
training programs	—	—	—	—	—	—	—	1	—	—	—	1	1	1	1	1	—	—	6
using references	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	2
working environment	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	2
	6	4	6	6	3	3	8	12	2	17	3	5	4	8	8	4	5	5	—