EAI Endorsed Transactions
on Internet of Things
Research Article EAI.EU

Offshore Outsourcing Risk Management for Pakistan

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Abstract

Software offshore outsourcing is strong pillar of software development. Software offshore outsourcing involves many risks, due to internal or external factors, that must be recognized and managed. Each organization that deals with the offshore outsourcing must be well aware of all the risk factors and barriers in the offshore outsourcing to maintain the quality of their product.
It is very important for the Pakistan's software industry to improve and maintain the quality of the products with minimal risk and compete with other countries in offshore outsourcing. The problem addressed in this research article is to minimize the risks occurring in offshore software outsourcing. For that purpose, we propose some offshore outsourcing risk mitigation guidelines for the software industry of Pakistan. We use empirical analysis and the qualitative method. A comprehensive literature review is carried out. The risk factors related to offshore outsourcing specifically for Pakistan's software industry are generated empirically.

Keywords: Software Offshore Outsourcing (SOO), Software Development Outsourcing (SDO), Offshore Outsourcing Risks, Risk management, Critical Success Factor (CSF).

Received on 30 May 2017, accepted on 05 July 2017, published on 26 July 2017

doi: 10.4108/eai.26-3-2018.154381

1. Introduction

According to the Oxford dictionary [1] outsource means "obtain (goods or a service) by contract from an outside supplier". Outsourcing is an effective strategy in which one organization or company contracting with another company for their business process in order to get financial advantages and quality products [2]. Outsourcing of software development is based on formal agreement between the customer and vendor organization in which customer contracting whole or portion of the software development activities to the organizations which deliver assistance against agreed scope of work [3].

The practice of contracting an international firm, which is outside the client's country, to get services for business tasks is known as 'Offshore Outsourcing' [4].

When the client and vendor organizations are geographically distant then many risks are involved in Software Offshore Outsourcing (SOO). It would be appropriate to consider risks, when any risk is identified, it should be gaged and mitigated. SOO also involves many risks, due to internal or external factors, that must be recognized and managed. Risks that are undisclosed for long in the project and remain invisible may affect the project detrimentally when exposed later. If the risks are identified early in the project, their impacts can be minimized. If the risks are identified late in the project, more will be the cost to fix them.
PM-BOK explains risk as: "an uncertain event or condition that, if it occurs, has a positive or negative effect on a project's objectives" [5].

2. Literature review

Researchers have been actively conducting studies to identify risk factors occurred in the offshore outsourcing. Identification of risk factors is very important in initial stages of the software development. If risks are not identified and managed in early stages that may results in loss. Identification of critical barriers, success factors involved in the software outsourcing, country specific issues and their management is also proposed by many researchers. Some of the previously work done regarding

offshore outsourcing is briefly stated in the section given below.

2.1. Identified risk factors

Nakatsu and Lacovou [6] first identified the most important risks commencing literature of IT outsourcing that includes Client capabilities (e.g. Lack of experience with outsourcing, project management and with contract management), Security (e.g. Theft of intellectual property, planned information Weaknesses and issues in Data confidentiality), Financial (e.g. unable to calculate the outsourcing hidden costs, Currency fluctuations), Geopolitical (e.g. Political instability, Trade barriers and Border tensions between two countries) etc. Top ten offshore risk factors are: Deficiency in top management assurance, miscommunicated requirements, Language barriers, Inadequate user participation, client's deficiency of project management experience, Unable to achieve user expectations, Deprived change controls, Lack of business and necessary technical know-how by offshore team, and unable to calculate all costs.

Top domestic risks include; Original requirements are miscommunicated, deficiency in top management's support, communication, technical knowledge by vendor, project management experience by customer, inability to manage the user expectations, Insufficient user participation and vendor staffing. The panelists of offshore acknowledged seven risks that are distinctive to the offshore outsourcing. The factors include: cultural difference, language barriers, time-zone difference, and Political instability, unawareness about foreign contract law, client's organization negative impact and Currency oscillation. They compared offshore and domestic outsourced projects. They directed Delphi studies in order to recognize the risks from client viewpoint, in both offshore and domestic situations.

Herath and Kishore [7] developed an analysis theory about risk elaboration of the offshore outsourcing developments, manager's challenges in the teamwork, and overcoming solutions to those challenges.

Qadeem khan and Shahbaz Ghayyur [8, 12] identified list of potential risks that occurred in IT projects. They also provide essential information concerning the risks followed in Global Software Development (GSD) and its issues. They collected a possible list of risk factors, occurred in IT projects, from a study conducted at various operational organizations at Islamabad. Their identified risks include: employee's appointment and shortfalls, impracticable budgets and schedules, gold- plating, evolving wrong properties and functions, erroneous user interface development, user platform incompetence, continuous change in requirements, external furnished components shortfalls, and shortage of real time performance.

Beulen E. et al [13] conveyed a case-based research and commenced results into three firms. Their research purpose was to examine the distribution, process and deliver offshore outsourcing process risks; their research method was to generate 'exploratory-descriptive' case-based studies of offshore outsourcing at certain firms. They stated that three types of offshore service providers are there, these are: captive, native, and foreign service providers [14]. They only focused on process risks and their delivery which includes Cultural, Language and communication barriers, Different time zones and Length of the contract.

Coward [20] examines the global outsourcing decision of small and medium enterprise (SMEs), a sector that is increasingly looking offshore to fulfill its software development needs. They explain why the companies engaged in outsourcing contracts with providers in companies other than India. They also identify the factors that shape the global outsourcing decision of small and medium sized companies in America. Gallaugher and Stoller [21] conducted a case study of a locally operating pioneer, software outsourcing in Vietnam. They explore the potential offshore partners operating in developing nations too mature to be considered more attractive to the suitors. Their theory 'Glass Egg Digital Media' provides a lens for identifying success factors that enable firms in developing nations to emerge as strategic technology outsourcing partners.

Rao [22] discuss some key issues for global IT sourcing that includes country and individual factors. Country factors include Telecommunication infrastructure, Legal and security issues, and Time zone differences. While other factors include cultural differences and the language barriers. He concludes that both country and individual factors must be taken into account when evaluating outsourcing options and managing offshore vendor relationship.

2.2. Identified critical bariers

Siffat Ullah and Niazi [15, 16] performed a literature review in which they recognized critical barriers that have bad effect on software outsourcing consumers in the selecting SDO vendors. Some of the barriers that they identified include the cultural and language barriers, deficiency of technical capability and project management, Hidden costs, Communication gap, Delayed delivery, client's inconsistency, Country instability, Lack of technical capability, control over project and project management, Language and cultural barriers, and Poor service quality and process. They have concluded that known barriers have bad influence on the SDO clients in the selection of SDO vendors.

2.3. Identified success factors

Carmel [17] introduced the 'Oval Model', the success factors included in the model are: Government vision and

policies, Human capital, managerial and language skills, Wages, life quality, Linkages, between individuals and work groups, Technological infrastructure, Capital, Industry characteristics. Their proposed model is beneficial for the nations that have already a successful industry.
Siffat Ullah et al. [18] performed another systematic literature review in which they identify the Critical Success Factors (CSFs) which put the good impact on software outsourcing customers in the assortment cycle of offshore software growth outsourcing vendors. They sort out different factors that include product worth, cost-effectiveness, proper infrastructure, proficient human resource, and services which have prime importance to outsourcing clients.
Won Kim [19] reviewed the status of the outsourcing practices, and considers the potential impacts on both sides of outsourcing. Won Kim also provides the success factors and issues regarding outsourcing for many countries that include Malaysia, Vietnam, Russia, Singapore, and Nepal etc.

2.4. Risk management

The risk associated to a software outsourcing project must be evaluated and managed. The risk related to a software outsourcing assignment should be assessed and managed. Numbers of frameworks have been proposed in order to manage the risks. Studies have suggested that the proposed frameworks give guidelines and are very helpful to manage the risks occurred in offshore outsourcing.

Aubert et al. [23] suggested a risk management system with a description of cases together with the assessment risk exposure and mechanisms. The case studies provide the support for the proposed framework. Aziz et al. [24] analyses the factors that contributed to the growth of developing economies to help them get to their current successful status. Using the Country Selection Framework (conceptual framework) they have analyzed and evaluated the potential of Pakistan for offshore outsourcing. manpower, Lack of trust, Low domestic growth, Lack of policy implementation, Lack of domestic demand of IT, Unavailability of appropriate laws, Lack of quality certified companies, Lack of Government initiatives, Lack of collaboration between government and industry, and Education System. The identified threats include; Brain drain, Rapid changes in technology. The opportunities identified in the SWOT analysis are; Global Investment in IT Trend of offshore outsourcing and India at neighborhood. The major factors that plays an important role in the selection of country framework have been divided into three categories: Human Expertise and resources: (Availability of skilled resources, Education system, English proficiency, Software/ hardware, Marketing skills, etc.), Country infrastructure (Political stability, Government support, Regulatory environment, Communication infrastructure etc.), Cultural issues (Work style, Communication techniques, etc.).
Krenic et al. [25] were proponents of a research which should aim at two things. Firstly, the study should review the extensive literature which has surfaced in last one score or so for effective decision making. The second aim of the research is to afford a numerical analysis of the available studies to bring to fore the similarities and shortcomings. The purpose of such a review would be to provide guidance for future research. They applied a decision system that categorized the studies on the basis of their purposes i.e. if they dealt with the outsourcing benefits, risks, motivations etc.

3. Problem Statement & Motivation

Offshore outsourcing is considered as a modern business strategy but Software Development Outsourcing (SDO) procedure comprises of many problems/difficulties. It involves many risks that affect the product quality as well as the organizations reputation. The activities of project management will be achieved if the risk factors are mitigated and the project manager is capable to manage the complex problems occurred during the project development [6]. Each organization that deals with the offshore outsourcing must be well aware of all the risk factors and barriers in the offshore outsourcing to maintain the quality of their product. From many years, much of the previously work is done on the offshore outsourcing risk assessment and management in general and also for the specific domain or specific cultural environment (country specific). According to our study and knowledge very little work is done in the context of Pakistan, which is on the analysis level.
The current issue in Pakistan's software outsourcing industry is that very little work is done for offshore outsourcing (i.e. at analysis level). There is no mitigation framework or guidelines proposed for software offshore outsourcing risk management.
Research Objectives
In order to provide the solution to the problem, the main objectives of our research are:

- To find out the risk factors that are specific to Pakistan's software offshore outsourcing industry.
- To propose guidelines for risk mitigation so that it suits our local software offshore outsourcing industry.

4. Methodology

First of all, review of literature is made to know the existing knowledge regarding the research topic. In order to collect the real data "interviews" are conducted and some questionnaires are also collected. Finally, "analysis" is done, in order to compare the literature and the data collected from the interviews/questionnaires. On the basis of data collected through interviews, guidelines are

proposed, their usefulness is also proved through survey form and finally conclusions are made.

The process of data collection starts when the "Research problem" is identified. For this study two round structured interviews are conducted. These interviews are basically open-ended interviews in which the interviewer prepares fixed questions beforehand [26], [27]. The same order of basic questions is followed with all interviewees. The basic questions include two main research questions.

The process of interview involves two major steps, i.e., presentation of oral-verbal stimuli and reply in terms of over-verbal responses [26].

To gather precise information "Expert Opinion" technique is used. Fourteen employees, working in different capacities of the project are conducted and interviewed.

The researcher needs explained and thorough answers. The interview is made-up to produce responses that can be implied and managed fast. In this research an interview schedule carrying two basic questions were prepared. The two basic research questions are:

1. What are the risks involved in Pakistan's software offshore outsourcing industry?
2. What are the current strategies used to mitigate the risks occurred in software offshore outsourcing?

After asking these two questions more questions were asked based on the response of each question that increase the number of asked questions in order to get desired/required feedback.

5.Analysis & results

This section presents the information collected from literature and empirical data collected from interviews and is analyzed.

5.1. Risk collected through Literature

There are number of risks that are presented by many researchers in previous researches regarding Offshore Outsourcing. The list of risks collected from the literature, [09], [10], [11] concerning offshore outsourcing is given in table 1.

Table 1. Offshore Outsourcing Risk Factors.

S.No.	Risk Factors
1	Lack of experience with outsourcing
2	Lack of contract management experience
3	Lack of project manager experience
4	Vulnerability of strategic information
5	Data privacy issues
6	Hidden cost
7	Currency fluctuation
8	Political/Country instability
9	Trade barriers
10	Border tension
11	Language barriers
12	Inadequate user involvement
13	Inadequate staffing by vendor
14	Constraints due to time-zone difference
15	Negative impact on image of client organization
16	Intellectual property rights

Many researchers [16], [17] also identify the critical success factors that are occurred in offshore outsourcing. Some of the critical success factors are given in table 2

Table 2: Critical Success Factors

S. No.	Critical Success Factors in Offshore Outsourcing
1.	Government vision and policies, including funding and tax benefits
2.	Wages
3.	Technological infrastructure
4.	Cost-saving
5.	Skilled human resources
6.	Appropriate infrastructure

5.2. Risk collected through Interviews

In the first round of interviews, interviewees were asked about the risk factors that are occurred in the SOO in Pakistan. The risk factors that are collected through interviews along with their rationale are shown in the table 3.

Table 3. Risk Factors collected through Interviews

S. No.	Risk Factors
1	Political instability
2	Country image and relations
3	Ethical risks/data confidentiality
4	Energy crisis
5	Financial risks
6	Terrorism
7	Communication Gap
8	Delayed delivery due to scope creep
9	Lack of trust and uncertainty
10	Time zone difference.

5.3 Identification of risks specific to Pakistan

After the data gathering through interviews, the data collected from the interviews is compared with the literature and the risk factors that are specific to the Pakistan are separated. The risks that are specific to Pakistan are:

- Terrorism
- Energy crisis
- Political instability

5.4 Proposed Guidelines

The guidelines are proposed against each identified risk factors based on their rationale. If any organization follows the proposed guidelines, there is a possibility that the effect of the risk can be minimized, that affects the overall project in a very good way. The proposed guidelines are given in the table 4.

Table 4. Risk factors with guidelines

S. No.	Risk Factors & Guidelines
1.	Data confidentiality ▪ Make secure policies and procedures in place to protect your business Intellectual Property (IP) theft.
2.	Energy crisis ▪ Arrange dependable alternate energy resources like UPS backed up by Generators.
3.	Financial risks ▪ Don't accept the project if it doesn't have ideal Financial terms.
4.	Communication gap ▪ Schedule meetings daily or weekly.
5.	Delayed delivery due to scope creep ▪ Document and approve SRS (Software Requirement Specification) before development phase.
6.	Lack of trust and uncertainty ▪ Make Project Agreements (like NDA agreements)
7.	Time zone difference ▪ Arrange your resource according to client's availability.
8.	Country image and relations ▪ Make trusted and long term relation with the client.
9.	Terrorism ▪ Get data access remotely from any location.
10.	Political instability ▪ Make clear legal rules or companies' policies that helps to avoid political confrontation among employees.

5. Conclusion

There are so many risks occurred in software offshore outsourcing like other disciplines. In literature there are many risks identified regarding offshore outsourcing in general. Some risk management frameworks are also proposed. But there is no work done in software offshore outsourcing for the Pakistan's organizations.

For that purpose, research is conducted in which first of all general risk factors regarding software offshore outsourcing are collected through literature, then risk factors that are faced by Pakistan's software offshore organizations are collected through interviews. Interviews are conducted to gather real data from different employees of the companies. After that collected data is analyzed in which risk factors collected from literature and interviews are compared. Analysis revealed that there are some risks that are specific to Pakistan, these risks factors are:

- Terrorism
- Energy crisis
- Political instability

After the analysis, the risk factors that are specifically occurred in Pakistan's software offshore outsourcing are filtered and guidelines are proposed against each risk factor in order to mitigate the effect of risk factors which helps the Pakistan's software organizations that offshore their services.

References

1. "Outsource", URL http://www.oxforddictionaries.com/definition/english/outsource?q=outsource . [ONLINE]: November 25, 2013.
2. Kern, T., Willcocks, L., 2000. "Exploring information technology outsourcing relationships: theory and practice". Journal of Strategic Information Systems 9 (4), 321–350.
3. Loh, L., Venkatraman, N., 1992. "Diffusion of Information Technology Outsourcing: Influence Sources and the Kodak Effect". Alfred P. Sloan School of Management, Massachusetts Institute of Technology, 1992.
4. Palvia, P.C. "A dialectic view of information-systems outsourcing – pros and cons". Journal of Information & Management. 1995. Vol. 29, Issue 5, Page(s) 265–275.
5. Hughes B; and Cotterell M; (1996), "*Software Project Management"* 4th ed, pp. 147, McGraw-Hill (UK).
6. Robbie T. Nakatsu & Charalambos L. Iocavou, "A comparative study of important risk factors involved in offshore and domestic outsourcing of software development projects: A two-panel Delphi study". Journal of Information & Management, 2009.
7. Herath T. & Kishore R., "Offshore Outsourcing: Risks, Challenges, and Potential Solutions". Journal of Information Systems Management, 2009.
8. Khan Q; Ghayyur S; "Software Risk and Mitigation in Global Software Development". Journal of Theoretical and Applied Information Technology. 2010.
9. Siffat Ullah Khan, Mahmood Niazi &Rashid Ahmad, "Critical Barriers for Offshore Software Development Outsourcing vendors: A systematic literature review". 16th Asia-Pacific Software Engineering Conference. APSEC '09, December 2009. Page(s) 79-86.
10. Erran Carmel, "The new Software Exporting Nations: Success Factors". The Electronic Journal on Information Systems in Developing Countries (EJISDC), 2003. Vol. 13, Issue 4. Page(s) 1 – 12.

Siffat Ullah Khan, Mahmood Niazi &Rashid Ahmad, "Critical success Factors for Offshore Softwaare Development Outsourcing Vendors: A systematic Literature Review", Fourth