Significant Risks of Outsourced IT Projects

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Abstract-The volume of IT outsourcing is continuously growing due to benefits of outsourcing and various constraints of the organizations. However, there are certain risks linked with IT outsourcing. Manifestation of such risks adversely affects the successful completion of outsourced projects and may cause project failure. This study's objective is to explore and rank the significant risks for IT outsourcing. A literature-based list of IT outsourcing risks has been employed for this purpose. Two questionnaire surveys have been conducted to perform Delphi method. After the first round, significant risks for IT outsourcing have been identified. The significant risks have been ranked during the second round. The study also highlights top 10 risks for IT outsourcing. Keeping in view identified and ranked IT outsourcing risks, designing a proactive strategy can address the risks and hence anticipated benefits of IT outsourcing can be achieved.

Keywords-IT Outsourcing, Outsourced Projects, Risk Identification, Risk Management, Outsourcing risks.

I. INTRODUCTION

During the IT outsourcing, services of another organizations are attained to accomplish software development and associated activities [i]. The income of the Information Technology Outsourcing (ITO) market has augmented from $228.7 billion in 2010 to $246.6 billion in 2011 with rate of growth of 7.8% according to a report published in 2012 [ii].

According to Barry Boehm [iii], cost reduction is the main reason of outsourcing. There are multiple reasons of outsourcing that can be categorized into: 1) benefits of outsourcing and 2) certain limitations of companies. The possible benefits include obtainability of high-class competencies, cost lessening, amplified revenue, effective processes, emancipating inner resources, and outsourcing non-core activities. The possible limitations are shortage of resources, privation of suitable services, and complications in handling IT functions. Outsourcing concept is making progress by leaps and bounds due to such benefits and limitations [iv].

IT Outsourced projects can be classified into four types:

I) Contractor and outsourcing organization are co-located.
ii) Contractor is located in another country (off shore development).
iii) Contractor and outsourcing organizations are located in the same country but at significant distance.
iv) Group of contractors and/or subcontractors (Global Software Development) [v].

Risk is the likelihood of happening an event that may lead to unwanted consequences [vi]. Many software development projects are failed in spite of a lot of efforts and engaging huge resources, and one of the main failure causes is poor requirements definition [vii].

When project stakeholders are not co-located as is the case of outsourced projects, the following possible reasons lead to inadequate requirements definition:

- Ineffective communication.
- Different working hours (time zones).
- Intermittent face to face meetings.
- Multiple communication languages.
- Disparities in stakeholders' culture, political environment and intellectual property rights.
- Dissimilar working practices.

Similarly, some other risks for IT Outsourcing are change reluctant attitude, high employee staff turnover, scope slinking, service repudiation from contractor, undetected costs, litigation matters, utilization of superseded technologies by vendor, and high tax tariffs at out source destination [viii]. These risks also yield impediments when business processes are outsourced [ix]. Therefore, the significant risks for outsourcing must be identified, prior to the effective handling, to gain the pay backs of outsourcing [x]. In this context, this study intends to answer the following research questions:

RQ1: What are significant risks in case of IT outsourcing?
Rq2: What is the ranking of the significant risks in case of IT outsourcing?

II. RELATED WORK

IT outsourcing has been discussed in literature from various aspects. According to Ravi, outsourcing risks limit the business process outsourcing and risk management improvement has dramatically increased the sourcing [ix]. A framework for IT outsourcing risk

management has been presented in [vi]. For illustration, five case studies have also been discussed to show risk management. Literature-based IT offshoring risks have been identified in the study [viii] through content analysis. Another study presents risks, benefits and challenges of global IT outsourcing. The study confers two case studies to validate previous research [xi]. Risks related to information system outsourcing have been presented in [xii, xiii] by reviewing relevant literature and performing survey with 5000firms. In order to manage the risks in case of information system outsourcing, an approach has been presented in [xiv] to analyze outsourcing risks. Offshore outsourcing risks, challenges and possible solutions have been discussed in [xv]. Kim and Tim explore empirically how process standardization can reduce the risks related to outsourcing [xvi]. A systematic approach has been proposed in [xvii] to prioritize the outsourcing risks. Another study presents taxonomy of IT outsourcing risks to identify and quantify the risks [xviii]. Achievements and risks in case of information system outsourcing have been presented in [xix]. A framework for risk assessment in case of offshore IT outsourcing has been provided in [xx]. By applying grounded theory principles, offshore IT outsourcing risks have been analyzed in [xxi] from the service provider perspective. Three phase life cycle for information system outsourcing, has been identified in [xxii]. The study also analyses risk factors associated with each phase.

Several studies focus on IT outsourcing risks [ix][x][vi][viii][xi][xii][xvii] but to the best of our knowledge no study provides a list of significant risks for IT outsourcing. The objective of this research is to provide a comprehensive list of significant IT outsourcing risks and rank such risks. The next section explains research methodology followed in this research.

III. Research Methodology

Selection of appropriate research methodology is vital to achieve the research goals. Survey research method has been adopted in order to identify and rank the significant risk for outsourced IT projects. This method is considered as one of the appropriate techniques that work with both qualitative and quantitative data [xxiii]. Various methods can be used to collect the data such as written materials, observations, interviews, data sampling, documentations and survey questionnaires. Moreover, combination of different data gathering techniques or any specific method can be adopted for survey research method [xxiv].Therefore, semi-supervised surveys [xxv] have been deployed to gather required data. Before conducting the survey the respondents were demonstrated the survey goals, format of survey and different sections were explained to respondents specifically how to respond to the questions selecting appropriate option, utilizing *Computer-Assisted Telephone Interviewing* (CATI) technique. CATI is used to facilitate the surveys and guide respondents. *Automated Computer Telephone Interviewing* is advanced form of CATI which is used to record the answers given by respondents.

We have extracted a list of risks for IT outsourcing projects from [x][vi][viii][xi][xii][xiii][xvii]. The risks have been denoted by R_1, R_2, $R_3 \ldots R_{32}$ and have been shown in 2nd column of Appendix A. Several studies are based on lists extracted from literature [xxvi, xxvii]. For further research we have employed Delphi method briefed in the next subsection.

A. Delphi Method

This study involves two rounds of Delphi method. Delphi method is a repetitive process that is used to build the consensus or to converge the opinion of experts on certain issue(s). A group of experts, from a particular area, is employed for two or three rounds of study (or even more). After each round, every expert is provided with a summary of results of that round and his or her response in that round. The experts are suggested to modify their responses given during last round if they feel it appropriate keeping in view the combined responses of other experts in that round. This process is continued till the achievement of a pre-decided criterion like number of rounds or consensus on a specific achievement [xxviii, xxix]. In this research Delphi method was used to identify the RE practices for software development outsourcing that are significant according to the agreed-upon opinion of experts.

For completion of two rounds of Delphi method, two online questionnaire surveys were conducted. Before starting surveys, two rounds of pilot study were carried out for improvement of questionnaires' layout, for estimation of time required for questionnaires' filling and for assessing comprehension of language. We accommodated the suggestions given during first round of pilot study. Second round was conducted to ensure that the recommendations of first round were followed for modifications.

Two online questionnaires were presented to IT outsourcing practitioners belonging to Malaysian and Pakistani software development companies. The respondents were system analysts, senior managers, project managers, requirements engineers, technical managers having at least 10 years of IT outsourcing experience as basic criterion. Prior to conducting study, 200 relevant practitioners were identified who satisfied the basic criterion. Out of 200, only 45 responded to the request for participating in the study. However only 36

(T) respondents completed both rounds and thus were considered for the rest of the analysis.

B. First Questionnaire Survey

Questionnaire used during first round was divided into two parts. The first part was intended to gather information regarding the job nature of respondent, his experience and respective company as well. The succeeding part was for finding significant risks for IT outsourcing. By providing a literature-based list of 32 IT outsourcing risk, respondents were solicited to rank the given risks according to impact of those risks on outsourcing. Based on 10-point scale, four categories of impact as suggested by [xxvi, xxx] are as follows:

a. Catastrophic (C_i) (10): if an issue is most relevant and has direct impact on an IT outsourcing project.
b. Serious (S_i) (7): if an issue is relevant and has significant impact on an IT outsourcing project.
c. Tolerable (T_i) (4): if an issue is insignificantly relevant and has a little impact on an IT outsourcing project.
d. Insignificant (I_i) (1): if an issue is non-relevant and has no measurable impact on an IT outsourcing project.

i) Criterion for Selection of Significant risks for IT Outsourcing

If according to 50% of participants, the perceived effect of a risk falls in 'Catastrophic' and 'Serious' categories, then that is regarded as significant for outsourced IT projects. In preceding studies a similar methodology has been deployed very efficiently, in which decisions were made by taking into consideration the views of 50 percent or above respondents [xxxi, xxxii, xxxiii]. A similar measure was also used by Hall and Rainer [xxxi] for identifying key factors of software process improvement by considering that if 50 percent of respondents agree on strong impact of a factor, then that factor will be considered as important The term 'significant' here means 'important to be worthy of attention' or 'important enough to have an effect' as also described by [xxxiv, xxxv]. To identify the significant risks for IT outsourcing 'Catastrophic' and the 'Serious' impact categories have been taken into account only [xxxvi]. The rationale for this decision is that a risk belonging to 'Catastrophic' category is the most relevant and has direct impact on outsourced projects. Hence such risks must be considered for IT outsourcing projects. Likewise a risk from 'Serious' category is relevant and has significant impact on IT outsourcing project. Thus such risks cannot be ignored. For each risk, The percentages of responses in 'Serious' and 'Catastrophic' categories are represented here by prominence level (PL). It is calculated as follows

$$PL = \frac{[(Ci + Si)]}{T} * 100 \qquad (1)$$

Where C_i = No. of responses in 'Catastrophic' category (in case of an IT outsourcing risk),

S_i = No. of responses in 'Serious' category (in case of an IT Outsourcing risk), and

T = Total number of responses considered for analysis.

C. Second Questionnaire Survey

Questionnaire utilized during the second round also contained two parts. The first part was to collect demographic information about the professionals. The second part was to rank the significant risks for IT outsourcing.

During the first survey, we have sent online questionnaire to the 45 IT outsourcing practitioners. We have received back 40 responses. During the second survey, online questionnaires have been sent to the 40 IT outsourcing professionals who responded in the first round. For the second round, we have been successful in receiving back 36 responses. For the data analysis, we have considered responses from 36 professionals based on their participation in both rounds of Delphi method. The overall research methodology is shown via Fig. 1 below.

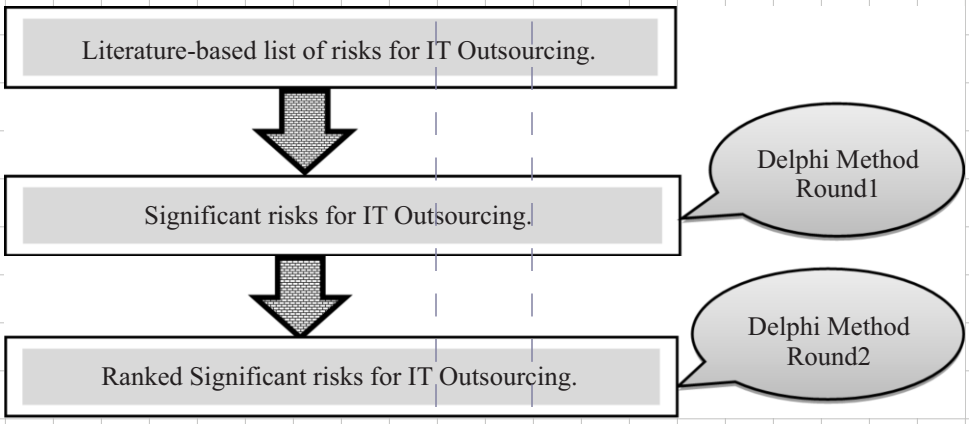

Fig. 1. Steps to identify significant risks for IT outsourcing.

IV. Results and Discussions

Results obtained can be divided into two main categories:

a. Identification of significant risks for IT outsourcing.
b. Ranking of significant risks for IT outsourcing.

A. Identification of significant risks for IT outsourcing

The significant risks for IT outsourcing have been identified through the first round of Delphi method.

i) First Round **:** By providing a literature-based list of 32 risks for IT outsourcing, we requested the IT outsourcing practitioners for ranking the given risks weighing their impact in case of outsourcing. The four categories of the ranks of impact, by incorporating 10-point scale are: Catastrophic (10), Serious (7), Tolerable (4) and Insignificant (1). By applying criterion for significance, we have identified 31 significant risks for IT outsourcing.

The results of first round of Delphi method are shown in column 3 and 4 of Appendix A. The column 3 shows number of responses for Catastrophic, Serious, Tolerable and Insignificant categories, and column 4 displays PL in case of each outsourcing risk. A PL of 50 or above proves that corresponding risk is significant for IT outsourcing. On observing 4th column of Appendix A, it is evident that in case of only one risk (R_{31}) value of PL is less than 50. This means that according to IT outsourcing practitioners' perception, $\mathbf{R_{31}}$is not significant for IT outsourcing. The R_{31}isregarding dissimilar languages at the client and vendor locations. In case of all the remaining IT outsourcing risks, the value of PL is above 50. All of the remaining 31 IT outsourcing risks are, therefore, significant according to defined criterion. This reveals that according to the perception of IT outsourcing professionals, these 31 risks substantially affect IT outsourcing projects, therefore, must be addressed through proactive strategy. The significant risks for IT outsourcing are R_1, R_2, R_3…..R_{29}, R_{30}, and R_{32}. These risks have been shown in 2nd column of Appendix A which also provides answer to research question 1 (RQ1) of this study. In the next phase for ranking, these 31 significant risks will be used as an input.

B. Ranking of the significant risks for IT outsourcing

Significant risks for IT outsourcing have been ranked during the second round of Delphi method based on the results of first round.

ii) Second Round : Before starting the second round of Delphi method, average rankings and standard deviations were calculated in case of each significant risk. In the second round, for each significant risk, IT outsourcing practitioners were provided with their respective individual round 1 ranking and average ranking. The practitioners were solicited to reassess their respective individual rankings, for each significant IT outsourcing risk, keeping in view the average rankings if necessary. The average rankings and standard deviations, for each significant risk, were calculated again after second round.

The average rankings and standard deviations calculated, for each significant risk, after first and second round have been shown in Appendix B. The average rankings calculated after second round have been shown in Table I in descending order**.** This order determines the overall ranks of significant IT outsourcing risks. This provides answer to research question 2 (RQ 2) of this study.

TABLE I
Average Rankings of the Impacts Of Risks (In Descending Order) Calculated After Round 2 of Delphi Method

Final Ranks	Significant Risk for IT Outsourcing	Round 2 Average Rankings of the Impacts of Risks	Final Ranks	Significant Risk for IT Outsourcing	Round 2 Average Rankings of the Impacts of Risks
1	**R_{24}**	9.58	17	R_{14}	8.42
2	**R_{21}**	9.50	18	R_{30}	8.42
3	**R_{23}**	9.50	19	R_{4}	8.33
4	**R_{25}**	9.42	20	R_{12}	8.33
5	**R_{16}**	9.33	21	R_{26}	8.33
6	**R_{29}**	9.08	22	R_{2}	8.08
7	**R_{17}**	9.00	23	R_{9}	8.08
8	**R_{28}**	9.00	24	R_{22}	8.00
9	**R_{11}**	8.92	25	R_{5}	7.92

10	**R_{18}**	8.92	26	R_{10}	7.92
11	R_{19}	8.83	27	R_{8}	7.83
12	R_{32}	8.75	28	R_{15}	7.83
13	R_{1}	8.67	29	R_{3}	7.67
14	R_{20}	8.67	30	R_{7}	7.58
15	R_{13}	8.58	31	R_{6}	6.17
16	R_{27}	8.50			

This is evident from the Appendix B that average standard deviation is reduced from 1.87 in round 1 to 1.83 in round 2. Also practitioners were not available to participate in the third round, therefore, we decided to conclude the study after two rounds.

a. Top 10 significant risks for IT outsourcing

Based on the average rankings of the impacts of risks, given in the Table 1, we confirm that the top ten significant IT outsourcing risks are:

1) Poor communication facilities or communication lack between vendor and client.
2) Inconsistency between outsourcing organization expectations and their deliverables.
3) No protection of Intellectual property rights.
4) Vendor's lack of expertise in related domain.
5) Confidentiality of information.
6) Resource shortage of outsourced location.
7) Legal issues.
8) Lack of trust.
9) The size of project and its complexity.
10) Unpredicted or high staff turnover of vendor.

V. Conclusion

The idea of IT outsourcing is gaining popularity rapidly owing to advantages like reduction of cost, optimal resource utilization and the state realization of art capabilities. But because of the occurrence of the risks like lack of communication between vendor and client, insufficient expertise of vendor and disparity between expectations and deliverables, the outsourcing benefits are not attained. Therefore, possible risks for IT outsourcing must be anticipated and handledin advance. In this study, significant risks for IT outsourcing have been identified and ranked by employing Delphi method. Two rounds of Delphi method have been conducted by involving 36 IT outsourcing practitioners having at least 10 year experience of IT outsourcing. By providing a literature-based list of 32 IT outsourcing risks, the respondentshave been solicited to rank the given risks according to the impact of the risks on IT outsourcing projects. Based on 10-point scale, four categories of a risk impact are: Catastrophic (10), Serious(7), Tolerable (4) and Insignificant (1). During the first round of Delphi method, 31 risks have been identified which are significant for IT outsourcing projects whereas the second round helps us to rank the identified significant risks. The top 10 significant risks have also been presented. The study suggests that for successful completion of outsourced IT projects and to attain foreseen benefits of IT outsourcing, strategy must be designed to avoid or address the identified significant risks for IT outsourcing.

Although this research work identifies significant risks for IT outsourcing but it lacks a framework to address the identified risks. Another limitation is that the study does not compare two contexts. We have addressed the external validity by selecting the opinion of 36 respondents from two different countries. All the relevant practitioners belonging to the two countries may not fully agree with the results, but we believe that this sample is a true representative of population. One limitation of the study is that it has small sample size. However, such small sample sizes are common in studies involving experts from the field because of the lack of time on their part.

One of the important aspects that could be enhanced from this work is to propose a framework for dealing with the identified risks.

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Appendix A: Results of Delphi method round 1

Risk IDs	Risks for IT outsourcing	Assessed Ranks				PL
		C_i	S_i	T_i	I_i	
R_1	High staff turnover of the outsourcing organization.	22	8	6	0	83.33
R_2	Outsourcing organization employees' low morale.	18	13	5	0	86.11
R_3	Resistance to alteration.	15	14	7	0	80.56
R_4	Less awareness about the contractor competence.	20	12	4	0	88.89
R_5	Inadequate or incomplete drafting of the outsourcing contract.	16	15	5	0	86.11
R_6	Augmented switching cost or start- up cost or transaction cost.	10	12	8	6	61.11
R_7	Outsourcing of wrong kind of service.	14	15	7	0	80.56
R_8	Unseen costs (e.g. due to unexpected changes to contract).	15	16	5	0	86.11
R_9	Ambiguous requirements.	17	15	4	0	88.89
R_{10}	Scope creeping.	16	15	5	0	86.11
R_{11}	Project complexity and size.	23	13	0	0	100.00
R_{12}	Risk of business failure.	20	12	4	0	88.89
R_{13}	Degradation or denial of service from contractor.	21	13	2	0	94.44
R_{14}	Vendor does not comply with the contract or fails to deliver.	20	13	3	0	91.67
R_{15}	Usage of obsolete technologies and products by vendor.	18	10	8	0	77.78
R_{16}	Confidentiality of information.	25	11	0	0	100.00
R_{17}	Legal issues.	24	12	0	0	100.00
R_{18}	Unexpected or high staff turnover of vendor.	23	13	0	0	100.00
R_{19}	Long learning curve of contractor's employees.	22	14	0	0	100.00
R_{20}	Disasters at off shored destination.	20	16	0	0	100.00
R_{21}	Disparity between outsourcing organization expectations and deliverables.	28	8	0	0	100.00
R_{22}	High tariff or tax rates at contractor destination.	20	8	8	0	77.78
R_{23}	No protection of Intellectual property rights.	29	7	0	0	100.00
R_{24}	Poor communication facilities or lacking of communication between vendor and client.	28	8	0	0	100.00
R_{25}	Insufficient expertise of vendor in relevant domain.	29	7	0	0	100.00
R_{26}	Synchronization and communication hazards due to different time zones.	21	10	5	0	86.11
R_{27}	Cultural diversities.	20	14	2	0	94.44
R_{28}	Lack of trust.	24	12	0	0	100.00
R_{29}	Shortage of resources on outsourced location.	25	11	0	0	100.00
R_{30}	Delayed delivery.	20	13	3	0	91.67
R_{31}	Dissimilar Languages.	6	8	15	7	38.89
R_{32}	Poor quality	19	13	4	0	88.89

Appendix B: Average Rankings of perceived impacts and Standard Deviations calculated after round 1 & round 2 of Delphi method.

Sr. #	IDs of the Significant Risks for IT outsourcing	Round 1		Round 2	
		Average	St. Dev	Average	St. Dev
1.	R_1	8.33	2.32	8.67	2.08
2.	R_2	8.08	2.17	8.08	2.17
3.	R_3	7.67	2.28	7.67	2.28
4.	R_4	8.33	2.08	8.33	2.08
5.	R_5	7.92	2.13	7.92	2.13
6.	R_6	6.17	3.18	6.17	3.18
7.	R_7	7.58	2.25	7.58	2.25
8.	R_8	7.83	2.10	7.83	2.10
9.	R_9	8.08	2.05	8.08	2.05
10.	R_{10}	7.92	2.13	7.92	2.13
11.	R_{11}	8.92	1.46	8.92	1.46
12.	R_{12}	8.33	2.08	8.33	2.08
13.	R_{13}	8.58	1.83	8.58	1.83
14.	R_{14}	8.42	1.96	8.42	1.96
15.	R_{15}	7.83	2.44	7.83	2.44
16.	R_{16}	9.08	1.40	9.33	1.26
17.	R_{17}	9.00	1.43	9.00	1.43
18.	R_{18}	8.92	1.46	8.92	1.46
19.	R_{19}	8.83	1.48	8.83	1.48
20.	R_{20}	8.67	1.51	8.67	1.51
21.	R_{21}	9.33	1.26	9.50	1.13
22.	R_{22}	8.00	2.48	8.00	2.48
23.	R_{23}	9.42	1.20	9.50	1.13
24.	R_{24}	9.33	1.26	9.58	1.05
25.	R_{25}	9.42	1.20	9.42	1.20
26.	R_{26}	8.33	2.20	8.33	2.20
27.	R_{27}	8.50	1.83	8.50	1.83
28.	R_{28}	9.00	1.43	9.00	1.43
29.	R_{29}	9.08	1.40	9.08	1.40
30.	R_{30}	8.42	1.96	8.42	1.96
31.	R_{32}	8.25	2.08	8.75	1.66
Average			**1.87**		**1.83**