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Research Article

# Intercultural Challenges in Offshore Software Development Outsourcing Relationship: An Empirical Study

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**Abstract:** The importance of intercultural challenges is recognized by both the practitioners and researchers in offshore software development outsourcing (OSDO) relationships. These challenges affect almost all the activities involved in offshore software development outsourcing relationships especially communication, mutual understanding, interpretation and decision making processes etc. which in turn leads to project failure. In our previous published study we identified, through systematic literature review (SLR), various intercultural challenges faced by vendors in OSDO relationship. The aim of this study was to validate these findings through industry practitioners and to identify its intensity as well as to identify any other intercultural challenges, faced by vendor organizations in OSDO relationships. We performed questionnaire surveys with 41 experts from different software companies. A seven point likert scale was used to determine the significance of each intercultural challenge. Our findings indicate that all the intercultural challenges are critical for OSDO vendors. We further analyzed these challenges based on different variables, such as company size, company type, expert's job/position etc. We have identified that there is no significant difference in the intercultural challenges based on company type and expert's experience level. We identified that "language and language proficiency" is the most commonly agreed and "difference in social behaviour" is the most commonly disagreed intercultural challenge in the category of both sizes of company. Similarly "language and language proficiency" is the most commonly agreed challenge based on experts job positions.

**Keywords**: Intercultural challenges, offshore software development outsourcing, vendors, empirical study

## 1. INTRODUCTION

Offshore software development outsourcing (OSDO) is a software development strategy used by various organizations spread across different temporal, cultural and geographical locations around the world. Information system services are transferred from one country to another in OSDO [1]. Services are provided by remote organizations, called vendors, to the client organizations. Indian vendors stood first in providing high quality software to their clients by using software outsourcing as their business strategy [1, 2]. The benefits this strategy provides to client and vendor organizations increase its use globally.

Factors like low development cost and higher availability of resources [3], high quality of software products [4], round the clock development [5], and access to latest technologies [6] attract companies towards offshore software

development outsourcing. The primary reason behind the adoption of OSDO is always low development cost however a latest study [7] stated two key causes for the adoption of OSDO: Firstly, enlarged workers requirements due to large number of software projects, secondly high maintenance charges and inadequate experts at onshore locations.

A number of project failures have been reported in offshore software development outsourcing. Client and vendor's organization geographical separation causes difficulties in face to face meetings [8]. Geographical, temporal and cultural distances negatively affect communication and increase coordination overheads [9-11]. Coordination and control problems arises in OSDO during project work division and assignment [12]. Similarly, software components developed by distributed teams cause many technical issues in integration [13].

Besides the aforesaid issues cultural distance is another issue in OSDO relationships [10], [14]. Client and vendor organizations' cultural incompatibilities and poor relationship management caused many projects failure i.e. partial or complete [4]. Cultural factors have a great impact on the communication, perception and the relationships between the clients and vendors [15]. Similarly cultural and language differences among team members reduce corporation and communication which may result in misunderstandings [9]. To realize the advantages of OSDO we need to address these intercultural challenges. However, despite the significance of intercultural challenges in OSDO relationships, little empirical research has been conducted. In our previous work we have identified numerous intercultural challenges confronted by vendors in OSDO relationships through SLR and has been published [16].This study aims to empirically validate, in OSDO industry, the outcomes of the SLR and to identify any new challenge other than the existing ones. To do so, we formulated the following research questions:

RQ1: What are the intercultural challenges, as identified in the real world, faced by vendors in OSDO relationships?

RQ2: Do the identified intercultural challenges vary based on company type?

RQ3: Do the identified intercultural challenges vary based on expert's experience?

RQ4: Do the identified intercultural challenges vary based on company size?

RQ5: Do the identified intercultural challenges vary based on expert's position?

## 2. BACKGROUND

The significance of cultural understanding and the vital role it plays in the IT field has largely increased over the last twenty years [17]. Cross-cultural inconsistencies and miscommunication hinder the efficiency of software outsourcing [4]. Culture is hard to describe and that is why culture has limited definitions in software outsourcing research field [4]. Culture has been defined in several ways in the literature [18]. A renowned Anthropologist and Sociologist Sir Edward Tylor [19] describes that culture spans knowledge, belief, art, morals, law, customs and any other capabilities and habits acquired by man as a member of society. It is clear from the definition that almost all the activities of life are being influenced by culture. It affects software outsourcing activities i.e. cooperation and coordination, create language barriers and misunderstandings [20]. Vendors must know their client's culture and its effect on software development activities and their relationships [14], [21]. Similarly understanding of both culture and language of the client organization are necessary for the developers [22]. Because language dissimilarities between development teams can result in misunderstanding and information sharing issues [23].

OSDO involves workers from several geographical sites and cultural backgrounds. This rises the need for research on the influence of

cross cultural and national cultural problems [24]. Culture has been identified as a critical factor for vendor organizations in OSDO relationships in our previous research project [14, 25]. Cultural importance cannot be ignored in OSDO relationships, because cultural problems can "make and break an offshore project" [26].

## 3. RESEARCH METHODOLOGY

### 3.1. Survey Design

A Survey research method is used to empirically verify and complement the results of our previously conducted SLR [16]. We took guidance from some previously published studies in order to perform our survey [27-29]. The reason to employ survey method is to target wide range of population in a short span of time with a reasonable budget. In this study, online survey is conducted with software engineering practitioners with the help of Google Doc. This method is considered appropriate for collecting self-reported qualitative and quantitative data from a huge number of people [30]. A survey can be a single or a collection of many data collecting methods such as questionnaires, interviews and others [31]. A questionnaire was used for data gathering because of many reasons such as gathering data from a huge span of people and available resources.

We used structured questionnaire for collecting data from the offshore software outsourcing experts. The questionnaire contained intercultural challenges identified through systematic literature reviews. Apart from the closed ended questions, we placed some open ended questions to find any other intercultural challenge. Seven point likert scale was used to describe the significance of the identified intercultural challenges. The respondents were requested to choose one of the seven options, i.e., Strongly Disagree, Moderately Disagree, Slightly Disagree, Not Sure, Slightly Agree, Strongly Agree, Moderately Agree.

A pilot survey was conducted to validate the questionnaire before sending and posting it on the web. Pilot survey helps in checking the practicability of the web-based survey and also to know the problems in answering the questionnaire. After designing the questionnaire, the secondary author performed piloting of the questionnaire by sending to five members of Software Engineering Research Group (SERG) University of Malakand and revised the questionnaire according to their feedbacks.

### 3.2. Data Sources

The main objective of this survey was to collect data on intercultural challenges faced by vendors in OSDO relationships from software outsourcing experts/practitioners in the industry. We posted a request for participation in our questionnaire survey to different online groups on linkedin as shown in the Table 1. Apart from this we also invited offshore software outsourcing companies and authors of industry papers to take part in the questionnaire survey. The list of the offshore software outsourcing companies is given in Table 2. From this participation a total of 117 participants show their willingness.

### 3.3. Data Analysis

A total of 44 participants responded to the survey, among them 3 responses were rejected because of our quality criteria. Hence, 41 responses, showing a response rate of 35%, were selected and used for the analysis.

Frequency analysis method was used for the analysis of the collected data, because it is useful for the management of descriptive information. Frequency tables were used to report the percentages and number of occurrences of each data variable. Frequencies can be used for numeric as well as ordinal/nominal data and are helpful for contrasting and comparing across group of variables or within groups of variables. Each intercultural challenge is analyzed by counting its existence in the questionnaires and the articles. The relative significance of each intercultural challenge is identified by comparing the existences

**Table 1.** Summary of online outsourcing professionals groups.

| S/ No | Group's Name | Number of Members (at the request time) | Date request posted |
|---|---|---|---|
| 1 | Software Development Outsourcing to Pakistan | 167 | 5th January, 2015 |
| 2 | Global Sourcing | 52,669 | 5th January, 2015 |
| 3 | Software Outsourcing Services in Europe | 1,297 | 5th January, 2015 |
| 4 | Outsourcing and Offshoring | 29,956 | 5th January, 2015 |
| 5 | IT/Software Development Outsourcing & Offshore | 19,123 | 5th January, 2015 |
| 6 | Outsourcing 2 India | 8, 067 | 6th January, 2015 |
| 7 | Global sourcing professionals | 10,000 | 6th January, 2015 |
| 8 | India GIS outsourcing and Offshoring | 185 | 6th January, 2015 |
| 9 | BP0-Business Process Outsourcing | 24, 789 | 6th January, 2015 |

**Table 2.** Summary of Software companies in Pakistan.

| S. No. | Software Company Name | Date the request sent |
|---|---|---|
| 1 | Datumsquare IT Service | 5th January, 2015 |
| 2 | Seven Software Develop-ment (Private) Limited | 5th January, 2015 |
| 3 | Developer Desk Technologies | 9th January, 2015 |
| 4 | DiscreteLogix | 5th January, 2015 |
| 5 | Techaccess Private Limited | 5th January, 2015 |
| 6 | StepNex Services (Pvt) ltd | 7th January, 2015 |
| 7 | Trend micro logics | 7th January, 2015 |
| 8 | Grey Beard Solutions | 9th January, 2015 |
| 9 | Vizteck Solutions | 5th January, 2015 |
| 10 | xFlow Research | 5th January, 2015 |

of one intercultural challenge against another intercultural challenge.

## 4. RESULTS AND ANALYSIS

### 4.1. Intercultural Challenges Identified via Questionnaire Survey

For RQ1, Table 3 depicts the list of intercultural challenges identified via the questionnaire survey. The outcomes show that more than 65% of the respondents agree that all the intercultural challenges are important. 'Organizational culture' is the intercultural challenge that most of the respondents agreed with i.e. 100%. Therefore, we

suggest vendor organizations to emphasis on 'organizational culture' in order to successfully complete OSDO relationship activities.

According to our results "language and language proficiency", "response to time" and "communication style" are the 2nd most agreed, i.e. 95%, intercultural challenges for OSDO vendor organizations. "Communication style" and "language and language proficiency" were also identified as critical intercultural challenges in the SLR results as discussed in section 4.1. Various studies mentioned "language and language proficiency" and "organizational culture" as the significant intercultural challenges for OSDO vendor organizations. Focusing on these two

intercultural challenges will result in efficient communication which is the backbone of any OSDO project.

Third most important intercultural challenge identified through questionnaire survey is the "professional culture" i.e., 92%. Difference in professional culture hinders individual knowledge share ability.

Other important intercultural challenges are: "difference in mutual understanding" – 87%, "different work ethics" – 85%, "attitude towards authority" – 82%, "education system" – 78%, "national culture" – 73%, and "difference in social behaviour" – 68%. These findings validate and complement the findings of the SLR [16]. More than 65% of respondent's willingness shows the importance of these intercultural challenges for OSDO vendor organizations. We suggest OSDO vendors to concentrate on these intercultural challenges in order to establish long lasting relationship with their clients.

Our results show that less than 22% of the respondent disagree that the identified intercultural challenges are not barriers for the OSDO vendors. This low response indicates that the identified intercultural challenges are very important for the vendors and must be handle in order to achieve success in OSDO activities. "Difference in social behaviour" is mentioned as the most unimportant intercultural challenge i.e. 21%. Other most unimportant intercultural challenges include "national culture", "different work ethics" etc. as shown in Table 3.

Table 3 depicts that less than 12% of the respondents are neutral about the identified intercultural challenges. The low percentage of the neutral respondents assures that the identified intercultural challenges are very important for the OSDO vendors and must be addressed properly.

### 4.1.1. Intercultural Challenges for OSDO Vendors Based on Company Type

We got responses from 41 OSDO experts during our questionnaire survey. These experts are form two types of OSDO vendor organizations i.e. national and multinational. The distribution of intercultural challenges based on company type in given in Table 4. In Table 4, DA=Disagree, A=Agree and NS=Not Sure. We gathered the results of slightly, moderately and extremely agree choices into category A. Similarly results of slightly, moderately and extremely disagree choices were gathered into DA category. Respondents which are neither agree or disagree are placed in NS=Not Sure category.

Our results indicate that experts from both company types are agreed with all the intercultural challenges as shown in Table 4. More than 69% of the experts in national companies and more than 66% of the experts in multinational companies are agree with the importance of the intercultural challenges for OSDO vendors. The percentages of the intercultural challenges across the company types are discussed below:

"Organizational culture", "language and language proficiency", and "communication style" are the most agreed intercultural challenges in national companies, i.e., 96%. Whereas "Response to time" is the most agreed intercultural challenge in multinational companies, i.e., 100%.

"Response to time" – 88% in national companies and "language and language proficiency", "difference in mutual understanding", and "professional culture" in multinational companies are the 2nd most agreed intercultural challenges.

In disagreed list (DA), "difference in social behaviour" – 15% is the most disagreed intercultural challenge in national companies. Similarly "national culture" – 33% and "difference in social behaviour" – 33% are the most disagreed intercultural challenge in multinational companies.

In 'Not Sure' (NS) list, 15% of the respondents in national whereas 13% of the respondents in multinational companies are

**Table 3.** Summary of intercultural challenges identified through empirical study.

| S. No. | Intercultural challenges | Experts Perception (n=41) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Positive | | | | Negative | | | | Neutral | |
| | | EA | MA | SA | % of Positive | ED | MD | SD | % of Negative | NS | % |
| 1 | Language and language proficiency | 27 | 9 | 3 | 95 | 1 | 0 | 0 | 2 | 1 | 2 |
| 2 | National culture | 10 | 12 | 8 | 73 | 3 | 2 | 2 | 17 | 3 | 7 |
| 3 | Organizational culture | 16 | 18 | 7 | 100 | 0 | 1 | 1 | 4 | 1 | 2 |
| 4 | Professional culture | 20 | 8 | 10 | 92 | 0 | 0 | 1 | 2 | 4 | 9 |
| 5 | Response to time | 22 | 8 | 9 | 95 | 0 | 0 | 1 | 2 | 2 | 5 |
| 6 | Difference in mutual understanding | 14 | 15 | 7 | 87 | 1 | 0 | 2 | 7 | 2 | 5 |
| 7 | Attitude towards authority | 11 | 15 | 8 | 82 | 0 | 2 | 2 | 9 | 4 | 9 |
| 8 | Difference in social behavior | 12 | 9 | 7 | 68 | 2 | 5 | 2 | 21 | 4 | 9 |
| 9 | Different Work ethics | 15 | 12 | 8 | 85 | 0 | 2 | 3 | 12 | 2 | 5 |
| 10 | Education system | 14 | 12 | 6 | 78 | 0 | 3 | 1 | 9 | 5 | 11 |
| 11 | Communication style | 23 | 9 | 7 | 95 | 1 | 0 | 1 | 5 | 1 | 2 |

**Table 4.** Summary of intercultural challenges based on different Company types.

| S. No. | Intercultural challenges | Expert Responses = 41 | | | | | | Chi Square Test (Linear-by-Linear association $\propto$ = 0.05), df=1 | |
|---|---|---|---|---|---|---|---|---|---|
| | | National (N = 26 ) | | | Multinational (N = 15 ) | | | | |
| | | A | DA | NS | A | DA | NS | $X^2$ | P |
| 1 | Language and language proficiency | 25 | 0 | 1 | 14 | 1 | 0 | 0.060 | 0.807 |
| 2 | National culture | 21 | 2 | 3 | 10 | 5 | 0 | 1.495 | 0.221 |
| **3** | **Organizational culture** | **25** | **0** | **1** | **13** | **2** | **0** | **4.658** | **0.031** |
| 4 | Professional culture | 22 | 0 | 4 | 14 | 1 | 0 | 0.144 | 0.704 |
| 5 | Response to time | 23 | 1 | 2 | 15 | 0 | 0 | 0.567 | 0.451 |
| 6 | Difference in mutual understanding | 22 | 2 | 2 | 14 | 1 | 0 | 0.591 | 0.442 |
| 7 | Attitude towards authority | 22 | 1 | 3 | 11 | 3 | 1 | 0.014 | 0.904 |
| 8 | Difference in social behavior | 18 | 4 | 4 | 10 | 5 | 0 | 1.126 | 0.289 |
| 9 | Different Work ethics | 22 | 2 | 2 | 12 | 3 | 0 | 0.000 | 0.988 |
| 10 | Education system | 21 | 2 | 3 | 11 | 2 | 2 | 0.122 | 0.727 |
| **11** | **Communication style** | **25** | **1** | **0** | **13** | **1** | **1** | **4.573** | **0.032** |

neutral about the identified intercultural challenges.

"Difference in social behaviour" is the most commonly disagreed intercultural challenge in both the companies. The two hypotheses that were observed are given below:

Null hypothesis (H0): There is no significant difference among the intercultural challenges based on company type.

Alternative hypothesis (H1): There is a significant

difference among the intercultural challenges based on company type.

It is clearly evident from Table 4 that only two intercultural challenges ("organizational culture" and "communication style") have value of 'p' less than 0.05 therefore we accept the alternative hypothesis (H1) for these two intercultural challenges. The following are the formulated alternative hypotheses for each case: "Organizational culture" and "communication style" is the most agreed intercultural challenge in

national companies. Whereas in multinational companies both of these intercultural challenges are ranked as the 3rd most agreed intercultural challenges.

### 4.1.2. Intercultural Challenges for OSDO Vendors Based on Expert's Experience

We have divided the total number of respondents into three levels based on their experience. The three levels are junior level experts having experience range of 1-3 years, intermediate level experts having experience range of 4-6 years and senor level experts having more than 6 years of experience in OSDO as shown in Table 5.

From Table 5 it is clear that all the three level of experts are agree with all the intercultural challenges. More than 68% of the junior level experts, more than 69% of the intermediate level experts and 88% of the senior level of experts consider that the identified intercultural challenges are important for OSDO vendors. The percentages of the different intercultural challenges based on the experts level is given below:

In junior level experts list "language and language proficiency", "organizational

culture", "response to time", and "communication style" are the most agreed intercultural challenges i.e. 94%. 'Professional culture' – 100% is the most agreed intercultural challenge according to intermediate level of experts. Similarly senior level experts consider "language and language proficiency", "organizational culture", "professional culture", "difference in mutual understanding", "different work ethics" and "communication style" most important intercultural challenges for OSDO vendors i.e. 100%.

"Difference in mutual understanding" – 89% in junior level, "language and language proficiency" – 92% and "response to time" – 92% in intermediate level, and "national culture" – 88%, "response to time" "difference in attitude towards authority" – 88%, "difference in social behaviour" – 88%, and "education system" – 88% in senior level experts list are the 2nd most agreed intercultural challenges.

"Difference in social behaviour" – 31% and "national culture" – 30% are the most disagreed intercultural challenges in junior and

**Table 5.** Summary of intercultural challenges based on expert's experience level.

| S. No. | Intercultural challenges | Expert Responses = 41 | | | | | | | | | Chi Square Test (Linear-by-Linear association ∝ = 0.05), df=1 | |
| | | Junior (N = 19 ) | | | Intermediate (N = 13 ) | | | Senior (N = 9) | | | | |
| | | A | DA | NS | A | DA | NS | A | DA | NS | $X^2$ | P |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Language and language proficiency | 18 | 0 | 1 | 12 | 1 | 0 | 9 | 0 | 0 | 0.010 | 0.921 |
| 2 | National culture | 14 | 3 | 2 | 9 | 4 | 0 | 8 | 0 | 1 | 1.456 | 0.228 |
| 3 | Organizational culture | 18 | 1 | 0 | 11 | 1 | 1 | 9 | 0 | 0 | 0.575 | 0.448 |
| 4 | Professional culture | 14 | 1 | 4 | 13 | 0 | 0 | 9 | 0 | 0 | 0.119 | 0.73 |
| 1 | Response to time | 18 | 1 | 0 | 12 | 0 | 1 | 8 | 0 | 1 | 1.089 | 0.297 |
| 6 | Difference in mutual understanding | 17 | 1 | 1 | 10 | 2 | 1 | 9 | 0 | 0 | 0.220 | 0.639 |
| 7 | Attitude towards authority | 16 | 1 | 2 | 9 | 3 | 1 | 8 | 0 | 1 | 0.296 | 0.587 |
| 8 | Difference in social behavior | 10 | 6 | 3 | 10 | 3 | 0 | 8 | 0 | 1 | 0.260 | 0.610 |
| 9 | Different Work ethics | 16 | 2 | 1 | 9 | 3 | 1 | 9 | 0 | 0 | 0.063 | 0.802 |
| 10 | Education system | 13 | 2 | 4 | 11 | 2 | 0 | 8 | 0 | 1 | 0.018 | 0.893 |
| 11 | Communication style | 18 | 0 | 1 | 11 | 2 | 0 | 9 | 0 | 0 | 0.400 | 0.527 |

intermediate level experts lists respectively. Whereas none of the senior level experts disagree with any of the intercultural challenges as shown in Table 5.

21% of the junior experts, 7% of the intermediate experts, and 11% of the senior experts were not sure about the intercultural challenges.

The results show more similarities than differences among the intercultural challenges across different expert's level. "Language and language proficiency" and "organizational culture" are the most commonly agreed intercultural challenges in junior experts and senior experts list. Similarly "Professional culture" is the most commonly agreed intercultural challenge in intermediate and senior expert's list. The two hypotheses that were observed are given below:

Null hypothesis (H0): There is no difference among the intercultural challenges across different expert's level.

Alternative hypothesis (H1): There is a significant difference among the intercultural challenges across different expert's level.

As it is evident form Table 5 that none of the intercultural challenges have value of 'p' less than 0.05. Therefore we accept the null hypotheses (H0) which means that there is no significant difference among the intercultural challenges based on different expert's level.

### 4.1.3. Intercultural Challenges for OSDO Vendors Based on Company Size

The whole sample size i.e. 41 responses from the experts were divided into two categories based on company size: 'Small' and 'Medium & Large'. We combined medium and large size companies because we got very few responses from large size companies.

Our results shows that more than 66% of the respondents in small companies and more than 65% of the respondents in 'medium & large' companies agreed that the identified intercultural challenges are confronted by vendors in OSDO relationships. The percentages of various intercultural challenges based on company size are given below:

Table 6 shows that "organizational culture" – 100% and "communication style" – 100% in small companies and "response to time" in medium & large companies are the most agreed intercultural challenges.

"Language and language proficiency" – 91% and "organizational culture" – 91% are the 2nd most agreed intercultural challenge in small companies. Similarly medium & large companies also consider "language and language proficiency" – 96% as the 2nd most significant intercultural challenge for OSDO vendors.

In small companies "difference in social behaviour" and "education system" whereas "difference in social behaviour" in medium & large companies are the most disagreed intercultural challenges.

Similarly 16% of the small company's respondents and 10% of the medium & large company's respondent are neutral about the identified intercultural challenges.

As it is clear for the above results that "language and language proficiency" are the most commonly agreed and "difference in social behaviour" are the most commonly disagreed intercultural challenges in both sizes of companies. The two hypotheses that were observed are given below:

Null hypothesis (H0): There is no difference among the intercultural challenges based on different company sizes.

Alternative hypothesis (H1): There is a significant difference among the intercultural challenges based on different company sizes.

We can see form Table 6 that only one intercultural challenge i.e. "organizational culture" has chi square value of 'p' less than 0.05. Therefore, alternative hypotheses (H1) is accepted

**Table 6.** Summary of intercultural challenges based on different company sizes.

| S. No. | Intercultural challenges | Expert Responses = 41 | | | | | | Chi Square Test (Linear-by-Linear association $\propto$ = 0.05), df=1 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Small (N = 12 ) | | | Medium & Large (N = 29 ) | | | | |
| | | A | DA | NS | A | DA | NS | $X^2$ | P |
| 1 | Language and language proficiency | 11 | 0 | 1 | 28 | 1 | 0 | 0.105 | 0.746 |
| 2 | National culture | 10 | 1 | 1 | 21 | 6 | 2 | 1.084 | 0.298 |
| 3 | Organizational culture | 12 | 0 | 0 | 26 | 2 | 1 | 4.329 | 0.037 |
| 4 | Professional culture | 10 | 0 | 2 | 26 | 1 | 2 | 1.015 | 0.314 |
| 5 | Response to time | 9 | 1 | 2 | 29 | 0 | 0 | 0.022 | 0.882 |
| 6 | Difference in mutual understanding | 11 | 0 | 1 | 25 | 3 | 1 | 3.608 | 0.057 |
| 7 | Attitude towards authority | 10 | 1 | 1 | 23 | 3 | 3 | 0.189 | 0.664 |
| 8 | Difference in social behavior | 9 | 2 | 1 | 19 | 7 | 3 | 0.477 | 0.490 |
| 9 | Different Work ethics | 10 | 1 | 1 | 24 | 4 | 1 | 0.274 | 0.601 |
| 10 | Education system | 8 | 2 | 2 | 24 | 2 | 3 | 0.272 | 0.602 |
| 11 | Communication style | 12 | 0 | 0 | 26 | 2 | 1 | 0.409 | 0.523 |

**Table 7.** Summary of intercultural challenges based on expert's job position.

| S. No. | Intercultural challenges | Expert Responses = 41 | | | | | | Chi Square Test (Linear-by-Linear association $\propto$ = 0.05), df=1 | |
|---|---|---|---|---|---|---|---|---|---|
| | | Developers (N = 30 ) | | | Managers (N = 11 ) | | | | |
| | | A | DA | NS | A | DA | NS | $X^2$ | P |
| 1 | Language and language proficiency | 29 | 0 | 1 | 10 | 1 | 0 | 2.073 | 0.150 |
| 2 | National culture | 25 | 3 | 2 | 6 | 4 | 1 | 5.372 | 0.020 |
| 3 | Organizational culture | 29 | 1 | 0 | 9 | 1 | 1 | 1.849 | 0.174 |
| 4 | Professional culture | 25 | 1 | 4 | 11 | 0 | 0 | 0.279 | 0.597 |
| 5 | Response to time | 27 | 1 | 2 | 11 | 0 | 0 | 0.312 | 0.576 |
| 6 | Difference in mutual understanding | 29 | 1 | 0 | 7 | 2 | 2 | 0.699 | 0.403 |
| 7 | Attitude towards authority | 25 | 3 | 2 | 8 | 1 | 2 | 0.561 | 0.454 |
| 8 | Difference in social behavior | 21 | 6 | 3 | 7 | 3 | 1 | 1.084 | 0.298 |
| 9 | Different Work ethics | 24 | 4 | 2 | 10 | 1 | 0 | 0.001 | 0.973 |
| 10 | Education system | 22 | 2 | 4 | 10 | 0 | 1 | 2.922 | 0.087 |
| 11 | Communication style | 28 | 1 | 1 | 10 | 1 | 0 | 1.360 | 0.244 |

for the intercultural challenge i.e. "organizational culture". The alternative hypotheses formulated for "organizational culture" is given below:

"Organizational culture" is the most agreed intercultural challenge in small but 3rd most agreed in 'medium & large' companies.

Only significant difference, i.e., "organizational culture" across the company's size is shown in Table 6.

### 4.1.4. Intercultural challenges for OSDO vendors based on expert's position

All the 41 responses we got form different experts are divided into two categories based on their job positions: developers and managers. Developer's category consists of front end, back end developers and manager's category consists of managers, team leads, and analysts. More than 70% of the developers and more than 54% of the

managers are agree with importance of all the intercultural challenges. The percentages of various intercultural challenges across the two job positions are given below:

> According to our results "language and language proficiency" – 96% and "organizational culture" – 96% in developer's list whereas "professional culture" – 100% and "response to time" – 100% in manager's list are the most agreed intercultural challenges.

> "Communication style" – 93% is the 2nd most agreed intercultural challenge in developer's list. Similarly "language and language proficiency", "different work ethics", "education system" and "communication style" are the 2nd most agreed i.e. 90% intercultural challenges in manager's list.

> In disagreed list (DA), "difference in social behaviour" – 20% and "national culture" – 36% are the most disagreed intercultural challenges in developer's and manager's lists respectively.

> 13% of the developers and 18% of the managers are not sure about the intercultural challenges as shown in Table 7.

From the above analysis it is clear the "language and language proficiency" is the most commonly agreed intercultural challenge in both types of job positions. The two hypotheses that were observed are given below:

*Null hypothesis (H0):* There is no difference among the intercultural challenges based on expert's job position.

*Alternative hypothesis (H1):* There is a significant difference among the intercultural challenges based on expert's job position.

Table 7 shows that only one intercultural challenge i.e. "national culture" has 'p' value less than 0.05. It means that there is a significant difference for "national culture" across different expert's job positions. The alternative hypotheses

formulated for "national culture" is given below:

> "National culture" is the most agreed intercultural challenge in developer's list and least agreed intercultural challenge in manager's list.

The significant difference is shown in Table 7 for national culture.

## 5.   SUMMARY OF FINDINGS

Intercultural challenges confronted by vendors in OSDO relationships have been identified through empirical study. Vendor organizations need to address these intercultural challenges properly in order to establish long lasting relationships with the client organizations. Critical intercultural challenges have been identified via the following criteria:

> If an intercultural challenge is strongly agreed by >= 50% of the experts then we consider that intercultural challenge as a critical intercultural challenge.

Other researchers have also used the same criterion [21]. However, researchers can specify their own criteria in order to select the criticality of identified intercultural challenges.

For RQ1, using the aforementioned criterion we have identified that all the intercultural challenges are critical for OSDO relationships as depicted in Table 3. All the intercultural challenges have frequency greater than 50% which shows the importance of all these challenge in OSDO relationships. In order to achieve success in OSDO relationships with the clients we recommend vendors to properly address all the listed intercultural challenges.

Using the above criterion we have identified that all the intercultural challenges are critical for RQ2, RQ3, RQ4 and RQ5. It shows the importance of these intercultural challenges in OSDO relationships. For RQ2 we identified two significant differences i.e. "organizational culture" and "communication style". National companies

are mostly agreed with these two intercultural challenges whereas in in multinational companies both of these intercultural challenges are the 3rd most agreed intercultural challenges. For RQ3 we identified no significant difference among the intercultural challenges based on expert's experience. For RQ4 using the above criterion we identified only one significant difference, i.e., "organizational culture". "Organizational culture" is the most agreed intercultural challenge in small but the 3rd most agreed in 'medium & large' companies. Similarly we identified only one significant difference for RQ5 i.e. "national culture". "National culture" is the most agreed intercultural challenge in the developer's list and least agreed intercultural challenge in the manager's list.

## 6. LIMITATIONS

Construct validity is concerned with whether or not the measurement scales represent the attributes being measured. This research used attributes that were taken from our previous research project [16]. The participants' replies show that the considered attributes were relevant to their work. Evaluation of the results can be accomplished through internal validity. The outcomes of the pilot studies provide a satisfactory level of internal validity as the variables involved in our study were taken from widespread literature review and piloting of questions. External validity is related with the generalisation of the outcomes to environments other than the one in which the preliminary study was conducted [32]. We gathered results from 41 experts in total, both national and international, which ensures the external validity; however we cannot argue that all other experts other than the respondents from these countries would agree with these challenges, we believe that they provide a representative sample.

Questionnaire survey method has limitation, that is, the respondents are given a list of possible intercultural challenges and are enquired to select

the challenges confronted by vendors in OSDO relationships. This limits the respondents to the given list of challenges and they only focus on the provided list. We asked the respondents to mention any other intercultural challenge if they know other than those already given in the questionnaire. However, like other many researchers (e.g. [33-35,37-39]), we are sure about our results because they are collected from a wide span of experts and practitioners working in OSDO industry. Moreover, experiences of experts were explored independently and without the researcher's suggestions.

## 7. CONCLUSIONS AND FUTURE WORK

Intercultural challenges faced by vendors have been investigated via empirical study in this research. Properly addressing these intercultural challenges will lead OSDO vendor organizations to successful and long lasting relationships with their clients. Our findings indicate that all the intercultural challenges are critical and important for the OSDO relationships as all the practitioners in the sample strongly agreed with these challenges.

The main objective of this research is to provide a bunch of information to the software development outsourcing vendors to assist them to successfully address intercultural challenges and establish effective relationships with their clients. We propose vendor organizations to emphasis on frequently mentioned challenges as depicted in Table 3 (RQ1) in general. Vendors working with different kinds of organizations (national and multinational) are advised to emphasis on the frequently mentioned intercultural challenges in Table 4 (RQ2). In order to know the experiences of junior, intermediate and senior-level experts, vendors should emphasis on the frequently mentioned challenges identified in Table 5 (RQ3). Similarly vendors undertaking outsourcing with different sizes of organizations (Small, Medium and Large) are advised to emphasis on the frequently mentioned challenges identified in

Table 6 (RQ4).

In case any vendors who want to know the experiences of developers and managers then they should emphasis on the frequently mentioned challenges as depicted in Table 7 (RQ5). We have planned to work on the following goals in future:

To conduct research on each intercultural challenge independently

To identify practices/mitigation advice for addressing each of the identified critical intercultural challenge via empirical study.

Intercultural challenges Mitigation Model (ICCMM) is the ultimate goal of this research study. The empirical study conducted in this research contributes to the 2nd phase of the ICCMM. The proposed structure of the ICCMM has been published [36]. ICCMM will assist vendors in addressing the identified intercultural challenges and managing their relationships with the clients.

## 9. REFERENCES

1. Kumar, S.A. and A.K. Thangavelu. Factors affecting the outcome of global software development projects: An empirical study. In: *IEEE International Conference on Computer Communication and Informatics (ICCCI -2013).* Coimbatore, India (2013).

2. Li, F., H. Lin, S. Li, C. Guo, & X. Zhao. Self-adapting task allocation approach for software outsourcing services. In: *IEEE International Conference on Service Operation, Logistics and Informatics (SOLI),* Suzhou, China (2012).

3. Wende, E. & T. Philip. Instant messenger in offshore outsourced software development projects: Experiences from a case study. In: *44th IEEE Hawaii International Conference System Sciences (HICSS),* Kauai, Hawaii (2011).

4. Shah, H., N.J. Nersessian, J.H. Mary, & N. Wendy. Studying the influence of culture in global software engineering: Thinking in terms of cultural models. In*: 4th International Conference on Intercultural Collaboration (ICIC '12),* Bengaluru, India (2012).

5. Cho, J. Globalization and global software development. *Issues in Information Systems* 8(2): 287-290 (2007).

6. Khan, S.U. & M. Niazi, Software Outsourcing Vendors' Readiness Model (SOVRM). School of Computing and Mathematics, Keele University, UK. p.381 (2011).

7. Nidhra, S., M. Yanamadala, W. Afzal, & R. Torkar, Knowledge transfer challenges and mitigation strategies in global software development — A systematic literature review and industrial validation. *International Journal of Information Management* 33: 333-355 (2013).

8. Jaanu, T., M. Paasivaara, & C. Lassenius. Effects of four distances on communication processes in global software projects. In: *IEEE International Symposium on Empirical Software Engineering and Measurement (ESEM),* Lund, Sweden (2012).

9. Bannerman, P.L., H. Emam, & J. Ross. Scrum practice mitigation of global software development coordination challenges: A distinctive advantage? In: *45th IEEE Hawaii International Conference on System Sciences.* Maui, Hawaii (2012).

10. Ita, R., C. Valentine, M. Fergal, B. John, & B. Sarah, A process framework for global software engineering teams. *Information and Software Technology* 54(11): 1175-1191 (2012).

11. Palacio, R.R., A.L. Moran, V.M. Gonzalez, and A. Vizcaino, Selective availability: Coordinating interaction initiation in distributed software development. *Institution of Engineering and Technology (IET) Software* 6(3): 185-198 (2012).

12. Gopal, A., E. J. Alberto, G. Sanjay, & D. David, Coordination and performance in global software service delivery: The vendor's perspective. *IEEE Transaction on Engineering Management* 58(4): 772-785 (2011).

13. Ilyas, M. & S.U. Khan. *Software integration model for global software development.* In: 15th International Multitopic Conference (INMIC)*,* Islamabad, Pakistan (2012).

14. Khan, S.U., M. Niazi, and R. Ahmad, Barriers in

the selection of offshore software development outsourcing vendors: An exploratory study using a systematic literature review. *Information and Software Technology* 53(7): 693-706 (2011).

15. Boroujerdi, M. & Y. Wang. *Cultural Challenges on Information Technology Outsourcing.* PhD Dissertation, Department of Computer Science and Engineering, University of Gothenburg, Gothenburg, Sweden (2015).

16. Khan, S.U. & M.I. Azeem, Intercultural challenges in offshore software development outsourcing relationships: An exploratory study using a systematic literature review. *Institution of Engineering and Technology (IET) Software* 8(4): 161-173 (2014).

17. Casey, V. Imparting the importance of culture to global software development. *ACM Inroads* 1(3): 51-57 (2010).

18. Zakour, A. B. Cultural differences and information technology acceptance. In: *7th Annual Conference of the Southern Association for Information Systems*, Savannah, USA, p. 156-161, (2004).

19. Tylor, S.E.B. *Primitive Culture: Researches into the Development of Mythology, Philosophy, Religion, Art, and Custom.* Cambridge University Press, Cambridge, UK, 468 pp. (2010).

20. Herbsleb, J. & D. Moitra, Global software development. *IEEE Software,* 18(2): 16-20 (2011).

21. Khan, S.U., M. Niazi, & R. Ahmad, Empirical investigation of success factors for offshore software development outsourcing vendors. *Institution of Engineering and Technology (IET) Software* 6(1):1-15 (2012).

22. Abufardeh, S. & K. Megal. The impact of global software cultural and linguistic aspects on global software development process (GSD): Issues and challenges. In: *4th IEEE International Conference on New Trends in Information Science and Service Science (NISS).* Gyeongju, South Korea, p. 133-138(2010).

23. Verner, J.M., O.P. Brereton, B.A. Kitchenham, M. Turner, & M. Niazi, Risks and risk mitigation in global software development: A tertiary study. *Information and Software Technology* 56(1): 54-78 (2014).

24. Niazi, M., N. Ikram, M. Bano, S. Imtiaz, & S.U. Khan, Establishing trust in offshore software outsourcing relationships: An exploratory study using systematic literature review. *Institution of Engineering and Technology (IET) Software* 7(5): 283-293 (2013).

25. Khan, S.U., M. Niazi, & R. Ahmad, Factors influencing clients in the selection of offshore software outsourcing vendors: An exploratory study using a systematic literature review. *The Journal of Systems and Software* 84(4): 686-699 (2011).

26. Gupta, U. & V. Raval, Critical success factors for anchoring offshore projects. *Information Strategy: The Executive's Journal* 15(2): 21-27 (1999).

27. Niazi, M., D. Wilson, D. Zowghi, & B. Wong. A model for the implementation of software process improvement: An empirical study. In: *Proceedings of Fifth International Conference on Product Focused Software Process Improvement* (Profes 2004). Kausai Science City, Japan, April 5-8, 2004 (2004).

28. Niazi, M., K. Cox, & J. Verner. An empirical study identifying high perceived value requirements engineering practices. In: *Fourteenth International Conference on Information Systems Development (ISD´2005).* Karlstad University, Sweden, August 15-17, (2005).

29. Niazi, M., S. Mahmood, M. Alshayeb, & A. Hroub, Empirical investigation of the challenges of the existing tools used in global software development projects. *Institution of Engineering and Technology (IET) Software* 9(5): 135-143 (2015).

30. Kitchenham, B. & S.L. Pfleeger, Principles of Survey Research, Parts 1 to 6, SIGSOFT Software Engineering Notes. ACM Press (2001-2002).

31. Lethbridge, T.C., Studying Software engineers: data collection techniques for software field studies. *Empirical Software Engineering,* 10: 311-341 (2005).

32. Regnell, B., P. Runeson, & T. Thelin, Are the perspectives really different-further experimentation on scenario-based reading of requirements. *Empirical Software Engineering* 5(4): 331-356 (2000).

33. Niazi, M., D. Wilson, & D. Zowghi, Critical success factors for software process improvement: An empirical study. *Software Process Improvement and Practice Journal* 11(2): 193-211 (2006).

34. Baddoo, N. & T. Hall, Motivators of software process improvement: An analysis of practitioner's views. *Journal of Systems and Software* (62): 85-96 (2002).

35. Beecham, S., T. Hall, & A. Rainer, Software process problems in twelve software companies: an empirical analysis. *Empirical Software Engineering* 8: 7-42 (2003).

36. Azeem, M.I. & S.U. Khan, Intercultural challenges mitigation model for software development

outsourcing vendors. *International Journal of Advanced Science and Technology* 47: 123-132 (2012).

37. Ali, S & S.U. Khan, Critical Success Factors for Software Outsourcing Partnership (SOP): A Systematic Literature Review, In: 9th IEEE International Conference on Global Software Engineering Software Engineering Conference (ICGSE 2014), Shanghai China, p.153-162(2014).

38. Khan S.U & S. Ali, Empirical Investigation of Success Factors for Establishing Software Outsourcing Partnership from Vendor's Perspective. *Proceedings of the Pakistan Academy of Sciences* 52(4):315–328 (2015).

39. Ali, S. & S.U. Khan. Software Outsourcing Partnership Model. *Science International (Lahore)* 26(4): 1437-144 (2014).