

# THE PERSPECTIVES, MOTIVATORS AND CHALLENGES OF OFFSHORE SOFTWARE DEVELOPMENT

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## ABSTRACT

Software project offshoring is a rapidly growing trend. With this rapid growth, the software engineering research community is facing many challenges like cultural differences, linguistic problem etc because offshore software development is largely different from co-located software development OSD. This variance in software development nature has introduced many challenges. One of them is communication gap between client and offshore vendor. The literature evidences indicate that many problems like time delays, over budgeting etc are directly rooted from this communication gap and some new risks are also introduced by poor communication in OSD offshore software development [5, 7]. In this paper we have highlighted different perspectives, and motivators of OSD. We have emphasized on the significance of some OSD challenges and especially focused on communication problems between client and offshore vendor along with suggested future work.

**Keywords:** *OSD, Offshore Communication, Offshoring, Offshore Outsourcing, Client-Vendor, Offshore Vendor*

## 1. INTRODUCTION

Due to the rapid development of information technology, the world has become a global village. In this era of globalization, software engineering trends have been totally changed. Like other communities, software engineering community is also utilizing global resources. Now software projects are being developed through establishing offshoring relationships. Software project offshoring is a rapidly growing trend. Along with the fruitfulness like cost reduction and accessing specialized skills, community is also facing challenge of communication across two different countries. The offshore outsourcing literature indicates that communication between client and offshore vendor is very critical challenge in a work setting where there are time zone differences, long distances, linguistics problems, and cultural differences between the teams. In such a situation a study on communication issues in OSD might be worthwhile for both client and vendor in order to reduce the communication gap.

The objective of study is to highlight the communication needs and challenges in OSD and to address those challenges in order to meet communication needs of OSD. The study addresses the significance of client-vendor communication in an offshoring relationship.

## 2. LITERATURE REVIEW

In recent years, software development paradigm has shifted from co-located software development to distributed software development. The nature of software development has changed now. New trends like distributed software development, software project outsourcing, software project offshoring, and even global software development (GSD) have been introduced. Our research analyzes the communication process in OSD.

### 2.1. Offshore Software Development

In OSD, the development work is usually done at offshore development centers. In OSD, a business process done at a local company is transferred to a foreign country in order to take advantage of low cost labor, regardless of whether the work done in the foreign country is still performed by the local company or a third party [7, 14]. Normally the ratio between onsite and offshore team members is 1 to 5 and the offshore team members usually handle coding and unit testing, while the onsite team's responsibility primarily consists of customer interaction, integration testing and system testing [3].

**2.2. Offshoring VS outsourcing**

According to the National Academy of Public Administration, the terms offshoring and Outsourcing are defined as follows:

**Offshoring:** “The process of shifting service and manufacturing activities of an organization abroad to their own affiliated or unaffiliated firms” [12].

**Outsourcing:** “The process of contracting out service and manufacturing activities to unaffiliated firms co-located or located in foreign countries” [12].

For offshoring software project, it is precondition that some of the activities of software development are shifted to an offshore vendor. Offshoring is sometimes termed as outsourcing or offshore outsourcing. The terms outsourcing, offshore outsourcing, and offshoring are usually used interchangeably but they have few slight technical differences. Outsourcing is a practice that involves the transfer of an organizational function to a third party within the same country or in a foreign country while offshoring involves the transfer of an organizational function to another country, regardless of whether the work remains within the same organization or given to a third party vendor [13].

**2.3. Perspectives of offshore software development**

There are different perspectives of software project outsourcing including Offshore delivery model, Offsite delivery model, Global delivery model, Onsite delivery model, Offshore/Onsite delivery model, Offsite/Offshore delivery model, and Offshore development centers model [12]. In this study, we are interested in OSD rather than software outsourcing because in some perspectives of software outsourcing, client and vendor can communicate easily. So we have considered only those perspectives which involve offshoring. For OSD, some of the activities are performed at client side and some are performed at offshore site. So, from the above mentioned perspectives of software project outsourcing, we have selected only those perspectives which involve offshoring. Following are some of OSD perspectives.

**i) Offshore software development perspective**

In this perspective of OSD, client and vendor are located in different countries as shown in fig.1.

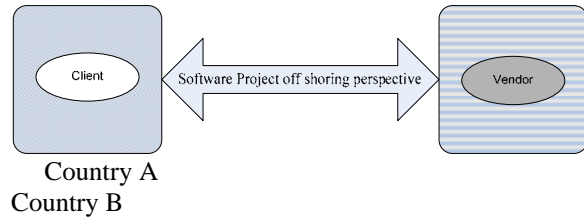


Fig. 1: Software Project offshoring perspective

**ii) Offshore in-sourcing perspective**

In offshore in-sourcing perspective of OSD, both client and vendor are located in the same country. But the vendor firm has their own OSD centers as shown in fig.2. In offshore in-sourcing perspective, vendor may carry out some of the activities onsite but most of work is done offshore.

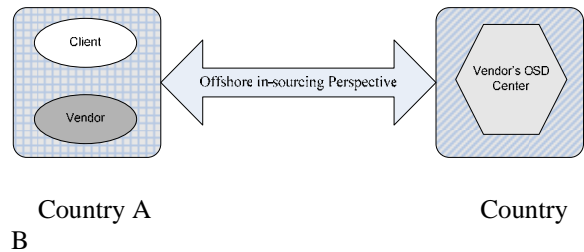


Fig. 2: Offshore in-sourcing Perspective

**iii) Offshore outsourcing perspective**

In offshore outsourcing perspective, both client and vendor are located in the same country. But the vendor outsources some of the activities or whole of the project to a third party located in another country as depicted from fig.3.

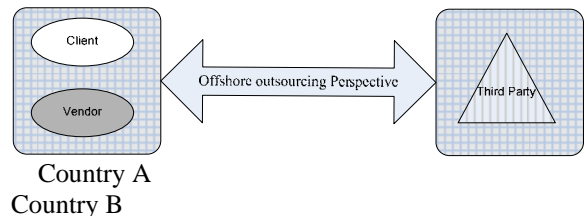


Fig. 3: Offshore Outsourcing Perspective

**2.4. Software offshoring motivators**

Some common motivators of OSD in order of priority include cost reduction, accessing



specialized skills and decreased time-to-market and customer proximity [17]. The primary motivator for OSD is cost [1]. The primary motivator for offshore development is cost but it is very difficult for offshore development community to reduce it due to communication problems. There is always an extra cost due to communication gap in offshoring [17]. Lower cost labor is first and most important motivator of OSD. In Asian countries, labor cost is very low like in India, the labor wages are less than 50% of their equivalent labor in USA and other European countries [24].

Companies decide to offshore their software development (SD) projects to low wage countries in order to minimize the costs, to enter in a new labor pool, new markets, to increase the quality of service or reduce the time to [24]. Offshore outsourcing provides a best alternative to implement distributed software development and to take advantage of the lower cost in other markets [19].

The primary motivators of OSD are cost savings, accessing specialized skills and increasing development speed [5]. The main purpose of decision for offshoring is to reduce the development cost [8]. Cost saving is not the only benefit of offshoring that makes it attractive. Other benefits such as an educated- English speaking work force and low turnover rates are all making offshoring more feasible for the OSD community [13]. In recent years, OSD is growing because OSD has many benefits like cost, increased flexibility [20].

There are many motivators of OSD like access to global expertise, reduced costs, achieve business goals faster, high quality results, benefit of focused employees, competitive advantage, no additional hiring required and sale software ship [15]. Accessing to global market and improved time-to-market by using time zone differences in “round the clock” are also included in the core advantages and objectives of OSD [23].

## 2.5. Challenges in offshore software development

In OSD, customer and vendor face different challenges like cultural differences, communication and coordination issues, and linguistic problems [9, 21]. Communication and coordination are two major pillars of OSD [24]. As it is common that a new challenge for OSD community is the offshore communication between client and vendor which co-located software development community to some extent does not face. Therefore, to achieve

fruitfulness of OSD, communication between client and vendor should be improved. One major reason that OSD community does not achieve its goal is poor communication between client and vendor [24]. Communication is the most common reason that, work sent offshore failed to meet project specification [14, 16].

Along with the advantages, some challenges of OSD are also there, such as scope creeping, within budget completion, poor software quality and communication between client and vendor [23]. Some of the well known challenges of OSD include communication, transfer of business logics, poorly defined project scope that require a lot of client cooperation, time zone differences, unclear and ambiguous requirements, insufficient customer involvement, cultural differences and geographical distances [23]. The only way to address these challenges is to develop a coordinative, cooperative, informative, and feedback-oriented communication relationship between client and offshore vendor.

Communication is the most critical factor in establishing and maintaining a close relationship between client and vendor [9]. When we move from co-located software development to OSD, we have to face challenges, like long distances, cultural diversity, linguistic problems, and differences in time zones, holiday customs, and limited use of technology. Some other very serious issues include lack of direct communication, late response or non-response, company’s confidential business policy and offshoring the offshorers. All these challenges directly affect the client-vendor communication in OSD. Now we are going to discuss these challenges in detail

### 2.5.1. Distance

Geographical differences largely affect the communication between client and vendor. As the distances increases, some new communication problems are introduced and it becomes difficult to travel for face-to-face meetings. Long distance introduces new challenges in the regions and frequent communication almost becomes impossible. As the distances increase, communication cost and cultural differences also increase. In OSD, change requests are very difficult to handle due to long distances between client sites and offshore vendor sites [4]. In OSD, communication between the client and offshore developer sites becomes difficult due to the long distances, time differences, and language barriers



despite establishing sophisticated IT technology [25].

### 2.5.2. Cultural differences/cultural diversity

It depends upon the culture that how people interpret and react to a situation [10]. There are different cultures in different societies. The cultural difference leads to ambiguous requirements analysis and often causes misunderstandings. The only way to reduce cultural diversity and establishing and maintaining a successful client-vendor relationship is to have an effective communication approach. Most of the vendors suggest that frequent communication not only help to avoid misunderstandings but also improves cultural understanding [5]. It is interesting to note that all the vendors consider that communication and cultural understanding are the most crucial factors in maintaining trust relationship with clients [5]. Cultural differences can become a barrier to communication, knowledge exchange [13]. Due to cultural differences, close cooperation between client and vendors is required in OSD [19].

### 2.5.3. Linguistic problems

Communication gap occurs due to cultural differences and linguistic problems. [4]. Offshoring often includes international teams, so the effects of cultural and linguistic issues on team communication, expectations etc, should also be addressed [6].

### 2.5.4. Differences in time zones

In OSD, time zone difference is also a major barrier to communication because successful communication is not possible if a time is inconvenient for either of the communicating parties. Difference in time zones limited the ability to communicate in real times [11]. In OSD, time zone differences reduce opportunities for real time collaboration and response time increases significantly when working hours in client and vendor countries do not overlap [11].

### 2.5.5. Holiday customs

Another big reason of communication gap in software project outsourcing is difference in holiday customs. Different countries and business societies have different holiday customs. Due to this difference, communication could not take place at proper times and replies often come the day after tomorrow. Difference in holiday customs bitterly affects the development speed and performance of

the development team. Basically, this is the main reason of schedule slippage.

### 2.5.6. Limited use of technology

Another reason of communication problems in software project offshore outsourcing is that, there is limited use of communication technology because most of small vendor companies cannot afford the expensive means of communication technology. If they use advanced means of communication, then it results in a business process overhead in the form of increased cost.

### 2.5.7. Lack of direct communication

Another problem in client-vendor relationship is the lack of direct communication that causes a huge communication gap and has undesirable consequences. In software offshoring relationship, most of the communication occurs through project managers but to achieve the business value of each development activity, it is essential that technical and concerning staff should interact directly by using appropriate communication modes.

### 2.5.8. Late response or non-response

In indirect communication, responses are often come late and sometimes non-responsive situations occur. So it is also a common reason for communication gap.

### 2.5.9. Company's confidential business policy

Every organization has some business secretes containing core competencies and organizations make them confidential. These business secretes are kept confidential and usually not communicated to the vendor organizations. Due to such kind of confidential business policies, the business processes are not supported properly and it becomes difficult to capture the actual business scenarios. As a result these business processes, to some extent lose their value and create ambiguities that lead to quality compromises. So, company's confidential business policy is also a potential reason for communication gap.

### 2.5.10. Offshoring the offshorers

Another new trend that increases communication gap significantly is offshoring the offshorers. One of leading outsourcing companies like Tata Consulting has also started offshoring their own work to other countries in order to take low cost labor advantage [18]. The table 1 represents summary of critical challenges of OSD.



OSD challenges	Literature
Distances	Erran Carmel, Pamela Abbott 2006, Steven Traser, Lougie Anderson, Ron Crocker 2004, James D. Herbsleb, Danial J. Paulish, Matthew Bass 2005
Cultural differences	Phong Thanh Nguyen, Muhammad Ali Babar, June M. Verner 2006, James D. Herbsleb, Daniel J. Paulish, Matthew Bass 2005, Vibeke Dalberg, Endre Angelvik, Asle Kristian Fossberg 2006, Haiyan Huang, Eilleen M. Trauth 2007
Linguistic problems	Hazel Taylor 2006, Matthew J. Hawthorne, Dewayne E. Perry 2005
Difference in time zones	Monica Adya, Dhruv Nath, Varadharajan Sridhar 2007
Holiday customs	Monica Adya, Dhruv Nath, Varadharajan Sridhar 2007
Company's confidential business policy	Haiyan Huang, Eilleen M. Trauth 2007
Offshoring the offshorers	Benjamin B.M. Shao and Julie Smith David 2007
Limited use of technology	Haiyan Huang, Eilleen M. Trauth 2007
Late response or non-response	Haiyan Huang, Eilleen M. Trauth 2007
Lake of direct communication	Haiyan Huang, Eilleen M. Trauth 2007,

Table 1: Challenges in OSD

The above discussion shows that OSD community is facing many problems like cultural differences, geographical distances, linguistic problems and time zone differences. To address these challenges, we need to improve the communication process between client and vendor. Our study is addressing this challenge of communication gap by utilizing appropriate communication modes for each activity of OSD. If both client and vendor use the appropriate communication modes in order to perform offshore development activities, then the

risk of miscommunication and need of re-communication can be reduced which ultimately results in better performance required for the project success.

### 3. COMMUNICATION IN OFFSHORE SOFTWARE DEVELOPMENT

Communication is very essential for exchanging day-to-day information between client and offshore vendor [10]. Communication and coordination between client and vendor has complex effects on OSD project performance. Better communication and coordination mechanisms in OSD reduce project uncertainties and improve performance of the project [1]. In OSD, usually a small team of developers located at client side handles the system integration, system testing, and installation [1, 3, 6]. There are many risks of producing infeasible, unrealistic, ambiguous, incomplete, wrong and incomplete requirements in offshore requirements analysis even with a best communication infrastructure [2]. In OSD, the negotiations caused by the time delays create needs for extra communication [25]. The experts say that in OSD scope creeps due to communication issues [4]

A software project which involves multiple OSD companies suffers extra cost for communication setups with each of them and this risk of extra cost is more than production cost savings through offshoring the project [2]. A potential difficulty is faced by the offshore developers is the development delay due to doubt in requirements specifications [3]. Miscommunication between client and vendor creates problems for the projects and results in project delays and overspendings [4]. According to an OSD professional “*don't rely on emails, communicate face-to-face as much as possible*” [6].

### 4. IMPACT OF COMMUNICATION GAP ON OSD

Today, software development is a global business. Software industry is earning billions of dollars per year. To maximize the income and profit, software research community is introducing new paradigms and surprising methods for software development. Adopting these innovations make it possible to save time and minimize development cost. Every new approach is developed for business community to enhance the value of business process. Software project off shoring is also such an innovation. In OSD, the communication gap between client and offshore vendor has serious impact on the success of OSD projects. The table 2 shows the impact of communication gap on success of OSD



**4.1. Cost overhead**

In software offshoring process, our prime business objective is to reduce cost. Literature evidence indicates that in software project offshoring, cost increased due to reduced level of communication. We often suffer increased cost due to the communication gap and it has serious impact on the business value of off shoring process. Therefore, it is better to concentrate solely on communication in OSD that strongly addresses the business concerns as well as the other aspects of business community. The communication cost is also a big risk in offshoring relationship. This risk of communication cost is more than production cost savings through offshoring. In offshoring, there is always an extra cost due to the communication gap between client and offshore vendor [17].

**4.2. Schedule delays**

Another business objective of project offshoring is to reduce development time but in OSD, there is a delay due to communication gap. In OSD, it is observed that quality and schedule consciousness among the offshore team is very low [3]. Software developers spend a lot of time in communication and coordination activities because communication is the glue that ties client and vendor [11].

By the above discussion, it is strongly justified that communication has a serious impact on business objectives of software project outsourcing, so there is a need to reduce the communication gap and to fulfill the communication needs of all the business stakeholders. Vendors believe that effective and frequent communication between client and offshore vendors at different levels of the organizational hierarchy is necessary for managing strong trust relationships [5].

**4.3. Trust between client and vendor**

In OSD, trust is an important success factor but due to communication gaps between client and offshore vendors, it is very difficult to establish trust relationship between them. Having a trust relationship with the customer is very important in order to understand the business requirements. Communication and contract conformance are most important factors in establishing and maintaining trust between client and vendor in offshore outsourcing because contract conformance is essential to protect clients trust [21]. Communication gap between client and vendor

seriously destroys the trust between client and vendor.

**4.4. Increased time to market**

In a competitive environment, time-to-market is an important success factor when task durations are very short [22]. Due to time-to-market pressure, delay cost per day is always intentionally high [22]. The communication gap between client and vendor increases time-to-market leading to project failure because sometimes entering first in the market is considered as the major success factor for a software development project. Time-to-market can be reduced by utilizing appropriate communication mode in OSD to reduce miscommunication and re-communication.

**4.5. Customer and user satisfaction**

In OSD, customer and business satisfaction is very important. Customer and business satisfaction is a major challenge for the offshore vendor. If proper communication pattern is not established between client and offshore vendor then customer requirements cannot be implemented properly which leads customer and business dissatisfaction. In OSD, proper communication can increase the satisfaction level of both customer/end user and vendor party.

Critical communication factor	Business Impact
Distances	Face-to-face meetings become difficult, communication cost increases, expensive technology is required for communication
Cultural difference	Interpretations changes, misunderstandings, poor client-vendor relationship, dissimilar conversational style, expectations cannot meet
Linguistic Problems	Direct communication becomes difficult, only formal methods can be used, misunderstandings, misconceptions, misinterpretations, translators required, cost increases
Difference in time zones	Direct communication becomes difficult, development speed reduces, schedule always slip due to delays
Holiday customs	Wastage of time, huge delays, late responses, schedule slippage



Company's business confidential policy	Incomplete information, ambiguous requirements, frequent changes, business process lose their value
Offshoring the offshorers	Communication gap increase largely, direct communication difficult
Limited use of technology	Development speed reduces, requirement are not fulfilled
Late response or non-response	Time delays, schedule slippage
Lake of direct communication	Misinterpretation of context, wrong implementation of requirements, vendor cannot fulfill their promises

Table 2: Impact analysis of communication factors in outsourcing

**5. CONCLUSION**

This discusses different perspectives, motivators, and challenges of OSD. There are three perspectives including OSD perspective, offshore in-sourcing perspective, and offshore outsourcing perspective. Some important motivators of offshore development include cost reduction, accessing specialized skills and decreased time-to-market, customer proximity, access to global expertise, achieve business goals faster, high quality results, benefit of focused employees, competitive advantage, no additional hiring required and sale software ship. Many challenges of OSD have also been discussed including distances, cultural differences, linguistic problems, and differences in time zone, holiday customs, and company's business confidential policy, offshoring the offshorers, limited use of technology, late response or non response, and lake of direct communication. It is concluded from the study that all the challenges of OSD negatively affect the communication between client and offshore vendor.

**6. FUTURE WORK**

In this study we have highlighted some critical challenges of OSD and found that communication between client and offshore vendor is very critical. This challenge needs to be addressed in order to achieve real essence of offshore software development. Communication gaps between client and vendor can be minimized by investigating the communication needs of different offshore software development activities.

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