

Global Software Development Issues and Problems What it means to Pakistani Software Industry

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ABSTRACT

Global Software Development (GSD) is a relationship in which a client company outsources its software project to another vendor which in turn develops software and takes remuneration from its client. The revenue from this industry is estimated around 500 Billion US \$ annually. GSD is a multi-billion industry and there are countries whose economy is based on GSD. Reasons for popularity of GSD are cheap labor which in turn reduces cost of software development. However, there are many software products which fell in trouble due to different issues related to GSD. Some products even got failed due to GSD. Such problems include lack of trust, communication issues, coordination issues and cultural differences. Pakistan being one of the emerging country in GSD also face these problems. The nature of the problem is more severe for Pakistan as it is relatively new in the field and if the issue persists, the damage to the software industry would be very hard. This paper is an attempt to identify various problems associated with GSD with special focus on Pakistani software industry.

KEYWORDS: GSD, Pakistan, Communication, Software Development

1. INTRODUCTION

Global Software Development (GSD) has been a term given by researchers to the software development in which a company known as Client Company outsource its product or some part of its product to another company known as Vendor Company. The motivation behind GSD was reduced cost due to cheap labor. One such example is India where a lot of offshore companies are operating which are catering the needs of various US and European firms.

Software Project Management is an important domain which deal with the overall management of a software product. It is an important tool which glues together various aspects of software product development. GSD has opened many new challenges for Software Project Managers which now include coordination among various stake holders in which at least one party is at a remote location, managing trust issues and planning issues specially focusing in various time zones etc.[1]. GSD is described as a multilingual, multicultural and multisite approach for software development [14]. There are various types of outsourcing such as domestic outsourcing in which both the companies are in same country but different locations, near source outsourcing in which teams are in neighboring countries and off shore outsourcing in which teams can be in different regions and continents etc. [2]. The authors in [15] discussed the challenges faced by the developers in a cloud computing environment. While accepting the importance of GSD the authors in [18] discuss in detail, the architectural requirements of GSD. Although there are many benefits of GSD for example reduced cost and increased availability of skilled workforce but on the other hand it provides new challenges as well which are reported in detail in [19, 20]. An in depth study of important factors which lead to success of GSD is provided in [21].

The advocates of GSD provide various reasoning for adopting this strategy such as cheap labor cost, round the clock development especially in case of off shore GSD and quick development time to name a few. However, this leads to many problems as well such as the cultural difference among teams, no face to face communication, arranging online meeting with each other due to different time zones, language barriers and no possibility of visit to customer site by at least one part of the team. Various Researchers are now focusing on problems related to GSD and its impact on overall product development. This paper is an attempt to discuss these issues with focus on Pakistani software industry. Two software houses, working for development of off shore software products, located at different parts of the country were visited. Interviews and questionnaires were carried out from the staff and the results are given in the paper.

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Rest of the paper is organized as follows, section 2 discusses the related work carried out by the researchers worldwide on this subject, section 3 describes the methodology carried out for this research, section 4 provide results of the study and section 5 concludes the discussion.

2. RELATED WORK

Software development is a complex task which has many phases and it involves a certain level of expertise to accomplish these tasks [3]. [4] Discusses various problems associated with GSD and identified Coordination and Communication control as major problems. [5] identified that developing software at various locations of the world is a difficult one and raise many problems because teams at different locations would not be having same set of expertise nor they have common understanding of the problems etc. [6] identified communication problems among the developers and testing teams which lead to major problems. Cultural issues were also highlighted by many researchers such as [3].

Another issue highlighted by [7] was sharing of information. They believed that for reaping the benefits of GSD it is necessary that one must have a proper standardize framework for information sharing and documentation. However, due to various people involved in GSD effective mechanism for the same is still lacking. Risk management is yet another issue related to GSD. While working as teams a proper synchronization mechanism must be adopted so that important milestones etc. are known to everyone. Nature of GSD makes this synchronization very difficult [8]. Korkala [9] advocated the use of agile model for development in GSD but the problem with this approach is that it requires frequent meetings with customers which may not be possible in GSD. Casey [10] emphasized that the idea behind GSD and issues related to it should be incorporated in to curricula so that students can be familiarized with it and can be better equipped while dealing with it. Keeping in view issues related to GSD various frameworks have been proposed. Such framework is identified in [11]. A comprehensive study about issues related to GSD is in [12]. The important issues described in [12] are cost, unemployment rate, skill set of labor, working environment, cultural issues and language problems.

There are other problems associated with GSD which are of as important nature as the already mentioned ones such as in GSD the concept of team is lost. Further, cultural differences and language problems also aggravate the problems. Some technical problems such as different telecommunication infrastructures, management practices and development methodologies lead to other problems in GSD [13]. Legal practices and ethical issues at different countries also create problems in GSD. The focus of [17] are the issues faced by the GSD practitioners in Mauritius and South Africa. A two phase approach is used in [22] to investigate the challenges related to project management in GSD environment. A detailed survey of challenges involved in GSD is provided in [23].

3. METHODOLOGY

This is an exploratory research where we have focused on two software development companies located at Islamabad and Peshawar. One company working at Islamabad has 35 employees and are working on various projects which include projects for federal and provincial governments, online projects obtained from certain websites and projects of foreign clients. The other company based in Peshawar was an off shore company working for a US based firm. It has 25 employees and specializes in website development and iphone software development. Apart from interview from Managers of both the firms a questionnaire consisting of 10 questions were also distributed among the programmers of both software houses. The questions asked and their answers are summarized in Table 1.

4. DISCUSSION ON FINDINGS

Based on our interaction with the Mangers, Developers, Testing teams and other members of the software houses following major problems identified in GSD in Pakistan.

- **Communication Gap:-** This is the primary problem which they face as the understanding related to different issues are at different level and sometimes which seem so obvious to one team is not understandable to the others. The issue can be overcome with the help of an experience and skillful Manager.
- **Language Barrier:-** English is not the primary language in Pakistan. Most of the developers are not very proficient in English and thus understanding each other viewpoint becomes more difficult. The problem is more aggravated when the client organization is from country where primary language is other than English. An interpreter which should have solid computer background can help in tackling this problem.

- **Lack of face to face meeting with the clients:-** For effective software development face to face meeting with the users is necessary, however, GSD create another layer between the actual user of the software and the actual developer. This problem can be solved if the client organization agrees to give access to the client to the representative of the vendor organization.
- **Difference in Time Zone:-**Because companies working are located in different time zones it becomes very difficult to arrange meeting between all the stockholders.
- **Different Style of Management:-**Another major issue is different type of management between the vendor organization and client organization. This problem persist even if the same organization have offices at different part of the world. Effective management techniques can solve this problem.
- **Legal Issues:-**Legal issues are another problem since most of the vendor organization at Pakistan do not have licensed software etc. due to poor copyright laws at Pakistan. Vendor organizations especially at US and European countries are very sensitive about it. Adoption of open source technology, wherever applicable, is a solution to this problem.
- **Timeline of the Project:-**In case of off shore development the delivering a project according to the timeline becomes very difficult because of political and social situation in a country. One such example of missing one deliverable in a project which got little delayed due to General Election in Pakistan in 2013. This problem can be solved if one have a flexible timeline for a given project.
- **Lack of Technical Skills:-**This is yet another problem where a client organization is of the view that a given task can be accomplished easily if a particular technology is implied but the vendor organization does not have a skilled person for that technology. The solution for this problem is to specify required technologies in start of the project.
- **Infrastructure:-**Pakistan is a developing country where IT infrastructure is not fully developed. In most of the cases vendor organization want a certain Quality of Service or feedback which may not be possible for client organization due to poor infrastructure.
- **Cultural Issues:-**Although most of the problems already being mentioned fall in cultural issues but there are other problems which come due to cultural issues. One such problem is schedule of holidays. For example in Pakistan we celebrate Eid and Moharram holidays etc. this is definitely unacceptable to client organization due to tight project schedule. On the other hand most of the client organization observe Christmas holidays when there are proper working hours at Pakistan. Flexible timeline is a solution to this problem.
- **Quality Issues:-**Quality is yet another problem which arises because of different QA techniques employed at client and vendor organizations. Adoption of Sound QA practices can solve this problem.
- **Lack of proper written procedures between client organization and vendor organization:-** Sometimes problems arise between both parties on small issues because a clear cut written policy and procedure is not available. This can be easily solved if a proper written policy is available between the organizations.

5. RESULTS AND DISCUSSION

In order to fully understand the problems related to GSD the Researchers asked the members of software houses about the issues they faced. Their answers were arranged according to different phases of Software Development Life Cycle. These results are depicted in following figures:-

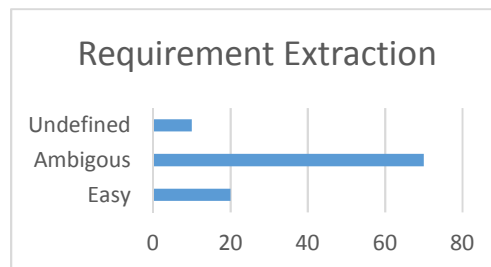


Figure 1: Problems associated with Requirement Extraction

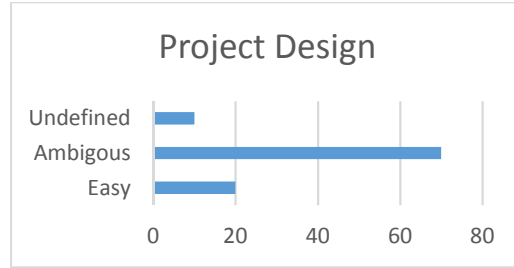


Figure 2: Problems associated during Designing

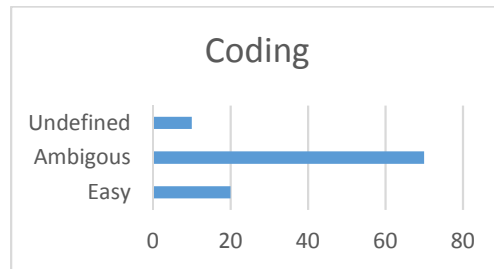


Figure 3: Problems related to Programming according to Design

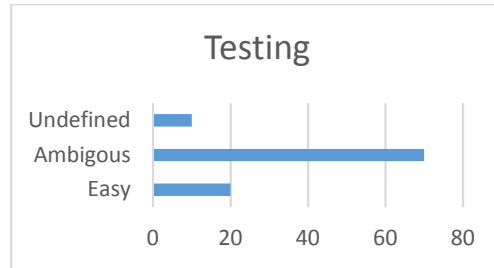


Figure 4: Problems during Testing phase

From the above figures one can easily see the problems in various stages of SDLC. Most of the issues are ambiguous in nature due to lack of direct relationship between client organization and ultimate user of the software product. An interesting finding of this study is that the problems are not only limited to requirements extraction phase goes deep in to coding and testing phase as well. These problems can be solved only by incorporating sound software engineering practices.

The study shows that it is very difficult for a new company to enter in the GSD domain as most of the clients require a well-established profile of the company before engaging their services. Use of pirated/unlicensed technologies for GSD is another area of concern for Pakistani software industry as the intellectual property rights laws at European and US clients are very sensitive about this problem. Although the problem can be solved by use of licensed software but that in turn increase the cost which the companies fear will be a hindrance in getting contract from the clients. Finally, the quality of software in terms of line of codes, validations and error handling etc. are the key challenges faced by the Pakistani software houses. However, with more exposure to the global software industry the same will be minimized.

6. CONCLUSION

GSD is a useful technique with which software development companies are earning good profits due to its benefits such as reduced labor cost, faster development etc. However, there are inherent problems in this technique as well. In order to fully utilize the benefits of GSD one must have to address issues related to it. This will not only enhance the profitability of the organizations but will also create better working environment in client and vendor organizations.

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Question 1	How you select the projects and what phenomena you follow during selection?	Projects are chosen on the basis of developer's skills, abilities, time periods, price offering from customer, time periods.
Question 2	How you extract project requirements from the customers?	Software requirement gathering is the done on the behalf of both the parties. Both of the parties are must illegible enough to understand one another point of view. This is one of the most difficult problem which is faced by client organizations.
Question 3	Are the customer requirements ambiguous or not?	The simple answer is "Yes". Most of the times even the vendor organization is not sure about it.
Question 4	How you interact with customers and is this task easy?	This is a very difficult task as most the time vendor organizations are very hesitant to this issue. Even if the customers are available it is very difficult to interact with them due to cultural issues etc.
Question 5	How you cover the designing aspects of Software development process?	Designer defines the architecture of the product, structure of project. But this process is also done by mutual understanding of both designer and developer. Because sometimes designer design the product in such a way that it become very difficult for the developers to implement the functionality of features.
Question 6	Different techniques or concepts of software engineering and HCI taught at universities can be implemented in the software industry?	Yes the topics discussed in the classrooms are equally relevant in practice.
Question 7	Do the projects are completed in time?	Normally, following 100% timeline is difficult but all the efforts are made to meet the timeline.
Question 8	How the contracts with the organizations is made and how negotiations are made?	At the beginning of project, we settle all agreements with the customers. We give user the samples of design or the organization show their rough design, on this step negotiation occurs between the parties.
Question 9	How big is the software industry in Pakistan?	Pakistan has a very limited software industry. There are two levels of software houses, large scale and medium or small scale. Large scale software houses may have employees between 300 to 400 and small software houses employees comprise of 25-45.
Question 10	What sorts of applications are being developed in Pakistani Software houses?	Most of the work is now a day is done on mobile applications and websites.

Table 1 Questionnaire and answer in Summary